

Energy & Sustainability Statement

Fives Court, Mere

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BOX TWENTY

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1. Executive Summary

The purpose of this report is to support the planning application for the proposed development of Fives Court, situated within Mere by detailing the proposed energy strategy for the site to demonstrate compliance with Wiltshire Core Strategy.

The proposal seeks to extend and refurbish former Fives Court to provide sheltered living facility. The proposed development will comprise of two storeys ground and first floor. The development will include 1- and 2-bedroom apartments, as well as communal lounges and activity rooms.

This Energy Assessment has closely followed 'fabric first' approach and Wiltshire Core Strategy. A baseline for comparison has been developed based on Part L 2021 compliant development. The policy requirements have been addressed by the following design principles:

- A fabric-first design approach for the reduction of energy demand;
- Highly insulated and airtight construction;
- Use of whole-dwelling Mechanical Ventilation with Heat Recovery (MVHR);
- Energy Efficient LED Lighting;
- Domestic hot water preparation via a low carbon air source heat pump;
- Roof-mounted PV panels

Low carbon technologies were then incorporated in the form of heat pumps for domestic hot water preparation and roof mounted photovoltaic panels, as the most appropriate low carbon technologies and details of this will be incorporated. After applying these measures, the carbon reduction for the domestic side is 96%, from baseline based on Part L 2021. The site-wide cumulative carbon reduction from Part L baseline is calculated to be 93%.

This report will also convey the results from the thermal comfort assessment to review the level of overheating in 6no. sample flats against Building Regulations Approved Document O Requirements.

The overheating analysis summarised in this report has been performed using IES-VE software which provides full dynamic thermal analysis and is CIBSE AM11 accredited.

2. Introduction

The proposed site is located at Angel Lane, Mere, BA12 6DH. It is within the borough of Wiltshire.

2.1 The Development

The development proposes the extension and refurbishment of the former Fives Court sheltered living facility in Mere, Wiltshire to provide a housing scheme for 20 independent living apartments and associated facilities, to provide 1 and 2 bed apartments. The development comprises of two storeys ground and first floor. It is proposed that the ground floor existing external walls will be retained, and the rest of the site will be a new construction. The site is predominately surrounded by residential properties.

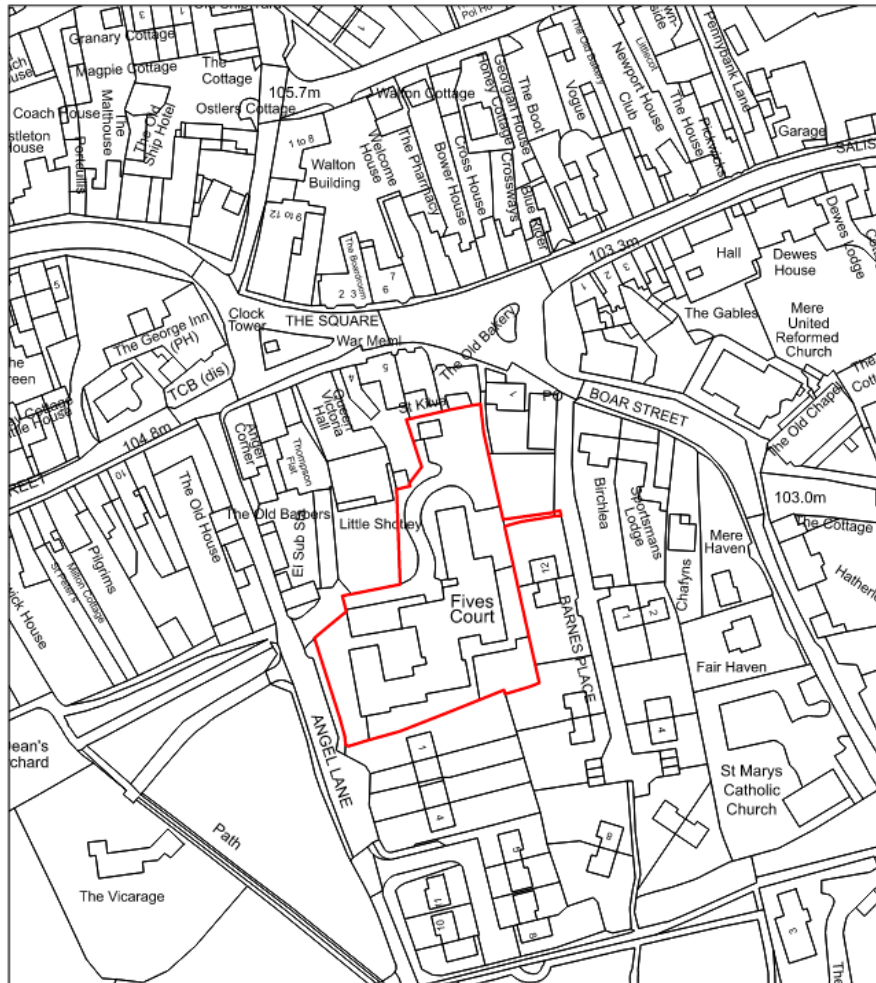


Figure 1: Current Site Location

3. Regulation, Policy, and Performance Targets

3.1 National Policy

The National Planning Policy Framework sets out the government's planning policies for England. It provides guidance for local planning authorities and decision-makers, both in drawing up plans and making decisions about planning applications.

Chapter 14 is the relevant policy and relates to Meeting the Challenge of Climate Change, Flooding and Coastal change. The policy makes it a requirement for the built environment to reduce CO₂ emissions and energy demand, and to also promote renewable energy.

3.2 Building Regulations

Building Regulations Part L defines the minimum energy efficiency standards required for buildings. This regulation controls the insulation values of thermal elements, areas of glazing, doors and other openings in the façade, as well the efficiency and controls of building services equipment such as heating, hot water, lighting, and ancillary items including fans and pumps.

New build domestic and non-domestic projects are required to comply with Approved Documents Part L 2021 Volume 1 and Volume 2 respectively. These documents set limits on design flexibility with minimum standards for both fabric and equipment. It is also required, that a calculation of the Dwelling Emissions Rate (DER) for domestic, and a Building Emissions Rate (BER) for non-domestic is produced in accordance with the National Calculation Methodology (NCM). It must be demonstrated that the DER and BER are lower than the Target Emissions Rate (TER) for the development to comply with criterion 1 of Part L Volume 1/2. A similar calculation must be done for the Primary Energy Rate, which needs to be lower than the NCM Target Primary Energy Rate (TPER). This National Calculation Methodology is used by the Government to assess and compare the carbon dioxide reduction performance of new buildings. Its purpose is to provide reliable assessments of carbon dioxide reduction performance that are needed to underpin energy and environmental policy initiatives.

The National Calculation Methodology for dwellings in the UK is called Standard Assessment Procedure (SAP), with the latest version being SAP 10.2.

For the purposes of the Building Regulations and Energy Strategy calculations, the residential units are considered domestic and have been assessed under Part L Volume 1. The communal areas within the development have been assessed under Part L Volume 2.

3.3 Local Policies

In accordance with the Wiltshire Core Strategy Core Policy 41.

Core Policy 41: Sustainable construction and low-carbon energy

Climate change adaptation

New development, building conversions, refurbishments and extensions will be encouraged to incorporate design measures to reduce energy demand.

Development will be well insulated and designed to take advantage of natural light and heat from the sun and use natural air movement for ventilation, whilst maximising cooling in the summer.

Sustainable construction

New homes (excluding extensions and conversions) will be required to achieve at least Level 4 (in full) of the Code for Sustainable Homes.

All non-residential development will be required to achieve the relevant BREEAM "Very Good" standards, rising to the relevant BREEAM "Excellent" standards from 2019.

Existing buildings

Retrofitting measures to improve the energy performance of existing buildings will be encouraged in accordance with the following hierarchy:

- i. Reduce energy consumption through energy efficiency measures*
- ii. Use renewable or low-carbon energy from a local/district source*
- iii. Use building-integrated renewable or low-carbon technologies.*

Opportunities should be sought to facilitate carbon reduction through retrofitting at whole street or neighbourhood scales to reduce individual costs, improve viability and support coordinated programmes for improvement.

Renewable and low-carbon energy

All proposals for major development will be required to submit a Sustainable Energy Strategy alongside the planning application outlining the low-carbon strategy for the proposal.

In all cases, including those listed above, proposals relating to historic buildings, listed buildings and buildings within conservation areas and world heritage sites should ensure that appropriate sensitive approaches and materials are used.

Safeguarding of the significance of heritage assets should be in accordance with appropriate national policy and established best practice.

In all cases the impact of these requirements on the viability of development will be taken into consideration.

With regards to Core Policy 41, it must be noted that Code for Sustainable homes have been withdrawn and is now incorporated within Part L 2021.

4. Energy Hierarchy

This section is intended to detail the fabric and energy efficiency measures that are proposed as part of the energy hierarchy.

4.1 Fabric-first

A 'Fabric First' approach is always recommended for new developments, encouraging energy efficiency to be achieved through improved insulation and air-tightness specification, before looking to offset any residual emissions with renewables and low carbon sources. This is also the preferred strategy according to the Wiltshire Local Policy.

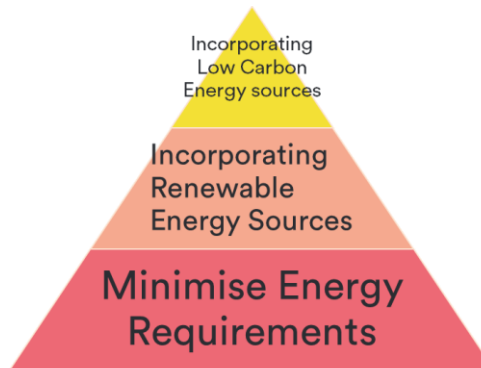


Figure 2: The Energy Hierarchy, prioritising energy efficiency measures

The fabric-first approach has been followed in the design of the Fives Court development, with insulation and air-tightness levels significantly improving on the Approved Document L limiting standards. Additional energy saving measures have been applied on top, having low energy LED lighting. The proposed energy strategy includes all the following efficiency measures to mitigate the energy demand:

- A fabric-first design approach for the reduction of energy demand;
- Highly insulated and airtight construction;
- Energy efficient, double glazed windows;
- Energy Efficient LED Lighting.

5. Methodology & Sample Selection

5.1 Residential Studio Samples

To identify the baseline for the residential building a range of typical apartments with different orientations, shapes and sizes were selected across all floors to present a representative model of the entirety of the building. 6no. samples were analysed for SAP. These results were then extrapolated across all the remaining apartments in the building based on their floor areas, occupancies, and orientations alongside various other factors.



Figure 3: Ground Floor Sample Bedrooms

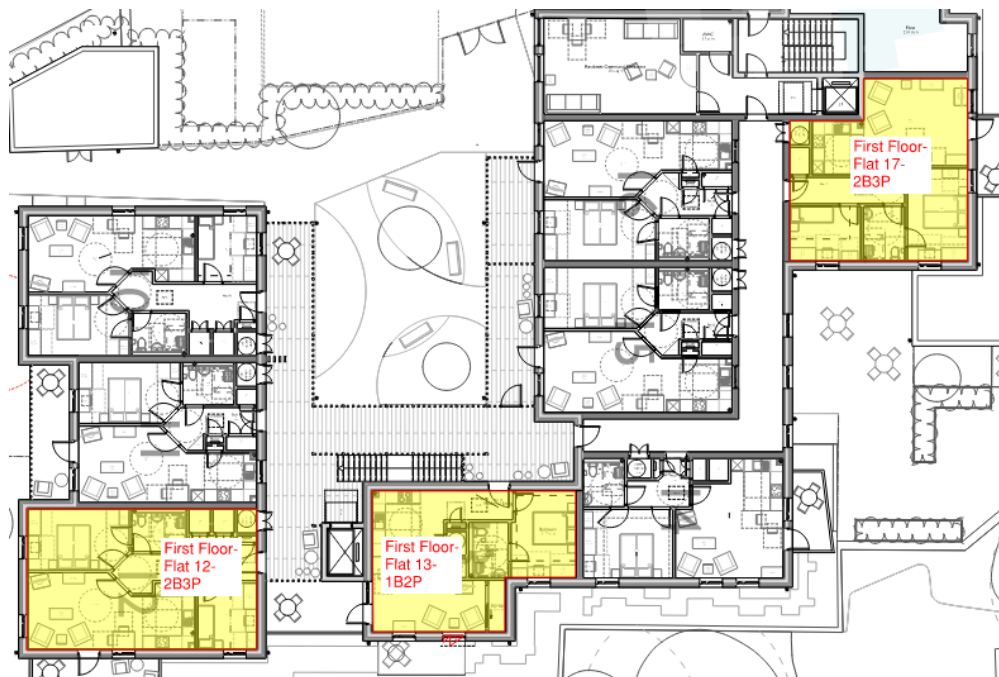


Figure 4: First Floor Sample Bedrooms

5.2 Communal Building Area

A full IESVE dynamic model has been set up to assess the communal areas on ground and first floor to calculate total carbon emissions associated. The model has been used to determine the non-domestic baseline Part L compliant building.

6. Residential Areas Part L Assessment

6.1 Refurbished Flats SAP Modelling Inputs

The proposed design specification for the flat samples is detailed in the tables below.

Flat numbers 2, 3 & 6 located on the ground floor are refurbished, hence having different fabric specifications than first floor flats which are new build.

Table 1 below, demonstrates baseline U Values which are the current building fabric inputs, Part L limiting values for existing buildings (Part L Volume 1).

Table 1: Ground Floor Fabric inputs

Building elements	Part L Limiting Values for Existing Buildings	Design Fabric Target
External Wall U-value (W/m ² K)	0.30	0.22
Ground/ Exposed Floor U-value (W/m ² K)	0.25	0.15
Roof U-value (W/m ² .K)	n/a	n/a
Window & Glazed Doors U-value (W/m ² .K)	1.40 (whole pane incl. frame, not centre pane value)	1.20 (whole pane incl. frame, not centre pane value)
Solid Door U-value (W/m ² .K)	1.40	1.20
Window - Thermal G Value	N/A	0.5
Air Permeability Target	8.0 m ³ /(h.m ²) @ 50 Pa	5.0 m ³ /(h.m ²) @ 50 Pa
Thermal Bridging Target	N/A	Thermal Bridging Y-value target ≤ 0.10 W/m ² K

Table 2: Ground Floor M&E Inputs

Building elements	Input in SAP
Space Heating system	The proposed heating strategy is for the dwelling to be heated via Electric Panel Heaters Efficiency = 100% Programmer and Appliance Thermostats
Ventilation Strategy	Mechanical Ventilation Heat Recovery (MVHR)
MVHR Unit	Vectair EVO250DC or equivalent/better energy performing unit
MVHR Specific Fan Power	0.75 W/l/s
MVHR Heat Recovery Efficiency	87%
Lighting	LED luminaires with efficacy ≥ 90 lm/W
Water Heating	Electric Heat Pump
Heat Pump make & model	Dimplex- EDL270UK-630
Cold Water Source	From Mains
Hot Water Cylinder Volume	269 litres
Hot Water cylinder loss	1.77 kWh/day
Pipework	All pipework insulated to within 1m of fitting
Shower Flow Rate	11 litres/min (Shower with water saving flow restrictor)

6.2 New build Flats SAP Modelling Inputs

Flat numbers 12, 13 & 17 located on first floor are new build.

Table 2 below, demonstrates the proposed fabric inputs and Part L limiting values for new build dwellings (Part L Volume 1). This is summarised in Table 3 below.

Table 3: First Floor Fabric inputs

Building elements	Part L Limiting Value for New Build	First Floor Design Target
External Wall U-value (W/m ² K)	0.26	0.15
Ground/ Exposed Floor U- value (W/m ² K)	0.18	0.12
Roof U-value (W/m ² .K)	0.16	0.10
Window & Glazed Doors U-value (W/m ² .K)	1.60	1.20 (whole pane incl. frame, not centre pane value)
Solid Door inc. Glazed Door U-value (W/m ² .K)	1.60	1.20
Window - Thermal G Value	N/A	0.5
Air Permeability Target	8.0 m ³ /(h.m ²) @ 50 Pa	5.0 m ³ /(h.m ²) @ 50 Pa
Thermal Bridging Target	N/A	Thermal Bridging Y-Value Target ≤ 0.05 W/m ² K

Table 4: Energy efficiency measures and servicing performance

Building elements	Input in SAP
Space Heating system	The proposed heating strategy is for the dwelling to be heated via Electric Panel Heaters Efficiency = 100% Programmer and Appliance Thermostats
Ventilation Strategy	Mechanical Ventilation Heat Recovery (MVHR)
MVHR Unit	Vectair EVO250DC or equivalent/better energy performing unit
MVHR Specific Fan Power	0.75 W/l/s
MVHR Heat Recovery Efficiency	87%
Lighting	LED luminaires with efficacy ≥ 90 lm/W
Water Heating	Electric Heat Pump
Heat pump make & model	Dimplex- EDL270UK-630
Cold Water Source	From Mains
Hot Water Cylinder Volume	269 litres
Hot Water Cylinder loss	1.77 kWh/day
Pipework	All pipework insulated to within 1m of fitting
Shower Flow Rate	11 litres/min (Shower with water saving flow restrictor)

7. Communal Areas Part L Assessment

7.1 Energy Hierarchy

New build developments need to establish a Part L compliant building which is then used as the baseline for comparison. This baseline is the NCM notional building for compliance with the Part L 2021 requirements.

Energy and carbon reduction from the baseline is demonstrated by following the “fabric-first” energy hierarchy. The energy hierarchy has the following priorities:

1. Use less energy: Optimise the building fabric and glazing to minimise energy consumption in the first instance by using low U-values and good air tightness and ensure that active systems run as energy efficiently as possible.
2. Supply energy efficiently, using low carbon energy sources or decentralised energy.
3. Use renewable energy: When the above design elements have been reasonably exhausted, supply energy through renewable sources where practical.



Figure 5: The “fabric-first” energy hierarchy

The proposed development Fives Court Mere has closely followed the energy hierarchy. The energy demand is first reduced by passive and energy efficiency measures. The remaining energy demand is served by installing roof photovoltaic panels, sized to achieve an EPC rating A.

7.2 Setting the Correct Baseline for Comparison

A Dynamic Simulation Model (DSM) has been prepared using the 2024 version of the IES-VE thermal modelling software. The model has been used to determine the Part L notional building, which will establish the baseline energy and carbon emissions, upon which the proposed energy efficiency measures must show a performance improvement.

The preparation of the energy model has been based on the following drawings from the architectural planning drawing package received on 29/07/2025:

- 2116-SK081- Ground Floor Plan WIP
- WCMRFC-O50-00-01-DR-A-0005-P06 First Floor Plan

It was also based on the following drawings from the architectural planning drawing package received on 17/07/2025:

- WCMRFC-O50-00-XX-DR-A-0201-P01 North Elevation
- WCMRFC-O50-00-XX-DR-A-0202-P02 East Elevation
- WCMRFC-O50-00-XX-DR-A-0203-P02 South Elevation

- WCMRFC-O50-00-XX-DR-A-0204-P01 West Elevation
- WCMRFC-O50-ZZ-ZZ-DR-A-0301-P01 Site Section A-A
- WCMRFC-O50-ZZ-ZZ-DR-A-0302-P01 Site Section B-B

The weather file used in the modelling is the Southampton TRY weather file. Southampton is the closest location to the site with an NCM approved set of weather data for Part L calculations.

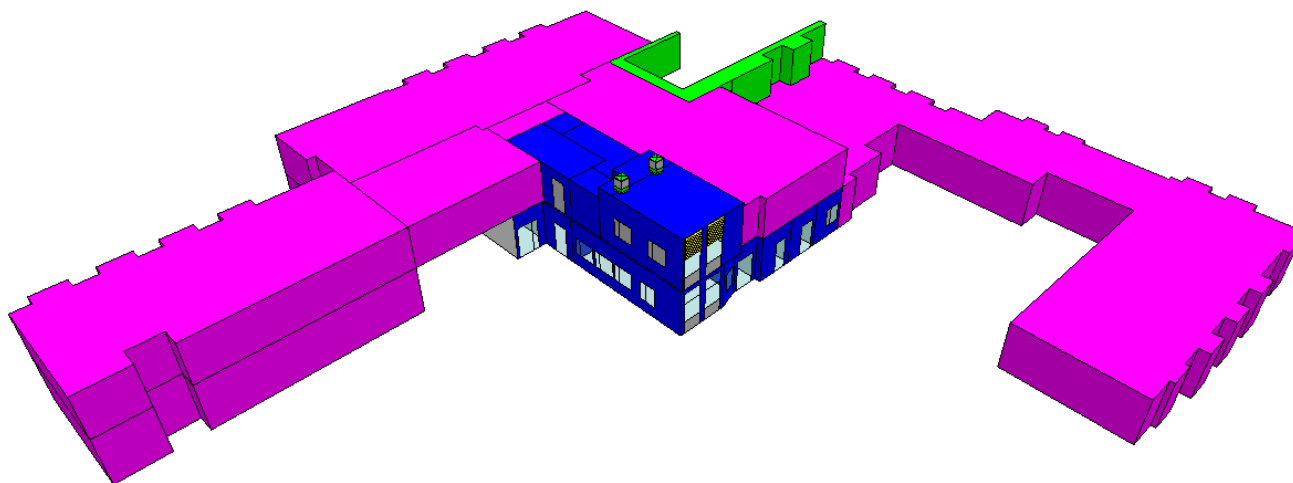


Figure 6: Part L Communal Areas IES Model

7.3 Methodology

The development must comply with Building Regulations Part L, Volume 2 as a minimum.

The proposed energy efficiency measures include the following:

- A highly insulated and airtight fabric, significantly improving upon the Part L limiting targets.
- Glazing g-value of 0.5.
- Mechanical ventilation with high efficiency heat recovery.
- Energy efficient fans.
- Energy efficient LED lighting with presence detection and daylight dimming in Quiet Room, Activity Area, Communal Area, Entrance on ground floor and Communal Residents Mezzanine Lounge on first floor.
- Renewables, in the form of roof-mounted PV panels. PV panels are not expected to have an adverse impact on the local environment.

The proposed fabric and M&E servicing performance targets for the communal areas are detailed in Tables 5 and 6 below.

Table 5: Ground Floor Fabric Inputs

Fabric Element	Part L Limiting Value	Design Target	Improvement over Part L limiting value
External wall U-Value (W/m ² K)	0.26	0.22	15.4%
Roof U-Value (W/m ² K)	0.18	N/A	N/A
Ground Floor U-Value (W/m ² K)	0.18	0.15	0%

Windows, Rooflights & Glazed Door U-Value (W/m²K)	N/A	1.20	-
Door U-Value (W/m²K)	N/A	1.20	-
Glazing g-value	N/A	g=0.5	-
Air Permeability Target	8.0 m³/(h.m²) @ 50 Pa	5.0 m³/(h.m²) @ 50 Pa	37.5%

Table 6: First Floor Fabric Inputs

Fabric Element	Part L Limiting Value	Design Target	Improvement over Part L limiting value
External wall U-Value (W/m²K)	0.26	0.15	42.3%
Roof U-Value (W/m²K)	0.18	0.10	44.4%
Ground Floor U-Value (W/m²K)	0.18	0.12	33.3%
Windows, Rooflights & Glazed Door U-Value (W/m²K)	N/A	1.20	-
Door U-Value (W/m²K)	N/A	1.20	-
Glazing g-value	N/A	g=0.5	-
Air Permeability Target	8.0 m³/(h.m²) @ 50 Pa	5.0 m³/(h.m²) @ 50 Pa	37.5%

The proposed fabric and M&E servicing performance targets for the communal areas are detailed in Table 7 below.

Table 7: HVAC Modelling Inputs

HVAC Servicing Strategy	Electrical Underfloor Heating in AWC, First Floor Residents Communal Mezzanine, Drying Room, Quiet Room, Stair Cores & First Floor Circulation	
	Electric Panel heaters in Activity Area, Kitchenette, Ground Floor Communal Area, Ground Floor Circulation Area & Entrance	
	Heating for Frost Protection in Plant Room, Cleaning Cupboard, Store & Comms Unit	
	Mechanical ventilation with Heat Recovery (MVHR) in Kitchenette, AWC, Circulation Spaces, Drying Room, Quiet Room & Cleaning Cupboard	
	Mechanical Ventilation with Heat Recovery with DCV in Activity Area, Ground Floor Communal Area & First Floor Residents Communal Mezzanine	
	Local Extract in Comms Unit	
	Natural Ventilation in Entrance, Stairs, Plant Room & Store	
	Electric Panel Heater Efficiency: 100%	
	MVHR Heat Recovery Efficiency: 80%	
	MVHR Specific Fan Power: 1.5 W/l/s	
	Extract Flow Rate: 3ACH	
	Exhaust Specific Fan Power: 0.30W(l/s)	
DHW System	Via point of use electric water heaters	
	100 litre total storage volume	
	A total standing loss of 0.281 kWh/l.day	
Lighting Luminaire Efficacy	100 Lm/W average efficacy across all areas	
Lighting Controls	Circulation, Stairs, Cleaning Cupboard, Store, AWC Circulation Area, AWC, Drying Room, Lifts & Kitchenette	Presence Detection
	Entrance, Activity Area, Ground Floor Communal Area, First Floor Residents Communal Mezzanine & Quiet Room	Presence Detection with Daylight Dimming Sensor
	Comms Unit & Plant Room	Manual On Off

Lighting Lux Levels	Circulation Spaces, Stairs, Store, Cleaners Cupboard	100 lux
	Entrance, Plant Rooms, Comms Room, AWC	200 lux
	Activity Area, Communal Area, First Floor Residents Communal Mezzanine. Drying Room & Quiet Room	300 lux
	Kitchenette	500 lux
M&E Systems Management and Controls	Electric Power Factor Correction	>0.95
	HVAC Systems Have Provision for Metering?	Yes
	Lighting Systems metering warns of 'out of range' values?	No

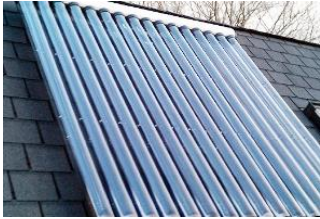
8. Renewables

8.1 Low and Zero Carbon Technology Feasibility

To develop an appropriate site wide energy strategy, it is important to assess the viability the possible Low or Zero Carbon technologies (LZC) that could be implemented as part of this development. The table below shows the LZC technologies considered.

Table 8: LZC Technologies

Technology	Image	Description	Recommendation
Ground Source Heating / Cooling		Ground source heating and/or cooling makes use of the thermal storage and ground temperature to provide heating and/or cooling to a building. Heating via low grade heating system such as underfloor heating.	Ground source heat pumps are not considered to be a viable technology for this development due to the limitations of available land area for such a system.
Air source heat pumps (heating)		An air source heat pump extracts heat from the outside air and uses it to provide space heating using either fan coil units, underfloor heating or similar. In addition, some systems can contribute to the domestic hot water requirements. Air source heat pumps are either air to water or air to air.	Since the development is made up of multiple individual dwellings and the intention is for individual billing this would have led to many individual units spread out around the site. This would have impact both noise assessments and visual aesthetics of the building therefore this was removed as a possible source of space heating.
Air source heat pumps (domestic hot water)		An air source heat pump extracts heat from the outside air and uses it to provide space heating using either fan coil units, underfloor heating or similar. In addition, some systems can contribute to the domestic hot water requirements. Air source heat pumps are either air to water or air to air.	Since the development is made up of multiple individual flats, small air source heat pump units can be placed internally within the building footprint to serve domestic hot water, this technology was therefore considered viable.

Technology	Image	Description	Recommendation
Solar thermal hot water (for hot water heating)		Solar thermal hot water (STHW) generation involves capturing solar radiant heat to preheat or heat domestic hot water. Correctly located and orientated, solar thermal systems can meet a proportion of a building's domestic hot water dependent on the expected demand profile and available space for locating STHW panels.	Solar hot water panels would require a central domestic hot water system with a large recirculating hot water loop and associated heat losses leading to inefficiency and potential overheating issues. Roof area is proposed to incorporate photo-voltaic panels instead.
Biomass heating		Biomass heating systems burn biomass material within a boiler to heat water in a similar way to a conventional gas-fired boiler. Biomass materials include all land and water-based vegetation, such as wood chips and wood pellets for example. Since the boiler uses a natural resource that can be replanted, it is considered as a renewable energy source. Solid biomass relies on a reliable fuel supply which must be delivered and stored on site. The site therefore requires good access routes and space for fuel storage and plant.	Biomass has not been identified as appropriate due to the adverse air quality impact it would have on surrounding area, as well as the physical constraints associated with fuel delivery and storage.
Wind power		Harnessing the kinetic energy of wind can provide a renewable source of on-site electricity generation. Wind turbines need to be positioned where a frequent and steady source of wind is available that is not too turbulent or uneven in direction. Typically, wind turbines are positioned on the roof of buildings that are significantly higher than their surroundings and/or located in open areas where there is minimum disruption to prevailing winds.	This technology has not been considered appropriate due to poor anticipated wind conditions in the urban environment.

