



ASSESSMENT HIVE

Energy Statement

Avondale, Truro Road, Wood Green, London, N22 8DP

Property Type: New Build

Result: COMPLIANCE MET

Calculation Method SAP 10 Software

Date: 10 February 2026

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Executive Summary

Site Description

This Energy and Sustainability Assessment has been prepared to support the planning application for the New Build Property.

Strategy

The strategy highlights how the proposed development will promote sustainability throughout both design and operation and responds to the UK Planning and regulatory framework, National Planning Policy Framework 2021, the London Plan 2021 and the Haringey Council Local Plan Policy SP4: Working Towards a Low Carbon Haringey, summarising how the relevant targets will be addressed and achieved.

Energy Hierarchy

In accordance with the Energy Hierarchy detailed within The London Plan 2021, this statement outlines an overall commitment to reducing energy consumption under occupancy through the adoption of a 'Fabric First' principle, which will seek to enhance insulation standards and improved heating and lighting efficiencies in comparison to the standard requirements of Approved Document Part L 2021. The viability of district heating will be explored.

Energy Efficiency & Carbon Reduction:

Be 'Lean': Passive design principles including a high level of insulation and reduced air permeability to deliver Part L compliant Building in absence of renewable technologies. It will achieve **65%** reduction in carbon emissions over Part L 2021 baseline.

Be 'Clean': district heating was deemed not viable for this project,

Be 'Green': Air Source Heat Pumps have been proposed for the specific scheme and will deliver a further **35%** reduction in regulated carbon emissions over Part L 2021 baseline,

Material and Waste Management

Minimising the use of virgin materials during construction by recycling and reusing where feasible. Low waste benchmark levels will be targeted during construction with requirements identifying that the diversion of waste from landfill is to be achieved by the contractor.

Recommendation and Results

This report demonstrates that the proposed development can achieve a carbon emission reduction of **80%** over the notional development (see Table 2).

The following tables demonstrate the carbon emissions and savings:

Table 1. Carbon Dioxide emissions after each stage of the Energy Hierarchy

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	1.0	
After energy demand reduction (be lean)	0.3	
After heat network connection (be clean)	0.3	
After renewable energy (be green)	0.0	

Table 2. Carbon Dioxide Savings from each stage of the Energy Hierarchy

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.7	65%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.3	35%
Cumulative on site savings	1.0	100%

Methodology

The Standard Assessment Procedure (SAP) is the UK Government methodology for assessing and calculating the energy performance of dwellings.

The Simplified Building Energy Model (SBEM) is the UK Government methodology for assessing and calculating the energy performance of non-domestic buildings.

SAP and SBEM calculations take into account a range of factors that contribute to energy efficiency, including:

- Materials used for the construction and the thermal insulation of the building fabric (u-values¹ and thermal mass)
- Air permeability
- Efficiency, fuel source, and control of heating and cooling systems
- Ventilation system energy use and heat recovery
- Lighting energy
- Low carbon and energy saving or generating technologies

Approved Document Part L of current Building Regulations addresses the conservation of fuel and power. Part L is divided into two separate documents:

- Part L1 Newly constructed and extended or renovated existing dwellings
- Part L2 Newly constructed and extended or renovated existing non-domestic buildings

To comply with Part L, the calculations should demonstrate how the building will either meet or achieve a percentage reduction in the Building Emission Rate (BER) under the required Target Emission Rate (TER).

The calculation software has been used to calculate a baseline of energy demand and carbon dioxide emissions as appropriate from which any reductions or contributions have been measured.

Planning Policy Context

National Planning Policy Framework (NPPF) 2021

Emphasised the concept of sustainable development by encouraging local authorities to adopt proactive strategies to mitigate and adapt to climate change. It recommends the move to a low carbon future by:

Avoiding increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

Contributing to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
- consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
- identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for colocating potential heat customers and suppliers.

The London Plan 2021

Policy SI 2 Minimising Greenhouse Gas Emissions:

Major development should be net zero-carbon. Proposals should make the fullest contribution to reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy: i) Be lean: use less energy and manage demand during operation, ii) Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly, iii) Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site, iiiii) Be seen: monitor, verify and report on energy performance

Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either: i) through a cash in lieu contribution to the borough's carbon offset fund, or ii) off-site provided that an alternative proposal is identified, and delivery is certain.

Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.

Policy 5.3 Sustainable Design and Construction:

Major development proposals should meet minimum standards outlined in the supplementary guidance Sustainable Design and Construction SPG (2014), to consider the following principles:

- Minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)
- Avoiding internal overheating and contributing to the urban heat island effect
- Efficient use of natural resources (including water), including making the most of natural systems both within and around buildings
- Minimising pollution (including noise, air and urban runoff)
- Minimising the generation of waste and maximising reuse or recycling
- Avoiding impacts from natural hazards (including flooding)
- Ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions,
- Securing sustainable procurement of materials, using local supplies where feasible, and
- Promoting and protecting biodiversity and green infrastructure.

Haringey Local plan - Policy SP4: Working Towards a Low Carbon Haringey

The Haringey Local Planning Policy requirements are as follows.

A 20% CO₂ reduction from on-site renewable technology sources

Energy Strategy

The Energy strategy for the proposed development is based on the Building Regulations Part L; it adopts a set of principles to guide design and decisions regarding energy, balanced with the need to optimise environmental and economic benefits. It seeks to incorporate energy efficiency through the approach detailed below.

Baseline Model

In accordance with London Plan Policy SI 2, a baseline model is run assuming the development complied with Part L 2021 of the Building Regulations. This baseline model is then used in the Energy Strategy process in comparison to the Be 'Lean', Be 'Clean' and Be 'Green' scenarios of the Energy Hierarchy, to establish the regulated CO₂ emissions from the development.

The baseline model used for this project assumed that any heating and hot water supply would be provided by gas boilers and any active cooling would be provided by electrically powered equipment. The comparative Be 'Lean' model assumes the same heating strategy.

Be 'Lean' – Demand Reduction

In accordance with London Plan Policy SI 2 the development must achieve at least a 10% improvement in energy efficiency on Building Regulations Part L 2021 baseline scenario.

The building fabric performance and engineering systems have been optimised in order to use less energy prior to the inclusion or consideration of Low and Zero Carbon (LZC) Technology.

Through passive design measures, efficient building fabric and engineering systems the building is estimated to achieve **65%** reduction in annual regulated CO₂ emissions over Part L benchmark, therefore demonstrating compliance with Building Regulations Through passive means alone without the utilisation of renewable technologies.

Passive Design Measures

Fabric Performance - The fabric performance values aim to reduce unwanted heat loss and heat gains, whilst maintaining a comfortable internal environment.

The heat loss of different building elements is dependent upon their U –value. A building with low U values provides better levels of insulation and reduced heating demand.

The development will incorporate high levels of insulation and efficient glazing; thereby reduce demand for space heating. The table below shows the U values for the development and the associated improvements over Building Regulations.

Table 3. Energy Efficient Design Specification

Element	Building Regulations Baseline Standards 2021	Specification
External Walls	0.18 W/m ² k	0.15 W/m ² k
External Floors	0.13 W/m ² k	0.12 W/m ² k
External Roofs	0.11 W/m ² k	0.10 W/m ² k
Windows	1.20 W/m ² k	1.00 W/m ² k
Air Tightness	5.0	3.5

Efficient Lighting and Controls - Throughout the development natural lighting will be optimised. The development will also incorporate low energy light fittings throughout. All light fittings will be specified as low energy lighting and will accommodate LED luminaires only.

Ventilation - The use of natural ventilation is proposed.

Thermal Bridging – Bespoke Thermal Bridging has been calculated.

Space Heating & Cooling - Space heating will be provided by a Valiant Arotherm Air Source Heat Pump or similar.

Heating Controls – Time and Temperature Zone Control

Domestic Hot Water (DHW) system – from the Air Source Heat Pump.

Be 'Clean' – Supply Energy Efficiently

The Be Clean step of the energy hierarchy refers to the use of 'Clean energy supply'. This includes, but is not limited to, the use of Combined Heat and Power (CHP) and District Heat Networks. Policy SI 3 seeks for new development to promote the use of CHP and district heating.

Policy SI 1 Improving Air Quality

Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

Development proposals should not:

- lead to further deterioration of existing poor air quality
- create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits
- create unacceptable risk of high levels of exposure to poor air quality.

In order to meet the requirements in Part 1, as a minimum:

- development proposals must be at least Air Quality Neutral
- development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures
- development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure.

Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development.

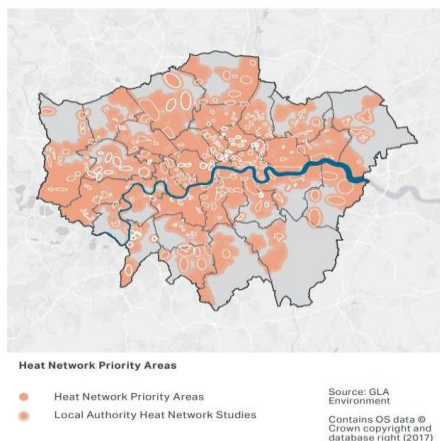
Policy SI 3 Energy Infrastructure

Boroughs and developers should engage at an early stage with relevant energy companies and bodies to establish the future energy and infrastructure requirements arising from large-scale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development.

Development Plans should:

- identify the need for, and suitable sites for, any necessary energy infrastructure requirements including energy centres, energy storage and upgrades to existing infrastructure
 - identify existing heating and cooling networks, identify proposed locations for future heating and cooling networks and identify opportunities for expanding and inter-connecting existing networks as well as establishing new networks.
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Figure 2: Heat Network Priority Areas - District Heating and Cooling



There is no existing or planned heat and energy network in the vicinity and the site does not fall into an opportunity area with decentralised energy potential as identified in the London Plan.

Community heating and Combined Heat and Power (CHP system)

CHP systems are usually needed where there is a large heat demand (schemes with more than 100- 150 dwellings), usually resulting from the building(s) being in continuous use, or through specific heating requirements such as a swimming pool. Community (or district) heating involves using a central boiler plant (or other heat sources) to heat a number of buildings through a network of well- insulated underground pipes. This system is not considered appropriate for this development

In light of the small scale of the proposed development, it is apparent that the use of CHP is also technically and financially unviable in this instance.

Site-wide communal system/network and design for district network connection

In light of the small scale of the proposed development and its location; it is apparent that the use of a heat pump fed site-wide network is technically and financially unviable.

Be 'Green' – Renewable Energy

Once energy demand reduction measures have been applied, methods for generating low and zero carbon energy can be assessed. The following renewable technologies can be considered for the project: Biomass, Water source heat pump, air source heat pump, Wind energy and solar photovoltaic panels.

Table 4. Renewable Technologies Feasibility Table

Technology	Pros	Cons
Biomass Heating A biomass system designed for wood pellets, which have a high-energy content, would fuel this development.	Less volume of storage Less maintenance and produce considerably less ash residue	Nox Emissions which may impacts High Costs Not suitable for the project
Ground Source Heat Pump It circulates a mixture of water and antifreeze around a loop of pipe, called a ground loop, which is buried in the garden. Heat from the ground is absorbed into the fluid and passes through a heat exchanger into the heat pump	Use all through the year	High Costs Not suitable for this project
Air Source Heat Pump They are an efficient and environmentally-friendly way of heating using air drawn freely from the atmosphere. They operate rather like a refrigerator in reverse, absorbing heat from the air into a working fluid which is passed into a compressor where its temperature is increased before it is transferred into the heating and hot water circuits of the building	Can generate less CO ₂ than conventional heating systems. Cheaper Provides heating and hot water Less maintenance	Needs electricity Can be noisy
Wind Turbines Wind turbines are available in various sizes from large rotors able to supply whole communities to small roof or wall-mounted units for individual dwellings.	Cheaper Less CO ₂	Local wind speeds in the area are likely to be below the level generally required for investment in large wind turbines. Noise and signal interference. Detrimental aesthetic impact
Solar Photovoltaic Panels (PV) Photovoltaic panels extract the energy of the sun to generate electricity. They operate most efficiently when oriented to the south and are inclined to about 35 degrees.	Cheaper Less CO ₂ No input power in order to generate electricity.	

Renewable Technologies Feasibility Review Conclusion

The renewable energy sources that have been reviewed for this project are Biomass Heating, Ground Source Heat Pump, Air Source Heat Pump, Domestic Wind Turbine and Solar Photovoltaic Panels (PV).

On review of the above technologies, it has been concluded that the use of air source heat pumps and solar panels will be incorporated in the design to achieve an additional CO₂ percentage reduction of **35%** to contribute to an overall reduction of **100%** in carbon emissions.

Be 'Seen' – Monitoring Performance

In accordance with London Plan Policy Guidance 'Be Seen' Energy Monitoring 1.2, the following is suggested:

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

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

The 'be seen' policy establishes post-construction monitoring as good practice, enabling developers and building owners to better understand their buildings and identify methods for improving energy performance from the project inception stage and throughout the building's lifetime.

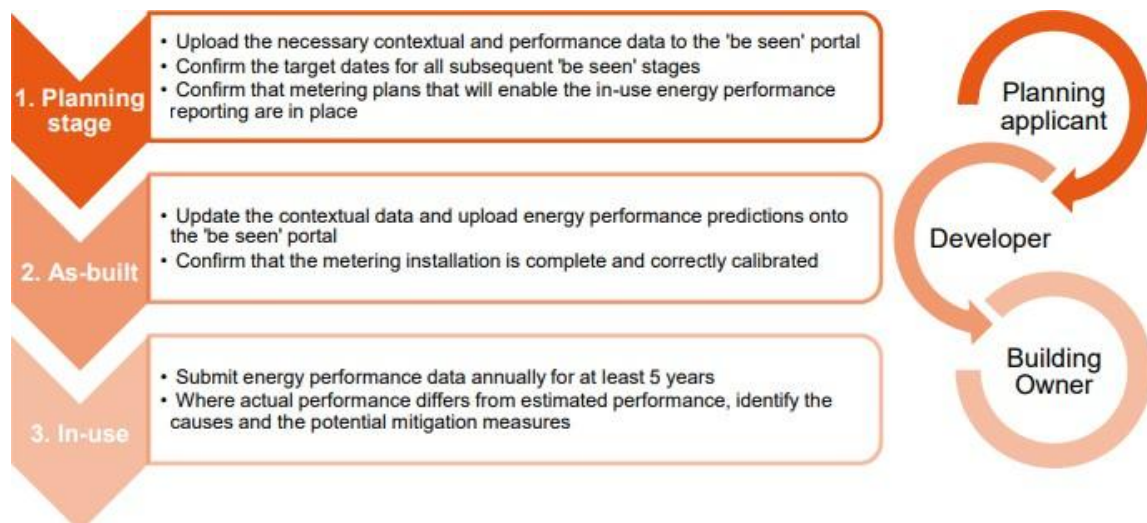
Ensuring that the actual energy and carbon performance of buildings is aligned with the estimated energy and carbon performance will also be a key factor in achieving a zero-carbon London.

The energy performance data that will be collected will provide an evidence base which could help inform future industry-wide benchmarks or performance ratings for major building typologies based on in-use performance.

An effectively implemented post-construction monitoring regime can have a number of benefits including environmental (for example, carbon emissions reduction) and socio-economic (for example, reduced occupants' bills, raised awareness around energy usage).

Figure 3 outlines the 'be seen' process through the reporting stages of a development.

Figure 3: 'Be seen' process and responsibilities.



Smart metering equipment will be installed with display of energy usage and generation to raise awareness of occupants. This can help occupants to reduce demand and subsequent running costs. The GLA spreadsheet informs the planning stage energy performance data including carbon offset. An on-site operational manual will be provided for the occupants on completion of the build to assist residents better understanding of appliances and cost management.

Sustainability Strategy

Sustainable Design

London Plan Policy 5.3 Sustainable Design and Construction and Sustainable Design and Construction SPG (2014) to consider the following principles:

- Minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)
- Avoiding internal overheating and contributing to the urban heat island effect
- Efficient use of natural resources (including water), including making the most of natural systems both within and around buildings
- Minimising pollution (including noise, air and urban runoff)
- Minimising the generation of waste and maximising reuse or recycling
- Avoiding impacts from natural hazards (including flooding)
- Ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions
- Securing sustainable procurement of materials, using local supplies where feasible, and
- Promoting and protecting biodiversity and green infrastructure.

The proposed project incorporates sustainable design and construction measures capable of mitigating and adapting to climate change to meet future needs. This section details site-specific initiatives which demonstrate how the conversion helps to meet the sustainability objectives set out in the National Planning Framework 2021.

Materials Efficiency

Materials can have a significant impact on environmental performance, both in construction but also ongoing use. Materials used for the building will have lower environmental impacts over their lifecycle. This applies to the materials used in the external walls, roof and glazing. This extends to elements of the materials category such as the basic building materials (internal walls) and the finishing elements (fascia, skirting, and furniture).

Overheating Strategy

Policy SI 4 Managing Heat Risk

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

Minimise Heat Generation Through Energy Efficient Design

Through the use of passive and active design measures, the design team have enabled the development to require less energy through the use of optimised insulation, cross ventilation, improved window u-values, higher air tightness, reduced cold bridging and light-coloured materials.

Daylight

The design of the development has taken into consideration day lighting to habitable spaces to improve the wellbeing of occupants. Good levels of daylight will offer occupants a pleasant and highly valued connection to the outdoors and plenty of natural light. It will also reduce the use of artificial lighting and therefore energy use. All light fittings will be specified as low energy lighting.

Water: Water Efficiency

In domestic and non-domestic buildings, the demand for water can be reduced as much as 50% using a variety of simple and innovative strategies that are integrated into the plumbing and mechanical systems. In order to reduce water consumption, the proposed development will include efficient fixtures with low flow rates. Total internal water consumption will not exceed 105 litres/person/day.

Table 6. Water Fittings Standards

Schedule Appliance Water Consumption		
Appliance	Flow rate or Capacity	Total Litres
WC	Dual flush WC 4/2.6 litre	14.72
Basin	1.7 litres/min	5.98
Shower	8 litres/minute flow	24.00
Bath	160 litres	25.60
Sink	4 litres/min	14.13
W/machine	Default used	16.66
Dish Washer	Default used	3.90
		104.99

Pollution: Light, Air and Noise

Light

Light pollution can best be described as artificial light that is allowed to illuminate or intrude upon areas not intended to be lit. Light in the wrong place at the wrong time can be intrusive.

Intrusive light is over bright or poorly directed lights shining onto neighbouring property which affect the neighbours' right to enjoy their property. Therefore, the proposal will incorporate lighting measures in order to avoid causing a nuisance.

Air and Noise

The layout of the development can provide good internal air quality for habitable areas but not too much so as to waste heat.

The use of openable windows will create horizontal airflow. By achieving a good naturally ventilated building the energy demand for air conditioning and mechanical ventilation will thereby be eliminated within the development.

The development will not increase the air pollution of the area by reducing as a start, its energy use, which in turn will reduce emissions that lead to air pollution.

Other measures will include:

- Use of eco-friendly building materials
- Non-toxic paints
- Installation of energy efficient appliances and devices
- Use of renewable technologies
- Waste Management
- Considerate Construction
- All contractors would have been required to sign up to the nationally recognised Considerate Constructors Scheme which requires, amongst other things that dust emissions, potential noise pollution, impacts on water quality and the potential for ground contamination are minimised during demolition and construction. The Contractor would also be obliged to adhere to a site-specific Code of Construction Practice to reduce potential nuisance effects.

Diversion of waste from landfill

Where possible, segregation of recyclable and non-recyclable material would have been employed for all waste generated throughout the construction process. Furthermore, material will be re-used on-site where feasible;

Pre-fabrication of materials/elements such as bathroom pods, pipework and riser materials were considered;

Reusable packing solutions with key product manufacturers will be explored at the earliest opportunity. Solutions may include lets, bulk bags, steel stillages and returnable cable drums;

Operational Waste

A space for reuse and recycling has been included for the resident's exclusive use.

Flood Risk

The development site is located in a Low Flood Risk Area on the Environment Agency Flood Risk Map.

Sustainable Procurement

It is expected that all timber used in the development should come from a legal Source (FSC Scheme). At least 80% of the building materials will be responsibly sourced and will use suppliers who can provide an EMS certificate or equivalent. Materials rated with an A or B in the BRE Green

Other measures will be implemented:

- The reuse of existing materials from the demolition of existing buildings
 - At least 20% of the total value of materials used should derive from recycled and reused content in the products and materials selected,
 - Steel will have a high recycled content,
 - Concrete will have a Ground Granulated Blast Furnace Slag (GGBS) value of 50%.
 - Biodiversity and Green Infrastructure
 - The proposed development will incorporate measures to support and enhance the environment through consideration of the existing site, including measures to mitigate the impact of the development and enhance site biodiversity.
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Conclusion

The development has been designed to exceed Part L building regulations requirements. In line with the national and local policies, regulated CO₂ emissions from the development will be reduced by **100%** from the notional emissions once energy efficiency measures and lean measures are taken into account.

The use of air source heat pumps and solar panels will be incorporated in the design to achieve a CO₂ percentage reduction of **35%** to contribute to the overall reduction of **100%** in carbon emissions.

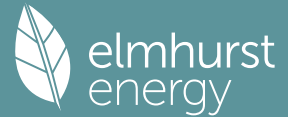
In order to achieve the required carbon emissions reduction, the report proposes the use of energy efficient measures outlined in the section 4 of this report.

An appraisal of the proposed development has been undertaken against key sustainability objectives identified from relevant policy guidance. The framework for the appraisal was guided by the National Plan. This process has ensured that the development responds to the sustainable development objectives that are relevant to the area. Key sustainability initiatives in ecology, waste management, water, health and wellbeing, materials, pollution and Surface water management have been incorporated in the design of the proposed Development.