Technology	Image	Description	Recommendation
Photovoltaics		The feasibility of providing roof mounted photovoltaic (PV) panels has been assessed based upon estimated energy production (kWh) from the installed location along with manufacturers cost data to enable a lifecycle cost analysis to be undertaken. Panels correctly oriented, maintained and not obscured by shading expected to provide in the region of 950kWh/m ² year in London.	A roof-mounted PV system is a viable on-site renewable energy technology for this development. The proposed servicing strategy for the dwelling is all-electric, maximising the potential of a PV system.
Biodiesel boiler / CHP		Bio diesel fuel is usually blended with a vegetable oil and can be used in standard diesel engines. The blend ratios depend upon many factors including the type of engine, typically this will be up to 80% standard diesel and 20% biodiesel.	It is not recommended that biodiesel is used within the development due to the uncertainty in sourcing the fuel.

Based on early-stage feasibility study, the following LZC technologies have been brought forward for the Fives Court development, satisfying Core Policy 41 requirement to use low carbon heating technologies:

- Dedicated Hot Water heat pump for DHW preparation;
- Photovoltaic panels for the residential developments.

The proposed specification of these two systems is detailed in table 9.

Table 9: LZC System specification allowed in the 'renewables' stage of the carbon calculation

	Input in Model
Residential	Dedicated Hot Water Heat pump Model Name: Dimplex EDL270UK-630.
	PV system with: - Flat 2: 2.7kWp West Facing & 2.7kWp East Facing - Flat 3: 2.25kWp South Facing & 2.7kWp North Facing - Flat 6: 1.35kWp East Facing & 1.35kWp West Facing - Flat 12: 1.80kWp East Facing & 1.8kWp West Facing - Flat 13: 1.80kWp South Facing & 1.35kWp North Facing - Flat 17: 1.35kWp East Facing & 1.35kWp West Facing This extrapolates to a total of 70.20kWp for all the residential flats @ 450W output per PV panel. - 156no. roof-mounted PV panels. - PV area (based on an area of 2 m² per panel): 308m²
Communal Areas	To achieve an EPC A ₂ , a PV System with the following properties is required: - 5.4kWp: West Facing - 5.4kWp: East Facing A total PV output of 10.80kWp for communal areas @ 450W output per PV panel.

- | | |
|--|---|
| | <ul style="list-style-type: none">- 24no. roof-mounted PV panels.- PV area (based on an area of 2 m² per PV panel): 48m² |
|--|---|

8.2 Heat Pump Design

Below is a list of some of the things that need to be considered when selecting an appropriate heating system for a mixed-use development such as this:

- The system should be designed to minimise unwanted heat losses resulting in inefficiency and increasing the likelihood of overheating in corridors where the pipework is distributed;
- The system should be efficient;
- Locating the plant and potential noise issues.

9. Results & Conclusions

The sections below detail the results of the assessment for both the domestic and non-domestic areas of the development. Supporting BRUKL reports and SAP calculation worksheets have been submitted alongside this report along with the site wide Energy Hierarchy calculation.

9.1 Part L Carbon Emission Results

This table shows the Part L calculated site wide carbon emission savings for both domestic and non-domestic parts of the development after each stage of the energy hierarchy.

Table 10: Site Wide Carbon Savings

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage Savings (%)
Part L 2021 Baseline Stage	18.7	N/A	N/A
Part L 2021 Proposed Design, incl. Renewables	1.2	17.5	94%

9.2 Energy & Carbon Assessment Conclusions

Following the energy hierarchy, it has been calculated that the building achieves the carbon reduction targets based on the proposed specification. This result is driven by:

- A fabric-first design approach for the reduction of energy demand;
- Highly insulated and airtight construction;
- Use of whole-dwelling Mechanical Ventilation with Heat Recovery (MVHR);
- Energy Efficient LED Lighting;
- Domestic hot water preparation via a low carbon air source heat pump;
- Roof-mounted PV panels

10. Overheating

A thermal comfort study has been carried out in accordance with Wiltshire Core Strategy policy.

The majority of fresh air is provided naturally via openable windows behind louvred panels and glazed doors, with mechanical ventilation providing background ventilation only (Part F limiting figures). The natural ventilation strategy has been designed to make use of cross and stack ventilation, via openings in multiple orientations.

The overheating mitigation measures that have been implemented and have driven this result are:

- A highly insulated and airtight dwelling;
- Use of external shading (louvred panels) to mitigate the risk of overheating in the summer;
- Recessed external windows;
- Use of cross ventilation via openable windows to mitigate the effects of climate change and the risk of overheating;
- Use of whole-dwelling Mechanical Ventilation with Heat Recovery (MVHR);

10.1 Overheating Sample Selection

The overheating risk assessment has included 6no. bedrooms and Kitchen/ Living & Dining (KLD) within the sheltered living facility care, with different orientations. Those are marked up in the floor plans below.



Figure 7: Ground Floor Sample Selection

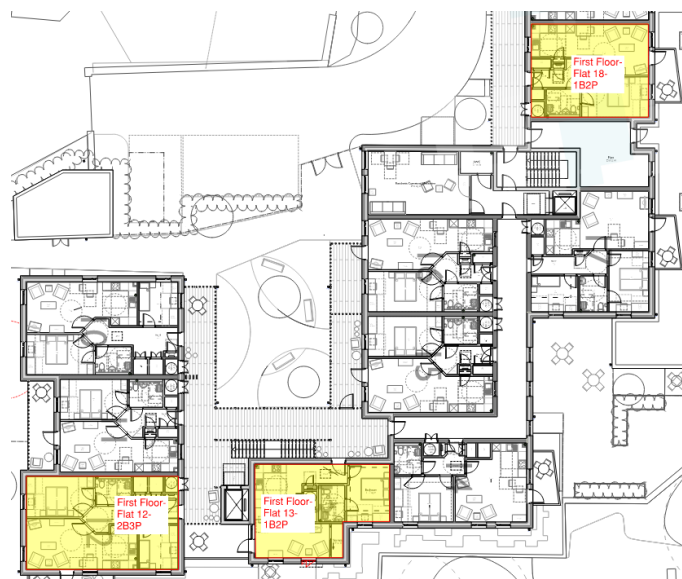


Figure 8: First Floor Sample Selection

Table 11: Flat Sample Selection & Orientation

Floor	Flat Nr & Type	External Glazing Orientation
Ground Floor	Flat 2- 2B3P	South & West
	Flat 3- 1B2P	South
	Flat 6- 1B2P	East
First Floor	Flat 12- 2B3P	South & West
	Flat 13- 1B2P	South
	Flat 18-1B2P	Northeast

10.2 Internal Gains

A number of internal gains have been applied to the spaces within the model. Refer to the table below where a summary of the details associated with each gain type and how they have been incorporated into the model.

It is important to note that although best practice TM59 guidelines regarding occupancy usage profiles have been followed in this study, this cannot accurately reflect likely occupancy patterns across all occupied rooms in reality.

For example, TM59 recommends that a 24-hour occupancy profile is applied in bedrooms, although this allows for continual internal gains occurring in the space, it also means that an occupant is present to open and close the windows. In reality it is likely that bedrooms could remain completely unoccupied during the day with the windows closed.

It is difficult to account for every eventuality in computer modelling; however, logic dictates that if any occupant enters a space that is perceived as too warm, they will subsequently open windows to alleviate the situation.

The Kitchen/ Living & Dining (KLD) rooms labelled in this report actually account for the open plan living spaces within the sheltered living facility and is treated as an eating/ drinking area. The internal gains for kitchen/ living & dining (KLD) areas are included in the table below.

Table 12: The internal gain assumptions modelled as recommended in CIBSE TM59 Guidance

Internal Gain Type	
Occupancy	Single Bedrooms
	- 1 person at 70% gains from 11 pm to 8 am
	- 1 person at full gains from 8 am to 11 pm
	Double Bedrooms
	- 2 people at 70% gains from 11 pm to 8 am
	- 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm
	- 1 person at full gain in the bedroom from 9 am to 10 pm
	1-bedroom apartment: living room/kitchen
Equipment	- 1 person from 9 am to 10 pm; room is unoccupied for the rest of the day
	- 75W (latent) & 55W (sensible)
	2-bedroom apartment: living room/kitchen
	- 2 people from 9 am to 10 pm; room is unoccupied for the rest of the day
	- 75W (latent) & 55W (sensible)
	Bedrooms
	- Peak load of 80 W from 8 am to 11 pm
	- Base load of 10 W during sleeping hours
Equipment	Double Bedroom
	- Peak load of 80 W from 8 am to 11 pm
	- Base load of 10 W during the sleeping hours
	1-bedroom apartment: living room/kitchen
Equipment	- Peak load of 450 W from 6 pm to 8 pm
	- 200 W from 8 pm to 10 pm
	- 110 W from 9 am to 6 pm and from 10 pm to 12 pm

Internal Gain Type	
	- Base load of 85 W for the rest of the day
	2-bedroom apartment: living room/kitchen
	- Peak load of 450 W from 6 pm to 8 pm
	- 200 W from 8 pm to 10 pm
	- 110 W from 9 am to 6 pm and from 10 pm to 12 pm
Lighting	- Base load of 85 W for the rest of the day
	Bedrooms
	2 W/m ² . 6 pm to 11 pm
	Kitchen, Living & Dining (KLD)
	8 W/m ²

10.3 Weather File Selection

The latest CIBSE weather files have been selected based on the 2020's high emission CIBSE Design Summer Year (DSY) dataset. As part of this dataset there are three separate DSY scenarios available for various sites in the UK which represent the following:

- DSY 1 – Moderate
 - Represents a moderately warm summer year
- DSY 2 – Intense
 - Represents a warming event about the same length as the moderate summer year but with a greater intensity
- DSY 3 – Long
 - Represents a year with a less intense extreme than the DSY 2 but more intense extreme than DSY 1 and lasting for a longer duration

Following TM59 guidance the most appropriate weather file location for this development is the Southampton DSY1 2020 & DSY1 2050s high emission 50th percentile.

10.4 Natural Ventilation

The external windows in bedrooms, Kitchen/ Living and Dining (KLD) areas within the sheltered living facility will be capable of opening. Ground floor external glazing (non- louvred), will only be openable during day for security. All the louvred glazing on ground & first floors are openable during day and night.

Window opening types (i.e. side-hung or top-hung), have been based on the architectural elevation drawings. Window equivalent ventilation areas have been calculated using the discharge coefficient calculator, as recommended by Part O. The discharge coefficient calculator has been downloaded from <https://www.gov.uk/government/publications/classvent-and-classcool-school-ventilation-design-tool>.

It is strongly recommended that the relevant project team member (e.g. the architect) reviews the intended opening types for the sheltered living facility and uses either their own or manufacturer's calculations to determine the actual effective opening area generated.

These calculations can then be reviewed to ensure that they either, as an absolute minimum meet, or exceed those opening areas referenced in this report based upon preliminary calculations.

Top Hung bedroom windows have will be restricted to only open 30deg for security. On the contrary, side hung windows will be restricted and will have a 400mm clearance from finish floor level. For more detailed information on openable window type please refer to Appendix E.

Table 13 below, summarises the different types of openings in bedrooms, kitchen living and dining areas within the Fives Court development. Table 14 outlines the number of opening types for Flats 2, 3, 6,12,13 & 18.

Table 13: Opening Types

Opening Type	Window Type	Openable Window Dimension	Opening Restriction?	Openable Area	Nighttime Ventilation Possible?
1	Top Hung Window	1.03 x 1.39	Restricted	65.4%	No
2	Side Hung Window	0.42x1.30	Restricted	59.6%	Yes
3	Top Hung Window	0.60 x 1.19	Restricted	53.9%	No
4	Patio/Sliding Door	1.00 x 2.10	No	85%	No
5	Side Hung Window	0.65 x 0.99	Restricted	63.2%	Yes
6	Side Hung Window	0.34 x 1.00	No	41%	Yes

Table 14: Opening Types per flat

Flat Nr.	Opening Type 1	Opening Type 2	Opening Type 3	Opening Type 4	Opening Type 5	Opening Type 6
2	3	4	n/a	1	n/a	n/a
3	2	3	n/a	1	n/a	n/a
6	1	2	1	1	n/a	n/a
12	n/a	n/a	n/a	1	4	4
13	n/a	n/a	n/a	1	4	4
18	n/a	n/a	n/a	1	3	3

10.5 Window Opening Control

All openable windows have been modelled based the Approved Document O templates to follow an opening profile such that they open when room air temperature exceeds 22°C within the room's hours of occupation, in accordance with Part O guidelines:

- a) When a room is occupied during the day (8am to 11pm), openings have been modelled to do all of the following:
 - i. Start to open when the internal temperature exceeds 22°C.
 - ii. Be fully open when the internal temperature exceeds 26°C.
 - iii. Start to close when the internal temperature falls below 26°C.
 - iv. Be fully closed when the internal temperature falls below 22°C.
- b) At night (11pm to 8am), openings have been modelled as fully open if both of the following apply:
 - i. The opening is on the first floor or above and not easily accessible.
 - ii. The internal temperature exceeds 23°C at 11pm.
- c) When a ground floor or easily accessible room is unoccupied, both of the following apply:
 - i. In the day, windows should be modelled as open, if this can be done securely, following the guidance in paragraph 3.7 below.
- d) Entrance doors have been modelled to be shut all the time.

10.6 Mechanical Ventilation

Bedrooms, Kitchen/ Living and Dining Areas (KLD) areas will be provided with Part F minimum background mechanical ventilation figures

Table 15: Background mechanical ventilation rates

Space Name	Minimum Ventilation rate by number of bedrooms (l/s)
Bedrooms	6

10.7 Infiltration rate

An average infiltration rate of 0.15 air changes per hour has been modelled within the software to mimic air permeability through the building fabric. This was established using CIBSE Guide A table 4.24, based on a targeted air permeability rate of 3.0 m³/(h.m²) @ 50 Pa.

10.8 Building Fabric

The table below provides all of the building fabric details currently assumed in the model.

Table 16: Ground Floor Fabric Inputs

Building elements	Input in IESVE
External Wall U-value (W/m ² K)	0.22
Roof U-value (W/m ² .K)	0.11
Ground/ Exposed Floor U-value (W/m ² .K)	0.15
Window/Panel U-value (W/m ² .K)	1.2 (double glazed, whole pane incl. frame, not centre pane value)
Window - Thermal G Value	0.5
Air Permeability Target	5.0 m ³ /(h.m ²) @ 50 Pa

Table 17: First Floor Fabric Inputs

Building elements	Input in IESVE
External Wall U-value (W/m ² K)	0.15
Roof U-value (W/m ² .K)	0.10
Ground/ Exposed Floor U-value (W/m ² .K)	0.12
Window/Panel U-value (W/m ² .K)	1.2 (double glazed, whole pane incl. frame, not centre pane value)
Window - Thermal G Value	0.5
Air Permeability Target	5.0 m ³ /(h.m ²) @ 50 Pa

10.9 Glazing Solar transmission

External glazing in bedrooms, Kitchen/ Living & Dining (KLD) areas have a g-value of 0.50, which gives the optimum balance between useful solar gains in the winter and preventing excessive solar gains in the summer period. This g-value can effectively control solar gains without compromising in appearance and aesthetics as it is clear, without tint.

10.10 Shading

Bedrooms, Kitchen/ Living and Dining areas (KLD) areas external windows will have an external louvred panel to provide external shading and mitigate incoming solar gains.

Shading from trees and internal shading devices (blinds, curtains) has been excluded from the thermal comfort assessment, as per the Part O guidelines.

10.11 Results

The table below outlines the performance of occupied rooms for the Part O / CIBSE TM59 Criteria for naturally ventilated dwellings under the 'DSY 1: moderate summer' weather file (Southampton DSY1 2020, high emissions, 50% percentile).

Criterion 1 applies to all continuously occupied areas and represents the number of hours during which operative temperature is greater than or equal to one degree (K) during the period May to September. The inclusive shall not be more than 3 per cent of occupied hours.

Criterion 2 applies to bedrooms only. During the sleeping hours (10pm – 7am) the operative temperature shall not exceed 26 °C for more than 1% of annual hours, equal to 33 hours per year.

The results show that all continuously occupied areas are compliant with the Part O requirements. These detailed results can be found in Appendix F.

Table 18: CIBSE TM59 results for DSY1 2020 High Emissions weather data

Southampton 2020's high emissions DSY1 Weather Data				
Floor	Room	Criterion 1: Hrs of exceedance < 3% (%Hrs TopTmax>=1K)	Criterion 2: Op. temperature (°C) - Number of hours > 26.00 between 10pm-7am	Pass or Fail
Ground	Flat 2- Single Bedroom	0.4	0	Pass
	Flat 2- Kitchen/ Living	0.8	N/A	Pass
	Flat 2- Double Bedroom	0.3	0	Pass
	Flat 3- KLD	0.8	N/A	Pass
	Flat 3- Double Bedroom	0.2	0	Pass
	Flat 6- Kitchen/ Living	0.1	N/A	Pass
	Flat 6- Double Bedroom	0.2	0	Pass
First Floor	Flat 12- Double Bedroom	0.2	0	Pass
	Flat 12- Kitchen/Living	0.7	N/A	Pass
	Flat 12- Single Bedroom	0.2	0	Pass
	Flat 13- Double Bedroom	0.1	0	Pass
	Flat 13- KLD	0.7	N/A	Pass
	Flat 18- Living/Kitchen	0.4	N/A	Pass
	Flat 18- Double Bedroom	0.1	0	Pass

Additional thermal modelling has been undertaken to assess the overheating risk under (Southampton DSY1 2020, high emissions, 50% percentile). These detailed results can be found in Appendix G.

Table 19: CIBSE TM59 results for DSY1 2050 High Emissions weather data

Southampton 2050's high emissions DSY1 Weather Data				
Floor	Room	Criterion 1: Hrs of exceedance < 3% (%Hrs TopTmax>=1K)	Criterion 2: Op. temperature (°C) - Number of hours > 26.00 between 10pm-7am	Pass or Fail
Ground	Flat 2- Single Bedroom	1.3	3	Pass
	Flat 2- Kitchen/ Living	2.6	N/A	Pass
	Flat 2- Double Bedroom	1.1	3	Pass
	Flat 3- KLD	2.3	N/A	Pass
	Flat 3- Double Bedroom	0.80	5	Pass
	Flat 6- Kitchen/ Living	1.30	N/A	Pass

	Flat 6- Double Bedroom	0.80	5	Pass
First Floor	Flat 12- Double Bedroom	0.70	3	Pass
	Flat 12- Kitchen/Living	2.0	N/A	Pass
	Flat 12- Single Bedroom	1.0	3	Pass
	Flat 13- Double Bedroom	0.70	7	Pass
	Flat 13- KLD	2.1	N/A	Pass
	Flat 18- Living/Kitchen	1.9	N/A	Pass
	Flat 18- Double Bedroom	0.7	6	Pass

10.12 Thermal Comfort Assessment Conclusion

The findings of this study suggested, the proposed rooms achieve acceptable levels of thermal comfort under current and projected climate change weather scenarios. The overheating mitigation measures that have been implemented and have driven this result are:

- A highly insulated and airtight sheltered living facility;
- Use of external louvred panels in bedrooms, Kitchen/ Living and Dining Areas (KLD) external windows to mitigate the risk of overheating in the summer;
- Use of cross ventilation through openable windows;
- Mechanical Ventilation with heat recovery;

Based on the measures above, all rooms selected in this sample in Fives Court sheltered living facility will have a satisfying level of thermal comfort.

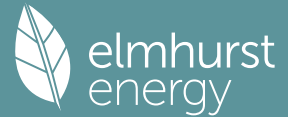
The analysis can only ever be read as guidance and should never be seen as an absolute guarantee of either performance or comfort. At best is should be seen as an indicator of what many people might think, most of the time.

Therefore, it is recommended that the client for this project should try to understand this report, seek advice from the design team and review their own thoughts on comfort levels.

Only once this has occurred will the client be in a position to decide on whether the level of comfort indicated in this report is likely to be acceptable once the building is in operation

Appendix A – Baseline SAP Reports

Full SAP Calculation Printout



Property Reference	250805-5Court-New- Baseline				Issued on Date	05/09/2025
Assessment Reference	Flat 2 2B3P_Baseline_New		Prop Type Ref			
Property						
SAP Rating	27 F	DER	20.49	TER		
Environmental	84 B	% DER < TER				N/A
CO ₂ Emissions (t/year)	1.21	DFEE	102.96	TFEE		
Compliance Check	N/A	% DFEE < TFEE				
% DPER < TPER		DPER	213.25	TPER		
Assessor Details	Mr. Georgios Sigalas				Assessor ID	T822-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	63.6600 (1b)	2.3500 (2b)	149.6010 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	63.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	149.6010 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7500	(18)
Number of sides sheltered	1	(19)

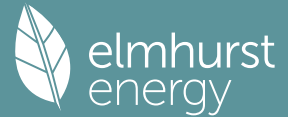
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.6938 (21)

	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	0.8845	0.8672	0.8498	0.7631	0.7458	0.6591	0.6591	0.6417	0.6938	0.7458	0.7805	0.8152 (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	0.9930	0.9757	0.9583	0.8716	0.8543	0.7676	0.7676	0.7502	0.8023	0.8543	0.8890	0.9237 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
East Facing Window			0.6000	2.9152	1.7491		(27)
South Facing Windows			6.2200	2.9152	18.1325		(27)
Entrance Door			2.1000	3.3000	6.9300		(26)
West Facing Window			6.6600	2.9152	19.4152		(27)
Heatloss Floor 1			63.6600	0.7000	44.5620	0.0000	0.0000 (28a)
External Wall 1	57.0800	15.5800	41.5000	0.7000	29.0500	0.0000	0.0000 (29a)
Total net area of external elements Aum (A, m ²)			120.7400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		119.8388		(33)
Main dwelling							
Party Wall 1			17.9300	0.0000	0.0000	0.0000	0.0000 (32)
Party Ceiling 1			63.6600			0.0000	0.0000 (32b)
Internal Wall 1			99.3600			9.0000	894.2400 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		894.2400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							14.0471 (35)

Full SAP Calculation Printout



Thermal bridges (Default value 0.200 * total exposed area)
 Point Thermal bridges (36a) = 24.1480 (36)
 Total fabric heat loss (33) + (36) + (36a) = 143.9868 (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	49.0243	48.1681	47.3118	43.0307	42.1744	37.8933	37.8933	37.0370	39.6057	42.1744	43.8869	45.5994	(38)
Heat transfer coeff	193.0111	192.1549	191.2987	187.0175	186.1613	181.8801	181.8801	181.0239	183.5926	186.1613	187.8737	189.5862	(39)
Average = Sum(39)m / 12 =												186.8034	
HLP	3.0319	3.0185	3.0050	2.9378	2.9243	2.8571	2.8571	2.8436	2.8840	2.9243	2.9512	2.9781	(40)
HLP (average)												2.9344	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0830 (42)
Hot water usage for mixer showers													
81.3240	80.1018	78.3209	74.9135	72.3989	69.5946	68.0007	69.7681	71.7056	74.7165	78.1971	81.0124	(42a)	
Hot water usage for baths													
25.5574	25.1778	24.6433	23.6578	22.9198	22.1016	21.6596	22.1903	22.7682	23.6438	24.6497	25.4710	(42b)	
Hot water usage for other uses													
35.9620	34.6543	33.3466	32.0389	30.7312	29.4235	29.4235	30.7312	32.0389	33.3466	34.6543	35.9620	(42c)	
Average daily hot water use (litres/day)												131.3665	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
142.8434	139.9340	136.3109	130.6102	126.0499	121.1197	119.0838	122.6897	126.5127	131.7069	137.5011	142.4454	(44)	
Energy content	226.2290	199.2641	209.5047	178.7988	169.6874	148.9308	144.0215	151.9154	156.0028	178.7250	195.8955	223.0351	(45)
Energy content (annual)										Total = Sum(45)m =		2182.0102	
Distribution loss (46)m = 0.15 x (45)m													
33.9344	29.8896	31.4257	26.8198	25.4531	22.3396	21.6032	22.7873	23.4004	26.8088	29.3843	33.4553	(46)	
Water storage loss:													
Store volume												269.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												1.0620	(55)
Total storage loss													
32.9220	29.7360	32.9220	31.8600	32.9220	31.8600	32.9220	32.9220	31.8600	32.9220	31.8600	32.9220	(56)	
If cylinder contains dedicated solar storage													
32.9220	29.7360	32.9220	31.8600	32.9220	31.8600	32.9220	32.9220	31.8600	32.9220	31.8600	32.9220	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
259.1510	229.0001	242.4267	210.6588	202.6094	180.7908	176.9435	184.8374	187.8628	211.6470	227.7555	255.9571	(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													
259.1510	229.0001	242.4267	210.6588	202.6094	180.7908	176.9435	184.8374	187.8628	211.6470	227.7555	255.9571	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2569.6402	(64)
Electric shower(s)												2570	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
75.2211	66.2553	69.6603	59.4506	56.4211	49.5195	47.8871	50.5119	51.8709	59.4261	65.1352	74.1592	(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	104.1501	104.1501	104.1501	104.1501	104.1501	104.1501	104.1501	104.1501	104.1501	104.1501	104.1501	104.1501 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.3130	108.8465	98.3130	101.5901	98.3130	101.5901	98.3130	98.3130	101.5901	98.3130	101.5901	98.3130 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.0743	183.9636	179.2025	169.0666	156.2719	144.2467	136.2131	134.3237	139.0848	149.2207	162.0154	174.0407 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.4150	33.4150	33.4150	33.4150	33.4150	33.4150	33.4150	33.4150	33.4150	33.4150	33.4150	33.4150 (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)	-83.3201	-83.3201	-83.3201	-83.3201	-83.3201	-83.3201	-83.3201	-83.3201	-83.3201	-83.3201	-83.3201	-83.3201 (71)
Water heating gains (Table 5)	101.1037	98.5942	93.6295	82.5703	75.8348	68.7771	64.3644	67.8923	72.0430	79.8738	90.4656	99.6763 (72)
Total internal gains	435.7360	445.6494	425.3900	407.4720	384.6647	368.8588	353.1355	354.7740	366.9629	381.6525	408.3162	426.2750 (73)

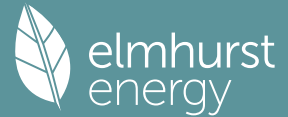
6. Solar gains

[Jan]												Gains
				Area	Solar flux	g		FF		Access		W
				m2	Table 6a	Specific data		Specific data		factor		
					W/m2	or Table 6b		or Table 6c		Table 6d		
East				0.6000	19.6403	0.7300		0.9000		0.7700		5.3653 (76)
South				6.2200	46.7521	0.7300		0.3800		0.7700		55.9025 (78)
West				6.6600	19.6403	0.7300		0.5100		0.7700		33.7480 (80)
Solar gains	95.0158	168.0678	242.6309	315.5842	362.5764	362.7398	348.6503	313.9703	268.3789	189.5396	115.0332	80.4698 (83)
Total gains	530.7517	613.7172	668.0209	723.0562	747.2411	731.5986	701.7858	668.7443	635.3418	571.1921	523.3493	506.7447 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
 Utilisation factor for gains for living area, nil,m (see Table 9a)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	1.2870	1.2927	1.2985	1.3282	1.3343	1.3657	1.3657	1.3722	1.3530	1.3343	1.3222	1.3102	
alpha	1.0858	1.0862	1.0866	1.0885	1.0890	1.0910	1.0910	1.0915	1.0902	1.0890	1.0881	1.0873	
util living area	0.8794	0.8568	0.8296	0.7835	0.7248	0.6398	0.5559	0.5786	0.6924	0.7976	0.8559	0.8835	(86)
MIT	14.6456	15.0550	15.8389	16.9680	18.1597	19.3006	19.9985	19.9066	18.9992	17.4655	15.8805	14.5795	(87)
Th 2	18.7341	18.7408	18.7475	18.7814	18.7883	18.8232	18.8232	18.8302	18.8091	18.7883	18.7746	18.7610	(88)
util rest of house	0.8619	0.8359	0.8028	0.7449	0.6641	0.5345	0.3806	0.4136	0.6009	0.7536	0.8314	0.8669	(89)
MIT 2	12.3612	12.8402	13.7596	15.0858	16.4542	17.7296	18.4252	18.3544	17.4217	15.6871	13.8343	12.2960	(90)
Living area fraction										FLA = Living area / (4) =		0.4026	(91)
MIT	13.2809	13.7319	14.5968	15.8436	17.1409	18.3621	19.0586	18.9794	18.0568	16.4031	14.6581	13.2153	(92)
Temperature adjustment												0.0000	
adjusted MIT	13.2809	13.7319	14.5968	15.8436	17.1409	18.3621	19.0586	18.9794	18.0568	16.4031	14.6581	13.2153	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7903	0.7597	0.7243	0.6680	0.5996	0.5043	0.4055	0.4287	0.5564	0.6800	0.7566	0.7963	(94)
Useful gains	419.4615	466.2637	483.8167	482.9655	448.0144	368.9496	284.6002	286.6994	353.5007	388.4348	395.9646	403.5384	(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	1733.4124	1697.0867	1548.9031	1298.5730	1012.8763	684.2527	447.1769	466.9249	726.4432	1080.3142	1419.9719	1709.1836	(97)
Space heating kWh	977.5794	827.1131	792.4243	587.2374	420.2573	0.0000	0.0000	0.0000	0.0000	514.7583	737.2852	971.4000	(98a)
Space heating requirement - total per year (kWh/year)												5828.0551	
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	977.5794	827.1131	792.4243	587.2374	420.2573	0.0000	0.0000	0.0000	0.0000	514.7583	737.2852	971.4000	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5828.0551	
Space heating per m2										(98c) / (4) =		91.5497	(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 %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	977.5794	827.1131	792.4243	587.2374	420.2573	0.0000	0.0000	0.0000	0.0000	514.7583	737.2852	971.4000	(98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)	
Space heating fuel (main heating system)	977.5794	827.1131	792.4243	587.2374	420.2573	0.0000	0.0000	0.0000	0.0000	514.7583	737.2852	971.4000	(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	259.1510	229.0001	242.4267	210.6588	202.6094	180.7908	176.9435	184.8374	187.8628	211.6470	227.7555	255.9571	(64)	
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)	
Fuel for water heating, kWh/month	259.1510	229.0001	242.4267	210.6588	202.6094	180.7908	176.9435	184.8374	187.8628	211.6470	227.7555	255.9571	(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	16.2762	14.7011	16.2762	15.7511	16.2762	15.7511	16.2762	16.2762	15.7511	16.2762	15.7511	16.2762	(231)	
Lighting	19.7310	15.8289	14.2522	10.4418	8.0655	6.5896	7.3576	9.5637	12.4223	16.2988	18.4094	20.2793	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1												5828.0551	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												100.0000		
Water heating fuel used												2569.6402	(219)	
Space cooling fuel												0.0000	(221)	
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)														
mechanical ventilation fans (SFP = 1.0500)													191.6389	(230a)
Total electricity for the above, kWh/year													191.6389	(231)
Electricity for lighting (calculated in Appendix L)													159.2401	(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)

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Energy used
Total delivered energy for all uses

0.0000 (237)
8748.5743 (238)

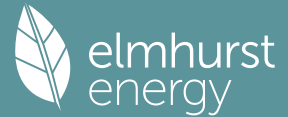
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5828.0551	0.1531	892.0488 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2569.6402	0.1411	362.6943 (264)
Space and water heating			1254.7431 (265)
Pumps, fans and electric keep-hot	191.6389	0.1387	26.5827 (267)
Energy for lighting	159.2401	0.1443	22.9833 (268)
Total CO2, kg/year			1304.3091 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			20.4900 (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	5828.0551	1.5667	9130.6031 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2569.6402	1.5219	3910.7841 (278)
Space and water heating			13041.3871 (279)
Pumps, fans and electric keep-hot	191.6389	1.5128	289.9113 (281)
Energy for lighting	159.2401	1.5338	244.2478 (282)
Total Primary energy kWh/year			13575.5463 (286)
Dwelling Primary energy Rate (DPER)			213.2500 (287)

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Property Reference	250805-5Court-New- Baseline				Issued on Date	05/09/2025
Assessment Reference	Flat 3 1B2P_Baseline_New		Prop Type Ref			
Property						
SAP Rating	24 F	DER	24.27	TER		
Environmental	83 B	% DER < TER				N/A
CO ₂ Emissions (t/year)	1.14	DFEE	123.55	TFEE		
Compliance Check	N/A	% DFEE < TFEE				
% DPER < TPER		DPER	252.52	TPER		
Assessor Details	Mr. Georgios Sigalas				Assessor ID	T822-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.6200 (1b)	2.3500 (2b)	118.9570 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.6200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	118.9570 (5)

2. Ventilation rate

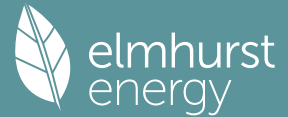
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6938 (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	0.8845	0.8672	0.8498	0.7631	0.7458	0.6591	0.6591	0.6417	0.6938	0.7458	0.7805	0.8152 (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	0.9930	0.9757	0.9583	0.8716	0.8543	0.7676	0.7676	0.7502	0.8023	0.8543	0.8890	0.9237 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
South Facing Windows			9.9300	2.9152	28.9479		(27)
Entrance Door			2.1000	3.3000	6.9300		(26)
Heatloss Floor 1			63.9500	0.7000	44.7650	0.0000	0.0000 (28a)
External Wall 1	63.9500	12.0300	51.9200	0.7000	36.3440	0.0000	0.0000 (29a)
Total net area of external elements Aum(A, m ²)			127.9000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	116.9869		(33)
Main dwelling							
Party Wall 1			8.4800	0.0000	0.0000	0.0000	0.0000 (32)
Party Ceiling 1			63.9500			0.0000	0.0000 (32b)
Internal Wall 1			83.4200			9.0000	750.7800 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	750.7800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							14.8317 (35)
Thermal bridges (Default value 0.200 * total exposed area)							25.5800 (36)
Point Thermal bridges						(36a) =	0.0000

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Total fabric heat loss (33) + (36) + (36a) = 142.5669 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	38.9822	38.3014	37.6206	34.2163	33.5355	30.1313	30.1313	29.4504	31.4930	33.5355	34.8972	36.2589
Heat transfer coeff	181.5491	180.8683	180.1874	176.7832	176.1024	172.6982	172.6982	172.0173	174.0599	176.1024	177.4641	178.8258
Average = Sum(39)m / 12 =												176.6130

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	3.5865	3.5731	3.5596	3.4924	3.4789	3.4117	3.4117	3.3982	3.4386	3.4789	3.5058	3.5327
HLP (average)												3.4890
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7084 (42)

Hot water usage for mixer showers 72.6869 71.5945 70.0028 66.9572 64.7097 62.2033 60.7786 62.3583 64.0900 66.7811 69.8921 72.4084 (42a)

Hot water usage for baths 22.8561 22.5167 22.0387 21.1573 20.4974 19.7656 19.3703 19.8450 20.3618 21.1448 22.0443 22.7789 (42b)

Hot water usage for other uses 32.1254 30.9572 29.7890 28.6208 27.4526 26.2844 26.2844 27.4526 28.6208 29.7890 30.9572 32.1254 (42c)

Average daily hot water use (litres/day) 30.3293 26.7144 28.0873 23.9707 22.7492 19.9665 19.3083 20.3665 20.9145 23.9607 26.2627 29.9011 (43)

Daily hot water use 127.6684 125.0684 121.8304 116.7353 112.6597 108.2532 106.4333 109.6559 113.0726 117.7149 122.8936 127.3126 (44)

Energy conte 202.1955 178.0957 187.2488 159.8048 151.6615 133.1100 128.7219 135.7769 139.4298 159.7381 175.0845 199.3408 (45)

Energy content (annual) Total = Sum(45)m = 1950.2084

Distribution loss (46)m = 0.15 x (45)m 30.3293 26.7144 28.0873 23.9707 22.7492 19.9665 19.3083 20.3665 20.9145 23.9607 26.2627 29.9011 (46)

Water storage loss:

Store volume 269.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.7700 (48)

Temperature factor from Table 2b 0.6000 (49)

Enter (49) or (54) in (55) 1.0620 (55)

Total storage loss 32.9220 29.7360 32.9220 31.8600 32.9220 31.8600 32.9220 32.9220 31.8600 32.9220 31.8600 32.9220 (56)

If cylinder contains dedicated solar storage 32.9220 29.7360 32.9220 31.8600 32.9220 31.8600 32.9220 32.9220 31.8600 32.9220 31.8600 32.9220 (57)

Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month 235.1175 207.8317 220.1708 191.6648 184.5835 164.9700 161.6439 168.6989 171.2898 192.6601 206.9445 232.2628 (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 235.1175 207.8317 220.1708 191.6648 184.5835 164.9700 161.6439 168.6989 171.2898 192.6601 206.9445 232.2628 (64)

Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 2337.8384 (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 67.2300 59.2168 62.2602 53.1351 50.4275 44.2591 42.8000 45.1458 46.3604 53.1129 58.2156 66.2808 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	85.4183	85.4183	85.4183	85.4183	85.4183	85.4183	85.4183	85.4183	85.4183	85.4183	85.4183	85.4183
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.4180	91.2485	82.4180	85.1653	82.4180	85.1653	82.4180	82.4180	85.1653	82.4180	85.1653	82.4180
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.8441	150.3886	146.4965	138.2105	127.7509	117.9204	111.3530	109.8084	113.7006	121.9866	132.4462	142.2767
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5418	31.5418	31.5418	31.5418	31.5418	31.5418	31.5418	31.5418	31.5418	31.5418	31.5418	31.5418
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Losses e.g. evaporation (negative values) (Table 5)	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347	-68.3347
Water heating gains (Table 5)	90.3629	88.1203	83.6831	73.7988	67.7789	61.4709	57.5269	60.6799	64.3894	71.3883	80.8550	89.0871
Total internal gains	370.2505	378.3829	361.2231	345.8000	326.5732	313.1821	299.9234	301.5318	311.8808	324.4184	347.0919	362.4073

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
South	9.9300	46.7521	0.7300	0.4500	0.7700	105.6863 (78)						
Solar gains	105.6863	173.0869	220.4820	249.1925	259.6740	249.9009	244.1684	237.1214	230.3195	186.6905	125.2743	91.3227
Total gains	475.9368	551.4698	581.7051	594.9925	586.2473	563.0830	544.0918	538.6532	542.2003	511.1089	472.3662	453.7300

7. Mean internal temperature (heating season)

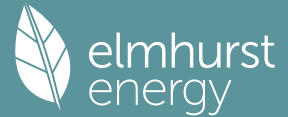
Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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	1.1487	1.1530	1.1574	1.1797	1.1843	1.2076	1.2076	1.2124	1.1982	1.1843	1.1752	1.1662
alpha	1.0766	1.0769	1.0772	1.0786	1.0790	1.0805	1.0805	1.0808	1.0799	1.0790	1.0783	1.0777

util living area

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	0.8827	0.8605	0.8387	0.8048	0.7597	0.6861	0.6048	0.6175	0.7126	0.8043	0.8595	0.8871 (86)	
MIT	14.5785	14.9852	15.7374	16.8110	17.9802	19.1444	19.8881	19.8116	18.9134	17.4028	15.8198	14.5083 (87)	
Th 2	18.4854	18.4908	18.4963	18.5240	18.5297	18.5583	18.5583	18.5641	18.5467	18.5297	18.5184	18.5073 (88)	
util rest of house													
	0.8635	0.8376	0.8098	0.7641	0.6956	0.5694	0.3976	0.4242	0.6101	0.7554	0.8324	0.8689 (89)	
MIT 2	12.1705	12.6450	13.5275	14.7906	16.1403	17.4463	18.1849	18.1219	17.1994	15.4927	13.6462	12.0987 (90)	
Living area fraction									fLA = Living area / (4) =				0.4698 (91)
MIT	13.3017	13.7444	14.5657	15.7397	17.0046	18.2440	18.9850	18.9157	18.0045	16.3900	14.6673	13.2307 (92)	
Temperature adjustment												0.0000	
adjusted MIT	13.3017	13.7444	14.5657	15.7397	17.0046	18.2440	18.9850	18.9157	18.0045	16.3900	14.6673	13.2307 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7965	0.7663	0.7371	0.6934	0.6369	0.5481	0.4473	0.4626	0.5774	0.6894	0.7629	0.8029	(94)
Useful gains	379.0793	422.5731	428.7602	412.5740	373.3569	308.6538	243.3698	249.2009	313.0689	352.3353	360.3535	364.2847	(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	1634.2553	1599.6697	1453.3303	1209.1514	934.1530	629.3152	411.8871	432.7363	679.6250	1019.6366	1342.9271	1614.9166	(97)
Space heating kWh	933.8509	791.0089	762.2802	573.5357	417.2323	0.0000	0.0000	0.0000	0.0000	496.4722	707.4529	930.4701	(98a)
Space heating requirement - total per year (kWh/year)												5612.3033	
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	933.8509	791.0089	762.2802	573.5357	417.2323	0.0000	0.0000	0.0000	0.0000	496.4722	707.4529	930.4701	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5612.3033	
Space heating per m2										(98c) / (4) =		110.8713	(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 %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	933.8509	791.0089	762.2802	573.5357	417.2323	0.0000	0.0000	0.0000	0.0000	496.4722	707.4529	930.4701	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	933.8509	791.0089	762.2802	573.5357	417.2323	0.0000	0.0000	0.0000	0.0000	496.4722	707.4529	930.4701	(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	235.1175	207.8317	220.1708	191.6648	184.5835	164.9700	161.6439	168.6989	171.2898	192.6601	206.9445	232.2628	(64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	235.1175	207.8317	220.1708	191.6648	184.5835	164.9700	161.6439	168.6989	171.2898	192.6601	206.9445	232.2628	(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	12.9422	11.6897	12.9422	12.5247	12.9422	12.5247	12.9422	12.9422	12.5247	12.9422	12.5247	12.9422	(231)
Lighting	16.4637	13.2078	11.8921	8.7127	6.7299	5.4984	6.1393	7.9801	10.3653	13.5998	15.3610	16.9213	(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												5612.3033	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												2337.8384	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)													
mechanical ventilation fans (SFP = 1.0500)												152.3839	(230a)
Total electricity for the above, kWh/year												152.3839	(231)
Electricity for lighting (calculated in Appendix L)												132.8713	(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												8235.3969	(238)

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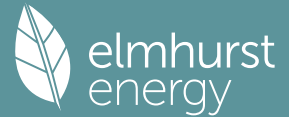
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5612.3033	0.1530	858.5105 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2337.8384	0.1411	329.8762 (264)
Space and water heating			1188.3867 (265)
Pumps, fans and electric keep-hot	152.3839	0.1387	21.1375 (267)
Energy for lighting	132.8713	0.1443	19.1774 (268)
Total CO2, kg/year			1228.7017 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			24.2700 (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	5612.3033	1.5663	8790.6758 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2337.8384	1.5218	3557.6249 (278)
Space and water heating			12348.3007 (279)
Pumps, fans and electric keep-hot	152.3839	1.5128	230.5264 (281)
Energy for lighting	132.8713	1.5338	203.8024 (282)
Total Primary energy kWh/year			12782.6295 (286)
Dwelling Primary energy Rate (DPER)			252.5200 (287)

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Property Reference	250805-5Court-New- Baseline				Issued on Date	05/09/2025
Assessment Reference	Flat 6 1B2P-Baseline_New		Prop Type Ref			
Property						
SAP Rating	40 E	DER	17.68	TER		
Environmental	87 B	% DER < TER				N/A
CO ₂ Emissions (t/year)	0.85	DFEE	76.58	TFEE		
Compliance Check	N/A	% DFEE < TFEE				
% DPER < TPER		DPER	184.94	TPER		
Assessor Details	Mr. Georgios Sigalas				Assessor ID	T822-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.2000 (1b)	2.3500 (2b)	120.3200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	120.3200 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.5813 (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	0.7411	0.7266	0.7120	0.6394	0.6248	0.5522	0.5522	0.5377	0.5813	0.6248	0.6539	0.6830 (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	0.8496	0.8351	0.8205	0.7479	0.7333	0.6607	0.6607	0.6462	0.6898	0.7333	0.7624	0.7915 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
East Facing Window			7.4000	2.9152	21.5724		(27)
Entrance Door			2.1000	1.2000	2.5200		(26)
Heatloss Floor 1			51.2000	0.7000	35.8400	0.0000	0.0000 (28a)
External Wall 1	16.0500	9.5000	6.5500	0.7000	4.5850	0.0000	0.0000 (29a)
Total net area of external elements Aum(A, m ²)			67.2500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	64.5174		(33)
Main dwelling							
Party Wall 1			52.0800	0.0000	0.0000	0.0000	0.0000 (32)
Party Ceiling 1			51.2000			0.0000	0.0000 (32b)
Internal Wall 1			79.3800			9.0000	714.4200 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		714.4200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							13.9535 (35)
Thermal bridges (Default value 0.200 * total exposed area)							13.4500 (36)
Point Thermal bridges						(36a) =	0.0000

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Total fabric heat loss (33) + (36) + (36a) = 77.9674 (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	33.7336	33.1567	32.5797	29.6948	29.1179	26.2330	26.2330	25.6560	27.3869	29.1179	30.2718	31.4257 (38)
Average = Sum(39)m / 12 =	111.7011	111.1241	110.5471	107.6623	107.0853	104.2004	104.2004	103.6235	105.3544	107.0853	108.2392	109.3932 (39)
												107.5180
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.1817	2.1704	2.1591	2.1028	2.0915	2.0352	2.0352	2.0239	2.0577	2.0915	2.1140	2.1366 (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													1.7255 (42)
Hot water usage for mixer showers													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for baths	73.0812	71.9829	70.3825	67.3205	65.0607	62.5407	61.1083	62.6966	64.4377	67.1434	70.2712	72.8012	(42a)
Hot water usage for other uses	22.9794	22.6382	22.1576	21.2715	20.6079	19.8722	19.4748	19.9520	20.4716	21.2589	22.1633	22.9018	(42b)
Average daily hot water use (litres/day)	32.3005	31.1260	29.9514	28.7768	27.6023	26.4277	26.4277	27.6023	28.7768	29.9514	31.1260	32.3005	(42c)
													118.0481 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	128.3612	125.7471	122.4915	117.3688	113.2710	108.8406	107.0108	110.2509	113.6861	118.3537	123.5605	128.0035	(44)
Energy content (annual)	203.2927	179.0621	188.2649	160.6720	152.4845	133.8323	129.4203	136.5137	140.1864	160.6049	176.0346	200.4225	(45)
Distribution loss (46)m = 0.15 x (45)m	30.4939	26.8593	28.2397	24.1008	22.8727	20.0748	19.4131	20.4771	21.0280	24.0907	26.4052	30.0634	(46)
Water storage loss:													
Store volume													269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.7700 (48)
Temperature factor from Table 2b													0.6000 (49)
Enter (49) or (54) in (55)													1.0620 (55)
Total storage loss	32.9220	29.7360	32.9220	31.8600	32.9220	31.8600	32.9220	32.9220	31.8600	32.9220	31.8600	32.9220	(56)
If cylinder contains dedicated solar storage	32.9220	29.7360	32.9220	31.8600	32.9220	31.8600	32.9220	32.9220	31.8600	32.9220	31.8600	32.9220	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	236.2147	208.7981	221.1869	192.5320	185.4065	165.6923	162.3423	169.4357	172.0464	193.5269	207.8946	233.3445	(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	236.2147	208.7981	221.1869	192.5320	185.4065	165.6923	162.3423	169.4357	172.0464	193.5269	207.8946	233.3445	(64)
12Total per year (kWh/year)													2348.4208 (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	67.5948	59.5382	62.5981	53.4234	50.7011	44.4992	43.0323	45.3908	46.6120	53.4011	58.5315	66.6405	(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	86.2735	86.2735	86.2735	86.2735	86.2735	86.2735	86.2735	86.2735	86.2735	86.2735	86.2735	86.2735	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.6118	95.8916	86.6118	89.4988	86.6118	89.4988	86.6118	86.6118	89.4988	86.6118	89.4988	86.6118	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	150.3500	151.9102	147.9786	139.6088	129.0434	119.1134	112.4796	110.9194	114.8510	123.2208	133.7862	143.7162	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6273	31.6273	31.6273	31.6273	31.6273	31.6273	31.6273	31.6273	31.6273	31.6273	31.6273	31.6273	(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)	-69.0188	-69.0188	-69.0188	-69.0188	-69.0188	-69.0188	-69.0188	-69.0188	-69.0188	-69.0188	-69.0188	-69.0188	(71)
Water heating gains (Table 5)	90.8533	88.5985	84.1372	74.1992	68.1466	61.8045	57.8391	61.0091	64.7389	71.7757	81.2937	89.5705	(72)
Total internal gains	376.6971	385.2823	367.6096	352.1889	332.6838	319.2988	305.8125	307.4224	317.9707	330.4903	353.4608	368.7805	(73)

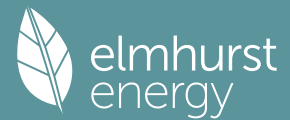
6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	7.4000	19.6403	0.7300	0.5100	0.7700	37.4978	(76)
Solar gains	37.4978	73.3536	120.8029	176.1838	215.9199	221.0324	210.4319
Total gains	414.1949	458.6359	488.4125	528.3727	548.6037	540.3312	516.2443

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	1.7766	1.7858	1.7952	1.8433	1.8532	1.9045	1.9045	1.9151	1.8836	1.8532	1.8334	1.8141	
alpha	1.1184	1.1191	1.1197	1.1229	1.1235	1.1270	1.1270	1.1277	1.1256	1.1235	1.1222	1.1209	
util living area													

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	0.8492	0.8283	0.8001	0.7470	0.6799	0.5851	0.4984	0.5237	0.6481	0.7629	0.8233	0.8527 (86)
MIT	15.0399	15.4236	16.1795	17.2963	18.4463	19.5241	20.1533	20.0650	19.2101	17.7400	16.2317	14.9863 (87)
Th 2	19.2150	19.2222	19.2294	19.2657	19.2730	19.3100	19.3100	19.3175	19.2951	19.2730	19.2584	19.2438 (88)
util rest of house												
	0.8328	0.8095	0.7766	0.7141	0.6302	0.5043	0.3733	0.4044	0.5761	0.7256	0.8011	0.8370 (89)
MIT 2	13.0277	13.4782	14.3668	15.6811	17.0037	18.2169	18.8610	18.7894	17.8919	16.2203	14.4527	12.9777 (90)
Living area fraction												
MIT	14.1336	14.5474	15.3630	16.5688	17.7966	18.9353	19.5713	19.4905	18.6164	17.0556	15.4305	14.0817 (92)
Temperature adjustment												0.0000
adjusted MIT	14.1336	14.5474	15.3630	16.5688	17.7966	18.9353	19.5713	19.4905	18.6164	17.0556	15.4305	14.0817 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7604	0.7349	0.7018	0.6438	0.5748	0.4824	0.3962	0.4191	0.5394	0.6580	0.7280	0.7649	(94)
Useful gains	314.9453	337.0480	342.7743	340.1599	315.3480	260.6402	204.5416	204.6101	247.2836	274.7554	291.3386	305.6758	(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	1098.4259	1072.0605	979.7836	825.6421	652.8517	451.7439	309.6066	320.2439	475.8237	691.2945	901.6855	1080.9868	(97)
Space heating kWh	582.9096	493.9283	473.9349	349.5472	251.1027	0.0000	0.0000	0.0000	0.0000	309.9051	439.4498	576.8313	(98a)
Space heating requirement - total per year (kWh/year)												3477.6089	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	582.9096	493.9283	473.9349	349.5472	251.1027	0.0000	0.0000	0.0000	0.0000	309.9051	439.4498	576.8313	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3477.6089	
Space heating per m2										(98c) / (4) =		67.9220	(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 %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	582.9096	493.9283	473.9349	349.5472	251.1027	0.0000	0.0000	0.0000	0.0000	309.9051	439.4498	576.8313	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	582.9096	493.9283	473.9349	349.5472	251.1027	0.0000	0.0000	0.0000	0.0000	309.9051	439.4498	576.8313	(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	236.2147	208.7981	221.1869	192.5320	185.4065	165.6923	162.3423	169.4357	172.0464	193.5269	207.8946	233.3445	(64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	236.2147	208.7981	221.1869	192.5320	185.4065	165.6923	162.3423	169.4357	172.0464	193.5269	207.8946	233.3445	(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	13.0905	11.8237	13.0905	12.6682	13.0905	12.6682	13.0905	13.0905	12.6682	13.0905	12.6682	13.0905	(231)
Lighting	17.3014	13.8798	12.4973	9.1560	7.0724	5.7782	6.4517	8.3861	10.8927	14.2919	16.1426	17.7823	(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												3477.6089	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												2348.4208	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)													
mechanical ventilation fans (SFP = 1.0500)													154.1299 (230a)
Total electricity for the above, kWh/year													154.1299 (231)
Electricity for lighting (calculated in Appendix L)													139.6324 (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													6119.7920 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3477.6089	0.1530	532.2132 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2348.4208	0.1411	331.3744 (264)
Space and water heating			863.5876 (265)
Pumps, fans and electric keep-hot	154.1299	0.1387	21.3797 (267)
Energy for lighting	139.6324	0.1443	20.1533 (268)
Total CO2, kg/year			905.1206 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			17.6800 (273)

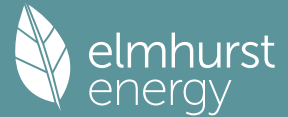
13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3477.6089	1.5666	5447.9733 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2348.4208	1.5218	3573.7476 (278)
Space and water heating			9021.7209 (279)
Pumps, fans and electric keep-hot	154.1299	1.5128	233.1677 (281)
Energy for lighting	139.6324	1.5338	214.1728 (282)
Total Primary energy kWh/year			9469.0615 (286)
Dwelling Primary energy Rate (DPER)			184.9400 (287)

Appendix B – Renewables Stage SAP Reports



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Property Reference	250813-5Court-Be Green-EPC A				Issued on Date	05/09/2025
Assessment Reference	Flat 2 2B3P Be Green_New		Prop Type Ref			
Property						
SAP Rating	93 A	DER	-0.29	TER		
Environmental	100 A	% DER < TER				N/A
CO ₂ Emissions (t/year)	-0.17	DFEE	44.38	TFEE		
Compliance Check	N/A	% DFEE < TFEE				
% DPER < TPER		DPER	27.25	TPER		
Assessor Details	Mr. Georgios Sigalas				Assessor ID	T822-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	66.1500 (1b)	2.3500 (2b)	155.4525 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.1500		155.4525 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 155.4525 (5)

2. Ventilation rate

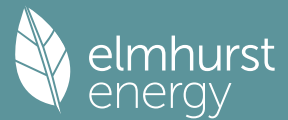
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	5.0000 (17)
Infiltration rate	0.2500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2125 (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	0.2709	0.2656	0.2603	0.2338	0.2284	0.2019	0.2019	0.1966	0.2125	0.2284	0.2391	0.2497 (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	0.3794	0.3741	0.3688	0.3423	0.3369	0.3104	0.3104	0.3051	0.3210	0.3369	0.3476	0.3582 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
East Facing Window			0.6000	1.1450	0.6870		(27)
South Facing Windows			6.2200	1.1450	7.1221		(27)
Entrance Door			2.1000	1.2000	2.5200		(26)
West Facing Windows			6.6600	1.1450	7.6260		(27)
Heatloss Floor 1			66.1500	0.1500	9.9225	110.0000	7276.5000 (28a)
External Wall 1	66.3600	15.5800	50.7800	0.2200	11.1716	9.0000	457.0200 (29a)
Total net area of external elements Aum (A, m ²)			132.5100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 39.0492		(33)
Main dwelling							
Party Wall 1			18.1200	0.0000	0.0000	20.0000	362.4000 (32)
Party Ceiling 1			66.1500			20.0000	1323.0000 (32b)
Internal Wall 1			99.3600			9.0000	894.2400 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 10313.1600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							155.9057 (35)