Appendix 1

SAP Calculations - Notional

Full SAP Calculation Printout



Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Notional Dwelling	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	96 A	DER	14.93	TER	12.85
Environmental	89 B	% DER < TER			-16.19
CO ₂ Emissions (t/year)	0.78	DFEE	54.59	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			-5.33
% DPER < TPER	-16.58	DPER	80.19	TPER	68.79
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

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	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 166.7000 (5)

2. Ventilation rate

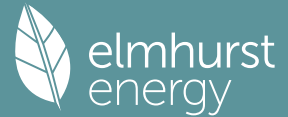
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (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) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	1.1450	34.3626		(27)
Heatloss Floor			66.6800	0.1300	8.6684	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1800	14.2182	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1100	7.3348	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	64.5840		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							355.9541 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0000	0.0500	0.6000	
E3 Sill				12.0000	0.0500	0.6000	
E4 Jamb				30.0000	0.0500	1.5000	
E5 Ground floor (normal)				43.6000	0.1600	6.9760	
E14 Flat roof				43.6000	0.1600	6.9760	
E16 Corner (normal)				20.0000	0.0900	1.8000	
E17 Corner (inverted - internal area greater than external area)				10.0000	-0.0900	-0.9000	

Full SAP Calculation Printout



Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal bridges
 Total fabric heat loss (33) + (36) + (36a) = 82.1360 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	114.0636	113.8918	113.7235	112.9330	112.7851	112.0965	112.0965	111.9690	112.3617	112.7851	113.0843	113.3971	(39)
Average = Sum(39)m / 12 =												112.9323	
HLP	1.7106	1.7080	1.7055	1.6937	1.6914	1.6811	1.6811	1.6792	1.6851	1.6914	1.6959	1.7006	(40)
HLP (average)												1.6936	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers													
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	(42a)
Hot water usage for baths													
69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838	69.4838	(42b)
Hot water usage for other uses													
36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	36.7803	(42c)
Average daily hot water use (litres/day)												98.0776	(43)
Daily hot water use													
106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641	106.2641	(44)
Energy conte	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	24.9576	(46)
Water storage loss (or HIU loss):													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	47.9862	47.8784	44.5735	45.4449	46.8643	46.7895	50.2479	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	217.3429	(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													
219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	217.3429	(64)
Total per year (kWh/year)													
12Total per year (kWh/year)													
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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													
68.8224	60.8084	64.5241	56.2876	54.0246	48.0971	47.2229	49.5784	50.5982	57.0524	60.9719	68.0624	68.0624	(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	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(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)													
-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)													
92.5032	90.4887	86.7260	78.1773	72.6137	66.8016	63.4717	66.6376	70.2753	76.6833	84.6832	91.4817	91.4817	(72)
Total internal gains													
435.9193	446.1073	427.1543	411.2451	389.1853	371.0470	356.1743	357.3745	369.1505	385.9189	410.4151	426.5397	426.5397	(73)

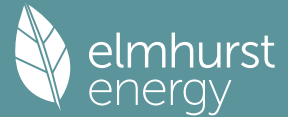
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				13.5800	10.6334		0.7600		0.7000		0.7700		53.2374 (74)
East				5.2500	19.6403		0.7600		0.7000		0.7700		38.0147 (76)
South				5.9300	46.7521		0.7600		0.7000		0.7700		102.2116 (78)
West				5.2500	19.6403		0.7600		0.7000		0.7700		38.0147 (80)
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305	195.2244	(83)
Total gains	667.3977	863.9726	1058.2039	1287.1598	1452.1882	1461.3474	1392.8581	1249.8235	1084.6267	864.0591	692.0456	621.7641	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	57.8016	57.8888	57.9745	58.3803	58.4569	58.8159	58.8159	58.8829	58.6771	58.4569	58.3022	58.1414	
alpha	4.8534	4.8593	4.8650	4.8920	4.8971	4.9211	4.9211	4.9255	4.9118	4.8971	4.8868	4.8761	

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util living area	0.9960	0.9862	0.9553	0.8541	0.6745	0.4833	0.3527	0.4090	0.6694	0.9294	0.9898	0.9971 (86)
MIT	19.6128	19.9016	20.2857	20.7006	20.9222	20.9874	20.9978	20.9957	20.9447	20.5852	20.0060	19.5606 (87)
Th 2	19.5332	19.5351	19.5369	19.5454	19.5470	19.5544	19.5544	19.5558	19.5515	19.5470	19.5438	19.5404 (88)
util rest of house												
MIT 2	0.9941	0.9798	0.9356	0.8007	0.5872	0.3780	0.2376	0.2823	0.5494	0.8879	0.9839	0.9957 (89)
Living area fraction	17.9914	18.3572	18.8294	19.2986	19.5005	19.5501	19.5541	19.5551	19.5275	19.1989	18.4993	17.9301 (90)
MIT	18.2723	18.6247	19.0817	19.5415	19.7467	19.7991	19.8042	19.8046	19.7730	19.4390	18.7603	18.2125 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	18.2723	18.6247	19.0817	19.5415	19.7467	19.7991	19.8042	19.8046	19.7730	19.4390	18.7603	18.2125 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9914	0.9741	0.9277	0.8006	0.5999	0.3962	0.2576	0.3044	0.5691	0.8839	0.9792	0.9937	(94)
Useful gains	661.6873	841.6105	981.6434	1030.4669	871.2229	578.9840	358.8377	380.4434	617.2474	763.7380	677.6358	617.8483	(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	1593.7267	1563.1364	1430.8325	1201.7724	907.5508	582.8014	359.1761	381.2082	637.4280	996.9084	1318.5956	1588.9772	(97)
Space heating kWh	693.4373	484.8654	334.1967	123.3400	27.0280	0.0000	0.0000	0.0000	0.0000	173.4788	461.4911	722.5199	(98a)
Space heating requirement - total per year (kWh/year)												3020.3571	
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	693.4373	484.8654	334.1967	123.3400	27.0280	0.0000	0.0000	0.0000	0.0000	173.4788	461.4911	722.5199	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3020.3571	
Space heating per m2										(98c) / (4) =		45.2963	(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 %)	79.0000	(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	693.4373	484.8654	334.1967	123.3400	27.0280	0.0000	0.0000	0.0000	0.0000	173.4788	461.4911	722.5199	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	877.7687	613.7537	423.0338	156.1265	34.2126	0.0000	0.0000	0.0000	0.0000	219.5934	584.1659	914.5821	(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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(64)
Efficiency of water heater (217)m	81.6434	81.2119	80.3169	78.4022	76.0942	75.0000	75.0000	75.0000	75.0000	79.1128	81.1028	81.7319	(216)
Fuel for water heating, kWh/month	269.0097	239.2540	257.3574	231.1063	229.1366	207.6168	204.3995	214.3145	218.3794	232.6471	241.1880	265.9216	(219)

Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-49.3319	-66.8873	-92.3059	-98.3040	-100.8543	-92.3143	-91.1323	-88.4831	-82.7384	-74.0911	-53.1600	-42.8399	(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	-41.0351	-88.0291	-180.6945	-277.9583	-370.8584	-373.7364	-367.8345	-308.3508	-221.1150	-126.6129	-54.8833	-32.1816	(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												3823.2368	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												75.0000	
Water heating fuel used												2810.3309	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												160.2193	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3375.7324	(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												3504.0546	(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	3823.2368	0.2100	802.8797 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2810.3309	0.2100	590.1695 (264)
Space and water heating			1393.0492 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	160.2193	0.1443	23.1246 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-932.4427	0.1357	-126.5202
PV Unit electricity exported	-2443.2897	0.1254	-306.3020
Total			-432.8222 (269)
Total CO2, kg/year			995.2809 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.9300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3823.2368	1.1300	4320.2576 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2810.3309	1.1300	3175.6740 (278)
Space and water heating			7495.9315 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-932.4427	1.5015	-1400.1001
PV Unit electricity exported	-2443.2897	0.4602	-1124.2943
Total			-2524.3944 (283)
Total Primary energy kWh/year			5347.3876 (286)
Dwelling Primary energy Rate (DPER)			80.1900 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.7000 (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) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (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) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (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			16.6700	1.1450	19.0878		(27)
Heatloss Floor			66.6800	0.1300	8.6684		(28a)

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External Wall	109.0000	16.6700	92.3300	0.1800	16.6194	(29a)
External Roof	66.6800		66.6800	0.1100	7.3348	(30)
Total net area of external elements Aum(A, m2)			242.3600			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.7104	(33)

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

355.9541 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000	
E3 Sill	12.0000	0.0500	0.6000	
E4 Jamb	30.0000	0.0500	1.5000	
E5 Ground floor (normal)	43.6000	0.1600	6.9760	
E14 Flat roof	43.6000	0.0800	3.4880	
E16 Corner (normal)	20.0000	0.0900	1.8000	
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				14.0640 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	65.7744 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355	(39)
Average = Sum(39)m / 12 =												96.5706	
HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552	(40)
HLP (average)												1.4483	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838	(42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	(42c)
Average daily hot water use (litres/day)												98.0776	(43)
Daily hot water use	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641	(44)
Energy conte	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840	(45)
Energy content (annual)										Total = Sum(45)m =		1628.7207	
Distribution loss (46)m = 0.15 x (45)m	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	50.9589	46.0274	50.9589	47.9862	47.8784	44.5735	45.4449	46.8643	46.7895	50.2479	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2206.7245	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	68.8224	60.8084	64.5241	56.2876	54.0246	48.0971	47.2229	49.5784	50.5982	57.0524	60.9719	68.0624	(65)

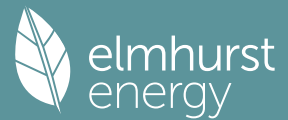
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)	92.5032	90.4887	86.7260	78.1773	72.6137	66.8016	63.4717	66.6376	70.2753	76.6833	84.6832	91.4817	(72)
Total internal gains	435.9193	446.1073	427.1543	411.2451	389.1853	371.0470	356.1743	357.3745	369.1505	385.9189	410.4151	426.5397	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	7.5400	10.6334	0.6300	0.7000	0.7700	24.5028 (74)
East	2.9200	19.6403	0.6300	0.7000	0.7700	17.5268 (76)
South	3.2900	46.7521	0.6300	0.7000	0.7700	47.0076 (78)
West	2.9200	19.6403	0.6300	0.7000	0.7700	17.5268 (80)

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Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	542.4832	638.4920	717.7188	814.5898	878.6990	873.1361	833.5709	768.3407	698.6013	606.0629	540.0702	516.4117 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
alpha	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
util living area	0.9984	0.9958	0.9881	0.9549	0.8560	0.6697	0.4998	0.5613	0.8245	0.9750	0.9962	0.9988 (86)
MIT	19.7416	19.9208	20.1883	20.5480	20.8327	20.9676	20.9946	20.9902	20.8999	20.5233	20.0672	19.7117 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9977	0.9938	0.9819	0.9314	0.7891	0.5530	0.3594	0.4135	0.7226	0.9572	0.9939	0.9982 (89)
MIT 2	18.2845	18.5145	18.8545	19.3006	19.6083	19.7229	19.7351	19.7355	19.6796	19.2825	18.7090	18.2517 (90)
Living area fraction									fLA =	Living area / (4) =		0.1732 (91)
MIT	18.5368	18.7581	19.0856	19.5167	19.8204	19.9385	19.9533	19.9528	19.8910	19.4974	18.9443	18.5046 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5368	18.7581	19.0856	19.5167	19.8204	19.9385	19.9533	19.9528	19.8910	19.4974	18.9443	18.5046 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9966	0.9914	0.9776	0.9264	0.7947	0.5728	0.3840	0.4395	0.7373	0.9526	0.9918	0.9973 (94)
Useful gains	540.6123	633.0305	701.6598	754.6204	698.3295	500.1481	320.0713	337.6990	515.1012	577.3421	535.6235	515.0044 (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	1390.9678	1351.5858	1225.3542	1025.2657	782.9976	511.0781	321.0244	339.6733	555.9337	857.9215	1145.6109	1388.0575 (97)
Space heating kWh	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98a)
Space heating requirement - total per year (kWh/year)												3060.4868
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3060.4868
Space heating per m2										(98c) / (4) =		45.8981 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.4000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000 (210)
Space heating fuel (main heating system)	684.7019	522.5857	421.6761	210.8924	68.1744	0.0000	0.0000	0.0000	0.0000	225.9210	475.3149	702.9488 (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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (64)
Efficiency of water heater (217)m	86.5124	86.2495	85.7179	84.5377	82.4160	80.3000	80.3000	80.3000	80.3000	84.6520	86.0599	80.3000 (216)
Fuel for water heating, kWh/month	253.8695	225.2798	241.1415	214.3335	211.5605	193.9136	190.9087	200.1692	203.9658	217.4240	227.2955	251.0449 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-52.0136	-68.6255	-92.4284	-97.2277	-99.6047	-91.2253	-90.1093	-87.5342	-82.3672	-75.1466	-55.4918	-45.5459 (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	-45.6190	-93.4766	-181.3857	-266.3137	-346.4408	-346.0176	-341.9030	-291.9937	-217.4651	-131.4731	-60.1551	-36.2624 (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												3312.2151 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												80.3000
Water heating fuel used												2630.9065 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	160.2193 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3295.8261 (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	2893.5148 (238)

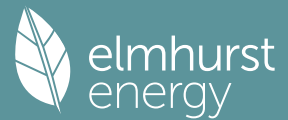
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3312.2151	0.2100	695.5652 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2630.9065	0.2100	552.4904 (264)
Space and water heating			1248.0555 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	160.2193	0.1443	23.1246 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	0.1360	-127.4762
PV Unit electricity exported	-2358.5059	0.1266	-298.5440
Total			-426.0202 (269)
Total CO2, kg/year			857.0892 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.8500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3312.2151	1.1300	3742.8031 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2630.9065	1.1300	2972.9244 (278)
Space and water heating			6715.7274 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	1.5027	-1408.5225
PV Unit electricity exported	-2358.5059	0.4647	-1095.9340
Total			-2504.4565 (283)
Total Primary energy kWh/year			4587.1214 (286)
Target Primary Energy Rate (TPER)			68.7900 (287)

Full SAP Calculation Printout



Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Notional Dwelling	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	96 A	DER	14.93	TER	12.85
Environmental	89 B	% DER < TER			-16.19
CO ₂ Emissions (t/year)	0.78	DFEE	54.59	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			-5.33
% DPER < TPER	-16.58	DPER	80.19	TPER	68.79
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	166.7000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (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) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	1.1450	34.3626		(27)
Heatloss Floor			66.6800	0.1300	8.6684	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1800	14.2182	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1100	7.3348	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		64.5840		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							355.9541 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0000	0.0500	0.6000	
E3 Sill				12.0000	0.0500	0.6000	
E4 Jamb				30.0000	0.0500	1.5000	
E5 Ground floor (normal)				43.6000	0.1600	6.9760	
E14 Flat roof				43.6000	0.1600	6.9760	

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E16 Corner (normal)	20.0000	0.0900	1.8000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.5520 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	82.1360 (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	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611 (38)
Average = Sum(39)m / 12 =	114.0636	113.8918	113.7235	112.9330	112.7851	112.0965	112.0965	111.9690	112.3617	112.7851	113.0843	113.3971 (39)
												112.9323
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.7106	1.7080	1.7055	1.6937	1.6914	1.6811	1.6811	1.6792	1.6851	1.6914	1.6959	1.7006 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1629 (42)
Hot water usage for mixer showers												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths												
26.1335	25.7454	25.1988	24.1911	23.4365	22.5998	22.1478	22.6906	23.2815	24.1768	25.2053	26.0452	(42b)
Hot water usage for other uses												
36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	(42c)
Average daily hot water use (litres/day)												57.6666 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
62.9139	61.1883	59.3042	56.9590	54.8670	52.6928	52.2408	54.1210	56.0494	58.2822	60.6482	62.8255	(44)
Energy conte	99.6402	87.1313	91.1484	77.9741	73.8615	64.7919	63.1808	67.0131	69.1146	79.0884	86.4045	(45)
Energy content (annual)												Total = Sum(45)m = 957.7183
Distribution loss (46)m = 0.15 x (45)m												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	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												
84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	(64)
12Total per year (kWh/year)												814.0605 (64)
Electric shower(s)	48.4380	43.1586	47.1276	44.9733	45.8172	43.7051	45.1620	45.8172	44.9733	47.1276	46.2414	48.4380 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												550.9791 (64a)
Heat gains from water heating, kWh/month	33.2830	29.3051	31.1509	27.8128	27.1499	24.6946	24.7164	25.6946	25.9302	28.5882	29.9213	33.0130 (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	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)												
44.7353	43.6087	41.8695	38.6289	36.4917	34.2980	33.2210	34.5357	36.0141	38.4250	41.5574	44.3723	(72)
Total internal gains	385.1513	396.2273	379.2978	368.6968	350.0633	338.5435	325.9236	325.2727	334.8893	344.6606	364.2892	376.4303 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
North					13.5800	10.6334	0.7600	0.7000	0.7700		53.2374 (74)	
East					5.2500	19.6403	0.7600	0.7000	0.7700		38.0147 (76)	
South					5.9300	46.7521	0.7600	0.7000	0.7700		102.2116 (78)	
West					5.2500	19.6403	0.7600	0.7000	0.7700		38.0147 (80)	
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305	195.2244 (83)
Total gains	616.6297	814.0926	1010.3475	1244.6114	1413.0662	1428.8439	1362.6074	1217.7216	1050.3655	822.8008	645.9197	571.6547 (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

Full SAP Calculation Printout



tau	57.8016	57.8888	57.9745	58.3803	58.4569	58.8159	58.8159	58.8829	58.6771	58.4569	58.3022	58.1414
alpha	4.8534	4.8593	4.8650	4.8920	4.8971	4.9211	4.9211	4.9255	4.9118	4.8971	4.8868	4.8761
util living area	0.9972	0.9892	0.9621	0.8666	0.6886	0.4935	0.3604	0.4194	0.6860	0.9400	0.9923	0.9980 (86)
MIT	19.5570	19.8492	20.2423	20.6772	20.9149	20.9863	20.9976	20.9952	20.9385	20.5520	19.9567	19.5052 (87)
Th 2	19.5332	19.5351	19.5369	19.5454	19.5470	19.5544	19.5544	19.5558	19.5515	19.5470	19.5438	19.5404 (88)
util rest of house	0.9958	0.9840	0.9449	0.8156	0.6010	0.3864	0.2429	0.2897	0.5652	0.9029	0.9878	0.9970 (89)
MIT 2	18.2764	18.5663	18.9459	19.3356	19.5069	19.5507	19.5541	19.5551	19.5304	19.2485	18.6818	18.2304 (90)
Living area fraction	18.4982	18.7886	19.1705	19.5680	19.7508	19.7994	19.8042	19.8046	19.7743	19.4743	18.9026	18.4512 (91)
MIT	18.4982	18.7886	19.1705	19.5680	19.7508	19.7994	19.8042	19.8046	19.7743	19.4743	18.9026	18.4512 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4982	18.7886	19.1705	19.5680	19.7508	19.7994	19.8042	19.8046	19.7743	19.4743	18.9026	18.4512 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9943	0.9804	0.9393	0.8165	0.6142	0.4050	0.2633	0.3123	0.5853	0.9005	0.9849	0.9959 (94)
Useful gains	613.0971	798.1010	949.0177	1016.2159	867.8410	578.6303	358.8017	380.3473	614.8073	740.9343	636.1780	569.3222 (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	1619.5011	1581.7939	1440.9326	1204.7672	908.0116	582.8340	359.1758	381.2066	637.5745	1000.8869	1334.6910	1616.0473 (97)
Space heating kWh	748.7646	526.6416	365.9847	135.7569	29.8869	0.0000	0.0000	0.0000	0.0000	193.4047	502.9294	778.7635 (98a)
Space heating requirement - total per year (kWh/year)												3282.1324
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	748.7646	526.6416	365.9847	135.7569	29.8869	0.0000	0.0000	0.0000	0.0000	193.4047	502.9294	778.7635 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3282.1324
Space heating per m2										(98c) / (4) =		49.2221 (99)

8c. Space cooling requirement

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

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1053.7071	829.5141	850.9643	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9557	0.9785	0.9635	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1007.0743	811.6848	819.9425	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1634.4221	1558.8749	1391.3780	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	451.6904	555.9094	425.1480	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	112.9226	138.9774	106.2870	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												358.1870 (107)
Energy for space heating												49.2221 (99)
Energy for space cooling												5.3717 (108)
Total												54.5939 (109)
Fabric Energy Efficiency (DFEE)												54.6 (109)

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

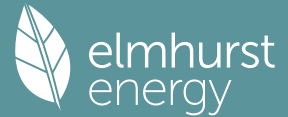
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	166.7000 (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) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (18)
Number of sides sheltered	2 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683	(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			16.6700	1.1450	19.0878			(27)
Heatloss Floor			66.6800	0.1300	8.6684			(28a)
External Wall	109.0000	16.6700	92.3300	0.1800	16.6194			(29a)
External Roof	66.6800		66.6800	0.1100	7.3348			(30)
Total net area of external elements Aum(A, m2)			242.3600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 51.7104			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 355.9541 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000	
E3 Sill	12.0000	0.0500	0.6000	
E4 Jamb	30.0000	0.0500	1.5000	
E5 Ground floor (normal)	43.6000	0.1600	6.9760	
E14 Flat roof	43.6000	0.0800	3.4880	
E16 Corner (normal)	20.0000	0.0900	1.8000	
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.0640 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 65.7744 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355	(39)
Average = Sum(39)m / 12 =												96.5706	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552	(40)
HLP (average)												1.4483	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