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Thermal bridges (User defined value 0.100 * total exposed area)
Point Thermal bridges (36a) = 13.2510 (36)
Total fabric heat loss (33) + (36) + (36a) = 52.3002 (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	19.4649	19.1924	18.9198	17.5572	17.2847	15.9220	15.9220	15.6495	16.4671	17.2847	17.8297	18.3748 (38)
Heat transfer coeff	71.7651	71.4926	71.2200	69.8574	69.5849	68.2222	68.2222	67.9497	68.7673	69.5849	70.1299	70.6750 (39)
Average = Sum(39)m / 12 =												69.7893
HLP	1.0849	1.0808	1.0766	1.0560	1.0519	1.0313	1.0313	1.0272	1.0396	1.0519	1.0602	1.0684 (40)
HLP (average)												1.0550
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1492 (42)
Hot water usage for mixer showers												
	106.3849	104.7861	102.4564	97.9990	94.7095	91.0410	88.9559	91.2680	93.8024	97.7412	102.2944	105.9773 (42a)
Hot water usage for baths												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses												
	36.6395	35.3072	33.9748	32.6425	31.3101	29.9778	29.9778	31.3101	32.6425	33.9748	35.3072	36.6395 (42c)
Average daily hot water use (litres/day)												131.3920 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	143.0244	140.0933	136.4313	130.6415	126.0196	121.0188	118.9337	122.5781	126.4449	131.7161	137.6016	142.6168 (44)
Energy conte	226.5157	199.4910	209.6898	178.8416	169.6466	148.8068	143.8400	151.7773	155.9193	178.7374	196.0387	223.3035 (45)
Energy content (annual)										Total = Sum(45)m =		2182.6078
Distribution loss (46)m = 0.15 x (45)m												
	33.9774	29.9237	31.4535	26.8262	25.4470	22.3210	21.5760	22.7666	23.3879	26.8106	29.4058	33.4955 (46)
Water storage loss:												
Store volume												269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												
Temperature factor from Table 2b												1.7700 (48)
Enter (49) or (54) in (55)												0.5400 (49)
Total storage loss												0.9558 (55)
	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (56)
If cylinder contains dedicated solar storage												
	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	256.1455	226.2534	239.3196	207.5156	199.2764	177.4808	173.4698	181.4071	184.5933	208.3672	224.7127	252.9333 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h												
	256.1455	226.2534	239.3196	207.5156	199.2764	177.4808	173.4698	181.4071	184.5933	208.3672	224.7127	252.9333 (64)
Total per year (kWh/year) = Sum(64)m =												2531.4748 (64)
12Total per year (kWh/year)												2531 (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												
	75.3165	66.3308	69.7219	59.4648	56.4075	49.4783	47.8268	50.4660	51.8432	59.4302	65.1829	74.2484 (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	107.4579	107.4579	107.4579	107.4579	107.4579	107.4579	107.4579	107.4579	107.4579	107.4579	107.4579	107.4579 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	102.9325	113.9610	102.9325	106.3636	102.9325	106.3636	102.9325	102.9325	106.3636	102.9325	106.3636	102.9325 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	188.1502	190.1026	185.1826	174.7084	161.4867	149.0602	140.7585	138.8061	143.7261	154.2003	167.4219	179.8485 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	33.7458	33.7458	33.7458	33.7458	33.7458	33.7458	33.7458	33.7458	33.7458	33.7458	33.7458	33.7458 (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)												
	-85.9663	-85.9663	-85.9663	-85.9663	-85.9663	-85.9663	-85.9663	-85.9663	-85.9663	-85.9663	-85.9663	-85.9663 (71)
Water heating gains (Table 5)												
	101.2318	98.7065	93.7122	82.5901	75.8165	68.7198	64.2833	67.8306	72.0044	79.8793	90.5318	99.7962 (72)
Total internal gains	447.5518	458.0074	437.0646	418.8994	395.4731	379.3810	363.2117	364.8066	377.3315	392.2494	419.5547	437.8146 (73)

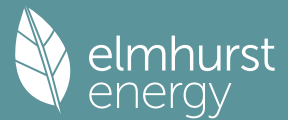
6. Solar gains

[Jan]			Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
East			0.6000	19.6403	0.5000	0.6700	0.7700	2.7358 (76)				
South			6.2200	46.7521	0.5000	0.3700	0.7700	37.2817 (78)				
West			6.6600	19.6403	0.5000	0.5200	0.7700	23.5683 (80)				
Solar gains	63.5858	112.5142	162.5181	211.4947	243.0664	243.2052	233.7469	210.4452	179.8047	126.9139	76.9896	53.8460 (83)
Total gains	511.1376	570.5216	599.5827	630.3942	638.5395	622.5861	596.9586	575.2517	557.1361	519.1633	496.5443	491.6606 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	39.9187	40.0708	40.2242	41.0088	41.1694	41.9917	41.9917	42.1601	41.6589	41.1694	40.8494	40.5344
alpha	3.6612	3.6714	3.6816	3.7339	3.7446	3.7994	3.7994	3.8107	3.7773	3.7446	3.7233	3.7023
util living area	0.9742	0.9602	0.9385	0.8867	0.7945	0.6348	0.4838	0.5177	0.7231	0.8973	0.9585	0.9772 (86)
MIT	19.3562	19.5829	19.8948	20.3231	20.6690	20.9014	20.9729	20.9649	20.8298	20.3896	19.8217	19.3341 (87)
Th 2	20.0132	20.0166	20.0200	20.0369	20.0403	20.0573	20.0573	20.0607	20.0505	20.0403	20.0335	20.0267 (88)
util rest of house	0.9691	0.9524	0.9260	0.8628	0.7500	0.5608	0.3880	0.4222	0.6556	0.8708	0.9490	0.9727 (89)
MIT 2	18.1092	18.3967	18.7897	19.3267	19.7321	19.9865	20.0444	20.0427	19.9166	19.4182	18.7127	18.0903 (90)
Living area fraction	18.6295	18.8917	19.2508	19.7424	20.1230	20.3682	20.4318	20.4275	20.2977	19.8235	19.1754	18.6092 (92)
MIT	18.6295	18.8917	19.2508	19.7424	20.1230	20.3682	20.4318	20.4275	20.2977	19.8235	19.1754	18.6092 (93)
Temperature adjustment												0.0000
adjusted MIT	18.6295	18.8917	19.2508	19.7424	20.1230	20.3682	20.4318	20.4275	20.2977	19.8235	19.1754	18.6092 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9595	0.9410	0.9140	0.8545	0.7542	0.5863	0.4270	0.4606	0.6744	0.8639	0.9384	0.9639 (94)
Useful gains	490.4591	536.8848	548.0159	538.6511	481.5784	365.0333	254.9135	264.9623	375.7604	448.4846	465.9434	473.9228 (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	1028.3564	1000.2999	908.1114	757.4237	586.1152	393.5218	261.4137	273.6650	426.1956	641.8189	846.8466	1018.3730 (97)
Space heating kWh	400.1956	311.4149	267.9110	157.5163	77.7754	0.0000	0.0000	0.0000	0.0000	143.8407	274.2503	405.0709 (98a)
Space heating requirement - total per year (kWh/year)												2037.9752
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	400.1956	311.4149	267.9110	157.5163	77.7754	0.0000	0.0000	0.0000	0.0000	143.8407	274.2503	405.0709 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2037.9752
Space heating per m2										(98c) / (4) =		30.8084 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	400.1956	311.4149	267.9110	157.5163	77.7754	0.0000	0.0000	0.0000	0.0000	143.8407	274.2503	405.0709 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	400.1956	311.4149	267.9110	157.5163	77.7754	0.0000	0.0000	0.0000	0.0000	143.8407	274.2503	405.0709 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	256.1455	226.2534	239.3196	207.5156	199.2764	177.4808	173.4698	181.4071	184.5933	208.3672	224.7127	252.9333 (64)
Efficiency of water heater												336.8842 (216)
(217)m	336.8842	336.8842	336.8842	336.8842	336.8842	336.8842	336.8842	336.8842	336.8842	336.8842	336.8842	336.8842 (217)
Fuel for water heating, kWh/month	76.0337	67.1606	71.0391	61.5985	59.1528	52.6830	51.4924	53.8485	54.7943	61.8513	66.7033	75.0802 (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	16.9128	15.2761	16.9128	16.3672	16.9128	16.3672	16.9128	16.3672	16.9128	16.3672	16.9128	16.9128 (231)
Lighting	21.0047	16.8507	15.1722	11.1158	8.5862	7.0150	7.8326	10.1811	13.2242	17.3509	19.5978	21.5884 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-60.8070	-93.8497	-144.9356	-160.0305	-156.0523	-120.7058	-118.9584	-114.9081	-103.8601	-102.4797	-67.7740	-51.2053 (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	-24.7108	-62.3110	-153.8010	-283.0171	-424.7765	-463.1875	-451.8544	-362.1617	-239.3294	-106.3466	-36.3878	-18.4802 (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												2037.9752 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												336.8842
Water heating fuel used												751.4377 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)												
mechanical ventilation fans (SFP = 1.0500)												199.1347 (230a)
Total electricity for the above, kWh/year												199.1347 (231)
Electricity for lighting (calculated in Appendix L)												169.5196 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3921.9303 (233)
Wind generation												0.0000 (234)

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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	-763.8631 (238)

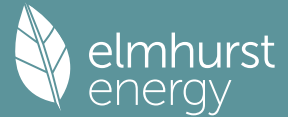
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2037.9752	0.1550	315.8405 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	751.4377	0.1412	106.1005 (264)
Space and water heating			421.9411 (265)
Pumps, fans and electric keep-hot	199.1347	0.1387	27.6224 (267)
Energy for lighting	169.5196	0.1443	24.4669 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1295.5664	0.1361	-176.3332
PV Unit electricity exported	-2626.3639	0.1206	-316.8371
Total			-493.1703 (269)
Total CO2, kg/year			-19.1398 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.2900 (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	2037.9752	1.5738	3207.2859 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	751.4377	1.5221	1143.7702 (278)
Space and water heating			4351.0561 (279)
Pumps, fans and electric keep-hot	199.1347	1.5128	301.2509 (281)
Energy for lighting	169.5196	1.5338	260.0149 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1295.5664	1.5032	-1947.4521
PV Unit electricity exported	-2626.3639	0.4425	-1162.2153
Total			-3109.6674 (283)
Total Primary energy kWh/year			1802.6545 (286)
Dwelling Primary energy Rate (DPER)			27.2500 (287)

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Property Reference	250813-5Court-Be Green-EPC A				Issued on Date	05/09/2025
Assessment Reference	Flat 3 1B2P- Be Green_New		Prop Type Ref			
Property						
SAP Rating	93 A	DER	-0.62	TER		
Environmental	101 A	% DER < TER				N/A
CO ₂ Emissions (t/year)	-0.17	DFEE	50.65	TFEE		
Compliance Check	N/A	% DFEE < TFEE				
% DPER < TPER		DPER	30.36	TPER		
Assessor Details	Mr. Georgios Sigalas				Assessor ID	T822-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.5000 (1b)	2.3500 (2b)	121.0250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	121.0250 (5)

2. Ventilation rate

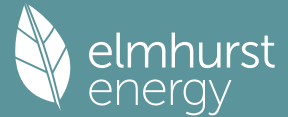
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	5.0000 (17)
Infiltration rate	0.2500 (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) = 0.2313 (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	0.2948	0.2891	0.2833	0.2544	0.2486	0.2197	0.2197	0.2139	0.2313	0.2486	0.2602	0.2717 (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	0.4033	0.3976	0.3918	0.3629	0.3571	0.3282	0.3282	0.3224	0.3398	0.3571	0.3687	0.3802 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
South Facing Windows			10.4800	1.1450	12.0000		(27)
Entrance Door			2.1000	1.2000	2.5200		(26)
East Facing Windows			1.2600	1.1450	1.4427		(27)
West Facing Windows			0.8400	1.1450	0.9618		(27)
Heatloss Floor 1			51.5000	0.1500	7.7250	110.0000	5665.0000 (28a)
External Wall 1	69.8200	14.6800	55.1400	0.2200	12.1308	9.0000	496.2600 (29a)
Total net area of external elements Aum (A, m ²)			121.3200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.7804		(33)
Main dwelling							
Party Wall 1			8.4000	0.0000	0.0000	20.0000	168.0000 (32)
Party Ceiling 1			51.5000			20.0000	1030.0000 (32b)
Internal Wall 1			83.4200			9.0000	750.7800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8110.0400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							157.4765 (35)

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Thermal bridges (User defined value 0.100 * total exposed area)
 Point Thermal bridges (36a) = 12.1320 (36)
 Total fabric heat loss (33) + (36) + (36a) = 48.9124 (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	16.1088	15.8780	15.6471	14.4926	14.2617	13.1072	13.1072	12.8763	13.5690	14.2617	14.7235	15.1853	(38)
Heat transfer coeff	65.0212	64.7903	64.5594	63.4050	63.1741	62.0196	62.0196	61.7887	62.4814	63.1741	63.6359	64.0977	(39)
Average = Sum(39)m / 12 =												63.3472	
HLP	1.2625	1.2581	1.2536	1.2312	1.2267	1.2043	1.2043	1.1998	1.2132	1.2267	1.2356	1.2446	(40)
HLP (average)												1.2300	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7343 (42)
Hot water usage for mixer showers													
94.0580	92.6445	90.5848	86.6438	83.7354	80.4921	78.6485	80.6927	82.9335	86.4159	90.4415	93.6976	93.6976	(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
32.3912	31.2133	30.0354	28.8576	27.6797	26.5019	26.5019	27.6797	28.8576	30.0354	31.2133	32.3912	32.3912	(42c)
Average daily hot water use (litres/day)												116.1649	(43)
Daily hot water use													
126.4492	123.8578	120.6202	115.5014	111.4152	106.9939	105.1504	108.3724	111.7911	116.4513	121.6548	126.0888	126.0888	(44)
Energy conte	200.2646	176.3719	185.3888	158.1156	149.9862	131.5615	127.1703	134.1877	137.8496	158.0234	173.3196	197.4246	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.0397	26.4558	27.8083	23.7173	22.4979	19.7342	19.0755	20.1282	20.6774	23.7035	25.9979	29.6137	29.6137	(46)
Water storage loss:													
Store volume												269.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9558	(55)
Total storage loss													
29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	(56)
If cylinder contains dedicated solar storage													
29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
229.8944	203.1343	215.0186	186.7896	179.6160	160.2355	156.8001	163.8175	166.5236	187.6532	201.9936	227.0544	227.0544	(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													
229.8944	203.1343	215.0186	186.7896	179.6160	160.2355	156.8001	163.8175	166.5236	187.6532	201.9936	227.0544	227.0544	(64)
12Total per year (kWh/year)												2278.5308	(64)
Electric shower(s)												2279	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
66.5880	58.6437	61.6418	52.5734	49.8704	43.7442	42.2841	44.6174	45.8350	52.5428	57.6288	65.6437	65.6437	(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	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
79.7631	88.3092	79.7631	82.4219	79.7631	82.4219	79.7631	79.7631	82.4219	79.7631	82.4219	79.7631	79.7631	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605	144.4605	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	(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)													
-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	(71)
Water heating gains (Table 5)													
89.5000	87.2673	82.8518	73.0187	67.0301	60.7558	56.8335	59.9696	63.6597	70.6220	80.0400	88.2308	88.2308	(72)
Total internal gains													
369.4066	377.2882	360.3747	344.7872	325.5197	311.9228	298.6735	300.2414	310.5422	323.2588	345.9557	361.4691	361.4691	(73)

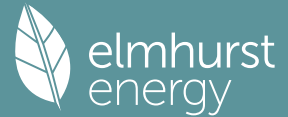
6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
South					10.4800	46.7521	0.5000	0.4300			0.7700	73.0018 (78)
East					1.2600	19.6403	0.5000	0.5600			0.7700	4.8019 (76)
West					0.8400	19.6403	0.5000	0.5600			0.7700	3.2012 (80)
Solar gains	81.0049	135.2139	178.0787	209.7301	225.4509	219.7914	213.5693	202.3683	189.0775	147.5316	96.5110	69.6617 (83)
Total gains	450.4115	512.5022	538.4534	554.5173	550.9707	531.7142	512.2428	502.6097	499.6197	470.7904	442.4667	431.1308 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
 Utilisation factor for gains for living area, nil,m (see Table 9a)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	34.6470	34.7704	34.8948	35.5302	35.6600	36.3238	36.3238	36.4595	36.0554	35.6600	35.4012	35.1462
alpha	3.3098	3.3180	3.3263	3.3687	3.3773	3.4216	3.4216	3.4306	3.4037	3.3773	3.3601	3.3431
util living area	0.9675	0.9495	0.9257	0.8775	0.7957	0.6506	0.5020	0.5277	0.7129	0.8802	0.9488	0.9714 (86)
MIT	19.1411	19.4069	19.7457	20.1912	20.5697	20.8520	20.9543	20.9448	20.7831	20.2999	19.6621	19.1098 (87)
Th 2	19.8703	19.8738	19.8774	19.8951	19.8987	19.9166	19.9166	19.9202	19.9094	19.8987	19.8916	19.8845 (88)
util rest of house	0.9608	0.9394	0.9101	0.8503	0.7471	0.5679	0.3908	0.4185	0.6378	0.8485	0.9367	0.9654 (89)
MIT 2	17.7434	18.0786	18.5036	19.0607	19.5052	19.8132	19.8960	19.8935	19.7448	19.2027	18.4156	17.7131 (90)
Living area fraction	18.3888	18.6919	19.0771	19.5827	19.9967	20.2928	20.3847	20.3790	FLA = Living area / (4) =	19.7093	18.9912	0.4617 (91)
MIT	18.3888	18.6919	19.0771	19.5827	19.9967	20.2928	20.3847	20.3790	20.2242	19.7093	18.9912	18.3580 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3888	18.6919	19.0771	19.5827	19.9967	20.2928	20.3847	20.3790	20.2242	19.7093	18.9912	18.3580 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9491	0.9259	0.8966	0.8414	0.7519	0.5983	0.4405	0.4667	0.6612	0.8421	0.9243	0.9546 (94)
Useful gains	427.4954	474.5049	482.7776	466.5740	414.2874	318.1271	225.6302	234.5769	330.3567	396.4528	408.9574	411.5611 (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	916.0678	893.5838	811.9729	677.3351	524.1378	353.0672	234.7238	245.8553	382.6507	575.4745	756.7044	907.4974 (97)
Space heating kWh	363.4979	281.6210	244.9213	151.7480	81.7287	0.0000	0.0000	0.0000	0.0000	133.1922	250.3778	368.9766 (98a)
Space heating requirement - total per year (kWh/year)												1876.0635
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	363.4979	281.6210	244.9213	151.7480	81.7287	0.0000	0.0000	0.0000	0.0000	133.1922	250.3778	368.9766 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1876.0635
Space heating per m2										(98c) / (4) =		36.4284 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	363.4979	281.6210	244.9213	151.7480	81.7287	0.0000	0.0000	0.0000	0.0000	133.1922	250.3778	368.9766 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	363.4979	281.6210	244.9213	151.7480	81.7287	0.0000	0.0000	0.0000	0.0000	133.1922	250.3778	368.9766 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	229.8944	203.1343	215.0186	186.7896	179.6160	160.2355	156.8001	163.8175	166.5236	187.6532	201.9936	227.0544 (64)
Efficiency of water heater												337.7120 (216)
(217)m	337.7120	337.7120	337.7120	337.7120	337.7120	337.7120	337.7120	337.7120	337.7120	337.7120	337.7120	337.7120 (217)
Fuel for water heating, kWh/month	68.0741	60.1501	63.6692	55.3103	53.1861	47.4474	46.4301	48.5081	49.3093	55.5660	59.8124	67.2331 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.1672	11.8929	13.1672	12.7424	13.1672	12.7424	13.1672	13.1672	12.7424	13.1672	12.7424	13.1672 (231)
Lighting	15.9333	12.7823	11.5091	8.4320	6.5131	5.3213	5.9415	7.7230	10.0314	13.1617	14.8662	16.3762 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-61.8764	-88.4290	-129.3625	-141.6927	-138.7101	-102.0679	-100.5584	-97.4318	-88.7204	-93.3225	-66.9613	-53.5146 (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	-28.2353	-63.3334	-142.0331	-255.6448	-392.4407	-439.4561	-425.4365	-333.0733	-219.4105	-103.2868	-39.9824	-21.9739 (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												1876.0635 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												337.7120
Water heating fuel used												674.6964 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)												
mechanical ventilation fans (SFP = 1.0500)												155.0330 (230a)
Total electricity for the above, kWh/year												155.0330 (231)
Electricity for lighting (calculated in Appendix L)												128.5912 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3626.9542 (233)
Wind generation												0.0000 (234)

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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	-792.5701 (238)

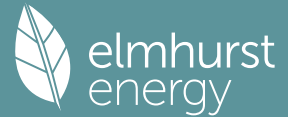
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1876.0635	0.1548	290.3350 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	674.6964	0.1412	95.2352 (264)
Space and water heating			385.5702 (265)
Pumps, fans and electric keep-hot	155.0330	0.1387	21.5050 (267)
Energy for lighting	128.5912	0.1443	18.5597 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1162.6475	0.1370	-159.2710
PV Unit electricity exported	-2464.3066	0.1211	-298.3347
Total			-457.6057 (269)
Total CO2, kg/year			-31.9708 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.6200 (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	1876.0635	1.5729	2950.9357 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	674.6964	1.5219	1026.8500 (278)
Space and water heating			3977.7857 (279)
Pumps, fans and electric keep-hot	155.0330	1.5128	234.5340 (281)
Energy for lighting	128.5912	1.5338	197.2375 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1162.6475	1.5065	-1751.4998
PV Unit electricity exported	-2464.3066	0.4440	-1094.2689
Total			-2845.7687 (283)
Total Primary energy kWh/year			1563.7884 (286)
Dwelling Primary energy Rate (DPER)			30.3600 (287)

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Property Reference	250813-5Court-Be Green-EPC A				Issued on Date	05/09/2025
Assessment Reference	Flat 6 1B2P- Be Green_New		Prop Type Ref			
Property						
SAP Rating	93 A	DER	0.99	TER		
Environmental	100 A	% DER < TER				N/A
CO ₂ Emissions (t/year)	-0.04	DFEE	34.31	TFEE		
Compliance Check	N/A	% DFEE < TFEE				
% DPER < TPER		DPER	26.70	TPER		
Assessor Details	Mr. Georgios Sigalas				Assessor ID	T822-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	53.1000 (1b)	2.3500 (2b)	124.7850 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	124.7850 (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	5.0000 (17)
Infiltration rate	0.2500 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1938 (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	0.2470	0.2422	0.2373	0.2131	0.2083	0.1841	0.1841	0.1792	0.1938	0.2083	0.2180	0.2277 (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	0.3555	0.3507	0.3458	0.3216	0.3168	0.2926	0.2926	0.2877	0.3023	0.3168	0.3265	0.3362 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
East Facing Window			7.9000	1.1450	9.0458		(27)
Entrance Door			2.1000	1.2000	2.5200		(26)
North Windows			0.8400	1.1450	0.9618		(27)
South Windows			0.8400	1.1450	0.9618		(27)
Heatloss Floor 1			53.1000	0.1500	7.9650	110.0000	5841.0000 (28a)
External Wall 1	21.9300	11.6800	10.2500	0.2200	2.2550	30.0000	307.5000 (29a)
Total net area of external elements Aum (A, m ²)			75.0300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.7095		(33)
Main dwelling							
Party Wall 1			52.0800	0.0000	0.0000	20.0000	1041.6000 (32)
Party Ceiling 1			53.1000			20.0000	1062.0000 (32b)
Internal Wall 1			79.3800			9.0000	714.4200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	8966.5200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							168.8610 (35)

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Thermal bridges (User defined value 0.100 * total exposed area)

Point Thermal bridges

Total fabric heat loss

(33) + (36) + (36a) = 31.2125 (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	14.6404	14.4410	14.2415	13.2442	13.0448	12.0474	12.0474	11.8480	12.4464	13.0448	13.4437	13.8426	(38)
Heat transfer coeff	45.8529	45.6534	45.4540	44.4567	44.2572	43.2599	43.2599	43.0605	43.6588	44.2572	44.6561	45.0551	(39)
Average = Sum(39)m / 12 =												44.4068	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8635	0.8598	0.8560	0.8372	0.8335	0.8147	0.8147	0.8109	0.8222	0.8335	0.8410	0.8485	(40)
HLP (average)												0.8363	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy

Hot water usage for mixer showers 1.7815 (42)

Hot water usage for baths 95.0945 (42a)

Hot water usage for other uses 0.0000 (42b)

Hot water usage for other uses 32.8744 (42c)

Average daily hot water use (litres/day) 117.8970 (43)

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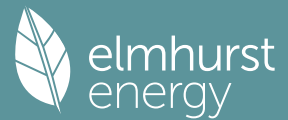
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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	54.3194	54.5567	54.7961	56.0253	56.2778	57.5752	57.5752	57.8419	57.0492	56.2778	55.7751	55.2812
alpha	4.6213	4.6371	4.6531	4.7350	4.7519	4.8383	4.8383	4.8561	4.8033	4.7519	4.7183	4.6854
util living area	0.9717	0.9553	0.9268	0.8507	0.7216	0.5331	0.3907	0.4246	0.6434	0.8688	0.9509	0.9750 (86)
MIT	19.9464	20.1260	20.3653	20.6813	20.8851	20.9794	20.9962	20.9945	20.9495	20.6981	20.2970	19.9319 (87)
Th 2	20.1986	20.2018	20.2051	20.2212	20.2244	20.2406	20.2406	20.2439	20.2341	20.2244	20.2180	20.2115 (88)
util rest of house	0.9662	0.9470	0.9131	0.8243	0.6777	0.4746	0.3245	0.3566	0.5835	0.8398	0.9404	0.9701 (89)
MIT 2	18.9758	19.2028	19.5017	19.8925	20.1210	20.2264	20.2389	20.2411	20.1959	19.9217	19.4316	18.9673 (90)
Living area fraction												0.5516 (91)
MIT	19.5112	19.7121	19.9781	20.3276	20.5425	20.6417	20.6566	20.6567	20.6116	20.3500	19.9089	19.4994 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5112	19.7121	19.9781	20.3276	20.5425	20.6417	20.6566	20.6567	20.6116	20.3500	19.9089	19.4994 (93)

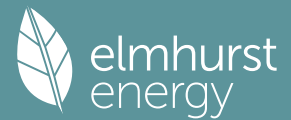
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9606	0.9410	0.9087	0.8282	0.6963	0.5059	0.3609	0.3940	0.6137	0.8449	0.9355	0.9648 (94)
Useful gains	400.3477	429.5346	433.5212	418.1576	359.4921	256.0923	174.6611	182.0480	271.0565	347.8984	375.2707	388.5753 (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	697.4774	676.2213	612.6312	508.0328	391.3438	261.3645	175.4895	183.2940	284.2888	431.5058	571.9969	689.3159 (97)
Space heating kWh	221.0645	165.7735	133.2578	64.7102	23.6976	0.0000	0.0000	0.0000	0.0000	62.2040	141.6429	223.7510 (98a)
Space heating requirement - total per year (kWh/year)												1036.1015
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	221.0645	165.7735	133.2578	64.7102	23.6976	0.0000	0.0000	0.0000	0.0000	62.2040	141.6429	223.7510 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1036.1015
Space heating per m2										(98c) / (4) =		19.5123 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	221.0645	165.7735	133.2578	64.7102	23.6976	0.0000	0.0000	0.0000	0.0000	62.2040	141.6429	223.7510 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	221.0645	165.7735	133.2578	64.7102	23.6976	0.0000	0.0000	0.0000	0.0000	62.2040	141.6429	223.7510 (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)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	232.8805	205.7641	217.7828	189.1472	181.8524	162.1972	158.6963	165.8184	168.5791	190.0094	204.5779	229.9982 (64)
Efficiency of water heater												337.6179 (216)
(217)m	337.6179	337.6179	337.6179	337.6179	337.6179	337.6179	337.6179	337.6179	337.6179	337.6179	337.6179	337.6179 (217)
Fuel for water heating, kWh/month	68.9775	60.9459	64.5057	56.0241	53.8634	48.0417	47.0047	49.1142	49.9319	56.2794	60.5945	68.1238 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.5763	12.2624	13.5763	13.1383	13.5763	13.1383	13.5763	13.5763	13.1383	13.5763	13.1383	13.5763 (231)
Lighting	17.1385	13.7492	12.3796	9.0698	7.0058	5.7238	6.3909	8.3072	10.7902	14.1573	15.9906	17.6149 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-32.0054	-50.6699	-80.8665	-93.7026	-98.3789	-87.7302	-86.3119	-80.5733	-68.9634	-57.5635	-36.1679	-26.8039 (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)	-10.7535	-27.4104	-68.5017	-127.8212	-192.0356	-204.2165	-199.0945	-157.9616	-102.6314	-46.8497	-15.9130	-8.0389 (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												1036.1015 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												337.6179
Water heating fuel used												683.4068 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)												
mechanical ventilation fans (SFP = 1.0500)												159.8496 (230a)
Total electricity for the above, kWh/year												159.8496 (231)
Electricity for lighting (calculated in Appendix L)												138.3177 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1960.9652 (233)
Wind generation												0.0000 (234)

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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	56.7104 (238)

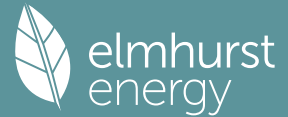
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1036.1015	0.1560	161.6466 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	683.4068	0.1412	96.4684 (264)
Space and water heating			258.1150 (265)
Pumps, fans and electric keep-hot	159.8496	0.1387	22.1731 (267)
Energy for lighting	138.3177	0.1443	19.9635 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-799.7373	0.1342	-107.2871
PV Unit electricity exported	-1161.2279	0.1208	-140.3144
Total			-247.6016 (269)
Total CO2, kg/year			52.6501 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.9900 (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	1036.1015	1.5776	1634.5467 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	683.4068	1.5220	1040.1210 (278)
Space and water heating			2674.6676 (279)
Pumps, fans and electric keep-hot	159.8496	1.5128	241.8205 (281)
Energy for lighting	138.3177	1.5338	212.1563 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-799.7373	1.4958	-1196.2583
PV Unit electricity exported	-1161.2279	0.4433	-514.7468
Total			-1711.0051 (283)
Total Primary energy kWh/year			1417.6393 (286)
Dwelling Primary energy Rate (DPER)			26.7000 (287)

Full SAP Calculation Printout



Property Reference	250813-5Court-Be Green-EPC A				Issued on Date	05/09/2025
Assessment Reference	Flat 12 2B3P_Be Green_New	Prop Type Ref				
Property						
SAP Rating	92 A	DER	0.70	TER	12.66	
Environmental	100 A	% DER < TER				94.47
CO ₂ Emissions (t/year)	-0.04	DFEE	31.45	TFEE	37.38	
Compliance Check	See BREL	% DFEE < TFEE				15.86
% DPER < TPER	62.35	DPER	25.01	TPER	66.44	
Assessor Details	Mr. Georgios Sigalas				Assessor ID	T822-0001
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)
Main dwelling	67.4000 (1b)	2.3500 (2b)	158.3900 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.4000		158.3900 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 158.3900 (5)

2. Ventilation rate

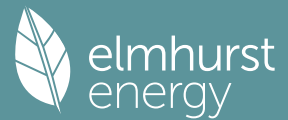
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	5.0000 (17)
Infiltration rate	0.2500 (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) = 0.2313 (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	0.2948	0.2891	0.2833	0.2544	0.2486	0.2197	0.2197	0.2139	0.2313	0.2486	0.2602	0.2717 (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	0.4033	0.3976	0.3918	0.3629	0.3571	0.3282	0.3282	0.3224	0.3398	0.3571	0.3687	0.3802 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
South Facing Window			4.2000	1.1450	4.8092		(27)
West Facing Windows			2.8400	1.1450	3.2519		(27)
Entrance Door			2.1000	1.2000	2.5200		(26)
Heatloss Floor 1			23.4900	0.1200	2.8188	9.0000	211.4100 (28b)
External Wall 1	60.3200	9.1400	51.1800	0.1500	7.6770	9.0000	460.6200 (29a)
External Roof 1	67.4000		67.4000	0.1000	6.7400	9.0000	606.6000 (30)
Total net area of external elements Aum (A, m ²)			151.2100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 27.8169		(33)
Main dwelling							
Party Wall 1			19.2000	0.0000	0.0000	9.0000	172.8000 (32)
Party Floor 1			43.9600			9.0000	395.6400 (32d)
Internal Wall 1			122.5100			9.0000	1102.5900 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 2949.6600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							43.7635 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	7.1100	0.0400	0.2844
E3 Sill	4.2000	0.0400	0.1680
E4 Jamb	22.0000	0.0400	0.8800
E9 Balcony between dwellings, wall insulation continuous	13.5400	0.0200	0.2708
E16 Corner (normal)	7.0500	0.0800	0.5640
E18 Party wall between dwellings	4.7000	0.0600	0.2820
E20 Exposed floor (normal)	19.6600	0.0800	1.5728
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.1700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.1700	0.0800	0.6536
E21 Exposed floor (inverted)	13.3900	0.0800	1.0712
E10 Eaves (insulation at ceiling level)	12.8500	0.0600	0.7710
E12 Gable (insulation at ceiling level)	12.8200	0.0500	0.6410
E7 Party floor between dwellings (in blocks of flats)	12.1300	0.0600	0.7278
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.8866 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	35.7035 (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	21.0823	20.7801	20.4779	18.9670	18.6648	17.1539	17.1539	16.8518	17.7583	18.6648	19.2692	19.8735	(38)
Heat transfer coeff	56.7857	56.4835	56.1814	54.6705	54.3683	52.8574	52.8574	52.5552	53.4618	54.3683	54.9727	55.5770	(39)
Average = Sum(39)m / 12 =													54.5949
HLP	0.8425	0.8380	0.8336	0.8111	0.8067	0.7842	0.7842	0.7798	0.7932	0.8067	0.8156	0.8246	(40)
HLP (average)													0.8100
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1814 (42)
Hot water usage for mixer showers	83.5922	82.3359	80.5054	77.0029	74.4182	71.5357	69.8973	71.7140	73.7055	76.8004	80.3781	83.2719	(42a)
Hot water usage for baths	26.2668	25.8767	25.3273	24.3144	23.5560	22.7150	22.2608	22.8063	23.4002	24.3001	25.3338	26.1780	(42b)
Hot water usage for other uses	36.9696	35.6252	34.2809	32.9365	31.5922	30.2478	30.2478	31.5922	32.9365	34.2809	35.6252	36.9696	(42c)
Average daily hot water use (litres/day)													135.0313 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	146.8285	143.8378	140.1136	134.2539	129.5663	124.4985	122.4059	126.1125	130.0422	135.3813	141.3371	146.4194	(44)
Energy conte	232.5404	204.8231	215.3493	183.7868	174.4212	153.0855	148.0393	156.1536	160.3550	183.7112	201.3606	229.2574	(45)
Energy content (annual)													Total = Sum(45)m = 2242.8837
Distribution loss (46)m = 0.15 x (45)m	34.8811	30.7235	32.3024	27.5680	26.1632	22.9628	22.2059	23.4230	24.0533	27.5567	30.2041	34.3886	(46)
Water storage loss:													
Store volume													269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.7700 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9558 (55)
Total storage loss	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(56)
If cylinder contains dedicated solar storage	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	262.1702	231.5855	244.9791	212.4608	204.0510	181.7595	177.6691	185.7834	189.0290	213.3410	230.0346	258.8872	(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	262.1702	231.5855	244.9791	212.4608	204.0510	181.7595	177.6691	185.7834	189.0290	213.3410	230.0346	258.8872	(64)
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2591.7507 (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	77.3197	68.1037	71.6037	61.1091	57.9951	50.9009	49.2231	51.9211	53.3181	61.0840	66.9524	76.2281	(65)

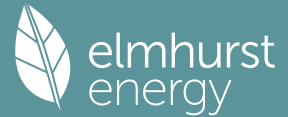
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	112.3997	124.4425	112.3997	116.1464	112.3997	116.1464	112.3997	112.3997	116.1464	112.3997	116.1464	112.3997	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	191.1544	193.1380	188.1394	177.4980	164.0652	151.4403	143.0060	141.0225	146.0210	156.6624	170.0952	182.7201	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	(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)	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	(71)
Water heating gains (Table 5)	103.9243	101.3448	96.2415	84.8738	77.9503	70.6957	66.1600	69.7864	74.0529	82.1021	92.9895	102.4571	(72)
Total internal gains	463.1992	474.6461	452.5014	434.2390	410.1361	394.0032	377.2866	378.9293	391.9410	406.8850	434.9518	453.2978	(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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South	4.2000	46.7521	0.5000	0.6200	0.7700	42.1837 (78)
West	2.8400	19.6403	0.5000	0.6700	0.7700	12.9492 (80)

Solar gains	55.1330	94.4175	129.7207	160.3051	178.2109	176.0756	170.1268	157.0666	140.4488	104.5737	66.1483	47.0994 (83)
Total gains	518.3322	569.0636	582.2220	594.5441	588.3469	570.0787	547.4133	535.9959	532.3899	511.4587	501.1001	500.3972 (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	14.4288	14.5060	14.5840	14.9871	15.0704	15.5011	15.5011	15.5903	15.3259	15.0704	14.9047	14.7426
alpha	1.9619	1.9671	1.9723	1.9991	2.0047	2.0334	2.0334	2.0394	2.0217	2.0047	1.9936	1.9828
util living area	0.8336	0.8019	0.7671	0.7014	0.6156	0.4883	0.3785	0.3975	0.5416	0.7000	0.7930	0.8405 (86)
MIT	18.1904	18.5270	18.9853	19.6419	20.2006	20.6613	20.8566	20.8371	20.5473	19.8445	18.9687	18.1744 (87)
Th 2	20.2166	20.2205	20.2243	20.2437	20.2476	20.2670	20.2670	20.2709	20.2592	20.2476	20.2398	20.2321 (88)
util rest of house	0.8225	0.7891	0.7514	0.6805	0.5862	0.4469	0.3251	0.3451	0.5019	0.6756	0.7780	0.8299 (89)
MIT 2	16.9258	17.3417	17.9103	18.7235	19.3995	19.9450	20.1531	20.1376	19.8155	18.9811	17.9027	16.9101 (90)
Living area fraction									fLA = Living area / (4) =			0.3591 (91)
MIT	17.3799	17.7673	18.2963	19.0532	19.6872	20.2022	20.4057	20.3888	20.0783	19.2911	18.2854	17.3640 (92)
Temperature adjustment												0.0000
adjusted MIT	17.3799	17.7673	18.2963	19.0532	19.6872	20.2022	20.4057	20.3888	20.0783	19.2911	18.2854	17.3640 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7724	0.7401	0.7055	0.6434	0.5624	0.4431	0.3356	0.3539	0.4915	0.6404	0.7313	0.7805 (94)
Useful gains	400.3650	421.1785	410.7642	382.5521	330.8687	252.5844	183.7047	189.6623	261.6861	327.5625	366.4771	390.5596 (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	742.7491	726.7900	662.7307	555.0822	434.2491	296.1175	201.1589	209.6299	319.6080	472.5184	614.8922	731.6179 (97)
Space heating kWh	254.7337	205.3710	187.4631	124.2217	76.9150	0.0000	0.0000	0.0000	0.0000	107.8472	178.8589	253.7474 (98a)
Space heating requirement - total per year (kWh/year)												1389.1579
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	254.7337	205.3710	187.4631	124.2217	76.9150	0.0000	0.0000	0.0000	0.0000	107.8472	178.8589	253.7474 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1389.1579
Space heating per m2										(98c) / (4) =		20.6107 (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)

Fraction of main heating from main system 2

0.0000 (203)

Fraction of total heating from main system 1

1.0000 (204)

Fraction of total heating from main system 2

0.0000 (205)

Efficiency of main space heating system 1 (in %)

100.0000 (206)

Efficiency of main space heating system 2 (in %)

0.0000 (207)

Efficiency of secondary/supplementary heating system, %

0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	254.7337	205.3710	187.4631	124.2217	76.9150	0.0000	0.0000	0.0000	0.0000	107.8472	178.8589	253.7474 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	254.7337	205.3710	187.4631	124.2217	76.9150	0.0000	0.0000	0.0000	0.0000	107.8472	178.8589	253.7474 (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)
Space heating fuel used, main 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)
Water heating												
Water heating requirement	262.1702	231.5855	244.9791	212.4608	204.0510	181.7595	177.6691	185.7834	189.0290	213.3410	230.0346	258.8872 (64)
Efficiency of water heater (217)m	336.6863	336.6863	336.6863	336.6863	336.6863	336.6863	336.6863	336.6863	336.6863	336.6863	336.6863	336.6863 (216)
Fuel for water heating, kWh/month	77.8678	68.7838	72.7618	63.1035	60.6057	53.9848	52.7699	55.1800	56.1440	63.3649	68.3231	76.8927 (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	17.2324	15.5647	17.2324	16.6765	17.2324	16.6765	17.2324	17.2324	16.6765	17.2324	16.6765	17.2324 (232)
Lighting	22.4528	18.0124	16.2182	11.8822	9.1781	7.4986	8.3726	10.8830	14.1360	18.5471	20.9489	23.0768 (231)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-41.8923	-66.1821	-106.1417	-125.6185	-133.9379	-109.3956	-107.6541	-101.1269	-87.4485	-76.3556	-47.4468	-35.1078 (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	-15.1195	-37.9250	-93.0160	-169.7465	-253.2813	-279.8666	-272.8878	-216.9196	-141.3444	-62.8618	-21.9944	-11.3492 (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												1389.1579 (211)
Space heating fuel - main system 2												0.0000 (213)

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	336.6863
Water heating fuel used	769.7820 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)	
mechanical ventilation fans (SFP = 1.0500)	202.8976 (230a)
Total electricity for the above, kWh/year	202.8976 (231)
Electricity for lighting (calculated in Appendix L)	181.2067 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2614.6202 (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	-71.5760 (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	1389.1579	0.1541	214.0150 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	769.7820	0.1412	108.6875 (264)
Space and water heating			322.7025 (265)
Pumps, fans and electric keep-hot	202.8976	0.1387	28.1444 (267)
Energy for lighting	181.2067	0.1443	26.1537 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1038.3080	0.1345	-139.6439
PV Unit electricity exported	-1576.3122	0.1207	-190.2122
Total			-329.8562 (269)
Total CO2, kg/year			47.1444 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.7000 (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	1389.1579	1.5704	2181.4883 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	769.7820	1.5221	1171.6801 (278)
Space and water heating			3353.1684 (279)
Pumps, fans and electric keep-hot	202.8976	1.5128	306.9435 (281)
Energy for lighting	181.2067	1.5338	277.9410 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1038.3080	1.4971	-1554.4423
PV Unit electricity exported	-1576.3122	0.4426	-697.7042
Total			-2252.1465 (283)
Total Primary energy kWh/year			1685.9063 (286)
Dwelling Primary energy Rate (DPER)			25.0100 (287)

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

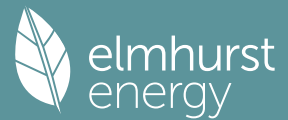
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	67.4000 (1b)	x 2.3500 (2b)	= 158.3900 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	67.4000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 158.3900 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1263 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3763 (18)

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Number of sides sheltered

1 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.9250 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.3481 \quad (21)$$

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	0.4438	0.4351	0.4264	0.3829	0.3742	0.3306	0.3306	0.3219	0.3481	0.3742	0.3916	0.4090	(22b)
Effective ac	0.5985	0.5946	0.5909	0.5733	0.5700	0.5547	0.5547	0.5518	0.5606	0.5700	0.5767	0.5836	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type			7.0400	1.1450	8.0611		(27)
Heatloss Floor 1			23.4900	0.1300	3.0537		(28b)
External Wall 1	60.3200	9.1400	51.1800	0.1800	9.2124		(29a)
External Roof 1	67.4000		67.4000	0.1100	7.4140		(30)
Total net area of external elements Aum(A, m2)			151.2100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.8412		(33)
Main dwelling							
Party Wall 1			19.2000	0.0000	0.0000		(32)

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

43.7635 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.1100	0.0500	0.3555
E3 Sill	4.2000	0.0500	0.2100
E4 Jamb	22.0000	0.0500	1.1000
E9 Balcony between dwellings, wall insulation continuous	13.5400	0.0200	0.2708
E16 Corner (normal)	7.0500	0.0900	0.6345
E18 Party wall between dwellings	4.7000	0.0600	0.2820
E20 Exposed floor (normal)	19.6600	0.3200	6.2912
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.1700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.1700	0.1200	0.9804
E21 Exposed floor (inverted)	13.3900	0.3200	4.2848
E10 Eaves (insulation at ceiling level)	12.8500	0.0600	0.7710
E12 Gable (insulation at ceiling level)	12.8200	0.0600	0.7692
E7 Party floor between dwellings (in blocks of flats)	12.1300	0.0700	0.8491

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

16.7985 (36)

Point Thermal Bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 46.6397 \quad (37)$$

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

(38)m	Jan 31.2809	Feb 31.0811	Mar 30.8852	Apr 29.9651	May 29.7929	Jun 28.9916	Jul 28.9916	Aug 28.8432	Sep 29.3002	Oct 29.7929	Nov 30.1412	Dec 30.5053	(38)
Heat transfer coeff	77.9206	77.7207	77.5248	76.6047	76.4326	75.6312	75.6312	75.4828	75.9399	76.4326	76.7808	77.1449	(39)
Average = Sum(39)m / 12 =												76.6039	

HLP	Jan 1.1561	Feb 1.1531	Mar 1.1502	Apr 1.1366	May 1.1340	Jun 1.1221	Jul 1.1221	Aug 1.1199	Sep 1.1267	Oct 1.1340	Nov 1.1392	Dec 1.1446	(40)
HLP (average)												1.1366	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1814 (42)
Hot water usage for mixer showers	60.7943	59.8807	58.5494	56.0021	54.1223	52.0260	50.8344	52.1556	53.6040	55.8548	58.4568	60.5614	(42a)
Hot water usage for baths	26.2668	25.8767	25.3273	24.3144	23.5560	22.7150	22.2608	22.8063	23.4002	24.3001	25.3338	26.1780	(42b)
Hot water usage for other uses	36.9696	35.6252	34.2809	32.9365	31.5922	30.2478	30.2478	31.5922	32.9365	34.2809	35.6252	36.9696	(42c)
Average daily hot water use (litres/day)												114.0124	(43)

Daily hot water use	Jan 124.0306	Feb 121.3826	Mar 118.1576	Apr 113.2531	May 109.2705	Jun 104.9888	Jul 103.3430	Aug 106.5541	Sep 109.9407	Oct 114.4358	Nov 119.4158	Dec 123.7089	(44)
Energy conte	196.4342	172.8472	181.6038	155.0378	147.0991	129.0960	124.9844	131.9362	135.5679	155.2883	170.1297	193.6983	(45)
Energy content (annual)										Total = Sum(45)m =		1893.7228	
Distribution loss (46)m = 0.15 x (45)m	29.4651	25.9271	27.2406	23.2557	22.0649	19.3644	18.7477	19.7904	20.3352	23.2932	25.5195	29.0547	(46)

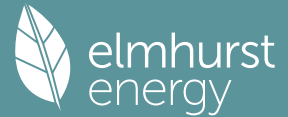
Water storage loss:

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

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	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													
243.0291	214.9329	228.1987	200.1296	193.6940	174.1878	171.5793	178.5311	180.6597	201.8832	215.2216	240.2932	240.2932	(62)
WWHRS	-27.7926	-24.5800	-25.7388	-21.3127	-19.8627	-16.9966	-15.9316	-16.9417	-17.5854	-20.7312	-23.4860	-27.2779	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Output from w/h	215.2365	190.3529	202.4599	178.8169	173.8313	157.1912	155.6477	161.5894	163.0744	181.1519	191.7356	213.0152	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2184.1028	(64)
Electric shower(s)												2184	(64)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
102.5903	91.1403	97.6592	87.6235	86.1864	78.9979	78.8332	81.1447	81.1498	88.9093	92.6416	101.6806	(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	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693	109.0693 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	110.3093	122.1282	110.3093	113.9863	110.3093	113.9863	110.3093	110.3093	113.9863	110.3093	113.9863	110.3093 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	191.1544	193.1380	188.1394	177.4980	164.0652	151.4403	143.0060	141.0225	146.0210	156.6624	170.0952	182.7201 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069	33.9069 (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)	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554	-87.2554 (71)
Water heating gains (Table 5)	137.8902	135.6254	131.2623	121.6994	115.8419	109.7193	105.9586	109.0655	112.7081	119.5017	128.6689	136.6675 (72)
Total internal gains	498.0747	509.6123	488.4318	471.9045	448.9372	430.8667	414.9948	416.1181	428.4362	445.1942	471.4712	488.4177 (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	
South	4.2000		46.7521		0.6300		0.7000		0.7700		60.0098 (78)	
West	2.8400		19.6403		0.6300		0.7000		0.7700		17.0466 (80)	
Solar gains	77.0564	131.6273	180.1093	221.5878	245.6034	242.3783	234.3043	216.8130	194.6489	145.5735	92.3871	65.8722 (83)
Total gains	575.1310	641.2396	668.5411	693.4922	694.5406	673.2450	649.2991	632.9311	623.0851	590.7677	563.8583	554.2900 (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	10.5152	10.5422	10.5689	10.6958	10.7199	10.8335	10.8335	10.8548	10.7895	10.7199	10.6713	10.6209
alpha	1.7010	1.7028	1.7046	1.7131	1.7147	1.7222	1.7222	1.7237	1.7193	1.7147	1.7114	1.7081
util living area	0.8436	0.8132	0.7786	0.7188	0.6389	0.5258	0.4182	0.4393	0.5766	0.7209	0.8076	0.8509 (86)
MIT	17.3469	17.7271	18.2886	19.0598	19.7887	20.4060	20.7203	20.6836	20.2497	19.3264	18.2333	17.2844 (87)
Th 2	19.9553	19.9577	19.9600	19.9711	19.9732	19.9828	19.9828	19.9846	19.9791	19.9732	19.9690	19.9646 (88)
util rest of house	0.8307	0.7980	0.7597	0.6931	0.6017	0.4699	0.3419	0.3647	0.5244	0.6908	0.7897	0.8386 (89)
MIT 2	15.8396	16.2982	16.9784	17.9073	18.7668	19.4683	19.7908	19.7590	19.3024	18.2387	16.9253	15.7666 (90)
Living area fraction	16.3808	16.8112	17.4488	18.3211	19.1337	19.8050	20.1246	20.0910	19.6425	18.6292	17.3950	16.3116 (91)
MIT	16.3808	16.8112	17.4488	18.3211	19.1337	19.8050	20.1246	20.0910	19.6425	18.6292	17.3950	16.3116 (92)
Temperature adjustment	16.3808	16.8112	17.4488	18.3211	19.1337	19.8050	20.1246	20.0910	19.6425	18.6292	17.3950	16.3116 (93)
adjusted MIT	16.3808	16.8112	17.4488	18.3211	19.1337	19.8050	20.1246	20.0910	19.6425	18.6292	17.3950	16.3116 (93)

8. Space heating requirement

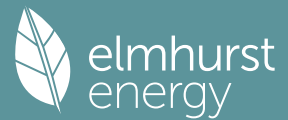
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7713	0.7387	0.7028	0.6439	0.5671	0.4592	0.3532	0.3731	0.5053	0.6436	0.7319	0.7797 (94)
Useful gains	443.5958	473.6738	469.8526	446.5649	393.8515	309.1793	229.3554	236.1514	314.8159	380.2168	412.7039	432.1849 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	941.3454	925.7471	848.8065	721.7002	568.1780	393.6604	266.5661	278.6072	420.8981	613.6958	790.4560	934.3471 (97)
Space heating kWh	370.3257	303.7933	281.9417	198.0975	129.6989	0.0000	0.0000	0.0000	0.0000	173.7084	271.9815	373.6087 (98a)
Space heating requirement - total per year (kWh/year)												2103.1556
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	370.3257	303.7933	281.9417	198.0975	129.6989	0.0000	0.0000	0.0000	0.0000	173.7084	271.9815	373.6087 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2103.1556
Space heating per m ²										(98c) / (4) =		31.2041 (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	370.3257	303.7933	281.9417	198.0975	129.6989	0.0000	0.0000	0.0000	0.0000	173.7084	271.9815	373.6087 (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)	401.2196	329.1368	305.4623	214.6235	140.5189	0.0000	0.0000	0.0000	0.0000	188.1997	294.6712	404.7765 (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

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Efficiency of water heater (217)m	215.2365	190.3529	202.4599	178.8169	173.8313	157.1912	155.6477	161.5894	163.0744	181.1519	191.7356	213.0152 (64)
Fuel for water heating, kWh/month	85.2653	85.1027	84.8026	84.2900	83.4124	79.8000	79.8000	79.8000	79.8000	83.9658	84.8435	79.8000 (216)
Space cooling fuel requirement (221)m	252.4316	223.6743	238.7427	212.1450	208.3998	196.9814	195.0472	202.4930	204.3538	215.7450	225.9873	85.3064 (217)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	249.7060 (219)
Lighting	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	0.0000 (221)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	22.9201	18.3874	16.5558	12.1295	9.3692	7.6547	8.5469	11.1095	14.4302	18.9332	21.3850	7.0685 (231)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	-31.7823	-44.9239	-64.7337	-72.9711	-78.8520	-73.6791	-72.8086	-68.6917	-61.3935	-51.5116	-34.9996	23.5571 (232)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-17.5612	-37.0023	-73.6516	-110.7623	-146.5789	-147.3030	-145.5300	-123.1213	-90.1414	-52.9138	-23.4483	0.0000 (235a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
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 (235a)
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 (235c)
Annual totals kWh/year												
Space heating fuel - main system 1												2278.6085 (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												2625.7072 (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)												184.9783 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1665.7069 (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												3509.5871 (238)

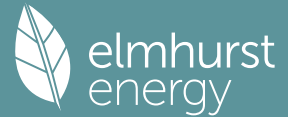
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2278.6085	0.2100	478.5078 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2625.7072	0.2100	551.3985 (264)
Space and water heating			1029.9063 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	184.9783	0.1443	26.6981 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-683.8142	0.1345	-91.9903
PV Unit electricity exported	-981.8927	0.1259	-123.5844
Total			-215.5748 (269)
Total CO2, kg/year			852.9589 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6600 (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	2278.6085	1.1300	2574.8276 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2625.7072	1.1300	2967.0491 (278)
Space and water heating			5541.8767 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	184.9783	1.5338	283.7259 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-683.8142	1.4972	-1023.7925
PV Unit electricity exported	-981.8927	0.4620	-453.6388
Total			-1477.4313 (283)
Total Primary energy kWh/year			4478.2721 (286)
Target Primary Energy Rate (TPER)			66.4400 (287)

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Property Reference	250813-5Court-Be Green-EPC A				Issued on Date	05/09/2025	
Assessment Reference	Flat 13 1B2P_Be Green_New			Prop Type Ref			
Property							
SAP Rating	93 A		DER	0.37		TER	13.28
Environmental	100 A		% DER < TER				97.21
CO ₂ Emissions (t/year)	-0.06		DFEE	33.80		TFEE	34.08
Compliance Check	See BREL		% DFEE < TFEE				0.83
% DPER < TPER	64.66		DPER	24.66		TPER	69.80
Assessor Details	Mr. Georgios Sigalas					Assessor ID	T822-0001
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)
Main dwelling			
Ground floor	52.7000 (1b)	2.3500 (2b)	123.8450 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	123.8450 (5)

2. Ventilation rate

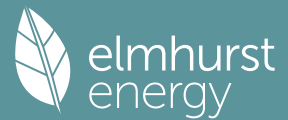
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	5.0000 (17)
Infiltration rate	0.2500 (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) = 0.2313 (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	0.2948	0.2891	0.2833	0.2544	0.2486	0.2197	0.2197	0.2139	0.2313	0.2486	0.2602	0.2717 (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	0.4033	0.3976	0.3918	0.3629	0.3571	0.3282	0.3282	0.3224	0.3398	0.3571	0.3687	0.3802 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
South Facing Windows			3.1500	1.1450	3.6069		(27)
Entrance Door			2.1000	1.2000	2.5200		(26)
West Facing Windows			3.8900	1.1450	4.4542		(27)
External Wall 1	65.1000	9.1400	55.9600	0.1500	8.3940	9.0000	503.6400 (29a)
External Roof 1	52.7000		52.7000	0.1000	5.2700	9.0000	474.3000 (30)
Total net area of external elements A _{um} (A, m ²)			117.8000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.2451		(33)
Main dwelling							
Party Wall 1			9.4000	0.0000	0.0000	20.0000	188.0000 (32)
Party Floor 1			52.7000			30.0000	1581.0000 (32d)
Internal Wall 1			60.9200			9.0000	548.2800 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		3295.2200 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							62.5279 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.2000	0.0700	0.4340
E3 Sill	4.2000	0.0600	0.2520
E4 Jamb	17.8000	0.0600	1.0680
E7 Party floor between dwellings (in blocks of flats)	10.5500	0.0600	0.6330
E16 Corner (normal)	7.0500	0.0900	0.6345
E18 Party wall between dwellings	4.7000	0.0600	0.2820
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.0000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	4.0000	0.1200	0.4800
E17 Corner (inverted - internal area greater than external area)	2.3500	-0.0900	-0.2115
E9 Balcony between dwellings, wall insulation continuous	17.1500	0.0400	0.6860
E10 Eaves (insulation at ceiling level)	18.6700	0.0600	1.1202
E12 Gable (insulation at ceiling level)	8.9600	0.0600	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.9158 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	30.1609 (37)