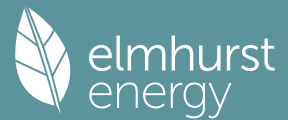
Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.1335	25.7454	25.1988	24.1911	23.4365	22.5998	22.1478	22.6906	23.2815	24.1768	25.2053	26.0452	(42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	(42c)
Average daily hot water use (litres/day)												57.6666	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	62.9139	61.1883	59.3042	56.9590	54.8670	52.6928	52.2408	54.1210	56.0494	58.2822	60.6482	62.8255	(44)
Energy conte	99.6402	87.1313	91.1484	77.9741	73.8615	64.7919	63.1808	67.0131	69.1146	79.0884	86.4045	98.3696	(45)
Energy content (annual)										Total = Sum(45)m =		957.7183	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	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	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141	(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	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		814.0605	(64)
Electric shower(s)	48.4380	43.1586	47.1276	44.9733	45.8172	43.7051	45.1620	45.8172	44.9733	47.1276	46.2414	48.4380	(64a)
Heat gains from water heating, kWh/month	33.2830	29.3051	31.1509	27.8128	27.1499	24.6946	24.7164	25.6946	25.9302	28.5882	29.9213	33.0130	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	95.5446	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)

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

	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (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 (70)
Losses e.g. evaporation (negative values) (Table 5)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Water heating gains (Table 5)	44.7353	43.6087	41.8695	38.6289	36.4917	34.2980	33.2210	34.5357	36.0141	38.4250	41.5574 (72)
Total internal gains	385.1513	396.2273	379.2978	368.6968	350.0633	338.5435	325.9236	325.2727	334.8893	344.6606	364.2892 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				7.5400	10.6334	0.6300		0.7000		0.7700		24.5028 (74)
East				2.9200	19.6403	0.6300		0.7000		0.7700		17.5268 (76)
South				3.2900	46.7521	0.6300		0.7000		0.7700		47.0076 (78)
West				2.9200	19.6403	0.6300		0.7000		0.7700		17.5268 (80)
Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	491.7152	588.6120	669.8623	772.0414	839.5770	840.6326	803.3202	736.2388	664.3401	564.8046	493.9443	466.3023 (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	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
alpha	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
util living area	0.9990	0.9972	0.9913	0.9636	0.8740	0.6904	0.5175	0.5834	0.8467	0.9816	0.9975	0.9993 (86)
MIT	19.6834	19.8644	20.1362	20.5087	20.8114	20.9625	20.9936	20.9881	20.8843	20.4810	20.0148	19.6541 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9986	0.9958	0.9867	0.9437	0.8111	0.5724	0.3728	0.4311	0.7492	0.9678	0.9960	0.9989 (89)
MIT 2	18.5419	18.7237	18.9944	19.3598	19.6204	19.7239	19.7352	19.7355	19.6832	19.3421	18.8814	18.5186 (90)
Living area fraction	18.7396	18.9213	19.1922	19.5588	19.8267	19.9384	19.9531	19.9525	19.8912	19.5394	19.0777	18.7153 (92)
MIT	18.7396	18.9213	19.1922	19.5588	19.8267	19.9384	19.9531	19.9525	19.8912	19.5394	19.0777	18.7153 (93)
Temperature adjustment												0.0000
adjusted MIT	18.7396	18.9213	19.1922	19.5588	19.8267	19.9384	19.9531	19.9525	19.8912	19.5394	19.0777	18.7153 (93)

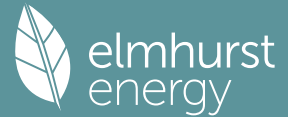
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9980	0.9945	0.9841	0.9403	0.8168	0.5926	0.3982	0.4580	0.7636	0.9649	0.9949	0.9985 (94)
Ext temp.	490.7402	585.3671	659.1871	725.9502	685.7891	498.1895	319.8679	337.2232	507.2978	544.9917	491.4247	465.6110 (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	1410.7799	1367.5010	1235.7349	1029.3326	783.6061	511.0746	321.0124	339.6462	555.9593	861.9689	1158.5163	1408.4988 (97)
Space heating kWh	684.5095	525.5939	428.9516	218.4353	72.7759	0.0000	0.0000	0.0000	0.0000	235.8310	480.3059	701.5085 (98a)
Space heating requirement - total per year (kWh/year)												3347.9116
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	684.5095	525.5939	428.9516	218.4353	72.7759	0.0000	0.0000	0.0000	0.0000	235.8310	480.3059	701.5085 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3347.9116
Space heating per m2										(98c) / (4) =		50.2086 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	899.9079	708.4382	726.6161	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8690	0.9311	0.8982	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	782.0271	659.6088	652.6381	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	946.9024	905.1625	828.6060	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	118.7102	182.6920	130.9200	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.6776	45.6730	32.7300	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												108.0806 (107)
Energy for space heating												50.2086 (99)
Energy for space cooling												1.6209 (108)
Total												51.8295 (109)
Fabric Energy Efficiency (TFEE)												51.8 (109)

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Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Notional Dwelling	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	96 A	DER	14.93	TER	12.85
Environmental	89 B	% DER < TER			-16.19
CO ₂ Emissions (t/year)	0.78	DFEE	54.59	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			-5.33
% DPER < TPER	-16.58	DPER	80.19	TPER	68.79
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

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	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 166.7000 (5)

2. Ventilation rate

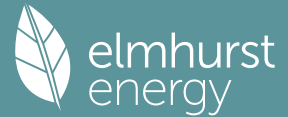
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (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) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	1.1450	34.3626		(27)
Heatloss Floor			66.6800	0.1300	8.6684	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1800	14.2182	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1100	7.3348	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	64.5840		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							355.9541 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0000	0.0500	0.6000	
E3 Sill				12.0000	0.0500	0.6000	
E4 Jamb				30.0000	0.0500	1.5000	
E5 Ground floor (normal)				43.6000	0.1600	6.9760	
E14 Flat roof				43.6000	0.1600	6.9760	
E16 Corner (normal)				20.0000	0.0900	1.8000	
E17 Corner (inverted - internal area greater than external area)				10.0000	-0.0900	-0.9000	

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Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal bridges (36a) = 17.5520 (36)
 Total fabric heat loss (33) + (36) + (36a) = 82.1360 (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	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611 (38)
Average = Sum(39)m / 12 =	114.0636	113.8918	113.7235	112.9330	112.7851	112.0965	112.0965	111.9690	112.3617	112.7851	113.0843	113.3971 (39)
												112.9323
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.7106	1.7080	1.7055	1.6937	1.6914	1.6811	1.6811	1.6792	1.6851	1.6914	1.6959	1.7006 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

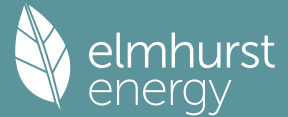
Water heating energy requirements (kWh/year)												
Assumed occupancy												2.1629 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838 (42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803 (42c)
Average daily hot water use (litres/day)												98.0776 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641 (44)
Energy content (annual)	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840 (45)
Distribution loss (46)m = 0.15 x (45)m	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	47.9862	47.8784	44.5735	45.4449	46.8643	46.7895	50.2479	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2206.7245 (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	68.8224	60.8084	64.5241	56.2876	54.0246	48.0971	47.2229	49.5784	50.5982	57.0524	60.9719	68.0624 (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	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698 (68)
Pumps, fans	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Water heating gains (Table 5)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Total internal gains	92.5032	90.4887	86.7260	78.1773	72.6137	66.8016	63.4717	66.6376	70.2753	76.6833	84.6832	91.4817 (72)
	435.9193	446.1073	427.1543	411.2451	389.1853	371.0470	356.1743	357.3745	369.1505	385.9189	410.4151	426.5397 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
North	13.5800	10.6334	0.7600	0.7000	0.7700	53.2374 (74)						
East	5.2500	19.6403	0.7600	0.7000	0.7700	38.0147 (76)						
South	5.9300	46.7521	0.7600	0.7000	0.7700	102.2116 (78)						
West	5.2500	19.6403	0.7600	0.7000	0.7700	38.0147 (80)						
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305	195.2244 (83)
Total gains	667.3977	863.9726	1058.2039	1287.1598	1452.1882	1461.3474	1392.8581	1249.8235	1084.6267	864.0591	692.0456	621.7641 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	57.8016	57.8888	57.9745	58.3803	58.4569	58.8159	58.8159	58.8829	58.6771	58.4569	58.3022	58.1414
	4.8534	4.8593	4.8650	4.8920	4.8971	4.9211	4.9211	4.9255	4.9118	4.8971	4.8868	4.8761

Full SAP Calculation Printout



util living area	0.9960	0.9862	0.9553	0.8541	0.6745	0.4833	0.3527	0.4090	0.6694	0.9294	0.9898	0.9971 (86)
MIT	19.6128	19.9016	20.2857	20.7006	20.9222	20.9874	20.9978	20.9957	20.9447	20.5852	20.0060	19.5606 (87)
Th 2	19.5332	19.5351	19.5369	19.5454	19.5470	19.5544	19.5544	19.5558	19.5515	19.5470	19.5438	19.5404 (88)
util rest of house												
MIT 2	0.9941	0.9798	0.9356	0.8007	0.5872	0.3780	0.2376	0.2823	0.5494	0.8879	0.9839	0.9957 (89)
Living area fraction	17.9914	18.3572	18.8294	19.2986	19.5005	19.5501	19.5541	19.5551	19.5275	19.1989	18.4993	17.9301 (90)
MIT	18.2723	18.6247	19.0817	19.5415	19.7467	19.7991	19.8042	19.8046	19.7730	19.4390	18.7603	18.2125 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	18.2723	18.6247	19.0817	19.5415	19.7467	19.7991	19.8042	19.8046	19.7730	19.4390	18.7603	18.2125 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9914	0.9741	0.9277	0.8006	0.5999	0.3962	0.2576	0.3044	0.5691	0.8839	0.9792	0.9937	(94)
Useful gains	661.6873	841.6105	981.6434	1030.4669	871.2229	578.9840	358.8377	380.4434	617.2474	763.7380	677.6358	617.8483	(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	1593.7267	1563.1364	1430.8325	1201.7724	907.5508	582.8014	359.1761	381.2082	637.4280	996.9084	1318.5956	1588.9772	(97)
Space heating kWh	693.4373	484.8654	334.1967	123.3400	27.0280	0.0000	0.0000	0.0000	0.0000	173.4788	461.4911	722.5199	(98a)
Space heating requirement - total per year (kWh/year)												3020.3571	
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	693.4373	484.8654	334.1967	123.3400	27.0280	0.0000	0.0000	0.0000	0.0000	173.4788	461.4911	722.5199	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3020.3571	
Space heating per m2											(98c) / (4) =	45.2963	(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 %)	79.0000 (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	693.4373	484.8654	334.1967	123.3400	27.0280	0.0000	0.0000	0.0000	0.0000	173.4788	461.4911	722.5199 (98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)
Space heating fuel (main heating system)	877.7687	613.7537	423.0338	156.1265	34.2126	0.0000	0.0000	0.0000	0.0000	219.5934	584.1659	914.5821 (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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(64)
Efficiency of water heater (217)m	81.6434	81.2119	80.3169	78.4022	76.0942	75.0000	75.0000	75.0000	75.0000	79.1128	81.1028	75.0000	(216)
Fuel for water heating, kWh/month	269.0097	239.2540	257.3574	231.1063	229.1366	207.6168	204.3995	214.3145	218.3794	232.6471	241.1880	265.9216	(219)

Space cooling fuel requirement	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-49.3319	-66.8873	-92.3059	-98.3040	-100.8543	-92.3143	-91.1323	-88.4831	-82.7384	-74.0911	-53.1600	-42.8399	(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	-41.0351	-88.0291	-180.6945	-277.9583	-370.8584	-373.7364	-367.8345	-308.3508	-221.1150	-126.6129	-54.8833	-32.1816	(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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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Full SAP Calculation Printout



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	3823.2368	0.2100	802.8797 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2810.3309	0.2100	590.1695 (264)
Space and water heating			1393.0492 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	160.2193	0.1443	23.1246 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-932.4427	0.1357	-126.5202
PV Unit electricity exported	-2443.2897	0.1254	-306.3020
Total			-432.8222 (269)
Total CO2, kg/year			995.2809 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.9300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3823.2368	1.1300	4320.2576 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2810.3309	1.1300	3175.6740 (278)
Space and water heating			7495.9315 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-932.4427	1.5015	-1400.1001
PV Unit electricity exported	-2443.2897	0.4602	-1124.2943
Total			-2524.3944 (283)
Total Primary energy kWh/year			5347.3876 (286)
Dwelling Primary energy Rate (DPER)			80.1900 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.7000 (5)

2. Ventilation rate

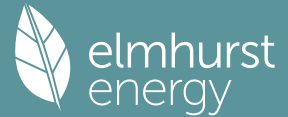
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (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) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (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			16.6700	1.1450	19.0878		(27)
Heatloss Floor			66.6800	0.1300	8.6684		(28a)

Full SAP Calculation Printout



External Wall	109.0000	16.6700	92.3300	0.1800	16.6194	(29a)
External Roof	66.6800		66.6800	0.1100	7.3348	(30)
Total net area of external elements Aum(A, m2)			242.3600			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.7104	(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 355.9541 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000
E3 Sill	12.0000	0.0500	0.6000
E4 Jamb	30.0000	0.0500	1.5000
E5 Ground floor (normal)	43.6000	0.1600	6.9760
E14 Flat roof	43.6000	0.0800	3.4880
E16 Corner (normal)	20.0000	0.0900	1.8000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.0640 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 65.7744 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355	(39)
Average = Sum(39)m / 12 =												96.5706	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552	(40)
HLP (average)												1.4483	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	(40)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838	(42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	(42c)
Average daily hot water use (litres/day)												98.0776	(43)
Daily hot water use	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641	(44)
Energy conte	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840	(45)
Energy content (annual)										Total = Sum(45)m =		1628.7207	(45)
Distribution loss (46)m = 0.15 x (45)m	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	50.9589	46.0274	50.9589	47.9862	47.8784	44.5735	45.4449	46.8643	46.7895	50.2479	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2206.7245	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	68.8224	60.8084	64.5241	56.2876	54.0246	48.0971	47.2229	49.5784	50.5982	57.0524	60.9719	68.0624	(65)

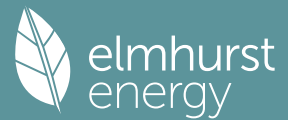
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)	92.5032	90.4887	86.7260	78.1773	72.6137	66.8016	63.4717	66.6376	70.2753	76.6833	84.6832	91.4817	(72)
Total internal gains	435.9193	446.1073	427.1543	411.2451	389.1853	371.0470	356.1743	357.3745	369.1505	385.9189	410.4151	426.5397	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	7.5400	10.6334	0.6300	0.7000	0.7700	24.5028 (74)
East	2.9200	19.6403	0.6300	0.7000	0.7700	17.5268 (76)
South	3.2900	46.7521	0.6300	0.7000	0.7700	47.0076 (78)
West	2.9200	19.6403	0.6300	0.7000	0.7700	17.5268 (80)

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Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	542.4832	638.4920	717.7188	814.5898	878.6990	873.1361	833.5709	768.3407	698.6013	606.0629	540.0702	516.4117 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
alpha	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
util living area	0.9984	0.9958	0.9881	0.9549	0.8560	0.6697	0.4998	0.5613	0.8245	0.9750	0.9962	0.9988 (86)
MIT	19.7416	19.9208	20.1883	20.5480	20.8327	20.9676	20.9946	20.9902	20.8999	20.5233	20.0672	19.7117 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9977	0.9938	0.9819	0.9314	0.7891	0.5530	0.3594	0.4135	0.7226	0.9572	0.9939	0.9982 (89)
MIT 2	18.2845	18.5145	18.8545	19.3006	19.6083	19.7229	19.7351	19.7355	19.6796	19.2825	18.7090	18.2517 (90)
Living area fraction									fLA = Living area / (4) =			0.1732 (91)
MIT	18.5368	18.7581	19.0856	19.5167	19.8204	19.9385	19.9533	19.9528	19.8910	19.4974	18.9443	18.5046 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5368	18.7581	19.0856	19.5167	19.8204	19.9385	19.9533	19.9528	19.8910	19.4974	18.9443	18.5046 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9966	0.9914	0.9776	0.9264	0.7947	0.5728	0.3840	0.4395	0.7373	0.9526	0.9918	0.9973 (94)
Useful gains	540.6123	633.0305	701.6598	754.6204	698.3295	500.1481	320.0713	337.6990	515.1012	577.3421	535.6235	515.0044 (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	1390.9678	1351.5858	1225.3542	1025.2657	782.9976	511.0781	321.0244	339.6733	555.9337	857.9215	1145.6109	1388.0575 (97)
Space heating kWh	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98a)
Space heating requirement - total per year (kWh/year)												3060.4868
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3060.4868
Space heating per m2										(98c) / (4) =		45.8981 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.4000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000 (210)
Space heating fuel (main heating system)	684.7019	522.5857	421.6761	210.8924	68.1744	0.0000	0.0000	0.0000	0.0000	225.9210	475.3149	702.9488 (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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (64)
Efficiency of water heater (217)m	86.5124	86.2495	85.7179	84.5377	82.4160	80.3000	80.3000	80.3000	80.3000	84.6520	86.0599	80.3000 (216)
Fuel for water heating, kWh/month	253.8695	225.2798	241.1415	214.3335	211.5605	193.9136	190.9087	200.1692	203.9658	217.4240	227.2955	251.0449 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-52.0136	-68.6255	-92.4284	-97.2277	-99.6047	-91.2253	-90.1093	-87.5342	-82.3672	-75.1466	-55.4918	-45.5459 (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	-45.6190	-93.4766	-181.3857	-266.3137	-346.4408	-346.0176	-341.9030	-291.9937	-217.4651	-131.4731	-60.1551	-36.2624 (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												3312.2151 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												80.3000
Water heating fuel used												2630.9065 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	160.2193 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3295.8261 (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	2893.5148 (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	3312.2151	0.2100	695.5652 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2630.9065	0.2100	552.4904 (264)
Space and water heating			1248.0555 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	160.2193	0.1443	23.1246 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	0.1360	-127.4762
PV Unit electricity exported	-2358.5059	0.1266	-298.5440
Total			-426.0202 (269)
Total CO2, kg/year			857.0892 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.8500 (273)

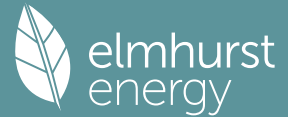
----- 13a. Primary energy - Individual heating systems including micro-CHP -----

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3312.2151	1.1300	3742.8031 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2630.9065	1.1300	2972.9244 (278)
Space and water heating			6715.7274 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	1.5027	-1408.5225
PV Unit electricity exported	-2358.5059	0.4647	-1095.9340
Total			-2504.4565 (283)
Total Primary energy kWh/year			4587.1214 (286)
Target Primary Energy Rate (TPER)			68.7900 (287)

Appendix 2

SAP Calculations – Be Lean

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Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Be Lean	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	98 A	DER	11.42	TER	12.85
Environmental	91 B	% DER < TER			11.13
CO ₂ Emissions (t/year)	0.59	DFEE	41.45	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			20.02
% DPER < TPER	10.86	DPER	61.32	TPER	68.79
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

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	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 166.7000 (5)

2. Ventilation rate

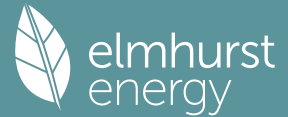
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.2950 (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) = 0.2507 (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	0.3197	0.3134	0.3071	0.2758	0.2695	0.2382	0.2382	0.2319	0.2507	0.2695	0.2821	0.2946 (22b)
Effective ac	0.5511	0.5491	0.5472	0.5380	0.5363	0.5284	0.5284	0.5269	0.5314	0.5363	0.5398	0.5434 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	0.9615	28.8558		(27)
Heatloss Floor			66.6800	0.1200	8.0016	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1500	11.8485	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1000	6.6680	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.3739		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							355.9541 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0000	0.0200	0.2400	
E3 Sill				12.0000	0.0220	0.2640	
E4 Jamb				30.0000	0.0180	0.5400	
E5 Ground floor (normal)				43.6000	0.0520	2.2672	
E14 Flat roof				43.6000	0.1290	5.6244	
E16 Corner (normal)				20.0000	0.0350	0.7000	
E17 Corner (inverted - internal area greater than external area)				10.0000	-0.0660	-0.6600	

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Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal bridges (36a) = 8.9756 (36)
 Total fabric heat loss (33) + (36) + (36a) = 64.3495 (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	30.3164	30.2073	30.1003	29.5978	29.5037	29.0661	29.0661	28.9850	29.2346	29.5037	29.6939	29.8928 (38)
Heat transfer coeff	94.6659	94.5568	94.4498	93.9472	93.8532	93.4155	93.4155	93.3345	93.5841	93.8532	94.0434	94.2423 (39)
Average = Sum(39)m / 12 =												93.9468
HLP	1.4197	1.4181	1.4165	1.4089	1.4075	1.4010	1.4010	1.3997	1.4035	1.4075	1.4104	1.4134 (40)
HLP (average)												1.4089
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1629 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838 (42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803 (42c)
Average daily hot water use (litres/day)												98.0776 (43)
Daily hot water use	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641 (44)
Energy conte	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840 (45)
Energy content (annual)												Total = Sum(45)m = 1628.7207
Distribution loss (46)m = 0.15 x (45)m	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.9589	46.0274	50.9589	47.9862	47.8784	44.5735	45.4449	46.8643	46.7895	50.2479	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (64)
Total per year (kWh/year)												2206.7245 (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	68.8224	60.8084	64.5241	56.2876	54.0246	48.0971	47.2229	49.5784	50.5982	57.0524	60.9719	68.0624 (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	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (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)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Water heating gains (Table 5)	92.5032	90.4887	86.7260	78.1773	72.6137	66.8016	63.4717	66.6376	70.2753	76.6833	84.6832	91.4817 (72)
Total internal gains	435.9193	446.1073	427.1543	411.2451	389.1853	371.0470	356.1743	357.3745	369.1505	385.9189	410.4151	426.5397 (73)