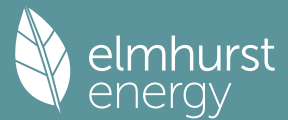
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.4842	16.2479	16.0116	14.8303	14.5940	13.4126	13.4126	13.1764	13.8852	14.5940	15.0666	15.5391	(38)
Heat transfer coeff	46.6451	46.4088	46.1725	44.9912	44.7549	43.5735	43.5735	43.3372	44.0461	44.7549	45.2274	45.7000	(39)
Average = Sum(39)m / 12 =												44.9321	
HLP	0.8851	0.8806	0.8761	0.8537	0.8492	0.8268	0.8268	0.8223	0.8358	0.8492	0.8582	0.8672	(40)
HLP (average)												0.8526	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.7697 (42)
Hot water usage for mixer showers	74.1013	72.9877	71.3650	68.2602	65.9689	63.4137	61.9613	63.5718	65.3371	68.0806	71.2521	73.8174	(42a)
Hot water usage for baths	23.2985	22.9525	22.4652	21.5668	20.8941	20.1481	19.7452	20.2290	20.7559	21.5541	22.4710	23.2197	(42b)
Hot water usage for other uses	32.7537	31.5626	30.3716	29.1805	27.9895	26.7985	26.7985	27.9895	29.1805	30.3716	31.5626	32.7537	(42c)
Average daily hot water use (litres/day)												119.6964	(43)
Daily hot water use	130.1535	127.5028	124.2018	119.0075	114.8525	110.3603	108.5050	111.7903	115.2735	120.0063	125.2857	129.7908	(44)
Energy conte	206.1313	181.5623	190.8935	162.9153	154.6135	135.7008	131.2274	138.4198	142.1438	162.8474	178.4925	203.2210	(45)
Energy content (annual)										Total = Sum(45)m =		1988.1685	
Distribution loss (46)m = 0.15 x (45)m	30.9197	27.2343	28.6340	24.4373	23.1920	20.3551	19.6841	20.7630	21.3216	24.4271	26.7739	30.4832	(46)
Water storage loss:													
Store volume												269.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9558	(55)
Total storage loss	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(56)
If cylinder contains dedicated solar storage	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	235.7611	208.3247	220.5233	191.5893	184.2433	164.3748	160.8572	168.0496	170.8178	192.4772	207.1665	232.8508	(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	235.7611	208.3247	220.5233	191.5893	184.2433	164.3748	160.8572	168.0496	170.8178	192.4772	207.1665	232.8508	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2337.0355	(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	68.5386	60.3695	63.4721	54.1693	51.4090	45.1205	43.6331	46.0246	47.2628	54.1468	59.3488	67.5710	(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	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.1089	95.3348	86.1089	88.9792	86.1089	88.9792	86.1089	86.1089	88.9792	86.1089	88.9792	86.1089	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	154.2407	155.8412	151.8079	143.2215	132.3827	122.1957	115.3902	113.7897	117.8230	126.4094	137.2482	147.4352	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	(71)
Water heating gains (Table 5)	92.1218	89.8355	85.3119	75.2352	69.0981	62.6674	58.6466	61.8610	65.6428	72.7779	82.4288	90.8212	(72)
Total internal gains	382.0171	390.5573	372.7745	356.9816	337.1354	323.3881	309.6915	311.3053	321.9907	334.8419	358.2020	373.9110	(73)

6. Solar gains								
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
South	3.1500	46.7521	0.5000	0.6700	0.7700	34.1892	(78)	
West	3.8900	19.6403	0.5000	0.6100	0.7700	16.1484	(80)	

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Solar gains	50.3377	87.5829	123.3491	156.4867	176.9898	176.0299	169.6104	154.5515	135.0136	97.8778	60.6611	42.8223 (83)
Total gains	432.3548	478.1402	496.1236	513.4684	514.1252	499.4180	479.3019	465.8569	457.0043	432.7197	418.8631	416.7333 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	19.6235	19.7234	19.8243	20.3449	20.4523	21.0068	21.0068	21.1213	20.7814	20.4523	20.2386	20.0293
alpha	2.3082	2.3149	2.3216	2.3563	2.3635	2.4005	2.4005	2.4081	2.3854	2.3635	2.3492	2.3353
util living area	0.8667	0.8341	0.7952	0.7223	0.6256	0.4878	0.3722	0.3944	0.5526	0.7279	0.8270	0.8738 (86)
MIT	18.7090	19.0213	19.4345	20.0008	20.4540	20.7940	20.9221	20.9085	20.7013	20.1313	19.3784	18.6917 (87)
Th 2	20.1802	20.1840	20.1878	20.2070	20.2109	20.2301	20.2301	20.2340	20.2224	20.2109	20.2032	20.1955 (88)
util rest of house	0.8555	0.8207	0.7782	0.6988	0.5921	0.4414	0.3142	0.3369	0.5075	0.7006	0.8112	0.8633 (89)
MIT 2	17.4836	17.8743	18.3913	19.0992	19.6445	20.0437	20.1734	20.1649	19.9410	19.2704	18.3391	17.4712 (90)
Living area fraction									fLA =	Living area / (4) =		0.5313 (91)
MIT	18.1347	18.4838	18.9455	19.5782	20.0746	20.4424	20.5712	20.5600	20.3449	19.7278	18.8913	18.1196 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1347	18.4838	18.9455	19.5782	20.0746	20.4424	20.5712	20.5600	20.3449	19.7278	18.8913	18.1196 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8217	0.7877	0.7484	0.6784	0.5860	0.4546	0.3404	0.3619	0.5149	0.6822	0.7807	0.8301 (94)
Useful gains	355.2487	376.6541	371.3100	348.3246	301.2944	227.0281	163.1447	168.5867	235.3183	295.2073	326.9879	345.9312 (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	645.3190	630.4057	574.6408	480.4259	374.8054	254.5731	173.0372	180.2814	275.0652	408.5144	533.2887	636.1275 (97)
Space heating kWh	215.8123	170.5211	151.2781	95.1129	54.6922	0.0000	0.0000	0.0000	0.0000	84.3005	148.5366	215.9061 (98a)
Space heating requirement - total per year (kWh/year)												1136.1597
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	215.8123	170.5211	151.2781	95.1129	54.6922	0.0000	0.0000	0.0000	0.0000	84.3005	148.5366	215.9061 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1136.1597
Space heating per m2										(98c) / (4) =		21.5590 (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)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	215.8123	170.5211	151.2781	95.1129	54.6922	0.0000	0.0000	0.0000	0.0000	84.3005	148.5366	215.9061 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	215.8123	170.5211	151.2781	95.1129	54.6922	0.0000	0.0000	0.0000	0.0000	84.3005	148.5366	215.9061 (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)
Space heating fuel used, main 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)
Water heating												
Water heating requirement	235.7611	208.3247	220.5233	191.5893	184.2433	164.3748	160.8572	168.0496	170.8178	192.4772	207.1665	232.8508 (64)
Efficiency of water heater (217)m	337.5200	337.5200	337.5200	337.5200	337.5200	337.5200	337.5200	337.5200	337.5200	337.5200	337.5200	337.5200 (216)
Fuel for water heating, kWh/month	69.8510	61.7222	65.3364	56.7638	54.5874	48.7008	47.6586	49.7895	50.6097	57.0269	61.3790	68.9887 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.4740	12.1701	13.4740	13.0394	13.4740	13.0394	13.4740	13.4740	13.0394	13.4740	13.0394	13.4740 (231)
Lighting	17.2010	13.7993	12.4247	9.1029	7.0313	5.7446	6.4142	8.3374	10.8295	14.2089	16.0489	17.6790 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-41.6026	-60.7227	-91.4781	-105.6530	-112.1633	-93.1174	-91.5004	-85.6868	-74.3917	-67.4965	-45.7181	-35.8056 (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	-16.9723	-37.8570	-84.1704	-149.9190	-227.7386	-252.6512	-244.6751	-190.5960	-124.5685	-60.0852	-23.7950	-13.2598 (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												1136.1597 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												337.5200

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Water heating fuel used	692.4139 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)	
mechanical ventilation fans (SFP = 1.0500)	158.6454 (230a)
Total electricity for the above, kWh/year	158.6454 (231)
Electricity for lighting (calculated in Appendix L)	138.8216 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2331.6240 (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	-205.5834 (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	1136.1597	0.1545	175.5134 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	692.4139	0.1412	97.7345 (264)
Space and water heating			273.2479 (265)
Pumps, fans and electric keep-hot	158.6454	0.1387	22.0061 (267)
Energy for lighting	138.8216	0.1443	20.0362 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-905.3360	0.1351	-122.3295
PV Unit electricity exported	-1426.2880	0.1214	-173.2095
Total			-295.5390 (269)
Total CO2, kg/year			19.7513 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.3700 (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	1136.1597	1.5719	1785.9467 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	692.4139	1.5219	1053.8094 (278)
Space and water heating			2839.7561 (279)
Pumps, fans and electric keep-hot	158.6454	1.5128	239.9988 (281)
Energy for lighting	138.8216	1.5338	212.9292 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-905.3360	1.4994	-1357.4944
PV Unit electricity exported	-1426.2880	0.4455	-635.3576
Total			-1992.8520 (283)
Total Primary energy kWh/year			1299.8322 (286)
Dwelling Primary energy Rate (DPER)			24.6600 (287)

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

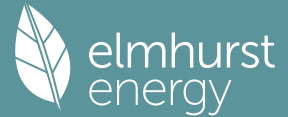
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	52.7000 (1b)	x 2.3500 (2b)	= 123.8450 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	52.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 123.8450 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1615 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4115 (18)
Number of sides sheltered	1 (19)

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Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3806 (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	0.4853	0.4758	0.4663	0.4187	0.4092	0.3616	0.3616	0.3521	0.3806	0.4092	0.4282	0.4472	(22b)
	0.6178	0.6132	0.6087	0.5877	0.5837	0.5654	0.5654	0.5620	0.5724	0.5837	0.5917	0.6000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			7.0400	1.1450	8.0611			(27)
External Wall 1	65.1000	9.1400	55.9600	0.1800	10.0728			(29a)
External Roof 1	52.7000		52.7000	0.1100	5.7970			(30)
Total net area of external elements Aum(A, m2)			117.8000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.0309			(33)
Main dwelling								
Party Wall 1			9.4000	0.0000	0.0000			(32)

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

List of Thermal Bridges 62.5279 (35)

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	6.2000	0.0500	0.3100	
E3 Sill	4.2000	0.0500	0.2100	
E4 Jamb	17.8000	0.0500	0.8900	
E7 Party floor between dwellings (in blocks of flats)	10.5500	0.0700	0.7385	
E16 Corner (normal)	7.0500	0.0900	0.6345	
E18 Party wall between dwellings	4.7000	0.0600	0.2820	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.0000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	4.0000	0.1200	0.4800	
E17 Corner (inverted - internal area greater than external area)	2.3500	-0.0900	-0.2115	
E9 Balcony between dwellings, wall insulation continuous	17.1500	0.0200	0.3430	
E10 Eaves (insulation at ceiling level)	18.6700	0.0600	1.1202	
E12 Gable (insulation at ceiling level)	8.9600	0.0600	0.5376	

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

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 31.3652 (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	25.2471	25.0602	24.8771	24.0167	23.8557	23.1063	23.1063	22.9675	23.3950	23.8557	24.1813	24.5218	(38)
Heat transfer coeff	56.6123	56.4254	56.2422	55.3818	55.2209	54.4715	54.4715	54.3327	54.7601	55.2209	55.5465	55.8870	(39)
Average = Sum(39)m / 12 =												55.3811	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0742	1.0707	1.0672	1.0509	1.0478	1.0336	1.0336	1.0310	1.0391	1.0478	1.0540	1.0605	(40)
HLP (average)												1.0509	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

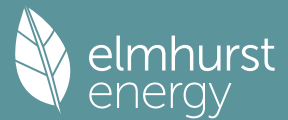
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7697 (42)
Hot water usage for mixer showers													
53.8919	53.0820	51.9018	49.6438	47.9774	46.1191	45.0628	46.2340	47.5179	49.5132	51.8197	53.6854	53.6854	(42a)
Hot water usage for baths													
23.2985	22.9525	22.4652	21.5668	20.8941	20.1481	19.7452	20.2290	20.7559	21.5541	22.4710	23.2197	23.2197	(42b)
Hot water usage for other uses													
32.7537	31.5626	30.3716	29.1805	27.9895	26.7985	26.7985	27.9895	29.1805	30.3716	31.5626	32.7537	32.7537	(42c)
Average daily hot water use (litres/day)													101.0639 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	109.9440	107.5971	104.7386	100.3911	96.8609	93.0656	91.6064	94.4526	97.4543	101.4388	105.8533	109.6588	(44)
Energy conte	174.1244	153.2168	160.9793	137.4304	130.3934	114.4350	110.7900	116.9520	120.1709	127.6515	150.8075	171.6991	(45)
Energy content (annual)										Total = Sum(45)m =		1678.6506	
Distribution loss (46)m = 0.15 x (45)m	26.1187	22.9825	24.1469	20.6146	19.5590	17.1653	16.6185	17.5428	18.0256	20.6477	22.6211	25.7549	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
220.7194	195.3025	207.5742	182.5222	176.9884	159.5269	157.3849	163.5469	165.2628	184.2464	195.8993	218.2940	218.2940	(62)
WWHRS	-24.6371	-21.7893	-22.8165	-18.8929	-17.6075	-15.0669	-14.1228	-15.0182	-15.5888	-18.3775	-20.8194	-24.1809	(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	196.0822	173.5133	184.7578	163.6293	159.3808	144.4600	143.2621	148.5287	149.6740	165.8690	175.0799	194.1132	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1998.3503	(64)
Electric shower(s)												1998	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	95.1723	84.6132	90.8015	81.7691	80.6317	74.1231	74.1136	76.1625	76.0303	83.0451	86.2170	94.3659	(65)

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

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Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859	88.4859 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	84.3238	93.3585	84.3238	87.1346	84.3238	87.1346	84.3238	84.3238	87.1346	84.3238	87.1346	84.3238 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	154.2407	155.8412	151.8079	143.2215	132.3827	122.1957	115.3902	113.7897	117.8230	126.4094	137.2482	147.4352 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486	31.8486 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887	-70.7887 (71)
Water heating gains (Table 5)												
	127.9198	125.9124	122.0451	113.5682	108.3760	102.9488	99.6151	102.3689	105.5976	111.6197	119.7458	126.8359 (72)
Total internal gains												
	419.0300	427.6579	410.7226	396.4700	377.6283	361.8249	348.8749	350.0282	360.1010	374.8987	396.6744	411.1406 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
South					3.1500	46.7521	0.6300	0.7000	0.7700		45.0073 (78)	
West					3.8900	19.6403	0.6300	0.7000	0.7700		23.3490 (80)	
Solar gains	68.3563	119.3860	169.1153	215.8263	245.0327	244.0542	235.0123	213.5339	185.5688	133.7016	82.4625	58.0916 (83)
Total gains	487.3864	547.0440	579.8378	612.2964	622.6610	605.8791	583.8872	563.5621	545.6698	508.6003	479.1369	469.2322 (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	16.1686	16.2221	16.2749	16.5278	16.5760	16.8040	16.8040	16.8469	16.7154	16.5760	16.4788	16.3784
alpha	2.0779	2.0815	2.0850	2.1019	2.1051	2.1203	2.1203	2.1231	2.1144	2.1051	2.0986	2.0919
util living area												
	0.8594	0.8249	0.7819	0.7076	0.6108	0.4833	0.3714	0.3958	0.5488	0.7181	0.8194	0.8672 (86)
MIT												
	18.2773	18.6321	19.1215	19.7620	20.3025	20.7059	20.8798	20.8582	20.5880	19.9056	19.0192	18.2317 (87)
Th 2												
	20.0219	20.0248	20.0277	20.0411	20.0437	20.0554	20.0554	20.0576	20.0509	20.0437	20.0386	20.0332 (88)
util rest of house												
	0.8465	0.8093	0.7621	0.6802	0.5719	0.4286	0.3020	0.3267	0.4960	0.6864	0.8010	0.8550 (89)
MIT 2												
	16.8739	17.3121	17.9172	18.7031	19.3444	19.8030	19.9752	19.9589	19.6802	18.8915	17.8075	16.8217 (90)
Living area fraction												
	17.6196	18.0134	18.5571	19.2657	19.8534	20.2827	20.4558	20.4367	20.1625	19.4303	18.4513	17.5708 (91)
MIT												
	17.6196	18.0134	18.5571	19.2657	19.8534	20.2827	20.4558	20.4367	20.1625	19.4303	18.4513	17.5708 (92)
Temperature adjustment												
	17.6196	18.0134	18.5571	19.2657	19.8534	20.2827	20.4558	20.4367	20.1625	19.4303	18.4513	17.5708 (93)
adjusted MIT												

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8068	0.7705	0.7270	0.6555	0.5636	0.4423	0.3322	0.3553	0.5026	0.6636	0.7645	0.8157 (94)
Useful gains	393.2020	421.4876	421.5693	401.3780	350.9549	267.9815	193.9844	200.2610	274.2348	337.4854	366.2821	382.7593 (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												
	754.0506	739.9306	678.1162	574.0710	450.2391	309.5465	210.0326	219.3266	331.9842	487.6168	630.5244	747.2542 (97)
Space heating kWh												
	268.4714	213.9937	190.8709	124.3389	73.8674	0.0000	0.0000	0.0000	0.0000	111.6977	190.2544	271.1842 (98a)
Space heating requirement - total per year (kWh/year)												1444.6786
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												
	268.4714	213.9937	190.8709	124.3389	73.8674	0.0000	0.0000	0.0000	0.0000	111.6977	190.2544	271.1842 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1444.6786
Space heating per m ²												(98c) / (4) =
												27.4133 (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												
	268.4714	213.9937	190.8709	124.3389	73.8674	0.0000	0.0000	0.0000	0.0000	111.6977	190.2544	271.1842 (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)												
	290.8683	231.8458	206.7940	134.7117	80.0297	0.0000	0.0000	0.0000	0.0000	121.0159	206.1261	293.8074 (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												
	196.0822	173.5133	184.7578	163.6293	159.3808	144.4600	143.2621	148.5287	149.6740	165.8690	175.0799	194.1132 (64)
Efficiency of water heater												
	84.7649	84.5312	84.1329	83.4520	82.4463	79.8000	79.8000	79.8000	79.8000	83.1931	84.2466	79.8000 (216)
(217)m												
	84.7649	84.5312	84.1329	83.4520	82.4463	79.8000	79.8000	79.8000	79.8000	83.1931	84.2466	84.8097 (217)
Fuel for water heating, kWh/month												

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	231.3249	205.2654	219.6023	196.0760	193.3148	181.0276	179.5265	186.1262	187.5614	199.3784	207.8184	228.8810	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	17.5208	14.0559	12.6557	9.2721	7.1621	5.8515	6.5335	8.4925	11.0309	14.4731	16.3473	18.0078	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-25.0969	-35.6082	-51.5207	-58.3496	-63.3176	-59.2944	-58.6179	-55.1780	-49.1135	-40.9701	-27.6933	-21.6758	(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	-13.4847	-28.4499	-56.6827	-85.3114	-112.9466	-113.4913	-112.1009	-94.8005	-69.3715	-40.6800	-18.0070	-10.6524	(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												1565.1990	(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												2415.9028	(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)												141.4031	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1302.4148	(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												2906.0901	(238)

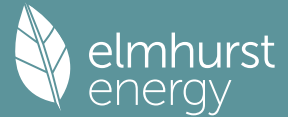
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1565.1990	0.2100	328.6918 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2415.9028	0.2100	507.3396 (264)
Space and water heating			836.0314 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	141.4031	0.1443	20.4088 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-546.4360	0.1344	-73.4532
PV Unit electricity exported	-755.9787	0.1258	-95.1369
Total			-168.5901 (269)
Total CO2, kg/year			699.7794 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.2800 (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	1565.1990	1.1300	1768.6748 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2415.9028	1.1300	2729.9702 (278)
Space and water heating			4498.6450 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	141.4031	1.5338	216.8888 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-546.4360	1.4968	-817.9014
PV Unit electricity exported	-755.9787	0.4619	-349.2169
Total			-1167.1183 (283)
Total Primary energy kWh/year			3678.5163 (286)
Target Primary Energy Rate (TPER)			69.8000 (287)

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Property Reference	250813-5Court-Be Green-EPC A				Issued on Date	05/09/2025	
Assessment Reference	Flat 17 1B2P_Be Green_New			Prop Type Ref			
Property							
SAP Rating	93 A	DER	1.00	TER	10.49		
Environmental	99 A	% DER < TER				90.47	
CO ₂ Emissions (t/year)	-0.01	DFEE	28.27	TFEE	29.03		
Compliance Check	See BREL	% DFEE < TFEE				2.64	
% DPER < TPER	55.99	DPER	24.12	TPER	54.80		
Assessor Details	Mr. Georgios Sigalas				Assessor ID	T822-0001	
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)
Main dwelling			
Ground floor	61.6000 (1b)	2.3500 (2b)	144.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	144.7600 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.2500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2125 (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	0.2709	0.2656	0.2603	0.2338	0.2284	0.2019	0.2019	0.1966	0.2125	0.2284	0.2391	0.2497 (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	0.3794	0.3741	0.3688	0.3423	0.3369	0.3104	0.3104	0.3051	0.3210	0.3369	0.3476	0.3582 (25)

3. Heat losses and heat loss parameter

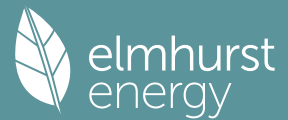
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
East Facing Window			4.9400	1.1450	5.6565		(27)
South Facing Window			2.1000	1.1450	2.4046		(27)
External Wall 1	59.5300	7.0400	52.4900	0.1500	7.8735	9.0000	472.4100 (29a)
External Roof 1	61.6000		61.6000	0.1000	6.1600	9.0000	554.4000 (30)
Total net area of external elements Aum(A, m ²)			121.1300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	22.0946	(33)
Main dwelling							
Party Wall 1			18.1000	0.0000	0.0000	20.0000	362.0000 (32)
Party Floor 1			61.6000			30.0000	1848.0000 (32a)
Internal Wall 1			116.3000			9.0000	1046.7000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							4283.5100 (34)
List of Thermal Bridges							69.5375 (35)
K1 Element				Length	Psi-value		Total

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E2 Other lintels (including other steel lintels)									5.2000	0.0600	0.3120	
E3 Sill									4.2000	0.0600	0.2520	
E4 Jamb									13.6000	0.0600	0.8160	
E7 Party floor between dwellings (in blocks of flats)									21.5300	0.0700	1.5071	
E16 Corner (normal)									4.7000	0.0900	0.4230	
E18 Party wall between dwellings									7.0500	0.0600	0.4230	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)									7.7000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)									7.7000	0.1200	0.9240	
E9 Balcony between dwellings, wall insulation continuous									3.8000	0.0200	0.0760	
E10 Eaves (insulation at ceiling level)									10.3000	0.0600	0.6180	
E12 Gable (insulation at ceiling level)									15.0300	0.0600	0.9018	
E17 Corner (inverted - internal area greater than external area)									2.3500	-0.0900	-0.2115	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												6.0414 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 28.1360 (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	18.1260	17.8723	17.6185	16.3496	16.0958	14.8269	14.8269	14.5731	15.3344	16.0958	16.6033	17.1109 (38)
Average = Sum(39)m / 12 =	46.2620	46.0082	45.7544	44.4855	44.2317	42.9628	42.9628	42.7090	43.4704	44.2317	44.7393	45.2469 (39)
												44.4221
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7510	0.7469	0.7428	0.7222	0.7180	0.6974	0.6974	0.6933	0.7057	0.7180	0.7263	0.7345 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.7211
												31
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0265 (42)
Hot water usage for mixer showers												
	102.7399	101.1959	98.9460	94.6413	91.4645	87.9218	85.9081	88.1409	90.5886	94.3924	98.7896	102.3463 (42a)
Hot water usage for baths												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses												
	35.3833	34.0966	32.8100	31.5233	30.2366	28.9500	28.9500	30.2366	31.5233	32.8100	34.0966	35.3833 (42c)
Average daily hot water use (litres/day)												126.8894 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	138.1232	135.2926	131.7560	126.1646	121.7011	116.8717	114.8581	118.3776	122.1119	127.2023	132.8862	137.7296 (44)
Energy content (annual)	218.7534	192.6548	202.5041	172.7130	163.8331	143.7074	138.9109	146.5762	150.5761	172.6124	189.3208	215.6512 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 2107.8134
	32.8130	28.8982	30.3756	25.9070	24.5750	21.5561	20.8366	21.9864	22.5864	25.8919	28.3981	32.3477 (46)
Water storage loss:												
Store volume												269.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7700 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9558 (55)
Total storage loss												
	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (56)
If cylinder contains dedicated solar storage												
	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	248.3832	219.4172	232.1339	201.3870	193.4629	172.3814	168.5407	176.2060	179.2501	202.2422	217.9948	245.2810 (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												
	248.3832	219.4172	232.1339	201.3870	193.4629	172.3814	168.5407	176.2060	179.2501	202.2422	217.9948	245.2810 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2456.6804 (64)
Electric shower(s)												2457 (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												
	72.7355	64.0577	67.3326	57.4271	54.4745	47.7827	46.1879	48.7366	50.0666	57.3936	62.9492	71.7040 (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	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	105.6101	116.9255	105.6101	109.1305	105.6101	109.1305	105.6101	105.6101	109.1305	105.6101	109.1305	105.6101 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	176.9634	178.7997	174.1722	164.3209	151.8853	140.1976	132.3895	130.5532	135.1807	145.0320	157.4676	169.1553 (68)
Pumps, fans	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325 (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)	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597 (71)
Total internal gains	97.7628	95.3240	90.5008	79.7598	73.2184	66.3649	62.0805	65.5061	69.5369	77.1420	87.4294	96.3764 (72)
	433.7337	444.4466	423.6805	406.6085	384.1112	369.0903	353.4775	355.0668	367.2454	381.1815	407.4248	424.5392 (73)
6. Solar gains												
[Jan]												
		Area		Solar flux		g		FF		Access		Gains
		m2		Table 6a		Specific data		Specific data		factor		W
				W/m2		or Table 6b		or Table 6c		Table 6d		
East		4.9400		19.6403		0.5000		0.4900		0.7700		16.4730 (76)
South		2.1000		46.7521		0.5000		0.6700		0.7700		22.7928 (78)

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Solar gains	39.2659	69.5535	100.6198	131.1409	150.8577	150.9960	145.1028	130.5470	111.3939	78.5000	47.5572	33.2417 (83)
Total gains	472.9995	514.0001	524.3003	537.7494	534.9689	520.0863	498.5803	485.6138	478.6393	459.6815	454.9820	457.7809 (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	25.7201	25.8620	26.0054	26.7472	26.9007	27.6952	27.6952	27.8598	27.3718	26.9007	26.5955	26.2972
alpha	2.7147	2.7241	2.7337	2.7831	2.7934	2.8463	2.8463	2.8573	2.8248	2.7934	2.7730	2.7531
util living area	0.8779	0.8479	0.8115	0.7360	0.6338	0.4842	0.3639	0.3858	0.5516	0.7366	0.8371	0.8843 (86)
MIT	19.2566	19.5091	19.8341	20.2945	20.6411	20.8841	20.9618	20.9543	20.8206	20.3976	19.8090	19.2516 (87)
Th 2	20.2960	20.2996	20.3032	20.3213	20.3249	20.3431	20.3431	20.3467	20.3358	20.3249	20.3177	20.3104 (88)
util rest of house	0.8679	0.8358	0.7962	0.7145	0.6030	0.4428	0.3137	0.3359	0.5107	0.7115	0.8225	0.8748 (89)
MIT 2	18.2331	18.5497	18.9569	19.5341	19.9499	20.2371	20.3147	20.3116	20.1652	19.6684	18.9410	18.2365 (90)
Living area fraction	18.2331	18.5497	18.9569	19.5341	19.9499	20.2371	20.3147	20.3116	20.1652	19.6684	18.9410	18.2365 (90)
MIT	18.6422	18.9332	19.3075	19.8380	20.2262	20.4957	20.5734	20.5685	20.4272	19.9599	19.2879	18.6422 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6422	18.9332	19.3075	19.8380	20.2262	20.4957	20.5734	20.5685	20.4272	19.9599	19.2879	18.6422 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8399	0.8085	0.7715	0.6979	0.5983	0.4526	0.3316	0.3531	0.5166	0.6967	0.7975	0.8475	(94)
Useful gains	397.2678	415.5934	404.4875	375.2891	320.0817	235.4070	165.3069	171.4836	247.2412	320.2807	362.8371	387.9636	(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	663.4990	645.6410	586.0010	486.5834	377.1272	253.2954	170.7068	178.0317	275.0443	414.0028	545.2792	653.4656	(97)
Space heating kWh	198.0760	154.5920	135.0461	80.1319	42.4418	0.0000	0.0000	0.0000	0.0000	69.7292	131.3583	197.5335	(98a)
Space heating requirement - total per year (kWh/year)												1008.9089	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	198.0760	154.5920	135.0461	80.1319	42.4418	0.0000	0.0000	0.0000	0.0000	69.7292	131.3583	197.5335	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1008.9089	
Space heating per m2											(98c) / (4) =	16.3784	(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)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	198.0760	154.5920	135.0461	80.1319	42.4418	0.0000	0.0000	0.0000	0.0000	69.7292	131.3583	197.5335	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	198.0760	154.5920	135.0461	80.1319	42.4418	0.0000	0.0000	0.0000	0.0000	69.7292	131.3583	197.5335	(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)
Space heating fuel used, main system 2													(213)
Water heating													
Water heating requirement	248.3832	219.4172	232.1339	201.3870	193.4629	172.3814	168.5407	176.2060	179.2501	202.2422	217.9948	245.2810	(64)
Efficiency of water heater (217)m	337.1290	337.1290	337.1290	337.1290	337.1290	337.1290	337.1290	337.1290	337.1290	337.1290	337.1290	337.1290	(216)
Fuel for water heating, kWh/month	73.6760	65.0841	68.8561	59.7359	57.3854	51.1322	49.9929	52.2666	53.1696	59.9896	64.6621	72.7558	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	15.7495	14.2253	15.7495	15.2414	15.7495	15.2414	15.7495	15.7495	15.2414	15.7495	15.2414	15.7495	(231)
Lighting	21.0965	16.9244	15.2385	11.1644	8.6237	7.0456	7.8668	10.2256	13.2821	17.4268	19.6835	21.6828	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-32.1198	-51.1967	-82.9551	-99.2620	-107.4293	-93.8245	-92.2761	-85.6272	-72.6173	-59.5538	-36.5119	-26.8621	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-10.6391	-26.8836	-66.4132	-122.2618	-182.9851	-198.1222	-193.1304	-152.9077	-98.9774	-44.8593	-15.5690	-7.9806	(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													1008.9089 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													337.1290
Water heating fuel used													728.7064 (219)