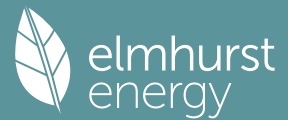
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				13.5800	10.6334		0.7600		0.7000		0.7700		53.2374 (74)
East				5.2500	19.6403		0.7600		0.7000		0.7700		38.0147 (76)
South				5.9300	46.7521		0.7600		0.7000		0.7700		102.2116 (78)
West				5.2500	19.6403		0.7600		0.7000		0.7700		38.0147 (80)
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305	195.2244	(83)
Total gains	667.3977	863.9726	1058.2039	1287.1598	1452.1882	1461.3474	1392.8581	1249.8235	1084.6267	864.0591	692.0456	621.7641	(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	69.6456	69.7260	69.8050	70.1783	70.2486	70.5778	70.5778	70.6391	70.4506	70.2486	70.1066	69.9586
alpha	5.6430	5.6484	5.6537	5.6786	5.6832	5.7052	5.7052	5.7093	5.6967	5.6832	5.6738	5.6639

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util living area	0.9955	0.9819	0.9355	0.7928	0.5873	0.4076	0.2949	0.3430	0.5824	0.8970	0.9871	0.9969 (86)
MIT	19.9355	20.2170	20.5590	20.8647	20.9768	20.9975	20.9997	20.9993	20.9836	20.7661	20.2742	19.8801 (87)
Th 2	19.7483	19.7495	19.7507	19.7565	19.7576	19.7626	19.7626	19.7635	19.7607	19.7576	19.7554	19.7531 (88)
util rest of house												
MIT 2	0.9935	0.9742	0.9111	0.7367	0.5146	0.3296	0.2121	0.2511	0.4842	0.8481	0.9802	0.9955 (89)
Living area fraction	18.5569	18.9111	19.3222	19.6496	19.7441	19.7617	19.7626	19.7634	19.7538	19.5685	18.9916	18.4900 (90)
MIT	18.7957	19.1373	19.5364	19.8601	19.9577	19.9758	19.9768	19.9775	19.9668	19.7760	19.2138	18.7308 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	18.7957	19.1373	19.5364	19.8601	19.9577	19.9758	19.9768	19.9775	19.9668	19.7760	19.2138	18.7308 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9911	0.9691	0.9060	0.7418	0.5266	0.3431	0.2264	0.2671	0.5010	0.8490	0.9759	0.9937	(94)
Useful gains	661.4802	837.3015	958.7277	954.8169	764.6639	501.4377	315.3985	333.7709	543.3735	733.5477	675.3859	617.8662	(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	1372.2481	1346.2347	1231.2838	1029.6683	775.0071	502.1820	315.4495	333.9015	549.0404	861.1925	1139.2231	1369.4181	(97)
Space heating kWh	528.8113	342.0031	202.7818	53.8930	7.6953	0.0000	0.0000	0.0000	0.0000	94.9678	333.9628	559.1547	(98a)
Space heating requirement - total per year (kWh/year)												2123.2697	
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	528.8113	342.0031	202.7818	53.8930	7.6953	0.0000	0.0000	0.0000	0.0000	94.9678	333.9628	559.1547	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2123.2697	
Space heating per m2										(98c) / (4) =		31.8427	(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 %)	79.0000	(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	528.8113	342.0031	202.7818	53.8930	7.6953	0.0000	0.0000	0.0000	0.0000	94.9678	333.9628	559.1547	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	669.3814	432.9154	256.6858	68.2190	9.7409	0.0000	0.0000	0.0000	0.0000	120.2123	422.7377	707.7907	(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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(64)
Efficiency of water heater (217)m	81.1427	80.5002	79.2024	76.8886	75.3412	75.0000	75.0000	75.0000	75.0000	77.8385	80.4347	81.2703	(216)
Fuel for water heating, kWh/month	270.6697	241.3693	260.9789	235.6560	231.4267	207.6168	204.3995	214.3145	218.3794	236.4557	243.1912	267.4322	(219)

Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-49.3319	-66.8873	-92.3059	-98.3040	-100.8543	-92.3143	-91.1323	-88.4831	-82.7384	-74.0911	-53.1600	-42.8399	(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	-41.0351	-88.0291	-180.6945	-277.9583	-370.8584	-373.7364	-367.8345	-308.3508	-221.1150	-126.6129	-54.8833	-32.1816	(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												2687.6832	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												75.0000	
Water heating fuel used												2831.8900	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												160.2193	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3375.7324	(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												2390.0600	(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	2687.6832	0.2100	564.4135 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2831.8900	0.2100	594.6969 (264)
Space and water heating			1159.1104 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	160.2193	0.1443	23.1246 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-932.4427	0.1357	-126.5202
PV Unit electricity exported	-2443.2897	0.1254	-306.3020
Total			-432.8222 (269)
Total CO2, kg/year			761.3420 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.4200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2687.6832	1.1300	3037.0820 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2831.8900	1.1300	3200.0357 (278)
Space and water heating			6237.1177 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-932.4427	1.5015	-1400.1001
PV Unit electricity exported	-2443.2897	0.4602	-1124.2943
Total			-2524.3944 (283)
Total Primary energy kWh/year			4088.5738 (286)
Dwelling Primary energy Rate (DPER)			61.3200 (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	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.7000 (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) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (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) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (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			16.6700	1.1450	19.0878		(27)
Heatloss Floor			66.6800	0.1300	8.6684		(28a)

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External Wall	109.0000	16.6700	92.3300	0.1800	16.6194	(29a)
External Roof	66.6800		66.6800	0.1100	7.3348	(30)
Total net area of external elements Aum(A, m2)			242.3600			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.7104	(33)

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

355.9541 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000	
E3 Sill	12.0000	0.0500	0.6000	
E4 Jamb	30.0000	0.0500	1.5000	
E5 Ground floor (normal)	43.6000	0.1600	6.9760	
E14 Flat roof	43.6000	0.0800	3.4880	
E16 Corner (normal)	20.0000	0.0900	1.8000	
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				14.0640 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	65.7744 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355	(39)
Average = Sum(39)m / 12 =												96.5706	
HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552	(40)
HLP (average)												1.4483	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838	(42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	(42c)
Average daily hot water use (litres/day)												98.0776	(43)
Daily hot water use	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641	(44)
Energy conte	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840	(45)
Energy content (annual)										Total = Sum(45)m =		1628.7207	
Distribution loss (46)m = 0.15 x (45)m	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	50.9589	46.0274	50.9589	47.9862	47.8784	44.5735	45.4449	46.8643	46.7895	50.2479	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2206.7245	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	68.8224	60.8084	64.5241	56.2876	54.0246	48.0971	47.2229	49.5784	50.5982	57.0524	60.9719	68.0624	(65)

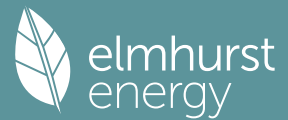
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)	92.5032	90.4887	86.7260	78.1773	72.6137	66.8016	63.4717	66.6376	70.2753	76.6833	84.6832	91.4817	(72)
Total internal gains	435.9193	446.1073	427.1543	411.2451	389.1853	371.0470	356.1743	357.3745	369.1505	385.9189	410.4151	426.5397	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North	7.5400	10.6334	0.6300	0.7000	0.7700	24.5028	(74)
East	2.9200	19.6403	0.6300	0.7000	0.7700	17.5268	(76)
South	3.2900	46.7521	0.6300	0.7000	0.7700	47.0076	(78)
West	2.9200	19.6403	0.6300	0.7000	0.7700	17.5268	(80)

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Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	542.4832	638.4920	717.7188	814.5898	878.6990	873.1361	833.5709	768.3407	698.6013	606.0629	540.0702	516.4117 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
alpha	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
util living area	0.9984	0.9958	0.9881	0.9549	0.8560	0.6697	0.4998	0.5613	0.8245	0.9750	0.9962	0.9988 (86)
MIT	19.7416	19.9208	20.1883	20.5480	20.8327	20.9676	20.9946	20.9902	20.8999	20.5233	20.0672	19.7117 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9977	0.9938	0.9819	0.9314	0.7891	0.5530	0.3594	0.4135	0.7226	0.9572	0.9939	0.9982 (89)
MIT 2	18.2845	18.5145	18.8545	19.3006	19.6083	19.7229	19.7351	19.7355	19.6796	19.2825	18.7090	18.2517 (90)
Living area fraction									fLA = Living area / (4) =			0.1732 (91)
MIT	18.5368	18.7581	19.0856	19.5167	19.8204	19.9385	19.9533	19.9528	19.8910	19.4974	18.9443	18.5046 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5368	18.7581	19.0856	19.5167	19.8204	19.9385	19.9533	19.9528	19.8910	19.4974	18.9443	18.5046 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9966	0.9914	0.9776	0.9264	0.7947	0.5728	0.3840	0.4395	0.7373	0.9526	0.9918	0.9973 (94)
Useful gains	540.6123	633.0305	701.6598	754.6204	698.3295	500.1481	320.0713	337.6990	515.1012	577.3421	535.6235	515.0044 (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	1390.9678	1351.5858	1225.3542	1025.2657	782.9976	511.0781	321.0244	339.6733	555.9337	857.9215	1145.6109	1388.0575 (97)
Space heating kWh	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98a)
Space heating requirement - total per year (kWh/year)												3060.4868
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3060.4868
Space heating per m2										(98c) / (4) =		45.8981 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.4000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000 (210)
Space heating fuel (main heating system)	684.7019	522.5857	421.6761	210.8924	68.1744	0.0000	0.0000	0.0000	0.0000	225.9210	475.3149	702.9488 (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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (64)
Efficiency of water heater (217)m	86.5124	86.2495	85.7179	84.5377	82.4160	80.3000	80.3000	80.3000	80.3000	84.6520	86.0599	80.3000 (216)
Fuel for water heating, kWh/month	253.8695	225.2798	241.1415	214.3335	211.5605	193.9136	190.9087	200.1692	203.9658	217.4240	227.2955	251.0449 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-52.0136	-68.6255	-92.4284	-97.2277	-99.6047	-91.2253	-90.1093	-87.5342	-82.3672	-75.1466	-55.4918	-45.5459 (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	-45.6190	-93.4766	-181.3857	-266.3137	-346.4408	-346.0176	-341.9030	-291.9937	-217.4651	-131.4731	-60.1551	-36.2624 (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												3312.2151 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												80.3000
Water heating fuel used												2630.9065 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	160.2193 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3295.8261 (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	2893.5148 (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	3312.2151	0.2100	695.5652 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2630.9065	0.2100	552.4904 (264)
Space and water heating			1248.0555 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	160.2193	0.1443	23.1246 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	0.1360	-127.4762
PV Unit electricity exported	-2358.5059	0.1266	-298.5440
Total			-426.0202 (269)
Total CO2, kg/year			857.0892 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.8500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3312.2151	1.1300	3742.8031 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2630.9065	1.1300	2972.9244 (278)
Space and water heating			6715.7274 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	1.5027	-1408.5225
PV Unit electricity exported	-2358.5059	0.4647	-1095.9340
Total			-2504.4565 (283)
Total Primary energy kWh/year			4587.1214 (286)
Target Primary Energy Rate (TPER)			68.7900 (287)

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Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Be Lean	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	98 A	DER	11.42	TER	12.85
Environmental	91 B	% DER < TER			11.13
CO ₂ Emissions (t/year)	0.59	DFEE	41.45	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			20.02
% DPER < TPER	10.86	DPER	61.32	TPER	68.79
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 166.7000 (5)

2. Ventilation rate

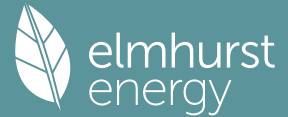
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.2950 (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) = 0.2507 (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	0.3197	0.3134	0.3071	0.2758	0.2695	0.2382	0.2382	0.2319	0.2507	0.2695	0.2821	0.2946 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5511	0.5491	0.5472	0.5380	0.5363	0.5284	0.5284	0.5269	0.5314	0.5363	0.5398	0.5434 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	0.9615	28.8558		(27)
Heatloss Floor			66.6800	0.1200	8.0016	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1500	11.8485	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1000	6.6680	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.3739		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							355.9541 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0000	0.0200	0.2400	
E3 Sill				12.0000	0.0220	0.2640	
E4 Jamb				30.0000	0.0180	0.5400	
E5 Ground floor (normal)				43.6000	0.0520	2.2672	
E14 Flat roof				43.6000	0.1290	5.6244	

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E16 Corner (normal)	20.0000	0.0350	0.7000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0660	-0.6600
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.9756 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	64.3495 (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	30.3164	30.2073	30.1003	29.5978	29.5037	29.0661	29.0661	28.9850	29.2346	29.5037	29.6939	29.8928 (38)
Average = Sum(39)m / 12 =	94.6659	94.5568	94.4498	93.9472	93.8532	93.4155	93.4155	93.3345	93.5841	93.8532	94.0434	94.2423 (39)
												93.9468
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4197	1.4181	1.4165	1.4089	1.4075	1.4010	1.4010	1.3997	1.4035	1.4075	1.4104	1.4134 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1629 (42)
Hot water usage for mixer showers												
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 (42a)
Hot water usage for other uses	26.1335	25.7454	25.1988	24.1911	23.4365	22.5998	22.1478	22.6906	23.2815	24.1768	25.2053	26.0452 (42b)
Average daily hot water use (litres/day)	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803 (42c)
												57.6666 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	62.9139	61.1883	59.3042	56.9590	54.8670	52.6928	52.2408	54.1210	56.0494	58.2822	60.6482	62.8255 (44)
Energy content (annual)	99.6402	87.1313	91.1484	77.9741	73.8615	64.7919	63.1808	67.0131	69.1146	79.0884	86.4045	98.3696 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
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 (61)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (62)
Total heat required for water heating calculated for each month	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141 (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	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141 (64)
12Total per year (kWh/year)												814.0605 (64)
Electric shower(s)	48.4380	43.1586	47.1276	44.9733	45.8172	43.7051	45.1620	45.8172	44.9733	47.1276	46.2414	48.4380 (64a)
Heat gains from water heating, kWh/month	33.2830	29.3051	31.1509	27.8128	27.1499	24.6946	24.7164	25.6946	25.9302	28.5882	29.9213	33.0130 (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	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (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)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Water heating gains (Table 5)	44.7353	43.6087	41.8695	38.6289	36.4917	34.2980	33.2210	34.5357	36.0141	38.4250	41.5574	44.3723 (72)
Total internal gains	385.1513	396.2273	379.2978	368.6968	350.0633	338.5435	325.9236	325.2727	334.8893	344.6606	364.2892	376.4303 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W
North					13.5800	10.6334	0.7600		0.7000		0.7700	53.2374 (74)
East					5.2500	19.6403	0.7600		0.7000		0.7700	38.0147 (76)
South					5.9300	46.7521	0.7600		0.7000		0.7700	102.2116 (78)
West					5.2500	19.6403	0.7600		0.7000		0.7700	38.0147 (80)
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305	195.2244 (83)
Total gains	616.6297	814.0926	1010.3475	1244.6114	1413.0662	1428.8439	1362.6074	1217.7216	1050.3655	822.8008	645.9197	571.6547 (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

Full SAP Calculation Printout



tau	69.6456	69.7260	69.8050	70.1783	70.2486	70.5778	70.5778	70.6391	70.4506	70.2486	70.1066	69.9586
alpha	5.6430	5.6484	5.6537	5.6786	5.6832	5.7052	5.7052	5.7093	5.6967	5.6832	5.6738	5.6639
util living area	0.9970	0.9862	0.9459	0.8092	0.6018	0.4167	0.3014	0.3520	0.5994	0.9126	0.9906	0.9980 (86)
MIT	19.8779	20.1642	20.5191	20.8492	20.9738	20.9972	20.9996	20.9992	20.9812	20.7381	20.2240	19.8228 (87)
Th 2	19.7483	19.7495	19.7507	19.7565	19.7576	19.7626	19.7626	19.7635	19.7607	19.7576	19.7554	19.7531 (88)
util rest of house	0.9956	0.9801	0.9243	0.7545	0.5279	0.3371	0.2168	0.2577	0.4992	0.8683	0.9855	0.9970 (89)
MIT 2	18.7627	19.0453	19.3817	19.6625	19.7457	19.7618	19.7626	19.7634	19.7544	19.5888	19.1116	18.7118 (90)
Living area fraction	18.9559	19.2391	19.5787	19.8680	19.9584	19.9758	19.9768	19.9775	19.9669	19.7879	19.3043	18.9043 (91)
MIT	18.9559	19.2391	19.5787	19.8680	19.9584	19.9758	19.9768	19.9775	19.9669	19.7879	19.3043	18.9043 (92)
Temperature adjustment	18.9559	19.2391	19.5787	19.8680	19.9584	19.9758	19.9768	19.9775	19.9669	19.7879	19.3043	18.9043 (93)
adjusted MIT	18.9559	19.2391	19.5787	19.8680	19.9584	19.9758	19.9768	19.9775	19.9669	19.7879	19.3043	18.9043 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9943	0.9768	0.9207	0.7599	0.5402	0.3509	0.2315	0.2741	0.5164	0.8696	0.9829	0.9961 (94)
Useful gains	613.0867	795.2217	930.2764	945.7566	763.3400	501.3492	315.3919	333.7508	542.4553	715.4795	634.8580	569.4200 (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	1387.4137	1355.8586	1235.2800	1030.4169	775.0790	502.1854	315.4493	333.9009	549.0489	862.3131	1147.7337	1385.7625 (97)
Space heating kWh	576.0993	376.7480	226.9227	60.9554	8.7338	0.0000	0.0000	0.0000	0.0000	109.2442	369.2704	607.3588 (98a)
Space heating requirement - total per year (kWh/year)												2335.3326
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	576.0993	376.7480	226.9227	60.9554	8.7338	0.0000	0.0000	0.0000	0.0000	109.2442	369.2704	607.3588 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2335.3326
Space heating per m2										(98c) / (4) =		35.0230 (99)

8c. Space cooling requirement

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

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	878.1059	691.2749	709.3419	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9864	0.9946	0.9894	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	866.1847	687.5408	701.8344	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1634.4221	1558.8749	1391.3780	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	553.1309	648.2725	513.0205	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	138.2827	162.0681	128.2551	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												428.6060 (107)
Energy for space heating												35.0230 (99)
Energy for space cooling												6.4278 (108)
Total												41.4508 (109)
Fabric Energy Efficiency (DFEE)												41.5 (109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

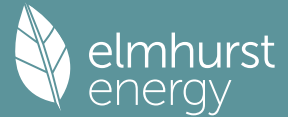
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	166.7000 (5)

2. Ventilation rate

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) =	0.1200 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3700	(18)
Number of sides sheltered	2	(19)

Full SAP Calculation Printout



Shelter factor
Infiltration rate adjusted to include shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683	(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			16.6700	1.1450	19.0878			(27)
Heatloss Floor			66.6800	0.1300	8.6684			(28a)
External Wall	109.0000	16.6700	92.3300	0.1800	16.6194			(29a)
External Roof	66.6800		66.6800	0.1100	7.3348			(30)
Total net area of external elements Aum(A, m2)			242.3600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 51.7104			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 355.9541 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	12.0000	0.0500	0.6000	
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000	
E3 Sill	30.0000	0.0500	1.5000	
E4 Jamb	43.6000	0.1600	6.9760	
E5 Ground floor (normal)	43.6000	0.0800	3.4880	
E14 Flat roof	20.0000	0.0900	1.8000	
E16 Corner (normal)	10.0000	-0.0900	-0.9000	
E17 Corner (inverted - internal area greater than external area)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.0640	(36)
Point Thermal bridges			(36a) = 0.0000	
Total fabric heat loss			(33) + (36) + (36a) = 65.7744	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
Jan	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355	(39)
Average = Sum(39)m / 12 =												96.5706	

HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552	(40)
HLP (average)												1.4483	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

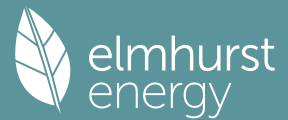
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629	(42)
Hot water usage for mixer showers	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	(42a)
Hot water usage for baths	26.1335	25.7454	25.1988	24.1911	23.4365	22.5998	22.1478	22.6906	23.2815	24.1768	25.2053	26.0452	26.0452	(42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	36.7803	(42c)
Average daily hot water use (litres/day)													57.6666	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	62.9139	61.1883	59.3042	56.9590	54.8670	52.6928	52.2408	54.1210	56.0494	58.2822	60.6482	62.8255	62.8255	(44)
Distribution loss (46)m = 0.15 x (45)m	99.6402	87.1313	91.1484	77.9741	73.8615	64.7919	63.1808	67.0131	69.1146	79.0884	86.4045	98.3696	98.3696	(45)
Total heat required for water heating calculated for each month										Total = Sum(45)m =		957.7183		
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	0.0000	(61)
WWHRS	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141	83.6141	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141	83.6141	(63d)
12Total per year (kWh/year)													814.0605	(64)
Electric shower(s)	48.4380	43.1586	47.1276	44.9733	45.8172	43.7051	45.1620	45.8172	44.9733	47.1276	46.2414	48.4380	48.4380	(64a)
Heat gains from water heating, kWh/month	33.2830	29.3051	31.1509	27.8128	27.1499	24.6946	24.7164	25.6946	25.9302	28.5882	29.9213	33.0130	33.0130	(64a)
													550.9791	(64a)