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Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.0500)	
mechanical ventilation fans (SFP = 1.0500)	185.4376 (230a)
Total electricity for the above, kWh/year	185.4376 (231)
Electricity for lighting (calculated in Appendix L)	170.2608 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1960.9652 (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	132.3485 (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	1008.9089	0.1549	156.2606 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	728.7064	0.1412	102.8821 (264)
Space and water heating			259.1427 (265)
Pumps, fans and electric keep-hot	185.4376	0.1387	25.7225 (267)
Energy for lighting	170.2608	0.1443	24.5739 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-840.2359	0.1338	-112.4366
PV Unit electricity exported	-1120.7292	0.1208	-135.3974
Total			-247.8339 (269)
Total CO2, kg/year			61.6052 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1.0000 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1008.9089	1.5734	1587.4207 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	728.7064	1.5221	1109.1376 (278)
Space and water heating			2696.5583 (279)
Pumps, fans and electric keep-hot	185.4376	1.5128	280.5299 (281)
Energy for lighting	170.2608	1.5338	261.1517 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-840.2359	1.4945	-1255.7697
PV Unit electricity exported	-1120.7292	0.4432	-496.6784
Total			-1752.4480 (283)
Total Primary energy kWh/year			1485.7919 (286)
Dwelling Primary energy Rate (DPER)			24.1200 (287)

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

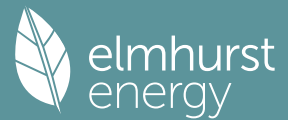
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	61.6000 (1b)	2.3500 (2b)	144.7600 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	144.7600 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1382 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3882 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)

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Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3299 (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													
	0.4207	0.4124	0.4042	0.3629	0.3547	0.3134	0.3134	0.3052	0.3299	0.3547	0.3712	0.3877	(22b)
Effective ac	0.5885	0.5850	0.5817	0.5659	0.5629	0.5491	0.5491	0.5466	0.5544	0.5629	0.5689	0.5751	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			7.0400	1.1450	8.0611			(27)
External Wall 1	59.5300	7.0400	52.4900	0.1800	9.4482			(29a)
External Roof 1	61.6000		61.6000	0.1100	6.7760			(30)
Total net area of external elements Aum(A, m2)			121.1300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	24.2853			(33)
Main dwelling								
Party Wall 1		18.1000		0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							69.5375	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.2000	0.0500	0.2600
E3 Sill	4.2000	0.0500	0.2100
E4 Jamb	13.6000	0.0500	0.6800
E7 Party floor between dwellings (in blocks of flats)	21.5300	0.0700	1.5071
E16 Corner (normal)	4.7000	0.0900	0.4230
E18 Party wall between dwellings	7.0500	0.0600	0.4230
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.7000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	7.7000	0.1200	0.9240
E9 Balcony between dwellings, wall insulation continuous	3.8000	0.0200	0.0760
E10 Eaves (insulation at ceiling level)	10.3000	0.0600	0.6180
E12 Gable (insulation at ceiling level)	15.0300	0.0600	0.9018
E17 Corner (inverted - internal area greater than external area)	2.3500	-0.0900	-0.2115

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

Point Thermal bridges		(36a) =	5.8114	(36)
Total fabric heat loss	(33) + (36) + (36a) =		30.0967	(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	28.1122	27.9481	27.7872	27.0315	26.8901	26.2320	26.2320	26.1101	26.4855	26.8901	27.1762	27.4752	(38)
Heat transfer coeff	58.2089	58.0447	57.8839	57.1282	56.9868	56.3287	56.3287	56.2068	56.5822	56.9868	57.2728	57.5718	(39)
Average = Sum(39)m / 12 =												57.1275	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9449	0.9423	0.9397	0.9274	0.9251	0.9144	0.9144	0.9124	0.9185	0.9251	0.9298	0.9346	(40)
HLP (average)												0.9274	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

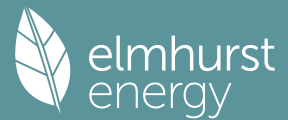
Assumed occupancy													2.0265	(42)
Hot water usage for mixer showers	74.7199	73.5970	71.9607	68.8300	66.5196	63.9431	62.4786	64.1025	65.8826	68.6490	71.8470	74.4336	(42a)	
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)	
Hot water usage for other uses	35.3833	34.0966	32.8100	31.5233	30.2366	28.9500	28.9500	30.2366	31.5233	32.8100	34.0966	35.3833	(42c)	
Average daily hot water use (litres/day)												101.0559	(43)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	110.1032	107.6937	104.7707	100.3533	96.7563	92.8931	91.4286	94.3391	97.4059	101.4590	105.9436	109.8169	(44)
Energy conte	174.3766	153.3544	161.0287	137.3787	130.2525	114.2229	110.5749	116.8116	120.1112	137.6789	150.9361	171.9468	(45)
Energy content (annual)										Total = Sum(45)m =		1678.6733	
Distribution loss (46)m = 0.15 x (45)m	26.1565	23.0032	24.1543	20.6068	19.5379	17.1334	16.5862	17.5217	18.0167	20.6518	22.6404	25.7920	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	220.9715	195.4401	207.6236	182.4705	176.8474	159.3147	157.1698	163.4065	165.2031	184.2738	196.0279	218.5417	(62)
WWHRS	-34.1588	-30.2103	-31.6345	-26.1946	-24.4125	-20.8899	-19.5810	-20.8224	-21.6135	-25.4800	-28.8657	-33.5263	(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	186.8127	165.2297	175.9891	156.2759	152.4350	138.4248	137.5889	142.5841	143.5895	158.7938	167.1622	185.0154	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1909.9011	(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	95.2561	84.6589	90.8180	81.7519	80.5849	74.0526	74.0421	76.1158	76.0105	83.0541	86.2597	94.4482	(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	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	101.3246	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.1450	110.8748	100.1450	103.4832	100.1450	103.4832	100.1450	100.1450	103.4832	100.1450	103.4832	100.1450	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	176.9634	178.7997	174.1722	164.3209	151.8853	140.1976	132.3895	130.5532	135.1807	145.0320	157.4676	169.1553	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	33.1325	(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)	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	-81.0597	(71)
Water heating gains (Table 5)	128.0325	125.9805	122.0672	113.5443	108.3130	102.8508	99.5189	102.3061	105.5701	111.6319	119.8052	126.9466	(72)
Total internal gains	461.5382	472.0524	452.7818	437.7457	416.7407	399.9290	385.4508	386.4017	397.6313	413.2063	437.1533	452.6442	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
East				4.9400	19.6403	0.6300	0.7000	0.7700	29.6515 (76)			
South				2.1000	46.7521	0.6300	0.7000	0.7700	30.0049 (78)			
Solar gains	59.6563	107.1448	158.1212	210.0649	244.4621	245.7302	235.7203	210.2548	176.4887	121.8297	72.5379	50.3109 (83)
Total gains	521.1946	579.1972	610.9030	647.8106	661.2028	645.6591	621.1711	596.6565	574.1200	535.0360	509.6912	502.9551 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
Jan	20.4413	20.4991	20.5561	20.8280	20.8796	21.1236	21.1236	21.1694	21.0290	20.8796	20.7754	20.6675		
alpha	2.3628	2.3666	2.3704	2.3885	2.3920	2.4082	2.4082	2.4113	2.4019	2.3920	2.3850	2.3778		
util living area	0.8787	0.8468	0.8050	0.7274	0.6240	0.4881	0.3716	0.3986	0.5621	0.7403	0.8406	0.8861	(86)	
MIT	18.7178	19.0264	19.4533	20.0152	20.4740	20.7958	20.9233	20.9067	20.6957	20.1193	19.3562	18.6736	(87)	
Th 2	20.1295	20.1317	20.1339	20.1443	20.1462	20.1553	20.1553	20.1569	20.1518	20.1462	20.1423	20.1382	(88)	
util rest of house	0.8675	0.8330	0.7870	0.7019	0.5874	0.4370	0.3078	0.3347	0.5124	0.7110	0.8241	0.8755	(89)	
MIT 2	17.4562	17.8411	18.3729	19.0665	19.6120	19.9773	20.1028	20.0905	19.8735	19.2057	18.2667	17.4064	(90)	
Living area fraction	17.9604	18.3148	18.8047	19.4456	19.9565	20.3045	20.4307	20.4167	20.2021	19.5708	18.7022	17.9128	(92)	
MIT	17.9604	18.3148	18.8047	19.4456	19.9565	20.3045	20.4307	20.4167	20.2021	19.5708	18.7022	17.9128	(93)	
Temperature adjustment												0.0000		
adjusted MIT	17.9604	18.3148	18.8047	19.4456	19.9565	20.3045	20.4307	20.4167	20.2021	19.5708	18.7022	17.9128		

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8325	0.7984	0.7551	0.6789	0.5788	0.4463	0.3291	0.3550	0.5155	0.6890	0.7911	0.8411	(94)
Useful gains	433.9205	462.4291	461.3198	439.7997	382.6816	288.1847	204.4348	211.7870	295.9506	368.6228	403.2337	423.0498	(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	795.1560	778.6582	712.2447	602.4537	470.5128	321.3241	215.7795	225.7680	345.2691	511.2194	664.4880	789.4739	(97)
Space heating kWh	268.7592	212.5060	186.6882	117.1109	65.3465	0.0000	0.0000	0.0000	0.0000	106.0918	188.1031	272.6196	(98a)
Space heating requirement - total per year (kWh/year)												1417.2253	
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	268.7592	212.5060	186.6882	117.1109	65.3465	0.0000	0.0000	0.0000	0.0000	106.0918	188.1031	272.6196	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1417.2253	
Space heating per m ²										(98c) / (4) =		23.0069	(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	268.7592	212.5060	186.6882	117.1109	65.3465	0.0000	0.0000	0.0000	0.0000	106.0918	188.1031	272.6196	(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)	291.1801	230.2340	202.2624	126.8807	70.7979	0.0000	0.0000	0.0000	0.0000	114.9424	203.7954	295.3625	(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	186.8127	165.2297	175.9891	156.2759	152.4350	138.4248	137.5889	142.5841	143.5895	158.7938	167.1622	185.0154	(64)	
Efficiency of water heater	84.8747	84.6252	84.1924	83.4218	82.3029	79.8000	79.8000	79.8000	79.8000	83.1764	84.3251	84.9276	(216)	
Fuel for water heating, kWh/month	220.1040	195.2489	209.0321	187.3321	185.2121	173.4647	172.4171	178.6768	179.9368	190.9121	198.2354	217.8507	(217)	
Space cooling fuel requirement														

Full SAP Calculation Printout



(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.8082	16.6931	15.0303	11.0118	8.5058	6.9493	7.7593	10.0859	13.1005	17.1886	19.4145	21.3865	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-29.1585	-41.2754	-59.5700	-67.2704	-72.8071	-68.0861	-67.2909	-63.4311	-56.6040	-47.3887	-32.1348	-25.1934	(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	-15.9387	-33.6008	-66.9068	-100.6522	-133.2248	-133.8797	-132.2588	-111.8758	-81.8908	-48.0505	-21.2834	-12.5945	(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												1535.4554	(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												2308.4228	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												167.9337	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1522.3672	(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												2575.4447	(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	1535.4554	0.2100	322.4456 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2308.4228	0.2100	484.7688 (264)
Space and water heating			807.2144 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	167.9337	0.1443	24.2380 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-630.2104	0.1345	-84.7546
PV Unit electricity exported	-892.1568	0.1259	-112.2831
Total			-197.0377 (269)
Total CO2, kg/year			646.3440 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.4900 (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	1535.4554	1.1300	1735.0646 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2308.4228	1.1300	2608.5178 (278)
Space and water heating			4343.5823 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	167.9337	1.5338	257.5824 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-630.2104	1.4970	-943.4456
PV Unit electricity exported	-892.1568	0.4620	-412.1550
Total			-1355.6007 (283)
Total Primary energy kWh/year			3375.6648 (286)
Target Primary Energy Rate (TPER)			54.8000 (287)

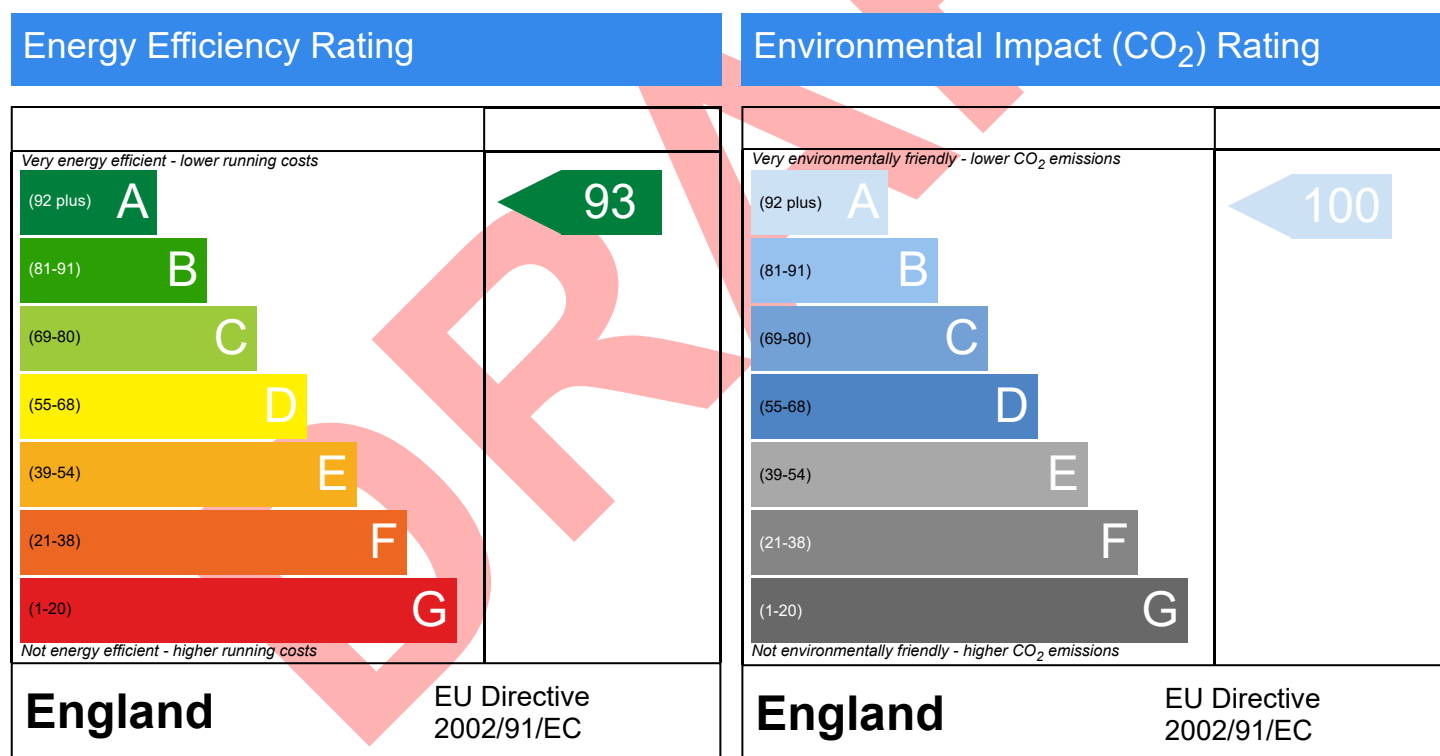
Predicted Energy Assessment



Dwelling type: Flat, End-Terrace
Date of assessment: 05/09/2025
Produced by: Georgios Sigalas
Total floor area: 66.15 m²
DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Predicted Energy Assessment

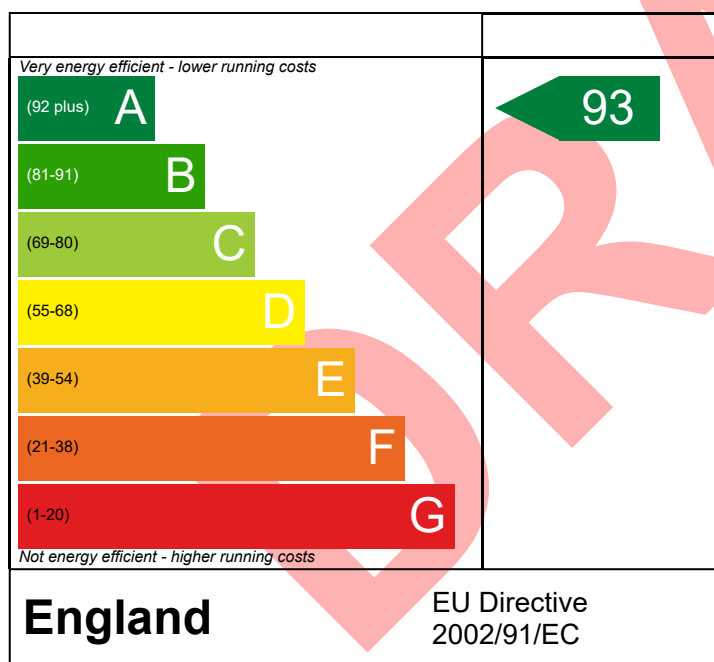


Dwelling type: Flat, End-Terrace
Date of assessment: 05/09/2025
Produced by: Georgios Sigalas
Total floor area: 51.5 m²
DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

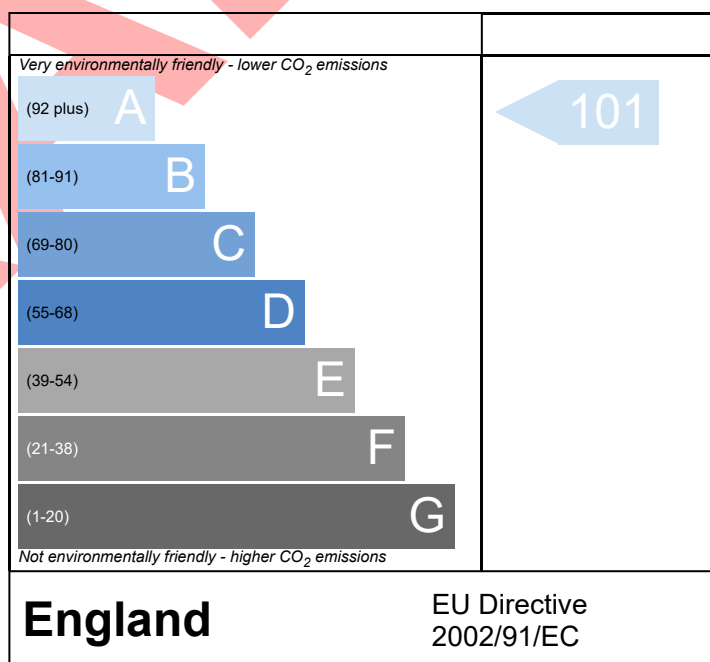
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

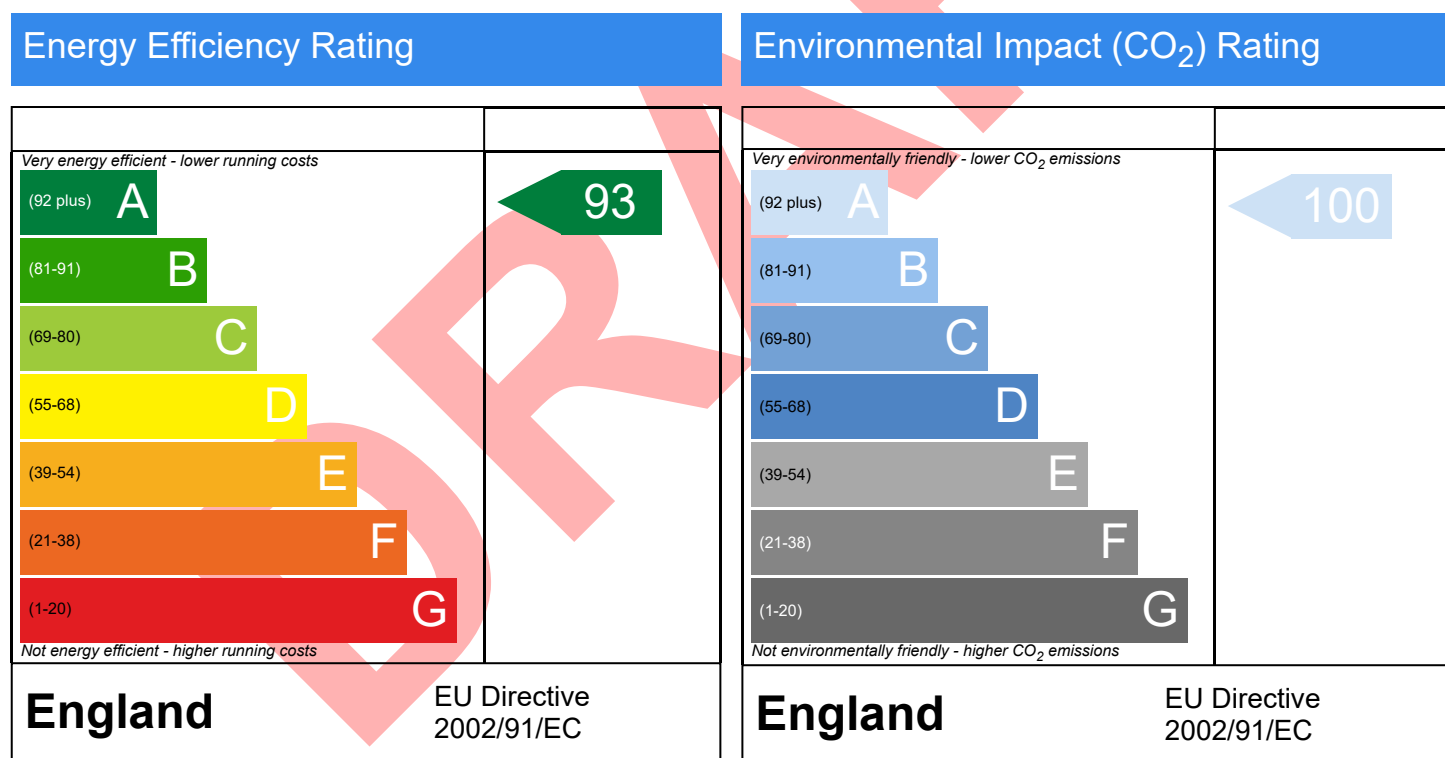
Predicted Energy Assessment



Dwelling type: Flat, Semi-Detached
Date of assessment: 05/09/2025
Produced by: Georgios Sigalas
Total floor area: 53.1 m²
DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

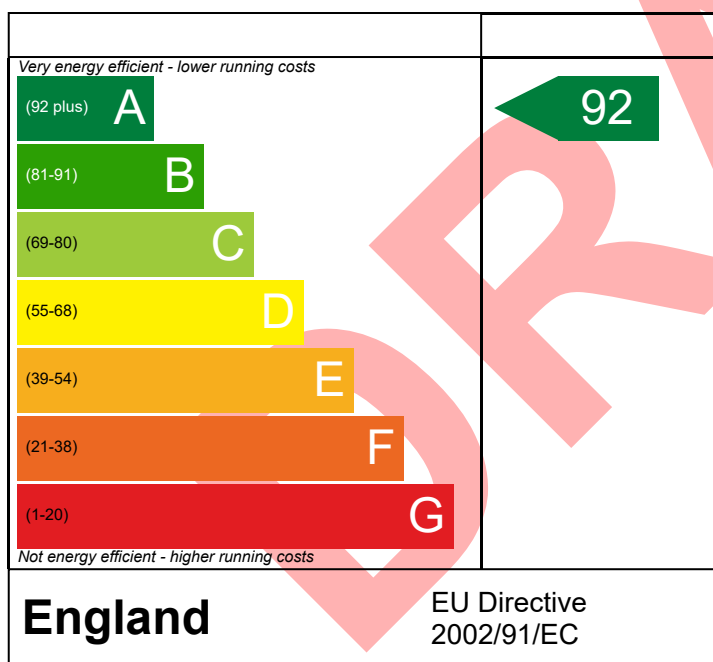
Predicted Energy Assessment

Dwelling type: Flat, End-Terrace
Date of assessment: 05/09/2025
Produced by: Georgios Sigalas
Total floor area: 67.4 m²
DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

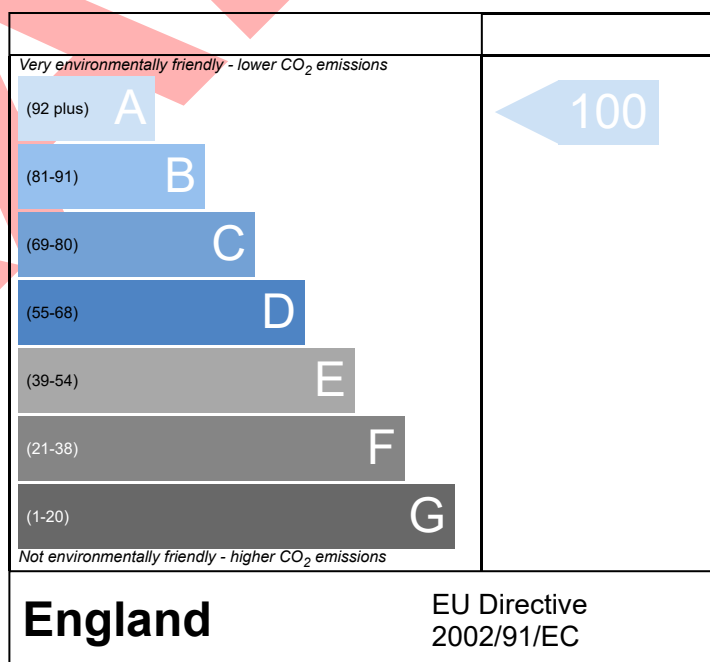
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Predicted Energy Assessment

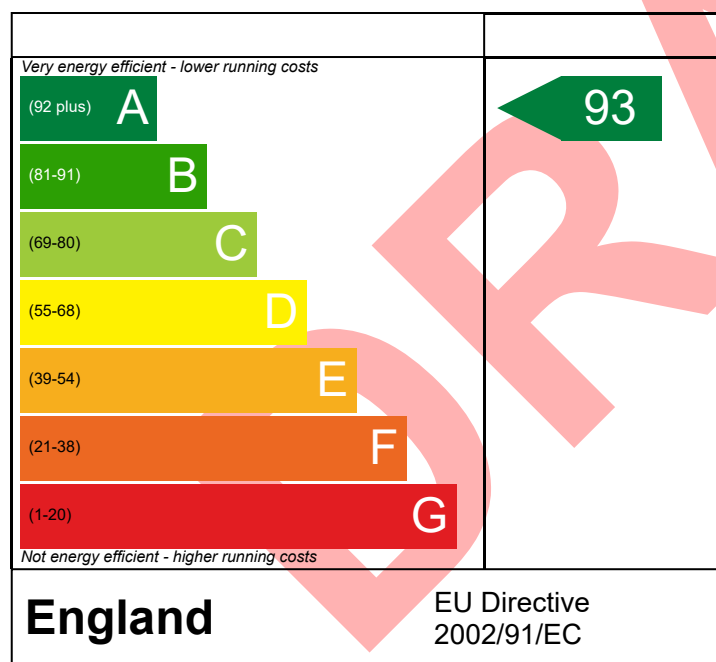


Dwelling type: Flat, End-Terrace
Date of assessment: 05/09/2025
Produced by: Georgios Sigalas
Total floor area: 52.7 m²
DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

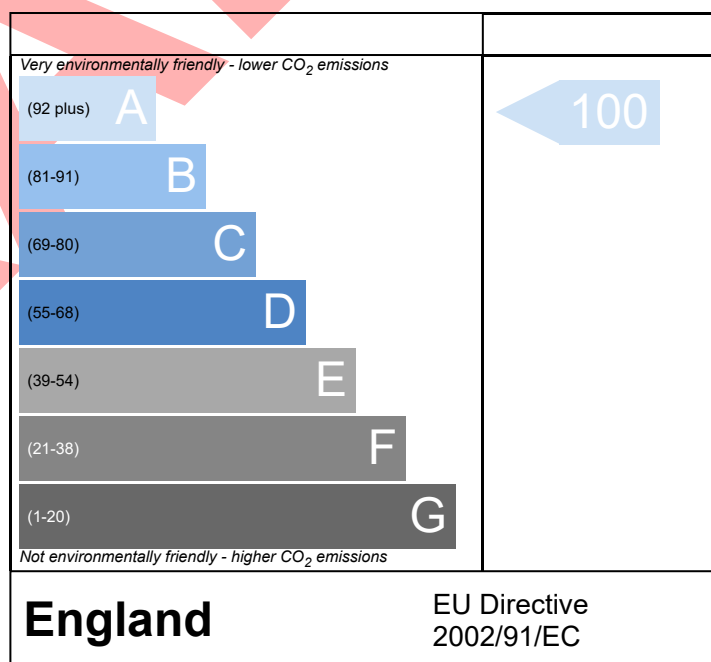
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

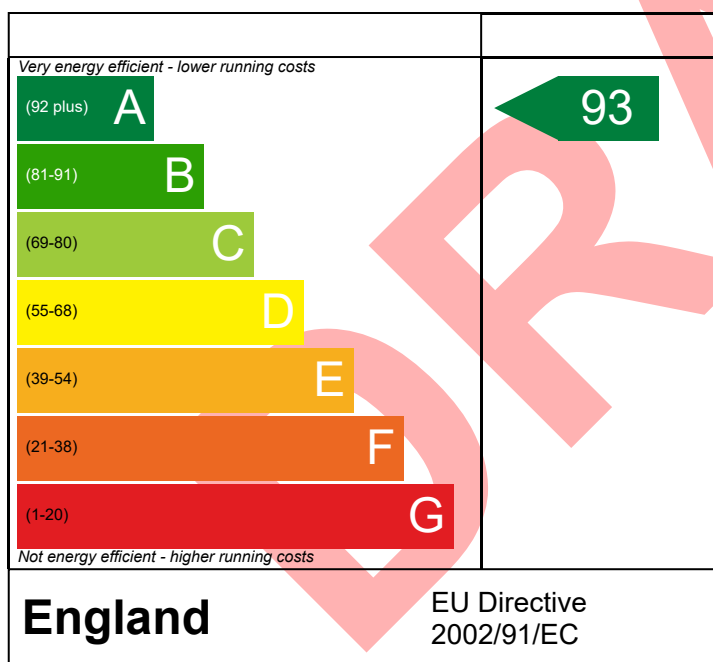
Predicted Energy Assessment

Dwelling type: Flat, End-Terrace
Date of assessment: 05/09/2025
Produced by: Georgios Sigalas
Total floor area: 61.6 m²
DRRN:

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

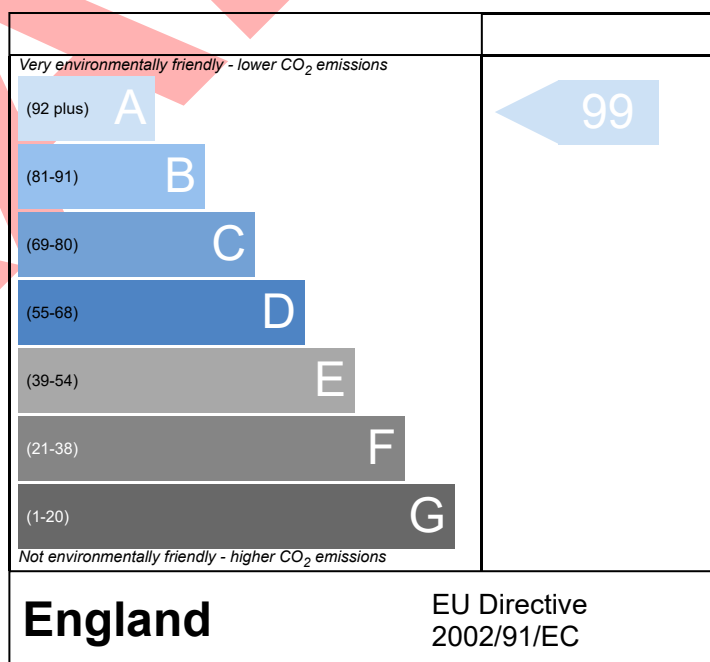
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Appendix C – EPC Assessment

Energy Performance Certificate

Non-Domestic Building

Fives Court
Angel Ln
Mere
Mere
BA12 6DH

Certificate Reference Number:
1024-5550-1418-0338-9631

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient

A+

Net zero CO₂ emissions

A 0-25

6

This is how energy efficient the building is.