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

Metabolic gains (Table 5), Watts														
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	95.5446	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	181.0698	(68)

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

	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (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 (70)
Losses e.g. evaporation (negative values) (Table 5)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Water heating gains (Table 5)	44.7353	43.6087	41.8695	38.6289	36.4917	34.2980	33.2210	34.5357	36.0141	38.4250	41.5574 (72)
Total internal gains	385.1513	396.2273	379.2978	368.6968	350.0633	338.5435	325.9236	325.2727	334.8893	344.6606	364.2892 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				7.5400	10.6334	0.6300		0.7000		0.7700		24.5028 (74)
East				2.9200	19.6403	0.6300		0.7000		0.7700		17.5268 (76)
South				3.2900	46.7521	0.6300		0.7000		0.7700		47.0076 (78)
West				2.9200	19.6403	0.6300		0.7000		0.7700		17.5268 (80)
Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	491.7152	588.6120	669.8623	772.0414	839.5770	840.6326	803.3202	736.2388	664.3401	564.8046	493.9443	466.3023 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
alpha	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
util living area	0.9990	0.9972	0.9913	0.9636	0.8740	0.6904	0.5175	0.5834	0.8467	0.9816	0.9975	0.9993 (86)
MIT	19.6834	19.8644	20.1362	20.5087	20.8114	20.9625	20.9936	20.9881	20.8843	20.4810	20.0148	19.6541 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9986	0.9958	0.9867	0.9437	0.8111	0.5724	0.3728	0.4311	0.7492	0.9678	0.9960	0.9989 (89)
MIT 2	18.5419	18.7237	18.9944	19.3598	19.6204	19.7239	19.7352	19.7355	19.6832	19.3421	18.8814	18.5186 (90)
Living area fraction									FLA = Living area / (4) =			0.1732 (91)
MIT	18.7396	18.9213	19.1922	19.5588	19.8267	19.9384	19.9531	19.9525	19.8912	19.5394	19.0777	18.7153 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7396	18.9213	19.1922	19.5588	19.8267	19.9384	19.9531	19.9525	19.8912	19.5394	19.0777	18.7153 (93)

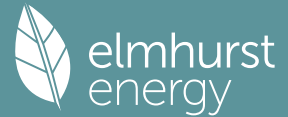
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9980	0.9945	0.9841	0.9403	0.8168	0.5926	0.3982	0.4580	0.7636	0.9649	0.9949	0.9985 (94)
Ext temp.	490.7402	585.3671	659.1871	725.9502	685.7891	498.1895	319.8679	337.2232	507.2978	544.9917	491.4247	465.6110 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1410.7799	1367.5010	1235.7349	1029.3326	783.6061	511.0746	321.0124	339.6462	555.9593	861.9689	1158.5163	1408.4988 (97)
Space heating requirement - total per year (kWh/year)	684.5095	525.5939	428.9516	218.4353	72.7759	0.0000	0.0000	0.0000	0.0000	235.8310	480.3059	701.5085 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	684.5095	525.5939	428.9516	218.4353	72.7759	0.0000	0.0000	0.0000	0.0000	235.8310	480.3059	701.5085 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3347.9116
Space heating per m2										(98c) / (4) =		50.2086 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	899.9079	708.4382	726.6161	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8690	0.9311	0.8982	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	782.0271	659.6088	652.6381	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	946.9024	905.1625	828.6060	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	118.7102	182.6920	130.9200	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.6776	45.6730	32.7300	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												108.0806 (107)
Energy for space cooling												50.2086 (99)
Total												1.6209 (108)
Fabric Energy Efficiency (TFEE)												51.8295 (109)

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Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Be Lean	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	98 A	DER	11.42	TER	12.85
Environmental	91 B	% DER < TER			11.13
CO ₂ Emissions (t/year)	0.59	DFEE	41.45	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			20.02
% DPER < TPER	10.86	DPER	61.32	TPER	68.79
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

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	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 166.7000 (5)

2. Ventilation rate

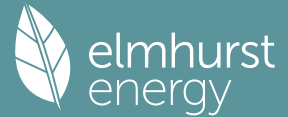
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.2950 (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) = 0.2507 (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	0.3197	0.3134	0.3071	0.2758	0.2695	0.2382	0.2382	0.2319	0.2507	0.2695	0.2821	0.2946 (22b)
Effective ac	0.5511	0.5491	0.5472	0.5380	0.5363	0.5284	0.5284	0.5269	0.5314	0.5363	0.5398	0.5434 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	0.9615	28.8558		(27)
Heatloss Floor			66.6800	0.1200	8.0016	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1500	11.8485	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1000	6.6680	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.3739		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							355.9541 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0000	0.0200	0.2400	
E3 Sill				12.0000	0.0220	0.2640	
E4 Jamb				30.0000	0.0180	0.5400	
E5 Ground floor (normal)				43.6000	0.0520	2.2672	
E14 Flat roof				43.6000	0.1290	5.6244	
E16 Corner (normal)				20.0000	0.0350	0.7000	
E17 Corner (inverted - internal area greater than external area)				10.0000	-0.0660	-0.6600	

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Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal bridges (36a) = 8.9756 (36)
 Total fabric heat loss (33) + (36) + (36a) = 64.3495 (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	30.3164	30.2073	30.1003	29.5978	29.5037	29.0661	29.0661	28.9850	29.2346	29.5037	29.6939	29.8928 (38)
Heat transfer coeff	94.6659	94.5568	94.4498	93.9472	93.8532	93.4155	93.4155	93.3345	93.5841	93.8532	94.0434	94.2423 (39)
Average = Sum(39)m / 12 =												93.9468
HLP	1.4197	1.4181	1.4165	1.4089	1.4075	1.4010	1.4010	1.3997	1.4035	1.4075	1.4104	1.4134 (40)
HLP (average)												1.4089
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Hot water usage for mixer showers												2.1629 (42)
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 (42a)
Hot water usage for baths												
69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838	69.4838 (42b)
Hot water usage for other uses												
36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	36.7803 (42c)
Average daily hot water use (litres/day)												98.0776 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641 (44)
Energy conte	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	24.9576 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	47.9862	47.8784	44.5735	45.4449	46.8643	46.7895	50.2479	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	217.3429 (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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (64)
Total per year (kWh/year)												2206.7245 (64)
Electric shower(s)												2207 (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												
68.8224	60.8084	64.5241	56.2876	54.0246	48.0971	47.2229	49.5784	50.5982	57.0524	60.9719	68.0624	68.0624 (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	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	181.0698 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (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)												
-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Water heating gains (Table 5)												
92.5032	90.4887	86.7260	78.1773	72.6137	66.8016	63.4717	66.6376	70.2753	76.6833	84.6832	91.4817	91.4817 (72)
Total internal gains	435.9193	446.1073	427.1543	411.2451	389.1853	371.0470	356.1743	357.3745	369.1505	385.9189	410.4151	426.5397 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				13.5800	10.6334		0.7600		0.7000		0.7700		53.2374 (74)
East				5.2500	19.6403		0.7600		0.7000		0.7700		38.0147 (76)
South				5.9300	46.7521		0.7600		0.7000		0.7700		102.2116 (78)
West				5.2500	19.6403		0.7600		0.7000		0.7700		38.0147 (80)
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305	195.2244	(83)
Total gains	667.3977	863.9726	1058.2039	1287.1598	1452.1882	1461.3474	1392.8581	1249.8235	1084.6267	864.0591	692.0456	621.7641	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	69.6456	69.7260	69.8050	70.1783	70.2486	70.5778	70.5778	70.6391	70.4506	70.2486	70.1066	69.9586
alpha	5.6430	5.6484	5.6537	5.6786	5.6832	5.7052	5.7052	5.7093	5.6967	5.6832	5.6738	5.6639

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util living area	0.9955	0.9819	0.9355	0.7928	0.5873	0.4076	0.2949	0.3430	0.5824	0.8970	0.9871	0.9969 (86)
MIT	19.9355	20.2170	20.5590	20.8647	20.9768	20.9975	20.9997	20.9993	20.9836	20.7661	20.2742	19.8801 (87)
Th 2	19.7483	19.7495	19.7507	19.7565	19.7576	19.7626	19.7626	19.7635	19.7607	19.7576	19.7554	19.7531 (88)
util rest of house												
MIT 2	0.9935	0.9742	0.9111	0.7367	0.5146	0.3296	0.2121	0.2511	0.4842	0.8481	0.9802	0.9955 (89)
Living area fraction	18.5569	18.9111	19.3222	19.6496	19.7441	19.7617	19.7626	19.7634	19.7538	19.5685	18.9916	18.4900 (90)
MIT	18.7957	19.1373	19.5364	19.8601	19.9577	19.9758	19.9768	19.9775	19.9668	19.7760	19.2138	18.7308 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	18.7957	19.1373	19.5364	19.8601	19.9577	19.9758	19.9768	19.9775	19.9668	19.7760	19.2138	18.7308 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9911	0.9691	0.9060	0.7418	0.5266	0.3431	0.2264	0.2671	0.5010	0.8490	0.9759	0.9937	(94)
Useful gains	661.4802	837.3015	958.7277	954.8169	764.6639	501.4377	315.3985	333.7709	543.3735	733.5477	675.3859	617.8662	(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	1372.2481	1346.2347	1231.2838	1029.6683	775.0071	502.1820	315.4495	333.9015	549.0404	861.1925	1139.2231	1369.4181	(97)
Space heating kWh	528.8113	342.0031	202.7818	53.8930	7.6953	0.0000	0.0000	0.0000	0.0000	94.9678	333.9628	559.1547	(98a)
Space heating requirement - total per year (kWh/year)												2123.2697	
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	528.8113	342.0031	202.7818	53.8930	7.6953	0.0000	0.0000	0.0000	0.0000	94.9678	333.9628	559.1547	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2123.2697	
Space heating per m2										(98c) / (4) =		31.8427	(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 %)													79.0000 (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	528.8113	342.0031	202.7818	53.8930	7.6953	0.0000	0.0000	0.0000	0.0000	94.9678	333.9628	559.1547	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	669.3814	432.9154	256.6858	68.2190	9.7409	0.0000	0.0000	0.0000	0.0000	120.2123	422.7377	707.7907	(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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(64)
Efficiency of water heater (217)m	81.1427	80.5002	79.2024	76.8886	75.3412	75.0000	75.0000	75.0000	75.0000	77.8385	80.4347	81.2703	(216)
Fuel for water heating, kWh/month	270.6697	241.3693	260.9789	235.6560	231.4267	207.6168	204.3995	214.3145	218.3794	236.4557	243.1912	267.4322	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-49.3319	-66.8873	-92.3059	-98.3040	-100.8543	-92.3143	-91.1323	-88.4831	-82.7384	-74.0911	-53.1600	-42.8399	(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	-41.0351	-88.0291	-180.6945	-277.9583	-370.8584	-373.7364	-367.8345	-308.3508	-221.1150	-126.6129	-54.8833	-32.1816	(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												2687.6832	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												75.0000	
Water heating fuel used												2831.8900	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												160.2193	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3375.7324	(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												2390.0600	(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	2687.6832	0.2100	564.4135 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2831.8900	0.2100	594.6969 (264)
Space and water heating			1159.1104 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	160.2193	0.1443	23.1246 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-932.4427	0.1357	-126.5202
PV Unit electricity exported	-2443.2897	0.1254	-306.3020
Total			-432.8222 (269)
Total CO2, kg/year			761.3420 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.4200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2687.6832	1.1300	3037.0820 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2831.8900	1.1300	3200.0357 (278)
Space and water heating			6237.1177 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-932.4427	1.5015	-1400.1001
PV Unit electricity exported	-2443.2897	0.4602	-1124.2943
Total			-2524.3944 (283)
Total Primary energy kWh/year			4088.5738 (286)
Dwelling Primary energy Rate (DPER)			61.3200 (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	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.7000 (5)

2. Ventilation rate

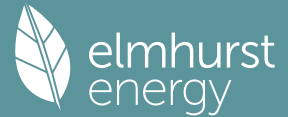
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3700 (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) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (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			16.6700	1.1450	19.0878		(27)
Heatloss Floor			66.6800	0.1300	8.6684		(28a)

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External Wall	109.0000	16.6700	92.3300	0.1800	16.6194	(29a)
External Roof	66.6800		66.6800	0.1100	7.3348	(30)
Total net area of external elements Aum(A, m2)			242.3600			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	51.7104		(33)

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

355.9541 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000
E3 Sill	12.0000	0.0500	0.6000
E4 Jamb	30.0000	0.0500	1.5000
E5 Ground floor (normal)	43.6000	0.1600	6.9760
E14 Flat roof	43.6000	0.0800	3.4880
E16 Corner (normal)	20.0000	0.0900	1.8000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000

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

Point Thermal bridges	(36a) =	14.0640 (36)
Total fabric heat loss	(33) + (36) + (36a) =	65.7744 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355	(39)
Average = Sum(39)m / 12 =												96.5706	(39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552	(40)
HLP (average)												1.4483	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	(40)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838	(42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	(42c)
Average daily hot water use (litres/day)												98.0776	(43)
Daily hot water use	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641	(44)
Energy conte	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840	(45)
Energy content (annual)										Total = Sum(45)m =		1628.7207	(45)
Distribution loss (46)m = 0.15 x (45)m	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	50.9589	46.0274	50.9589	47.9862	47.8784	44.5735	45.4449	46.8643	46.7895	50.2479	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2206.7245	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	68.8224	60.8084	64.5241	56.2876	54.0246	48.0971	47.2229	49.5784	50.5982	57.0524	60.9719	68.0624	(65)

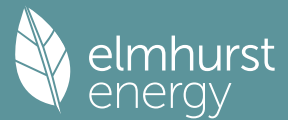
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)	92.5032	90.4887	86.7260	78.1773	72.6137	66.8016	63.4717	66.6376	70.2753	76.6833	84.6832	91.4817	(72)
Total internal gains	435.9193	446.1073	427.1543	411.2451	389.1853	371.0470	356.1743	357.3745	369.1505	385.9189	410.4151	426.5397	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	7.5400	10.6334	0.6300	0.7000	0.7700	24.5028 (74)
East	2.9200	19.6403	0.6300	0.7000	0.7700	17.5268 (76)
South	3.2900	46.7521	0.6300	0.7000	0.7700	47.0076 (78)
West	2.9200	19.6403	0.6300	0.7000	0.7700	17.5268 (80)

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Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	542.4832	638.4920	717.7188	814.5898	878.6990	873.1361	833.5709	768.3407	698.6013	606.0629	540.0702	516.4117 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
alpha	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
util living area	0.9984	0.9958	0.9881	0.9549	0.8560	0.6697	0.4998	0.5613	0.8245	0.9750	0.9962	0.9988 (86)
MIT	19.7416	19.9208	20.1883	20.5480	20.8327	20.9676	20.9946	20.9902	20.8999	20.5233	20.0672	19.7117 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9977	0.9938	0.9819	0.9314	0.7891	0.5530	0.3594	0.4135	0.7226	0.9572	0.9939	0.9982 (89)
MIT 2	18.2845	18.5145	18.8545	19.3006	19.6083	19.7229	19.7351	19.7355	19.6796	19.2825	18.7090	18.2517 (90)
Living area fraction									fLA = Living area / (4) =			0.1732 (91)
MIT	18.5368	18.7581	19.0856	19.5167	19.8204	19.9385	19.9533	19.9528	19.8910	19.4974	18.9443	18.5046 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5368	18.7581	19.0856	19.5167	19.8204	19.9385	19.9533	19.9528	19.8910	19.4974	18.9443	18.5046 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9966	0.9914	0.9776	0.9264	0.7947	0.5728	0.3840	0.4395	0.7373	0.9526	0.9918	0.9973 (94)
Useful gains	540.6123	633.0305	701.6598	754.6204	698.3295	500.1481	320.0713	337.6990	515.1012	577.3421	535.6235	515.0044 (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	1390.9678	1351.5858	1225.3542	1025.2657	782.9976	511.0781	321.0244	339.6733	555.9337	857.9215	1145.6109	1388.0575 (97)
Space heating kWh	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98a)
Space heating requirement - total per year (kWh/year)												3060.4868
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3060.4868
Space heating per m2										(98c) / (4) =		45.8981 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.4000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	632.6645	482.8692	389.6287	194.8646	62.9931	0.0000	0.0000	0.0000	0.0000	208.7510	439.1910	649.5247 (98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000 (210)
Space heating fuel (main heating system)	684.7019	522.5857	421.6761	210.8924	68.1744	0.0000	0.0000	0.0000	0.0000	225.9210	475.3149	702.9488 (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	219.6286	194.3028	206.7014	181.1925	174.3596	155.7126	153.2997	160.7359	163.7846	184.0537	195.6103	217.3429 (64)
Efficiency of water heater (217)m	86.5124	86.2495	85.7179	84.5377	82.4160	80.3000	80.3000	80.3000	80.3000	84.6520	86.0599	86.5753 (216)
Fuel for water heating, kWh/month	253.8695	225.2798	241.1415	214.3335	211.5605	193.9136	190.9087	200.1692	203.9658	217.4240	227.2955	251.0449 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-52.0136	-68.6255	-92.4284	-97.2277	-99.6047	-91.2253	-90.1093	-87.5342	-82.3672	-75.1466	-55.4918	-45.5459 (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	-45.6190	-93.4766	-181.3857	-266.3137	-346.4408	-346.0176	-341.9030	-291.9937	-217.4651	-131.4731	-60.1551	-36.2624 (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												3312.2151 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												80.3000
Water heating fuel used												2630.9065 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	160.2193 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3295.8261 (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	2893.5148 (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	3312.2151	0.2100	695.5652 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2630.9065	0.2100	552.4904 (264)
Space and water heating			1248.0555 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	160.2193	0.1443	23.1246 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	0.1360	-127.4762
PV Unit electricity exported	-2358.5059	0.1266	-298.5440
Total			-426.0202 (269)
Total CO2, kg/year			857.0892 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.8500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3312.2151	1.1300	3742.8031 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2630.9065	1.1300	2972.9244 (278)
Space and water heating			6715.7274 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	1.5027	-1408.5225
PV Unit electricity exported	-2358.5059	0.4647	-1095.9340
Total			-2504.4565 (283)
Total Primary energy kWh/year			4587.1214 (286)
Target Primary Energy Rate (TPER)			68.7900 (287)

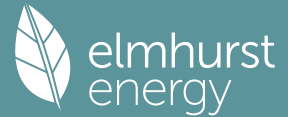
Appendix 3

SAP Calculations – Be Clean

Appendix 4

SAP Calculations – Be Green

Full SAP Calculation Printout



Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Be Green	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	99 A	DER	-0.04	TER	12.59
Environmental	100 A	% DER < TER			100.32
CO ₂ Emissions (t/year)	-0.06	DFEE	41.45	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			20.02
% DPER < TPER	88.90	DPER	7.48	TPER	67.40
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

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	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 166.7000 (5)

2. Ventilation rate

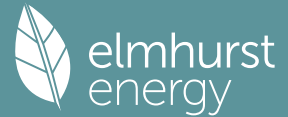
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.2950 (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) = 0.2507 (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	0.3197	0.3134	0.3071	0.2758	0.2695	0.2382	0.2382	0.2319	0.2507	0.2695	0.2821	0.2946 (22b)
Effective ac	0.5511	0.5491	0.5472	0.5380	0.5363	0.5284	0.5284	0.5269	0.5314	0.5363	0.5398	0.5434 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	0.9615	28.8558		(27)
Heatloss Floor			66.6800	0.1200	8.0016	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1500	11.8485	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1000	6.6680	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.3739		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							355.9541 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0000	0.0200	0.2400	
E3 Sill				12.0000	0.0220	0.2640	
E4 Jamb				30.0000	0.0180	0.5400	
E5 Ground floor (normal)				43.6000	0.0520	2.2672	
E14 Flat roof				43.6000	0.1290	5.6244	
E16 Corner (normal)				20.0000	0.0350	0.7000	
E17 Corner (inverted - internal area greater than external area)				10.0000	-0.0660	-0.6600	

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

(33) + (36) + (36a) = 8.9756 (36)
 0.0000
 64.3495 (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	
(39)m	30.3164	30.2073	30.1003	29.5978	29.5037	29.0661	29.0661	28.9850	29.2346	29.5037	29.6939	29.8928	(38)
Heat transfer coeff	94.6659	94.5568	94.4498	93.9472	93.8532	93.4155	93.4155	93.3345	93.5841	93.8532	94.0434	94.2423	(39)
Average = Sum(39)m / 12 =												93.9468	
HLP	1.4197	1.4181	1.4165	1.4089	1.4075	1.4010	1.4010	1.3997	1.4035	1.4075	1.4104	1.4134	(40)
HLP (average)												1.4089	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													69.7195 (42b)
Hot water usage for other uses													36.7803 (42c)
Average daily hot water use (litres/day)													98.0776 (43)
Daily hot water use													
Energy conte	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641	(44)
Energy content (annual)	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840	(45)
Distribution loss (46)m = 0.15 x (45)m	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	(46)
Water storage loss (or HIU loss):													
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8600 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0044 (55)
Total storage loss	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)
If cylinder contains dedicated solar storage	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(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	223.0685	197.4098	210.1413	185.8503	180.8801	163.7831	162.2536	168.2704	169.6390	188.2046	198.9392	220.7828	(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	223.0685	197.4098	210.1413	185.8503	180.8801	163.7831	162.2536	168.2704	169.6390	188.2046	198.9392	220.7828	(64)
12Total per year (kWh/year)													2269.2227 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	99.6017	88.6091	95.3034	86.4063	85.5741	79.0690	79.3808	81.3814	81.0160	88.0095	90.7583	98.8417	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(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)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)	133.8733	131.8588	128.0960	120.0087	115.0189	109.8180	106.6946	109.3835	112.5223	118.2923	126.0533	132.8518	(72)
Total internal gains	474.2893	484.4774	465.5243	450.0766	428.5905	414.0635	399.3972	400.1205	411.3974	424.5279	448.7852	464.9097	(73)

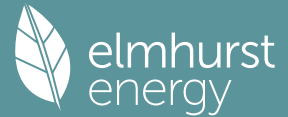
6. Solar gains

[Jan]													
				Area	Solar flux		g	FF		Access		Gains	
				m2	Table 6a		Specific data	Specific data		factor		W	
					W/m2		or Table 6b	or Table 6c		Table 6d			
North				13.5800		10.6334	0.7600	0.7000		0.7700		53.2374	(74)
East				5.2500		19.6403	0.7600	0.7000		0.7700		38.0147	(76)
South				5.9300		46.7521	0.7600	0.7000		0.7700		102.2116	(78)
West				5.2500		19.6403	0.7600	0.7000		0.7700		38.0147	(80)
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305	195.2244	(83)
Total gains	705.7677	902.3426	1096.5740	1325.9912	1491.5934	1504.3639	1436.0810	1292.5694	1126.8737	902.6681	730.4156	660.1342	(84)

7. Mean internal temperature (heating season)

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

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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	69.6456	69.7260	69.8050	70.1783	70.2486	70.5778	70.5778	70.6391	70.4506	70.2486	70.1066	69.9586
alpha	5.6430	5.6484	5.6537	5.6786	5.6832	5.7052	5.7052	5.7093	5.6967	5.6832	5.6738	5.6639
util living area	0.9941	0.9781	0.9265	0.7779	0.5733	0.3962	0.2861	0.3317	0.5625	0.8815	0.9834	0.9959 (86)
Living	20.1791	20.3877	20.6371	20.8535	20.9299	20.9440	20.9454	20.9452	20.9352	20.7880	20.4317	20.1381
Non living	18.8252	19.0867	19.3841	19.6146	19.6786	19.6923	19.6928	19.6937	19.6865	19.5628	19.1501	18.7771
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5801	20.3877	20.6371	20.8535	20.9299	20.9440	20.9454	20.9452	20.9352	20.7880	20.4317	20.2586 (87)
Th 2	19.7483	19.7495	19.7507	19.7565	19.7576	19.7626	19.7626	19.7635	19.7607	19.7576	19.7554	19.7531 (88)
util rest of house	0.9915	0.9690	0.8998	0.7208	0.5017	0.3202	0.2057	0.2428	0.4667	0.8287	0.9748	0.9940 (89)
MIT 2	19.3803	19.0867	19.3841	19.6146	19.6786	19.6923	19.6928	19.6937	19.6865	19.5628	19.1501	18.9530 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.5881	19.3121	19.6011	19.8292	19.8954	19.9091	19.9098	19.9105	19.9028	19.7751	19.3721	0.1732 (91)
Temperature adjustment												0.0000
adjusted MIT	19.5881	19.3121	19.6011	19.8292	19.8954	19.9091	19.9098	19.9105	19.9028	19.7751	19.3721	19.1792 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9910	0.9648	0.8960	0.7244	0.5098	0.3293	0.2153	0.2534	0.4780	0.8296	0.9713	0.9928 (94)
Useful gains	699.4299	870.5934	982.4758	960.5353	760.4194	495.3582	309.1452	327.5533	538.6176	748.8682	709.4201	655.3595 (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	1447.2612	1362.7578	1237.4002	1026.7644	769.1633	495.9505	309.1832	327.6500	543.0482	861.1080	1154.1127	1411.6692 (97)
Space heating kWh	556.3865	330.7345	189.6638	47.6849	6.5055	0.0000	0.0000	0.0000	0.0000	83.5065	320.1787	562.6943 (98a)
Space heating requirement - total per year (kWh/year)												2097.3546
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	556.3865	330.7345	189.6638	47.6849	6.5055	0.0000	0.0000	0.0000	0.0000	83.5065	320.1787	562.6943 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2097.3546
Space heating per m2										(98c) / (4) =		31.4540 (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 %)												237.3665 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	556.3865	330.7345	189.6638	47.6849	6.5055	0.0000	0.0000	0.0000	0.0000	83.5065	320.1787	562.6943 (98)
Space heating efficiency (main heating system 1)	237.3665	237.3665	237.3665	237.3665	237.3665	0.0000	0.0000	0.0000	0.0000	237.3665	237.3665	237.3665 (210)
Space heating fuel (main heating system)	234.3998	139.3350	79.9034	20.0892	2.7407	0.0000	0.0000	0.0000	0.0000	35.1804	134.8879	237.0572 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	223.0685	197.4098	210.1413	185.8503	180.8801	163.7831	162.2536	168.2704	169.6390	188.2046	198.9392	220.7828 (64)
Efficiency of water heater	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730 (216)
Fuel for water heating, kWh/month	125.9754	111.4849	118.6749	104.9568	102.1500	92.4947	91.6309	95.0288	95.8017	106.2864	112.3487	124.6846 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Lighting	17.5529	14.0816	12.6789	9.2891	7.1752	5.8622	6.5454	8.5080	11.0511	14.4996	16.3773	18.0408 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-72.3612	-112.9199	-173.5281	-199.0540	-216.0099	-201.9908	-199.3626	-187.4735	-163.2740	-131.8107	-83.0344	-61.1168 (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)	-4.7720	-15.7933	-45.6851	-94.7349	-146.9415	-154.8483	-152.7607	-120.1784	-77.6791	-32.7319	-8.4567	-3.4305 (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												883.5935 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												177.0730
Water heating fuel used												1281.5178 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												141.6621 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2659.9487 (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	-353.1753 (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	883.5935	0.1582	139.7534 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1281.5178	0.1407	180.3661 (264)
Space and water heating			320.1195 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	141.6621	0.1443	20.4462 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1801.9361	0.1338	-241.1010
PV Unit electricity exported	-858.0125	0.1191	-102.1920
Total			-343.2930 (269)
Total CO2, kg/year			-2.7273 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.0400 (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	883.5935	1.5854	1400.8758 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1281.5178	1.5204	1948.4362 (278)
Space and water heating			3349.3121 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	141.6621	1.5338	217.2860 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1801.9361	1.4945	-2692.9521
PV Unit electricity exported	-858.0125	0.4369	-374.8497
Total			-3067.8018 (283)
Total Primary energy kWh/year			498.7963 (286)
Dwelling Primary energy Rate (DPER)			7.4800 (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	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.7000 (5)

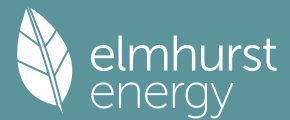
2. Ventilation rate

	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) =	0.1200 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3700	(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) =		0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (25)

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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			16.6700	1.1450	19.0878		(27)
Heatloss Floor			66.6800	0.1300	8.6684		(28a)
External Wall	109.0000	16.6700	92.3300	0.1800	16.6194		(29a)
External Roof	66.6800		66.6800	0.1100	7.3348		(30)
Total net area of external elements Aum(A, m2)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	51.7104	(33)

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

355.9541 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000
E3 Sill	12.0000	0.0500	0.6000
E4 Jamb	30.0000	0.0500	1.5000
E5 Ground floor (normal)	43.6000	0.1600	6.9760
E14 Flat roof	43.6000	0.0800	3.4880
E16 Corner (normal)	20.0000	0.0900	1.8000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000

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

14.0640 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 65.7744 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355
Average = Sum(39)m / 12 =												96.5706

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552
HLP (average)												1.4483
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

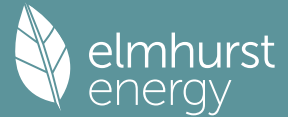
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers													
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	(42a)
Hot water usage for baths													
69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838	69.4838	(42b)
Hot water usage for other uses													
36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	36.7803	(42c)
Average daily hot water use (litres/day)													98.0776 (43)
Daily hot water use													
106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641	106.2641	(44)
Energy conte	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	24.9576	(46)
Water storage loss (or HIU loss):													
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8903 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0208 (55)
Total storage loss													
31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	(56)
If cylinder contains dedicated solar storage													
31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
223.5765	197.8686	210.6493	186.3419	181.3881	164.2747	162.7616	168.7784	170.1306	188.7126	199.4308	221.2908	221.2908	(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													
223.5765	197.8686	210.6493	186.3419	181.3881	164.2747	162.7616	168.7784	170.1306	188.7126	199.4308	221.2908	221.2908	(64)
12Total per year (kWh/year)													
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
100.0081	88.9761	95.7098	86.7996	85.9805	79.4622	79.7872	81.7878	81.4093	88.4159	91.1516	99.2481	99.2481	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)													
134.4195	132.4050	128.6422	120.5549	115.5651	110.3642	107.2408	109.9298	113.0685	118.8385	126.5995	133.3980	133.3980	(72)
Total internal gains													
477.8355	488.0236	469.0705	453.6228	432.1367	414.6097	399.9434	400.6667	411.9437	428.0741	452.3314	468.4560	468.4560	(73)

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6. Solar gains

[Jan]	Area				Solar flux	g	FF	Access	Gains			
	m2				Table 6a	Specific data	Specific data	factor	W			
					W/m2	or Table 6b	or Table 6c	Table 6d				
North				7.5400	10.6334	0.6300	0.7000	0.7700	24.5028 (74)			
East				2.9200	19.6403	0.6300	0.7000	0.7700	17.5268 (76)			
South				3.2900	46.7521	0.6300	0.7000	0.7700	47.0076 (78)			
West				2.9200	19.6403	0.6300	0.7000	0.7700	17.5268 (80)			
Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	584.3995	680.4082	759.6350	856.9675	921.6504	916.6988	877.3400	811.6329	741.3945	648.2181	581.9864	558.3279 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
util living area	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
	0.9977	0.9943	0.9846	0.9451	0.8357	0.6433	0.4760	0.5337	0.7964	0.9668	0.9945	0.9982 (86)
MIT	19.7894	19.9678	20.2331	20.5851	20.8535	20.9734	20.9958	20.9923	20.9167	20.5647	20.1143	19.7597 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9966	0.9916	0.9769	0.9179	0.7651	0.5286	0.3416	0.3919	0.6906	0.9444	0.9913	0.9974 (89)
MIT 2	18.3455	18.5741	18.9099	19.3421	19.6258	19.7255	19.7353	19.7359	19.6902	19.3302	18.7686	18.3131 (90)
Living area fraction									fLA =	Living area /	(4) =	0.1732 (91)
MIT	18.5956	18.8155	19.1391	19.5574	19.8385	19.9416	19.9536	19.9536	19.9027	19.5440	19.0017	18.5637 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5956	18.8155	19.1391	19.5574	19.8385	19.9416	19.9536	19.9536	19.9027	19.5440	19.0017	18.5637 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9952	0.9887	0.9720	0.9134	0.7721	0.5482	0.3651	0.4167	0.7066	0.9400	0.9886	0.9962 (94)
Useful gains	581.5673	672.7490	738.3856	782.7124	711.5659	502.5396	320.3221	338.2331	523.8866	609.3041	575.3537	556.1961 (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	1396.7099	1357.1808	1230.5626	1029.1985	784.7377	511.3786	321.0605	339.7470	557.0576	862.4115	1151.1681	1393.7886 (97)
Space heating kWh	606.4661	459.9382	366.1797	177.4699	54.4398	0.0000	0.0000	0.0000	0.0000	188.3119	414.5863	623.1688 (98a)
Space heating requirement - total per year (kWh/year)												2890.5607
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	606.4661	459.9382	366.1797	177.4699	54.4398	0.0000	0.0000	0.0000	0.0000	188.3119	414.5863	623.1688 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2890.5607
Space heating per m2										(98c) / (4) =		43.3497 (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	606.4661	459.9382	366.1797	177.4699	54.4398	0.0000	0.0000	0.0000	0.0000	188.3119	414.5863	623.1688	(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)	657.0597	498.3079	396.7278	192.2751	58.9814	0.0000	0.0000	0.0000	0.0000	204.0215	449.1726	675.1558	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	223.5765	197.8686	210.6493	186.3419	181.3881	164.2747	162.7616	168.7784	170.1306	188.7126	199.4308	221.2908	(64)
Efficiency of water heater	86.1819	85.8863	85.2873	83.9505	81.7118	79.8000	79.8000	79.8000	79.8000	84.0550	85.6621	79.8000	(216)
Fuel for water heating, kWh/month	259.4239	230.3843	246.9878	221.9663	221.9852	205.8580	203.9619	211.5018	213.1963	224.5108	232.8110	256.5663	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-52.0136	-68.6255	-92.4284	-97.2277	-99.6047	-91.2253	-90.1093	-87.5342	-82.3672	-75.1466	-55.4918	-45.5459	(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)	-45.6190	-93.4766	-181.3857	-266.3137	-346.4408	-346.0176	-341.9030	-291.9937	-217.4651	-131.4731	-60.1551	-36.2624	(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)

elmhurst
energy

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

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	3131.7018	1.1300	3538.8230 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2729.1537	1.1300	3083.9437 (278)
Space and water heating			6622.7667 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	1.5027	-1408.5225
PV Unit electricity exported	-2358.5059	0.4647	-1095.9340
Total			-2504.4565 (283)
Total Primary energy kWh/year			4494.1607 (286)
Target Primary Energy Rate (TPER)			67.4000 (287)

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Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Be Green	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	99 A	DER	-0.04	TER	12.59
Environmental	100 A	% DER < TER			100.32
CO ₂ Emissions (t/year)	-0.06	DFEE	41.45	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			20.02
% DPER < TPER	88.90	DPER	7.48	TPER	67.40
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 166.7000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1200 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.2950 (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) = 0.2507 (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	0.3197	0.3134	0.3071	0.2758	0.2695	0.2382	0.2382	0.2319	0.2507	0.2695	0.2821	0.2946 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5511	0.5491	0.5472	0.5380	0.5363	0.5284	0.5284	0.5269	0.5314	0.5363	0.5398	0.5434 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	0.9615	28.8558		(27)
Heatloss Floor			66.6800	0.1200	8.0016	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1500	11.8485	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1000	6.6680	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.3739		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							355.9541 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0000	0.0200	0.2400	
E3 Sill				12.0000	0.0220	0.2640	
E4 Jamb				30.0000	0.0180	0.5400	
E5 Ground floor (normal)				43.6000	0.0520	2.2672	
E14 Flat roof				43.6000	0.1290	5.6244	

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E16 Corner (normal)	20.0000	0.0350	0.7000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0660	-0.6600
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.9756 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	64.3495 (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	30.3164	30.2073	30.1003	29.5978	29.5037	29.0661	29.0661	28.9850	29.2346	29.5037	29.6939	29.8928 (38)
Average = Sum(39)m / 12 =	94.6659	94.5568	94.4498	93.9472	93.8532	93.4155	93.4155	93.3345	93.5841	93.8532	94.0434	94.2423 (39)
												93.9468
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4197	1.4181	1.4165	1.4089	1.4075	1.4010	1.4010	1.3997	1.4035	1.4075	1.4104	1.4134 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1629 (42)
Hot water usage for mixer showers												
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 (42a)
Hot water usage for other uses	26.1335	25.7454	25.1988	24.1911	23.4365	22.5998	22.1478	22.6906	23.2815	24.1768	25.2053	26.0452 (42b)
Average daily hot water use (litres/day)	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803 (42c)
												57.6666 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	62.9139	61.1883	59.3042	56.9590	54.8670	52.6928	52.2408	54.1210	56.0494	58.2822	60.6482	62.8255 (44)
Energy content (annual)	99.6402	87.1313	91.1484	77.9741	73.8615	64.7919	63.1808	67.0131	69.1146	79.0884	86.4045	98.3696 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
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 (61)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (62)
Total heat required for water heating calculated for each month	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141 (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	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141 (64)
12Total per year (kWh/year)												814.0605 (64)
Electric shower(s)	48.4380	43.1586	47.1276	44.9733	45.8172	43.7051	45.1620	45.8172	44.9733	47.1276	46.2414	48.4380 (64a)
Heat gains from water heating, kWh/month	33.2830	29.3051	31.1509	27.8128	27.1499	24.6946	24.7164	25.6946	25.9302	28.5882	29.9213	33.0130 (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	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (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)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Water heating gains (Table 5)	44.7353	43.6087	41.8695	38.6289	36.4917	34.2980	33.2210	34.5357	36.0141	38.4250	41.5574	44.3723 (72)
Total internal gains	385.1513	396.2273	379.2978	368.6968	350.0633	338.5435	325.9236	325.2727	334.8893	344.6606	364.2892	376.4303 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
North					13.5800	10.6334	0.7600	0.7000	0.7700	53.2374 (74)		
East					5.2500	19.6403	0.7600	0.7000	0.7700	38.0147 (76)		
South					5.9300	46.7521	0.7600	0.7000	0.7700	102.2116 (78)		
West					5.2500	19.6403	0.7600	0.7000	0.7700	38.0147 (80)		
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305	195.2244 (83)
Total gains	616.6297	814.0926	1010.3475	1244.6114	1413.0662	1428.8439	1362.6074	1217.7216	1050.3655	822.8008	645.9197	571.6547 (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

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tau	69.6456	69.7260	69.8050	70.1783	70.2486	70.5778	70.5778	70.6391	70.4506	70.2486	70.1066	69.9586
alpha	5.6430	5.6484	5.6537	5.6786	5.6832	5.7052	5.7052	5.7093	5.6967	5.6832	5.6738	5.6639
util living area	0.9970	0.9862	0.9459	0.8092	0.6018	0.4167	0.3014	0.3520	0.5994	0.9126	0.9906	0.9980 (86)
MIT	19.8779	20.1642	20.5191	20.8492	20.9738	20.9972	20.9996	20.9992	20.9812	20.7381	20.2240	19.8228 (87)
Th 2	19.7483	19.7495	19.7507	19.7565	19.7576	19.7626	19.7626	19.7635	19.7607	19.7576	19.7554	19.7531 (88)
util rest of house	0.9956	0.9801	0.9243	0.7545	0.5279	0.3371	0.2168	0.2577	0.4992	0.8683	0.9855	0.9970 (89)
MIT 2	18.7627	19.0453	19.3817	19.6625	19.7457	19.7618	19.7626	19.7634	19.7544	19.5888	19.1116	18.7118 (90)
Living area fraction	18.9559	19.2391	19.5787	19.8680	19.9584	19.9758	19.9768	19.9775	19.9669	19.7879	19.3043	18.9043 (91)
MIT	18.9559	19.2391	19.5787	19.8680	19.9584	19.9758	19.9768	19.9775	19.9669	19.7879	19.3043	18.9043 (92)
Temperature adjustment	18.9559	19.2391	19.5787	19.8680	19.9584	19.9758	19.9768	19.9775	19.9669	19.7879	19.3043	18.9043 (93)
adjusted MIT	18.9559	19.2391	19.5787	19.8680	19.9584	19.9758	19.9768	19.9775	19.9669	19.7879	19.3043	18.9043 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9943	0.9768	0.9207	0.7599	0.5402	0.3509	0.2315	0.2741	0.5164	0.8696	0.9829	0.9961 (94)
Useful gains	613.0867	795.2217	930.2764	945.7566	763.3400	501.3492	315.3919	333.7508	542.4553	715.4795	634.8580	569.4200 (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	1387.4137	1355.8586	1235.2800	1030.4169	775.0790	502.1854	315.4493	333.9009	549.0489	862.3131	1147.7337	1385.7625 (97)
Space heating kWh	576.0993	376.7480	226.9227	60.9554	8.7338	0.0000	0.0000	0.0000	0.0000	109.2442	369.2704	607.3588 (98a)
Space heating requirement - total per year (kWh/year)												2335.3326
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	576.0993	376.7480	226.9227	60.9554	8.7338	0.0000	0.0000	0.0000	0.0000	109.2442	369.2704	607.3588 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2335.3326
Space heating per m2										(98c) / (4) =		35.0230 (99)

8c. Space cooling requirement

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

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	878.1059	691.2749	709.3419	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9864	0.9946	0.9894	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	866.1847	687.5408	701.8344	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1634.4221	1558.8749	1391.3780	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	553.1309	648.2725	513.0205	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	138.2827	162.0681	128.2551	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												428.6060 (107)
Energy for space heating												35.0230 (99)
Energy for space cooling												6.4278 (108)
Total												41.4508 (109)
Fabric Energy Efficiency (DFEE)												41.5 (109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

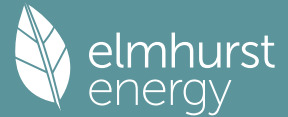
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	166.7000 (5)

2. Ventilation rate

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) =	0.1200 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3700	(18)
Number of sides sheltered	2	(19)

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Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683	(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			16.6700	1.1450	19.0878			(27)
Heatloss Floor			66.6800	0.1300	8.6684			(28a)
External Wall	109.0000	16.6700	92.3300	0.1800	16.6194			(29a)
External Roof	66.6800		66.6800	0.1100	7.3348			(30)
Total net area of external elements Aum(A, m2)			242.3600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 51.7104			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 355.9541 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000	
E3 Sill	12.0000	0.0500	0.6000	
E4 Jamb	30.0000	0.0500	1.5000	
E5 Ground floor (normal)	43.6000	0.1600	6.9760	
E14 Flat roof	43.6000	0.0800	3.4880	
E16 Corner (normal)	20.0000	0.0900	1.8000	
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.0640 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 65.7744 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355	(39)
Average = Sum(39)m / 12 =												96.5706	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552	(40)
HLP (average)												1.4483	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