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Heating and Mechanical Ventilation
Total useful floor area (m ²):	317.077
Building complexity:	Level 5
Building emission rate (kgCO ₂ /m ² per year):	1.59
Primary energy use (kWh _{ep} /m ² per year):	14.09

Benchmarks

Buildings similar to this one could have ratings as follows:

6

If newly built

24

If typical of the existing stock

BRUKL Output Document



HM Government

Compliance with England Building Regulations Part L 2021

Project name

P2563 - Fives Court Mere Communal Areas

As designed

Date: Fri Sep 05 11:54:51 2025

Administrative information

Building Details

Address: Fives Court, Mere, BA12 6DH

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

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

Certifier details

Name: George Sigalas

Telephone number: 0117 363 7221

Address: 6th Floor Beacon Tower, Bristol, BS1 4XE

Foundation area [m²]: 158.54

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	1.7
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	1.59
Target primary energy rate (TPER), kWh _{ep} /m ² annum	16.83
Building primary energy rate (BPER), kWh _{ep} /m ² annum	14.09
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 _{limit}	U _{calc}	U _{calc}	First surface with maximum value
Walls*	0.26	0.2	0.22	LS000006:Surf[2]
Floors	0.18	0.15	0.15	LS000006:Surf[3]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.45	FF000000:Surf[25]
Windows** and roof windows	1.6	1.2	1.2	LS000015:Surf[6]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.24	2.2	LS00001D:Surf[1]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{limit} = Limiting area-weighted average U-values [W/(m²K)]
 U_{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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m ²]	317.1	317.1		Retail/Financial and Professional Services
External area [m ²]	527.6	524.8		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	SOU	SOU		Offices and Workshop Businesses
Infiltration [m ³ /hm ² @ 50Pa]	5	3		General Industrial and Special Industrial Groups
Average conductance [W/K]	161.69	167.85		Storage or Distribution
Average U-value [W/m ² K]	0.31	0.32		Hotels
Alpha value* [%]	23.15	10	98	Residential Institutions: Hospitals and Care Homes
				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
				General Assembly and Leisure, Night Clubs, and Theatres
				Others: Passenger Terminals
				Others: Emergency Services
			2	Others: Miscellaneous 24hr Activities
				Others: Car Parks 24 hrs
				Others: Stand Alone Utility Block

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.62	4.41
Cooling	0	0
Auxiliary	8	4.51
Lighting	17.69	18.27
Hot water	5.51	2.05
Equipment*	147.24	147.24
TOTAL**	36.81	29.23

* 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.

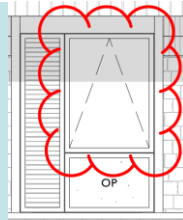
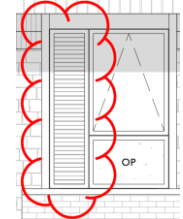
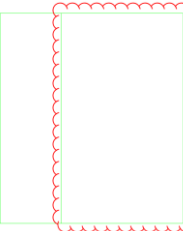
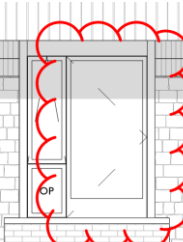
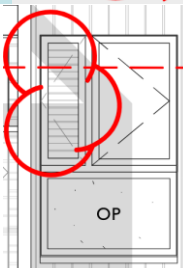
Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	27.79	18.01
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>27.79</i>	<i>18.01</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	17.06	22.38
Primary energy [kWh _{PE} /m ²]	14.09	16.83
Total emissions [kg/m ²]	1.59	1.7

Appendix E – Window Openings

	Window Type	Openable Dimension	Window	Opening Type
1	Top Hung Window	1.03 x 1.39		
2	Side Hung Window	0.42x1.30		
3	Top Hung Window	0.60 x 1.19		
4	Patio/Sliding Door	1.00 x 2.10		
5	Side Hung Window	0.65 x 0.99		
6	Side Hung Window	0.34 x 1.00		

Appendix F – Part O Overheating Results- DSY1 2020 H50

Approved Document O report
Overheating risk in residential buildings
for
Fives Court Mere

Fives Court Mere

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Building details

Project name: Fives Court Mere	Date: 04-09-2025 12:16:46
Location: Yeovilton, United Kingdom	
Address: Angel Lane, Mere, Wiltshire	
Building use: Residential	
Are there any security, noise, or pollution issues: None	

Designer's details

Designer's name: Georgios Sigalas
Designer's organisation: Box Twenty Consulting Engineers
Designer's address: 6th Floor, Beacon Tower, Bristol, BS1 4XE

Dynamic thermal model

Software: IESVE version 2024.0.2.0	
Weather file: Southampton_DSY1_2020High50_.epw	
Results file: 250904-DSY1 2020H50.aps	
Number of rooms analysed: 14	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category I (vulnerable)	
Overheating mitigation strategy: Natural purge ventilation via openable window and supplementary mech vent via MVHR	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	YES
Designer's signature:	

Fives Court Mere

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Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy, T_{max} is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Flat 2_ Single Bedroom	Pass	Pass	-	-
Flat 2_ Kitchen/ Living	Pass	N/A	-	-
Flat 2_ Double Bedroom	Pass	Pass	-	-
Flat 3_KLD	Pass	N/A	-	-
Flat 6_Kitchen/Living	Pass	N/A	-	-
Flat 6_Double Bedroom	Pass	Pass	-	-
Flat 3_Double Bedroom	Pass	Pass	-	-
Flat 13_Double Bedroom	Pass	Pass	-	-
Flat 13_KLD	Pass	N/A	-	-
Flat 12_Double Bedroom	Pass	Pass	-	-
Flat 12_Kitchen/Living	Pass	N/A	-	-
Flat 12_Single Bedroom	Pass	Pass	-	-
Flat 18_Living/Kitchen	Pass	N/A	-	-
Flat 18_Double Bedroom	Pass	Pass	-	-

Fives Court Mere

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Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion a check
Flat 2_ Single Bedroom	3672	14	0.4	Pass
Flat 2_ Kitchen/ Living	1989	16	0.8	Pass
Flat 2_ Double Bedroom	3672	11	0.3	Pass
Flat 3_KLD	1989	15	0.8	Pass
Flat 6_Kitchen/Living	1989	1	0.1	Pass
Flat 6_Double Bedroom	3672	6	0.2	Pass
Flat 3_Double Bedroom	3672	6	0.2	Pass
Flat 13_Double Bedroom	3672	5	0.1	Pass
Flat 13_KLD	1989	14	0.7	Pass
Flat 12_Double Bedroom	3672	7	0.2	Pass
Flat 12_Kitchen/Living	1989	14	0.7	Pass
Flat 12_Single Bedroom	3672	8	0.2	Pass
Flat 18_Living/Kitchen	1989	7	0.4	Pass
Flat 18_Double Bedroom	3672	3	0.1	Pass

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
Flat 2_ Single Bedroom	0	0	0	Pass
Flat 2_ Kitchen/ Living	N/A	N/A	N/A	N/A
Flat 2_ Double Bedroom	0	0	0	Pass
Flat 3_KLD	N/A	N/A	N/A	N/A
Flat 6_Kitchen/Living	N/A	N/A	N/A	N/A
Flat 6_Double Bedroom	0	0	0	Pass
Flat 3_Double Bedroom	0	0	0	Pass
Flat 13_Double Bedroom	0	0	0	Pass
Flat 13_KLD	N/A	N/A	N/A	N/A
Flat 12_Double Bedroom	0	0	0	Pass
Flat 12_Kitchen/Living	N/A	N/A	N/A	N/A
Flat 12_Single Bedroom	0	0	0	Pass
Flat 18_Living/Kitchen	N/A	N/A	N/A	N/A
Flat 18_Double Bedroom	0	0	0	Pass

Fives Court Mere

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Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
No mech vent rooms	N/A	N/A	N/A

Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Fives Court Mere

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Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m ²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Flat 2_ Single Bedroom	10.96	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Flat 2_ Kitchen/ Living	29.21	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 2_ Double Bedroom	14.98	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 3_KLD	28.23	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 6_Kitchen/Living	31.47	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 6_Double Bedroom	15.91	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 3_Double Bedroom	14.05	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 13_Double Bedroom	14.28	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 13_KLD	29.96	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 12_Double Bedroom	13.86	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 12_ Kitchen/Living	26.82	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 12_Single Bedroom	10.33	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Flat 18_Living/Kitchen	26.97	TM59 - 1 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 18_Double Bedroom	14.84	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h

Fives Court Mere

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Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Flat 2_ Single Bedroom	12.0	0.5, 0.104, 0.5007, 0.5	1.68, 0.32, 1.47, 0.74, 0.73, 0.36, 0.32	70.0, 20.0, 65.4000015258789, 20.0, 59.59998474121094, 20.0, 20.0	26.65	ADO.Section_26ab, ADO.AlwaysOff, ADO.Section_26a, Internal Door Weekly Profile
Flat 2_Kitchen/ Living	15.63	0.5007, 0.5, 0.104, 0.5007, 0.5	2.21, 0.73, 0.36, 1.89, 0.32, 1.47, 0.73, 0.73, 0.36, 0.31	85.0, 59.59998474121094, 20.0, 70.0, 20.0, 65.4000015258789, 20.0, 59.59998474121094, 20.0, 20.0	18.65	ADO.Section_26ab, Internal Door Weekly Profile, ADO.AlwaysOff, ADO.Section_26a
Flat 2_ Double Bedroom	22.25	0.104, 0.5007, 0.5, 0.5	1.89, 1.47, 0.73, 0.73, 0.36, 0.32, 0.31	70.0, 65.4000015258789, 20.0, 59.59998474121094, 20.0, 20.0, 20.0	20.45	ADO.Section_26ab, ADO.AlwaysOff, ADO.Section_26a, Internal Door Weekly Profile
Flat 3_KLD	13.85	0.5, 0.104, 0.5007, 0.5, 0.5, 0.5007, 0.5	0.32, 1.47, 0.74, 0.73, 0.36, 0.32, 0.31, 0.73, 0.36, 2.21, 0.32, 1.89	20.0, 65.4000015258789, 20.0, 59.59998474121094, 20.0, 20.0, 20.0, 59.59998474121094, 20.0, 85.0, 20.0, 70.0	19.76	ADO.Section_26ab, Internal Door Weekly Profile, ADO.AlwaysOff, ADO.Section_26a
Flat 6_Kitchen/Living	25.65	0.871, 0.5, 0.5007, 0.5	1.89, 1.89, 0.42, 0.84, 2.1, 0.32, 2.2, 1.15, 0.57, 0.32	70.0, 70.0, 0.0, 53.900001525878906, 20.0, 20.0, 85.0, 59.59998474121094, 0.0, 20.0	19.71	ADO.AlwaysOff, off continuously, ADO.Section_26ab, Internal Door Weekly Profile, ADO.Section_26a
Flat 6_Double Bedroom	24.48	0.5, 0.104, 0.5007, 0.5	1.89, 0.32, 1.47, 0.73, 1.15, 0.57, 0.31, 1.89	70.0, 20.0, 65.4000015258789, 0.0, 59.59998474121094, 0.0, 20.0, 70.0	27.77	ADO.AlwaysOff, off continuously, ADO.Section_26ab, Internal Door Weekly Profile, ADO.Section_26a

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Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Flat 3_Double Bedroom	13.71	0.104, 0.5007, 0.5	1.47, 0.74, 1.15, 0.57, 0.31, 1.89	65.4000015258789, 20.0, 59.599998474121094, 20.0, 20.0, 70.0	23.44	ADO.Section_26ab, Internal Door Weekly Profile, ADO.AlwaysOff, ADO.Section_26a
Flat 13_Double Bedroom	6.85	0.5	1.89, 1.89, 0.35, 0.7	70.0, 70.0, 41.0, 63.20000076293945	22.63	ADO.Section_26ab, Internal Door Weekly Profile
Flat 13_KLD	12.7	0.5, 0.5, 0.5	1.89, 1.99, 0.7, 0.35, 0.7, 0.35, 0.7, 0.35	70.0, 85.0, 63.20000076293945, 41.0, 63.20000076293945, 41.0, 63.20000076293945, 41.0	15.93	ADO.Section_26ab, ADO.Section_26a, Internal Door Weekly Profile
Flat 12_Double Bedroom	14.11	0.5	1.89, 0.7, 0.35	70.0, 63.20000076293945, 41.0	13.77	ADO.Section_26ab, Internal Door Weekly Profile
Flat 12_Kitchen/Living	14.52	0.5, 0.5, 0.5	2.1, 0.7, 0.35, 0.7, 0.35, 1.89	85.0, 63.20000076293945, 41.0, 63.20000076293945, 41.0, 70.0	15.96	ADO.Section_26ab, Internal Door Weekly Profile, ADO.Section_26a
Flat 12_Single Bedroom	6.53	0.5	0.35, 0.7, 1.89, 0.14	41.0, 63.20000076293945, 70.0, 20.0	18.75	ADO.Section_26ab, ADO.AlwaysOff, Internal Door Weekly Profile
Flat 18_Living/Kitchen	26.95	0.5, 0.5, 0.5	2.1, 0.7, 0.35, 0.35, 0.7, 1.89	85.0, 63.20000076293945, 41.0, 41.0, 63.20000076293945, 70.0	15.87	ADO.Section_26ab, Internal Door Weekly Profile, ADO.Section_26a
Flat 18_Double Bedroom	13.8	0.5	0.7, 0.35, 1.89	63.20000076293945, 41.0, 70.0	12.86	ADO.Section_26ab, Internal Door Weekly Profile

Fives Court Mere

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Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
Flat 2_ Single Bedroom	0.15	0
Flat 2_ Kitchen/ Living	0.15	0.52
Flat 2_ Double Bedroom	0.15	0.46
Flat 3_KLD	0.15	0.53
Flat 6_ Kitchen/Living	0.15	0.48
Flat 6_ Double Bedroom	0.15	0.44
Flat 3_ Double Bedroom	0.15	0.5
Flat 13_ Double Bedroom	0.15	0.61
Flat 13_KLD	0.15	0.62
Flat 12_ Double Bedroom	0.15	0.62
Flat 12_ Kitchen/Living	0.15	0.7
Flat 12_ Single Bedroom	0.15	0
Flat 18_ Living/Kitchen	0.15	0.69
Flat 18_ Double Bedroom	0.15	0.58

Appendix G – Part O Overheating Results- DSY1 2050 H50

Approved Document O report
Overheating risk in residential buildings
for
Fives Court Mere

Fives Court Mere

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Building details

Project name: Fives Court Mere	Date: 04-09-2025 12:11:50
Location: Yeovilton, United Kingdom	
Address: Angel Lane, Mere, Wiltshire	
Building use: Residential	
Are there any security, noise, or pollution issues: None	

Designer's details

Designer's name: Georgios Sigalas
Designer's organisation: Box Twenty Consulting Engineers
Designer's address: 6th Floor, Beacon Tower, Bristol, BS1 4XE

Dynamic thermal model

Software: IESVE version 2024.0.2.0	
Weather file: Southampton_DSY1_2050High50_.epw	
Results file: 250904-DSY1 2050H50.aps	
Number of rooms analysed: 14	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category I (vulnerable)	
Overheating mitigation strategy: Natural purge ventilation via openable window and supplementary mech vent via MVHR	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	YES
Designer's signature:	

Fives Court Mere

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Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy, T_{max} is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
Flat 2_ Single Bedroom	Pass	Pass	-	-
Flat 2_ Kitchen/ Living	Pass	N/A	-	-
Flat 2_ Double Bedroom	Pass	Pass	-	-
Flat 3_KLD	Pass	N/A	-	-
Flat 6_Kitchen/Living	Pass	N/A	-	-
Flat 6_Double Bedroom	Pass	Pass	-	-
Flat 3_Double Bedroom	Pass	Pass	-	-
Flat 13_Double Bedroom	Pass	Pass	-	-
Flat 13_KLD	Pass	N/A	-	-
Flat 12_Double Bedroom	Pass	Pass	-	-
Flat 12_Kitchen/Living	Pass	N/A	-	-
Flat 12_Single Bedroom	Pass	Pass	-	-
Flat 18_Living/Kitchen	Pass	N/A	-	-
Flat 18_Double Bedroom	Pass	Pass	-	-

Fives Court Mere

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Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion a check
Flat 2_ Single Bedroom	3672	47	1.3	Pass
Flat 2_ Kitchen/ Living	1989	52	2.6	Pass
Flat 2_ Double Bedroom	3672	42	1.1	Pass
Flat 3_KLD	1989	45	2.3	Pass
Flat 6_Kitchen/Living	1989	26	1.3	Pass
Flat 6_Double Bedroom	3672	30	0.8	Pass
Flat 3_Double Bedroom	3672	33	0.9	Pass
Flat 13_Double Bedroom	3672	27	0.7	Pass
Flat 13_KLD	1989	41	2.1	Pass
Flat 12_Double Bedroom	3672	27	0.7	Pass
Flat 12_Kitchen/Living	1989	39	2.0	Pass
Flat 12_Single Bedroom	3672	36	1.0	Pass
Flat 18_Living/Kitchen	1989	37	1.9	Pass
Flat 18_Double Bedroom	3672	25	0.7	Pass

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
Flat 2_ Single Bedroom	3	0	3	Pass
Flat 2_ Kitchen/ Living	N/A	N/A	N/A	N/A
Flat 2_ Double Bedroom	3	0	3	Pass
Flat 3_KLD	N/A	N/A	N/A	N/A
Flat 6_Kitchen/Living	N/A	N/A	N/A	N/A
Flat 6_Double Bedroom	5	0	5	Pass
Flat 3_Double Bedroom	5	0	5	Pass
Flat 13_Double Bedroom	7	0	7	Pass
Flat 13_KLD	N/A	N/A	N/A	N/A
Flat 12_Double Bedroom	3	0	3	Pass
Flat 12_Kitchen/Living	N/A	N/A	N/A	N/A
Flat 12_Single Bedroom	3	0	3	Pass
Flat 18_Living/Kitchen	N/A	N/A	N/A	N/A
Flat 18_Double Bedroom	6	0	6	Pass

Fives Court Mere

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Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
No mech vent rooms	N/A	N/A	N/A

Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Fives Court Mere

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Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m ²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
Flat 2_ Single Bedroom	10.96	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Flat 2_ Kitchen/ Living	29.21	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 2_ Double Bedroom	14.98	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 3_KLD	28.23	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 6_Kitchen/Living	31.47	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 6_Double Bedroom	15.91	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 3_Double Bedroom	14.05	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 13_Double Bedroom	14.28	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 13_KLD	29.96	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 12_Double Bedroom	13.86	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h
Flat 12_Kitchen/Living	26.82	TM59 - 2 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 12_Single Bedroom	10.33	TM59 - Single Bedroom	Single Bedroom Occupancy	Single Bedroom Equipment	18-23h
Flat 18_Living/Kitchen	26.97	TM59 - 1 Bedroom - Living / Kitchen	Living / Kitchen Occupancy	Living / Kitchen Equipment	18-23h
Flat 18_Double Bedroom	14.84	TM59 - Double Bedroom	Double Bedroom Occupancy	Double Bedroom Equipment	18-23h

Fives Court Mere

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Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Flat 2_ Single Bedroom	12.0	0.5, 0.104, 0.5007, 0.5	1.68, 0.32, 1.47, 0.74, 0.73, 0.36, 0.32	70.0, 20.0, 65.4000015258789, 20.0, 59.59998474121094, 20.0, 20.0	26.65	ADO.Section_26ab, ADO.AlwaysOff, ADO.Section_26a, Internal Door Weekly Profile
Flat 2_Kitchen/ Living	15.63	0.5007, 0.5, 0.104, 0.5007, 0.5	2.21, 0.73, 0.36, 1.89, 0.32, 1.47, 0.73, 0.73, 0.36, 0.31	85.0, 59.59998474121094, 20.0, 70.0, 20.0, 65.4000015258789, 20.0, 59.59998474121094, 20.0, 20.0	18.65	ADO.Section_26ab, Internal Door Weekly Profile, ADO.AlwaysOff, ADO.Section_26a
Flat 2_ Double Bedroom	22.25	0.104, 0.5007, 0.5, 0.5	1.89, 1.47, 0.73, 0.73, 0.36, 0.32, 0.31	70.0, 65.4000015258789, 20.0, 59.59998474121094, 20.0, 20.0, 20.0	20.45	ADO.Section_26ab, ADO.AlwaysOff, ADO.Section_26a, Internal Door Weekly Profile
Flat 3_KLD	13.85	0.5, 0.104, 0.5007, 0.5, 0.5, 0.5007, 0.5	0.32, 1.47, 0.74, 0.73, 0.36, 0.32, 0.31, 0.73, 0.36, 2.21, 0.32, 1.89	20.0, 65.4000015258789, 20.0, 59.59998474121094, 20.0, 20.0, 20.0, 59.59998474121094, 20.0, 85.0, 20.0, 70.0	19.76	ADO.Section_26ab, Internal Door Weekly Profile, ADO.AlwaysOff, ADO.Section_26a
Flat 6_Kitchen/Living	25.65	0.871, 0.5, 0.5007, 0.5	1.89, 1.89, 0.42, 0.84, 2.1, 0.32, 2.2, 1.15, 0.57, 0.32	70.0, 70.0, 0.0, 53.900001525878906, 20.0, 20.0, 85.0, 59.59998474121094, 0.0, 20.0	19.71	ADO.AlwaysOff, off continuously, ADO.Section_26ab, Internal Door Weekly Profile, ADO.Section_26a
Flat 6_Double Bedroom	24.48	0.5, 0.104, 0.5007, 0.5	1.89, 0.32, 1.47, 0.73, 1.15, 0.57, 0.31, 1.89	70.0, 20.0, 65.4000015258789, 0.0, 59.59998474121094, 0.0, 20.0, 70.0	27.77	ADO.AlwaysOff, off continuously, ADO.Section_26ab, Internal Door Weekly Profile, ADO.Section_26a

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Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m ²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
Flat 3_Double Bedroom	13.71	0.104, 0.5007, 0.5	1.47, 0.74, 1.15, 0.57, 0.31, 1.89	65.4000015258789, 20.0, 59.599998474121094, 20.0, 20.0, 70.0	23.44	ADO.Section_26ab, Internal Door Weekly Profile, ADO.AlwaysOff, ADO.Section_26a
Flat 13_Double Bedroom	6.85	0.5	1.89, 1.89, 0.35, 0.7	70.0, 70.0, 41.0, 63.20000076293945	22.63	ADO.Section_26ab, Internal Door Weekly Profile
Flat 13_KLD	12.7	0.5, 0.5, 0.5	1.89, 1.99, 0.7, 0.35, 0.7, 0.35, 0.7, 0.35	70.0, 85.0, 63.20000076293945, 41.0, 63.20000076293945, 41.0, 63.20000076293945, 41.0	15.93	ADO.Section_26ab, ADO.Section_26a, Internal Door Weekly Profile
Flat 12_Double Bedroom	14.11	0.5	1.89, 0.7, 0.35	70.0, 63.20000076293945, 41.0	13.77	ADO.Section_26ab, Internal Door Weekly Profile
Flat 12_Kitchen/Living	14.52	0.5, 0.5, 0.5	2.1, 0.7, 0.35, 0.7, 0.35, 1.89	85.0, 63.20000076293945, 41.0, 63.20000076293945, 41.0, 70.0	15.96	ADO.Section_26ab, Internal Door Weekly Profile, ADO.Section_26a
Flat 12_Single Bedroom	6.53	0.5	0.35, 0.7, 1.89, 0.14	41.0, 63.20000076293945, 70.0, 20.0	18.75	ADO.Section_26ab, ADO.AlwaysOff, Internal Door Weekly Profile
Flat 18_Living/Kitchen	26.95	0.5, 0.5, 0.5	2.1, 0.7, 0.35, 0.35, 0.7, 1.89	85.0, 63.20000076293945, 41.0, 41.0, 63.20000076293945, 70.0	15.87	ADO.Section_26ab, Internal Door Weekly Profile, ADO.Section_26a
Flat 18_Double Bedroom	13.8	0.5	0.7, 0.35, 1.89	63.20000076293945, 41.0, 70.0	12.86	ADO.Section_26ab, Internal Door Weekly Profile

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Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
Flat 2_ Single Bedroom	0.15	0
Flat 2_ Kitchen/ Living	0.15	0.52
Flat 2_ Double Bedroom	0.15	0.46
Flat 3_KLD	0.15	0.53
Flat 6_ Kitchen/Living	0.15	0.48
Flat 6_ Double Bedroom	0.15	0.44
Flat 3_ Double Bedroom	0.15	0.5
Flat 13_ Double Bedroom	0.15	0.61
Flat 13_KLD	0.15	0.62
Flat 12_ Double Bedroom	0.15	0.62
Flat 12_ Kitchen/Living	0.15	0.7
Flat 12_ Single Bedroom	0.15	0
Flat 18_ Living/Kitchen	0.15	0.69
Flat 18_ Double Bedroom	0.15	0.58

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