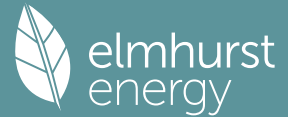
Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.1335	25.7454	25.1988	24.1911	23.4365	22.5998	22.1478	22.6906	23.2815	24.1768	25.2053	26.0452	(42b)
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803	(42c)
Average daily hot water use (litres/day)												57.6666	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	62.9139	61.1883	59.3042	56.9590	54.8670	52.6928	52.2408	54.1210	56.0494	58.2822	60.6482	62.8255	(44)
Energy conte	99.6402	87.1313	91.1484	77.9741	73.8615	64.7919	63.1808	67.0131	69.1146	79.0884	86.4045	98.3696	(45)
Energy content (annual)												957.7183	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	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	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141	(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	84.6941	74.0616	77.4762	66.2780	62.7823	55.0731	53.7037	56.9612	58.7474	67.2252	73.4438	83.6141	(64)
12Total per year (kWh/year)												814.0605	(64)
Electric shower(s)	48.4380	43.1586	47.1276	44.9733	45.8172	43.7051	45.1620	45.8172	44.9733	47.1276	46.2414	48.4380	(64a)
Heat gains from water heating, kWh/month	33.2830	29.3051	31.1509	27.8128	27.1499	24.6946	24.7164	25.6946	25.9302	28.5882	29.9213	33.0130	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	95.5446	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)

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

	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (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 (70)
Losses e.g. evaporation (negative values) (Table 5)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Water heating gains (Table 5)	44.7353	43.6087	41.8695	38.6289	36.4917	34.2980	33.2210	34.5357	36.0141	38.4250	41.5574 (72)
Total internal gains	385.1513	396.2273	379.2978	368.6968	350.0633	338.5435	325.9236	325.2727	334.8893	344.6606	364.2892 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d			Gains W	
North				7.5400	10.6334	0.6300	0.7000	0.7700			24.5028 (74)	
East				2.9200	19.6403	0.6300	0.7000	0.7700			17.5268 (76)	
South				3.2900	46.7521	0.6300	0.7000	0.7700			47.0076 (78)	
West				2.9200	19.6403	0.6300	0.7000	0.7700			17.5268 (80)	
Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	491.7152	588.6120	669.8623	772.0414	839.5770	840.6326	803.3202	736.2388	664.3401	564.8046	493.9443	466.3023 (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	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
alpha	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
util living area	0.9990	0.9972	0.9913	0.9636	0.8740	0.6904	0.5175	0.5834	0.8467	0.9816	0.9975	0.9993 (86)
MIT	19.6834	19.8644	20.1362	20.5087	20.8114	20.9625	20.9936	20.9881	20.8843	20.4810	20.0148	19.6541 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9986	0.9958	0.9867	0.9437	0.8111	0.5724	0.3728	0.4311	0.7492	0.9678	0.9960	0.9989 (89)
MIT 2	18.5419	18.7237	18.9944	19.3598	19.6204	19.7239	19.7352	19.7355	19.6832	19.3421	18.8814	18.5186 (90)
Living area fraction	18.7396	18.9213	19.1922	19.5588	19.8267	19.9384	19.9531	19.9525	19.8912	19.5394	19.0777	18.7153 (92)
MIT	18.7396	18.9213	19.1922	19.5588	19.8267	19.9384	19.9531	19.9525	19.8912	19.5394	19.0777	18.7153 (93)
Temperature adjustment												0.0000
adjusted MIT	18.7396	18.9213	19.1922	19.5588	19.8267	19.9384	19.9531	19.9525	19.8912	19.5394	19.0777	18.7153 (93)

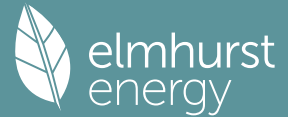
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9980	0.9945	0.9841	0.9403	0.8168	0.5926	0.3982	0.4580	0.7636	0.9649	0.9949	0.9985 (94)
Ext temp.	490.7402	585.3671	659.1871	725.9502	685.7891	498.1895	319.8679	337.2232	507.2978	544.9917	491.4247	465.6110 (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	1410.7799	1367.5010	1235.7349	1029.3326	783.6061	511.0746	321.0124	339.6462	555.9593	861.9689	1158.5163	1408.4988 (97)
Space heating kWh	684.5095	525.5939	428.9516	218.4353	72.7759	0.0000	0.0000	0.0000	0.0000	235.8310	480.3059	701.5085 (98a)
Space heating requirement - total per year (kWh/year)												3347.9116
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	684.5095	525.5939	428.9516	218.4353	72.7759	0.0000	0.0000	0.0000	0.0000	235.8310	480.3059	701.5085 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3347.9116
Space heating per m2										(98c) / (4) =		50.2086 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	899.9079	708.4382	726.6161	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8690	0.9311	0.8982	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	782.0271	659.6088	652.6381	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	946.9024	905.1625	828.6060	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	118.7102	182.6920	130.9200	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.6776	45.6730	32.7300	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												108.0806 (107)
Energy for space heating												50.2086 (99)
Energy for space cooling												1.6209 (108)
Total												51.8295 (109)
Fabric Energy Efficiency (TFEE)												51.8 (109)

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Plot Reference	Notional Dwelling			Issued on Date	17/03/2026
Assessment Reference	Be Green	Plot Type Ref	Notional Dwelling		
Plot Address	Avondale, Truro Road, Wood Green, London, N22 8DP			SAP Version	10.2
SAP Rating	99 A	DER	-0.04	TER	12.59
Environmental	100 A	% DER < TER			100.32
CO ₂ Emissions (t/year)	-0.06	DFEE	41.45	TFEE	51.83
Compliance Check	See BREL	% DFEE < TFEE			20.02
% DPER < TPER	88.90	DPER	7.48	TPER	67.40
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Trevor Brown Architect, Trevor Brown Architect				

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	66.6800 (1b)	2.5000 (2b)	166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		166.7000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 166.7000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1200 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.5000 (17)
Infiltration rate		0.2950 (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) =	0.2507 (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	0.3197	0.3134	0.3071	0.2758	0.2695	0.2382	0.2382	0.2319	0.2507	0.2695	0.2821	0.2946 (22b)
Effective ac	0.5511	0.5491	0.5472	0.5380	0.5363	0.5284	0.5284	0.5269	0.5314	0.5363	0.5398	0.5434 (25)

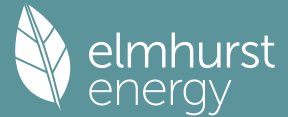
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			30.0100	0.9615	28.8558		(27)
Heatloss Floor			66.6800	0.1200	8.0016	110.0000	7334.8000 (28a)
External Wall	109.0000	30.0100	78.9900	0.1500	11.8485	190.0000	15008.1000 (29a)
External Roof	66.6800		66.6800	0.1000	6.6680	9.0000	600.1200 (30)
Total net area of external elements Aum(A, m ²)			242.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.3739		(33)
Main dwelling							
Internal Wall 1			88.0000			9.0000	792.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	23735.0200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		355.9541 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	12.0000	0.0200	0.2400
E2 Other lintels (including other steel lintels)	12.0000	0.0220	0.2640
E3 Sill	30.0000	0.0180	0.5400
E4 Jamb	43.6000	0.0520	2.2672
E5 Ground floor (normal)	43.6000	0.1290	5.6244
E14 Flat roof	20.0000	0.0350	0.7000
E16 Corner (normal)	10.0000	-0.0660	-0.6600
E17 Corner (inverted - internal area greater than external area)			

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

(33) + (36) + (36a) = 8.9756 (36)
 0.0000
 64.3495 (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	
(39)m	30.3164	30.2073	30.1003	29.5978	29.5037	29.0661	29.0661	28.9850	29.2346	29.5037	29.6939	29.8928	(38)
Heat transfer coeff	94.6659	94.5568	94.4498	93.9472	93.8532	93.4155	93.4155	93.3345	93.5841	93.8532	94.0434	94.2423	(39)
Average = Sum(39)m / 12 =												93.9468	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4197	1.4181	1.4165	1.4089	1.4075	1.4010	1.4010	1.3997	1.4035	1.4075	1.4104	1.4134	(40)
HLP (average)												1.4089	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1629 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													69.7195 (42b)
Hot water usage for other uses													36.7803 (42c)
Average daily hot water use (litres/day)													98.0776 (43)
Daily hot water use													
Energy conte	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641	(44)
Energy content (annual)	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840	(45)
Distribution loss (46)m = 0.15 x (45)m	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576	(46)
Water storage loss (or HIU loss):													
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8600 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0044 (55)
Total storage loss	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(56)
If cylinder contains dedicated solar storage	31.1364	28.1232	31.1364	30.1320	31.1364	30.1320	31.1364	31.1364	30.1320	31.1364	30.1320	31.1364	(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	223.0685	197.4098	210.1413	185.8503	180.8801	163.7831	162.2536	168.2704	169.6390	188.2046	198.9392	220.7828	(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	223.0685	197.4098	210.1413	185.8503	180.8801	163.7831	162.2536	168.2704	169.6390	188.2046	198.9392	220.7828	(64)
12Total per year (kWh/year)													2269.2227 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	99.6017	88.6091	95.3034	86.4063	85.5741	79.0690	79.3808	81.3814	81.0160	88.0095	90.7583	98.8417	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	(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)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	(71)
Water heating gains (Table 5)	133.8733	131.8588	128.0960	120.0087	115.0189	109.8180	106.6946	109.3835	112.5223	118.2923	126.0533	132.8518	(72)
Total internal gains	474.2893	484.4774	465.5243	450.0766	428.5905	414.0635	399.3972	400.1205	411.3974	424.5279	448.7852	464.9097	(73)

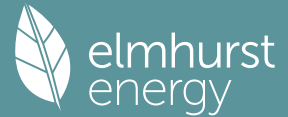
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				13.5800	10.6334		0.7600		0.7000		0.7700		53.2374 (74)
East				5.2500	19.6403		0.7600		0.7000		0.7700		38.0147 (76)
South				5.9300	46.7521		0.7600		0.7000		0.7700		102.2116 (78)
West				5.2500	19.6403		0.7600		0.7000		0.7700		38.0147 (80)
Solar gains	231.4784	417.8652	631.0497	875.9146	1063.0029	1090.3004	1036.6838	892.4489	715.4763	478.1402	281.6305		195.2244 (83)
Total gains	705.7677	902.3426	1096.5740	1325.9912	1491.5934	1504.3639	1436.0810	1292.5694	1126.8737	902.6681	730.4156		660.1342 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
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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	69.6456	69.7260	69.8050	70.1783	70.2486	70.5778	70.5778	70.6391	70.4506	70.2486	70.1066	69.9586
alpha	5.6430	5.6484	5.6537	5.6786	5.6832	5.7052	5.7052	5.7093	5.6967	5.6832	5.6738	5.6639
util living area	0.9941	0.9781	0.9265	0.7779	0.5733	0.3962	0.2861	0.3317	0.5625	0.8815	0.9834	0.9959 (86)
Living	20.1791	20.3877	20.6371	20.8535	20.9299	20.9440	20.9454	20.9452	20.9352	20.7880	20.4317	20.1381
Non living	18.8252	19.0867	19.3841	19.6146	19.6786	19.6923	19.6928	19.6937	19.6865	19.5628	19.1501	18.7771
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5801	20.3877	20.6371	20.8535	20.9299	20.9440	20.9454	20.9452	20.9352	20.7880	20.4317	20.2586 (87)
Th 2	19.7483	19.7495	19.7507	19.7565	19.7576	19.7626	19.7626	19.7635	19.7607	19.7576	19.7554	19.7531 (88)
util rest of house	0.9915	0.9690	0.8998	0.7208	0.5017	0.3202	0.2057	0.2428	0.4667	0.8287	0.9748	0.9940 (89)
MIT 2	19.3803	19.0867	19.3841	19.6146	19.6786	19.6923	19.6928	19.6937	19.6865	19.5628	19.1501	18.9530 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.5881	19.3121	19.6011	19.8292	19.8954	19.9091	19.9098	19.9105	19.9028	19.7751	19.3721	0.1732 (91)
Temperature adjustment												0.0000
adjusted MIT	19.5881	19.3121	19.6011	19.8292	19.8954	19.9091	19.9098	19.9105	19.9028	19.7751	19.3721	19.1792 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9910	0.9648	0.8960	0.7244	0.5098	0.3293	0.2153	0.2534	0.4780	0.8296	0.9713	0.9928 (94)
Useful gains	699.4299	870.5934	982.4758	960.5353	760.4194	495.3582	309.1452	327.5533	538.6176	748.8682	709.4201	655.3595 (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	1447.2612	1362.7578	1237.4002	1026.7644	769.1633	495.9505	309.1832	327.6500	543.0482	861.1080	1154.1127	1411.6692 (97)
Space heating kWh	556.3865	330.7345	189.6638	47.6849	6.5055	0.0000	0.0000	0.0000	0.0000	83.5065	320.1787	562.6943 (98a)
Space heating requirement - total per year (kWh/year)												2097.3546
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	556.3865	330.7345	189.6638	47.6849	6.5055	0.0000	0.0000	0.0000	0.0000	83.5065	320.1787	562.6943 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2097.3546
Space heating per m2										(98c) / (4) =		31.4540 (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 %)												237.3665 (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	556.3865	330.7345	189.6638	47.6849	6.5055	0.0000	0.0000	0.0000	0.0000	83.5065	320.1787	562.6943 (98)
Space heating efficiency (main heating system 1)	237.3665	237.3665	237.3665	237.3665	237.3665	0.0000	0.0000	0.0000	0.0000	237.3665	237.3665	237.3665 (210)
Space heating fuel (main heating system)	234.3998	139.3350	79.9034	20.0892	2.7407	0.0000	0.0000	0.0000	0.0000	35.1804	134.8879	237.0572 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	223.0685	197.4098	210.1413	185.8503	180.8801	163.7831	162.2536	168.2704	169.6390	188.2046	198.9392	220.7828 (64)
Efficiency of water heater	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730	177.0730 (216)
Fuel for water heating, kWh/month	125.9754	111.4849	118.6749	104.9568	102.1500	92.4947	91.6309	95.0288	95.8017	106.2864	112.3487	124.6846 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	17.5529	14.0816	12.6789	9.2891	7.1752	5.8622	6.5454	8.5080	11.0511	14.4996	16.3773	18.0408 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-72.3612	-112.9199	-173.5281	-199.0540	-216.0099	-201.9908	-199.3626	-187.4735	-163.2740	-131.8107	-83.0344	-61.1168 (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	-4.7720	-15.7933	-45.6851	-94.7349	-146.9415	-154.8483	-152.7607	-120.1784	-77.6791	-32.7319	-8.4567	-3.4305 (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												883.5935 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												177.0730
Water heating fuel used												1281.5178 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												141.6621 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2659.9487 (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	-353.1753 (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	883.5935	0.1582	139.7534 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1281.5178	0.1407	180.3661 (264)
Space and water heating			320.1195 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	141.6621	0.1443	20.4462 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1801.9361	0.1338	-241.1010
PV Unit electricity exported	-858.0125	0.1191	-102.1920
Total			-343.2930 (269)
Total CO2, kg/year			-2.7273 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.0400 (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	883.5935	1.5854	1400.8758 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1281.5178	1.5204	1948.4362 (278)
Space and water heating			3349.3121 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	141.6621	1.5338	217.2860 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1801.9361	1.4945	-2692.9521
PV Unit electricity exported	-858.0125	0.4369	-374.8497
Total			-3067.8018 (283)
Total Primary energy kWh/year			498.7963 (286)
Dwelling Primary energy Rate (DPER)			7.4800 (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	66.6800 (1b)	x 2.5000 (2b)	= 166.7000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 166.7000 (5)

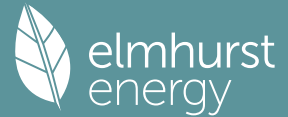
2. Ventilation rate

	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) =	0.1200 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3700	(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) =		0.3145 (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	0.4010	0.3931	0.3852	0.3459	0.3381	0.2988	0.2988	0.2909	0.3145	0.3381	0.3538	0.3695 (22b)
Effective ac	0.5804	0.5773	0.5742	0.5598	0.5571	0.5446	0.5446	0.5423	0.5494	0.5571	0.5626	0.5683 (25)

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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			16.6700	1.1450	19.0878			(27)
Heatloss Floor			66.6800	0.1300	8.6684			(28a)
External Wall	109.0000	16.6700	92.3300	0.1800	16.6194			(29a)
External Roof	66.6800		66.6800	0.1100	7.3348			(30)
Total net area of external elements Aum(A, m2)			242.3600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	51.7104		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 355.9541 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	12.0000	0.0500	0.6000	
E3 Sill	12.0000	0.0500	0.6000	
E4 Jamb	30.0000	0.0500	1.5000	
E5 Ground floor (normal)	43.6000	0.1600	6.9760	
E14 Flat roof	43.6000	0.0800	3.4880	
E16 Corner (normal)	20.0000	0.0900	1.8000	
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.0640 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 65.7744 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.9276	31.7558	31.5875	30.7970	30.6491	29.9605	29.9605	29.8330	30.2257	30.6491	30.9483	31.2611	(38)
Heat transfer coeff	97.7019	97.5302	97.3619	96.5714	96.4234	95.7349	95.7349	95.6074	96.0001	96.4234	96.7227	97.0355	(39)
Average = Sum(39)m / 12 =												96.5706	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4652	1.4627	1.4601	1.4483	1.4461	1.4357	1.4357	1.4338	1.4397	1.4461	1.4505	1.4552	(40)
HLP (average)												1.4483	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

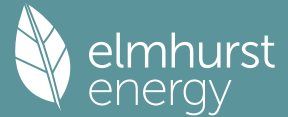
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1629 (42)	
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)	
Hot water usage for baths	69.7195	68.6841	67.2260	64.5375	62.5244	60.2922	59.0864	60.5343	62.1108	64.4994	67.2432	69.4838 (42b)	
Hot water usage for other uses	36.7803	35.4429	34.1054	32.7679	31.4305	30.0930	30.0930	31.4305	32.7679	34.1054	35.4429	36.7803 (42c)	
Average daily hot water use (litres/day)												98.0776 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	106.4998	104.1269	101.3314	97.3054	93.9548	90.3852	89.1794	91.9648	94.8788	98.6048	102.6861	106.2641 (44)	
Distribution loss (46)m = 0.15 x (45)m	168.6697	148.2754	155.7425	133.2063	126.4813	111.1391	107.8548	113.8716	116.9950	133.8058	146.2952	166.3840 (45)	
Store volume	Total = Sum(45)m =											1628.7207	
a) If manufacturer declared loss factor is known (kWh/day):	25.3005	22.2413	23.3614	19.9809	18.9722	16.6709	16.1782	17.0807	17.5493	20.0709	21.9443	24.9576 (46)	
Temperature factor from Table 2b	Water storage loss (or HIU loss):												
Enter (49) or (54) in (55)	Store volume												250.0000 (47)
Total storage loss	a) If manufacturer declared loss factor is known (kWh/day):												1.8903 (48)
If cylinder contains dedicated solar storage	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (56)	
Primary loss	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (57)	
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
WWHRS	223.5765	197.8686	210.6493	186.3419	181.3881	164.2747	162.7616	168.7784	170.1306	188.7126	199.4308	221.2908 (62)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
12Total per year (kWh/year)	223.5765	197.8686	210.6493	186.3419	181.3881	164.2747	162.7616	168.7784	170.1306	188.7126	199.4308	221.2908 (64)	
Electric shower(s)	Total per year (kWh/year) = Sum(64)m =											2275.2038 (64)	
Heat gains from water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	
	100.0081	88.9761	95.7098	86.7996	85.9805	79.4622	79.7872	81.7878	81.4093	88.4159	91.1516	99.2481 (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	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453	108.1453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.5446	105.7815	95.5446	98.7294	95.5446	98.7294	95.5446	95.5446	98.7294	95.5446	98.7294	95.5446 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.4278	191.3935	186.4401	175.8948	162.5834	150.0725	141.7144	139.7487	144.7021	155.2474	168.5589	181.0698 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145	33.8145 (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)	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163	-86.5163 (71)
Water heating gains (Table 5)	134.4195	132.4050	128.6422	120.5549	115.5651	110.3642	107.2408	109.9298	113.0685	118.8385	126.5995	133.3980 (72)
Total internal gains	477.8355	488.0236	469.0705	453.6228	432.1367	414.6097	399.9434	400.6667	411.9437	428.0741	452.3314	468.4560 (73)

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6. Solar gains

[Jan]	Area				Solar flux	g	Specific data	FF	Access	Gains		
	m2				Table 6a	or Table 6b	Specific data	or Table 6c	factor	W		
					W/m2				Table 6d			
North					7.5400	10.6334	0.6300	0.7000	0.7700	24.5028	(74)	
East					2.9200	19.6403	0.6300	0.7000	0.7700	17.5268	(76)	
South					3.2900	46.7521	0.6300	0.7000	0.7700	47.0076	(78)	
West					2.9200	19.6403	0.6300	0.7000	0.7700	17.5268	(80)	
Solar gains	106.5640	192.3846	290.5645	403.3447	489.5137	502.0891	477.3966	410.9662	329.4508	220.1440	129.6551	89.8720 (83)
Total gains	584.3995	680.4082	759.6350	856.9675	921.6504	916.6988	877.3400	811.6329	741.3945	648.2181	581.9864	558.3279 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	67.4814	67.6002	67.7170	68.2714	68.3761	68.8679	68.8679	68.9598	68.6776	68.3761	68.1646	67.9448
util living area	5.4988	5.5067	5.5145	5.5514	5.5584	5.5912	5.5912	5.5973	5.5785	5.5584	5.5443	5.5297
	0.9977	0.9943	0.9846	0.9451	0.8357	0.6433	0.4760	0.5337	0.7964	0.9668	0.9945	0.9982 (86)
MIT	19.7894	19.9678	20.2331	20.5851	20.8535	20.9734	20.9958	20.9923	20.9167	20.5647	20.1143	19.7597 (87)
Th 2	19.7137	19.7156	19.7175	19.7265	19.7282	19.7360	19.7360	19.7375	19.7330	19.7282	19.7248	19.7212 (88)
util rest of house	0.9966	0.9916	0.9769	0.9179	0.7651	0.5286	0.3416	0.3919	0.6906	0.9444	0.9913	0.9974 (89)
MIT 2	18.3455	18.5741	18.9099	19.3421	19.6258	19.7255	19.7353	19.7359	19.6902	19.3302	18.7686	18.3131 (90)
Living area fraction									fLA =	Living area /	(4) =	0.1732 (91)
MIT	18.5956	18.8155	19.1391	19.5574	19.8385	19.9416	19.9536	19.9536	19.9027	19.5440	19.0017	18.5637 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5956	18.8155	19.1391	19.5574	19.8385	19.9416	19.9536	19.9536	19.9027	19.5440	19.0017	18.5637 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9952	0.9887	0.9720	0.9134	0.7721	0.5482	0.3651	0.4167	0.7066	0.9400	0.9886	0.9962 (94)
Useful gains	581.5673	672.7490	738.3856	782.7124	711.5659	502.5396	320.3221	338.2331	523.8866	609.3041	575.3537	556.1961 (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	1396.7099	1357.1808	1230.5626	1029.1985	784.7377	511.3786	321.0605	339.7470	557.0576	862.4115	1151.1681	1393.7886 (97)
Space heating kWh	606.4661	459.9382	366.1797	177.4699	54.4398	0.0000	0.0000	0.0000	0.0000	188.3119	414.5863	623.1688 (98a)
Space heating requirement - total per year (kWh/year)												2890.5607
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	606.4661	459.9382	366.1797	177.4699	54.4398	0.0000	0.0000	0.0000	0.0000	188.3119	414.5863	623.1688 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2890.5607
Space heating per m2										(98c) / (4) =		43.3497 (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	606.4661	459.9382	366.1797	177.4699	54.4398	0.0000	0.0000	0.0000	0.0000	188.3119	414.5863	623.1688	(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)	657.0597	498.3079	396.7278	192.2751	58.9814	0.0000	0.0000	0.0000	0.0000	204.0215	449.1726	675.1558	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	223.5765	197.8686	210.6493	186.3419	181.3881	164.2747	162.7616	168.7784	170.1306	188.7126	199.4308	221.2908	(64)
Efficiency of water heater	86.1819	85.8863	85.2873	83.9505	81.7118	79.8000	79.8000	79.8000	79.8000	84.0550	85.6621	79.8000	(216)
Fuel for water heating, kWh/month	259.4239	230.3843	246.9878	221.9663	221.9852	205.8580	203.9619	211.5018	213.1963	224.5108	232.8110	256.5663	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	19.8523	15.9262	14.3398	10.5060	8.1151	6.6301	7.4029	9.6225	12.4987	16.3990	18.5226	20.4040	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-52.0136	-68.6255	-92.4284	-97.2277	-99.6047	-91.2253	-90.1093	-87.5342	-82.3672	-75.1466	-55.4918	-45.5459	(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	-45.6190	-93.4766	-181.3857	-266.3137	-346.4408	-346.0176	-341.9030	-291.9937	-217.4651	-131.4731	-60.1551	-36.2624	(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)

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

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	3131.7018	1.1300	3538.8230 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2729.1537	1.1300	3083.9437 (278)
Space and water heating			6622.7667 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	160.2193	1.5338	245.7497 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.3202	1.5027	-1408.5225
PV Unit electricity exported	-2358.5059	0.4647	-1095.9340
Total			-2504.4565 (283)
Total Primary energy kWh/year			4494.1607 (286)
Target Primary Energy Rate (TPER)			67.4000 (287)

EARLY STAGE OVERHEATING RISK TOOL Version 1.0, July 2019

This tool provides guidance on how to assess overheating risk in residential schemes at the early stages of design. It is specifically a pre-detail design assessment intended to help identify factors that could contribute to or mitigate the likelihood of overheating.

The questions can be answered for an overall scheme or for individual units. Score zero wherever the question does not apply.

Additional information is provided in the accompanying guidance, with examples of scoring and advice on next steps.

Find out more information and download accompanying guidance at goodhomes.org.uk/overheating-in-new-homes.



KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING

KEY FACTORS REDUCING THE LIKELIHOOD OF OVERHEATING

Geographical and local context

#1 Where is the scheme in the UK? See guidance for map	South east	4	4
	Northern England, Scotland & NI	0	
	Rest of England and Wales	2	
#2 Is the site likely to see an Urban Heat Island effect? See guidance for details	Central London (see guidance)	3	3
	Grtr London, Manchester, B'ham	2	
	Other cities, towns & dense sub-urban areas	1	

#8 Do the site surroundings feature significant blue/green infrastructure?

Proximity to green spaces and large water bodies has beneficial effects on local temperatures; as guidance, this would require at least 50% of surroundings within a 100m radius to be blue/green, or a rural context

1 0

Site characteristics

#3 Does the site have barriers to windows opening? - Noise/Acoustic risks - Poor air quality/smells e.g. near factory or car park or very busy road - Security risks/crime - Adjacent to heat rejection plant	Day - reasons to keep all windows closed	8	0
	Day - barriers some of the time, or for some windows e.g. on quiet side	4	
	Night - reasons to keep all windows closed	8	0
	Night - bedroom windows OK to open, but other windows are likely to stay closed	4	

#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green?

Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme

1 0

#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas?

Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels

1 0

Scheme characteristics and dwelling design

#4 Are the dwellings flats? Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples	3	0
#5 Does the scheme have community heating? i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures	3	0

#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation?

Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance

1 0

#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future?

Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans

>2.8m and fan installed	2	1
> 2.8m	1	

Solar heat gains and ventilation

#6 What is the estimated average glazing ratio for the dwellings? (as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space	>65%	12	4
	>50%	7	
	>35%	4	
#7 Are the dwellings single aspect? Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation	Single-aspect	3	0
	Dual aspect	0	

#13 Is there useful external shading?

Shading should apply to solar exposed (E/S/W) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per #6

	Full	Part	2
>65%	6	3	
>50%	4	2	
>35%	2	1	

#14 Do windows & openings support effective ventilation?

Larger, effective and secure openings will help dissipate heat - see guidance

	Openings compared to Part F purge rates		2
	= Part F		
Single-aspect	+50%	+100%	2
Dual aspect	minimum required		
	3	4	
	2	3	

TOTAL SCORE

6

= Sum of contributing factors:

11

minus

Sum of mitigating factors:

5

High

12

Medium

8

Low

score >12:

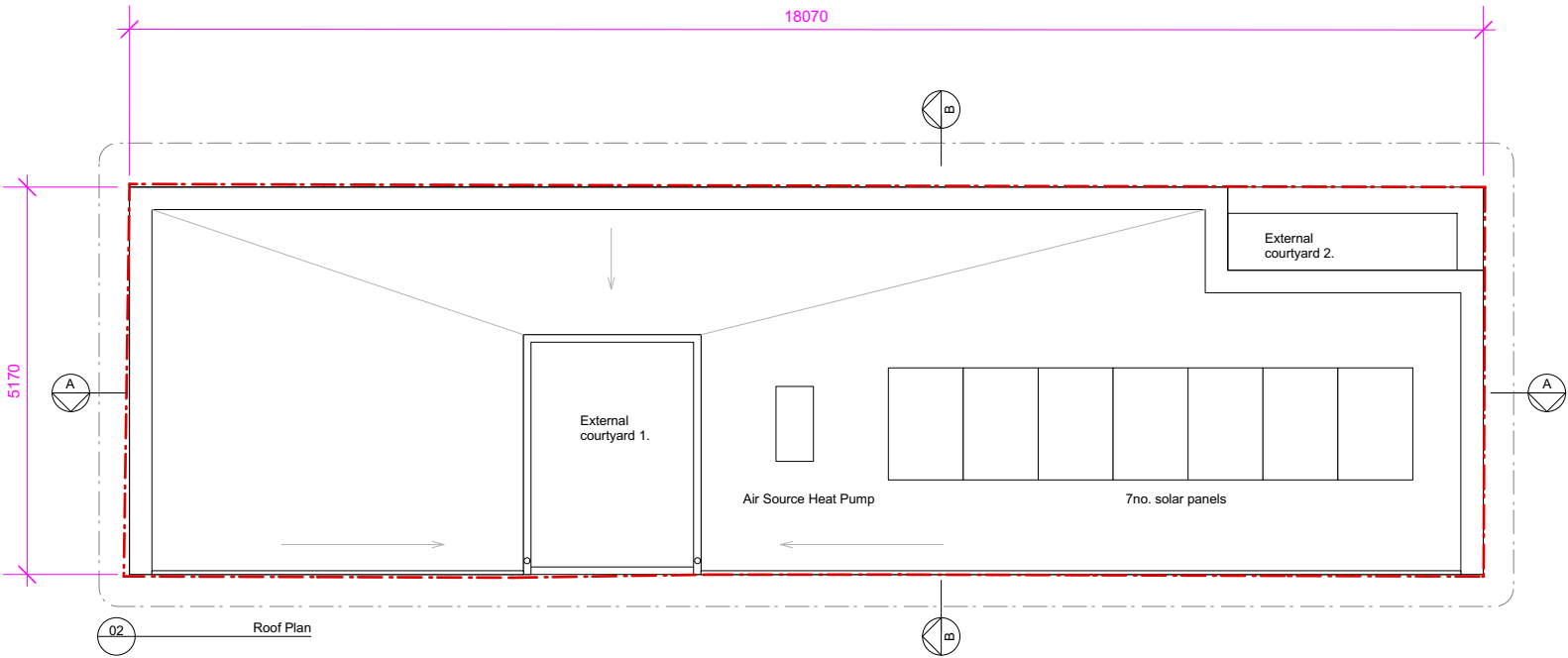
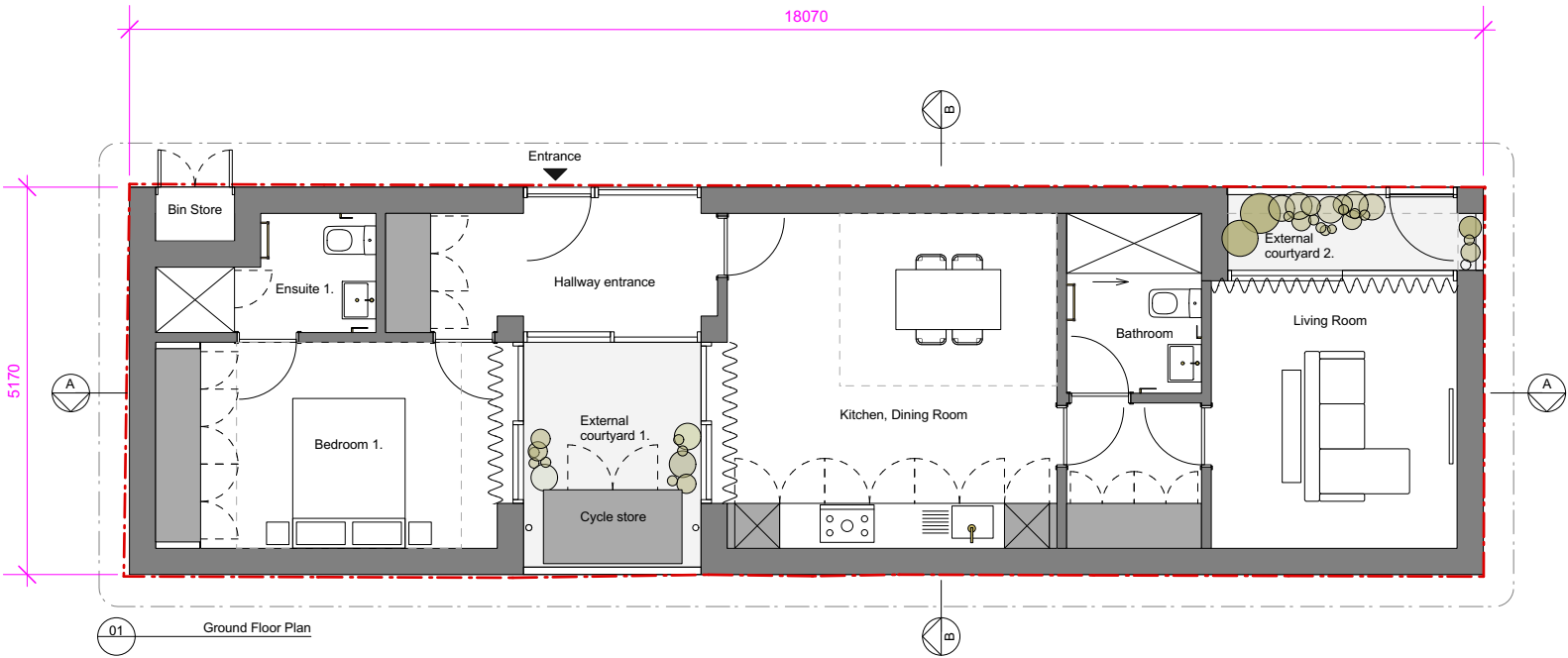
Incorporate design changes to reduce risk factors and increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score between 8 and 12:

Seek design changes to reduce risk factors and/or increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score <8:

Ensure the mitigating measures are retained, and that risk factors do not increase (e.g. in planning conditions)



- KEY:
- Property boundary
 - Proposed structure
 - Proposed furniture

Rev	Issued	Status & Description	Drawn / Checked
A	23.03.26	Issued for Planning	NR / TB
-	17.02.26	Issued for Planning	NR / TB

*Notes:

All dimensions to be checked on site prior to construction or fabrication of any element. Any discrepancies between figure dimensions reported to Architect for clarification prior to commencing work.

This drawing is to be read in conjunction with all consultants information.

Elements of services are indicated for coordination purposes. For full services layouts refer to Services Engineer's drawings and specification.

Elements of stucture are indicated for coordination purposes. For full structural layouts refer to Structural Engineer's drawings and specification.

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tba

Job
220 Avondale

Address
Land at the rear of Avondale,109 Truro Road, London. N22 8DP

Status
Planning

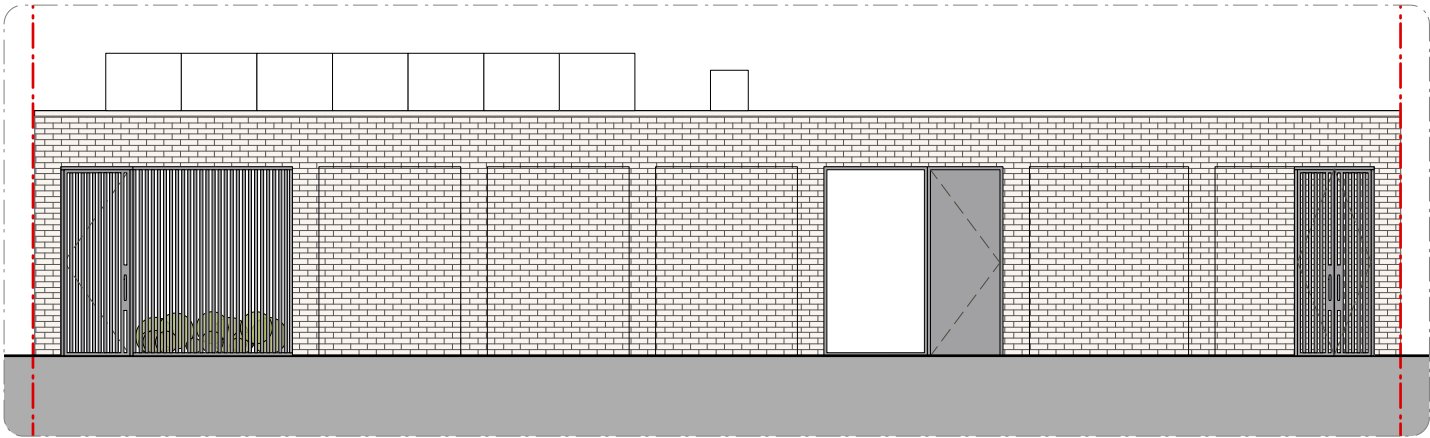
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Proposed Ground Floor & Roof Plans

Scale
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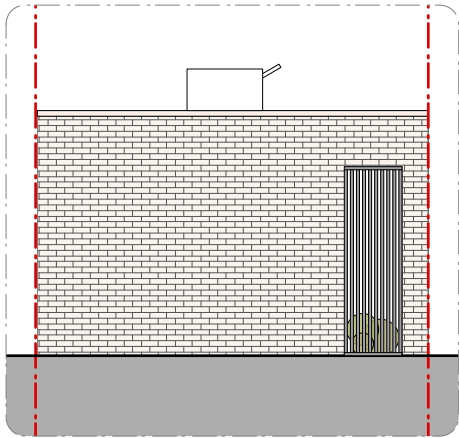
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220_1001

Revision
A

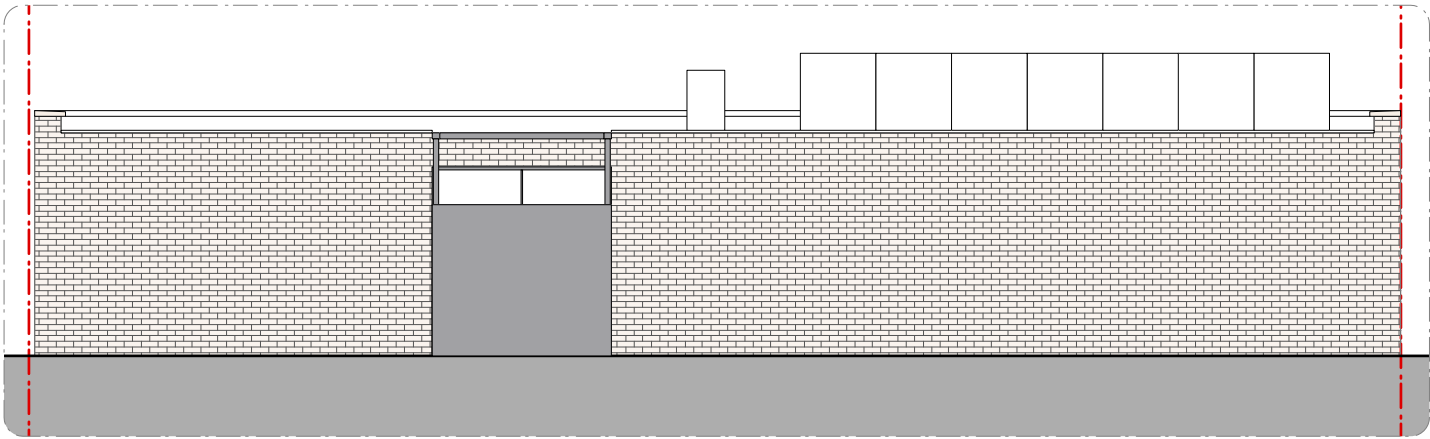
KEY:
Property boundary



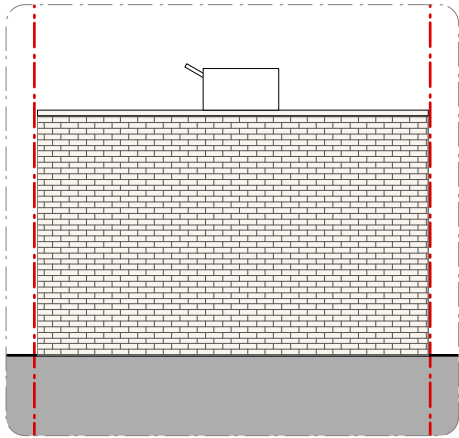
01 Front Elevation



02 Side Elevation



03 Rear Elevation



04 Side Elevation

Rev	Issued	Status & Description	Drawn / Checked
A	23.03.26	Issued for Planning	NR / TB
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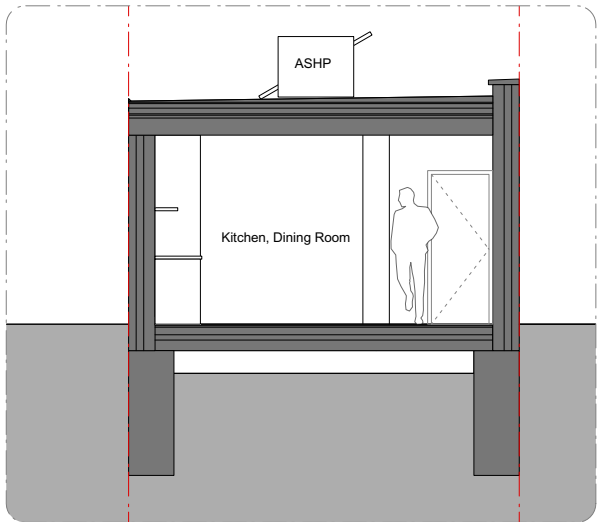
Job
220 Avondale
Address
Land at the rear of Avondale,109 Truro Road, London. N22 8DP
Status
Planning
Drawing title
Proposed Elevations

Scale
1:100 @A3

Drawing number
220_1200
Revision
A



01 Section AA



02 Section BB

SCALE BAR
0 1 2 3 5m

KEY:
- - - Property boundary
■ Proposed structure

A	23.03.26	Issued for Planning	NR / TB
-	17.02.26	Issued for Planning	NR / TB
Rev	Issued	Status & Description	Drawn / Checked

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Job
220 Avondale

Address
Land at the rear of Avondale,109 Truro Road, London. N22 8DP

Status
Planning

Drawing title
Proposed Sections AA & BB

Scale
1:100 @A3

Drawing number
220_1100

Revision
A