



EAL CONSULT BUILDING SUSTAINABILITY SINCE 2008

ENERGY & SUSTAINABILITY ASSESSMENT

**FLATS 1 - 5
105 RALEIGH ROAD**

PROPERTY ADDRESS

**FLATS 1 - 5
105 RALEIGH ROAD
LONDON
N8 0JD**

DATE

January 2026

PREPARED BY

EAL Consult

CONTENTS

1.	EXECUTIVE SUMMARY	3
2.	METHODOLOGY	4
3.	PLANNING POLICY CONTEXT	5
4.	ENERGY STRATEGY	8
a.	Baseline Model.....	9
b.	Be 'Lean' – Demand Reduction	9
c.	Be 'Clean' – Supply Energy Efficiently	10
d.	Be 'Green' – Renewable Energy	12
e.	Be 'Seen' – Monitoring Performance	14
5.	SUSTAINABILITY STRATEGY	16
a.	Sustainable Design	16
b.	Overheating Strategy	16
c.	Water Efficiency	18
d.	Pollution: Light, Air and Noise.....	18
e.	Waste Management.....	19
f.	Flood Risk	19
g.	Sustainable Procurement.....	19
h.	Biodiversity and Green Infrastructure	19
6.	CONCLUSION.....	20
7.	APPENDIX	21
A.	SAP Calculations	21
i.	Baseline	21
ii.	Be Lean	22
iii.	Be Green.....	23
B.	GHA Overheating Tool	Error! Bookmark not defined.

1.EXECUTIVE SUMMARY

Site description

This Energy and Sustainability Assessment has been prepared to support the planning application for the erection of a four storey building for 5 dwellings consisting of x2 basement flats, x1 ground floor flat, x1 first floor flat with roof terrace and x1 first floor maisonette with a roof terrace.

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 2024, the London Plan 2021 and Haringey's Local Plan Strategic Policies, 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. Further carbon emission reduction will be achieved by using renewable technologies.

- **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 **27%** 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 and Solar Photovoltaic Panels have been proposed for the specific scheme and will deliver a further **27%** reduction in regulated carbon emissions over Part L 2021 baseline

Energy Efficiency & Carbon Reduction

- This report demonstrates that the proposed development by incorporating the measures above can achieve an **overall** carbon emission reduction of **54%**

Overheating

The development proposal will minimise adverse impacts on the urban heat island through design, layout, orientation and materials.

Ventilation

The development utilises natural ventilation in the building.

Sustainable Design:

- Natural lighting is incorporated to prevent excessive demand for artificial lighting
- The development will not increase the air pollution of the area
- Total internal water consumption will not exceed 105 litres/person/day
- All contractors should sign up to the nationally recognised Considerate Constructors Scheme
- Designated space for waste and recycling facilities
- Very Low Flood Risk area

Reducing Waste and Supporting the Circular Economy:

- Minimising the use of virgin materials during construction by recycling and reusing where feasible.
- Promote a more circular economy that improves resource efficiency and innovation to keep products and materials at their highest use for as long as possible
- Encourage waste minimisation and waste prevention through the reuse of materials and using fewer resources in the production and distribution of products
- 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.

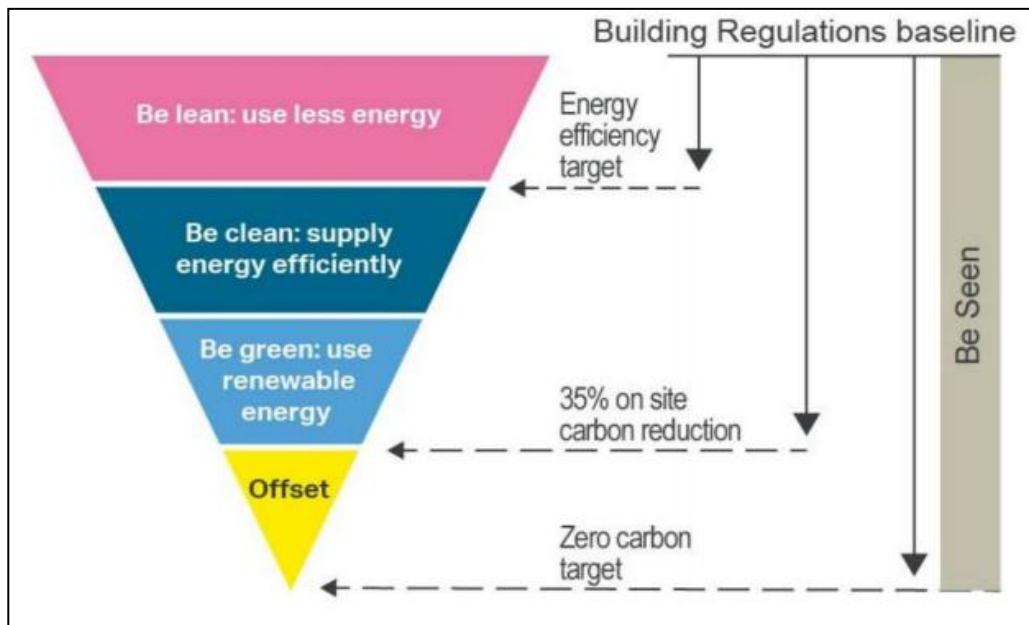
2.METHODOLOGY

This energy assessment outlines the energy demand from the development together with the associated CO₂ emissions, using Building Regulations Part L 2021 as a baseline. It demonstrates how the emissions from energy use in the development will be reduced through energy efficiency measures.

The proposed scheme is required to achieve carbon emission reduction principles in accordance with the UK Planning and regulatory framework.

The methodology employed to determine the potential CO₂ savings is in accordance with the three- step Energy Hierarchy.

Figure 1: The London Plan Energy Hierarchy



- **Be 'Lean'** - Improve the energy efficiency of the scheme;
- **Be 'Clean'** - Supply as much of the remaining energy requirement with low carbon; technologies such as district heating if available or combined heat and power (CHP); and
- **Be 'Green'** - Offset a proportion of the remaining carbon dioxide emissions by using renewable technologies.
- **Be 'Seen'** - monitor, verify and report on post-construction energy performance

The government approved Standard Assessment Procedure (SAP) methodology software (2021) has been used to determine the CO₂ emissions and energy requirements. It compares CO₂ emissions from regulated energy use (DER) with those of an equivalent dwelling built to Part L 2021 notional specifications (TER), a notional dwelling of the same size and shape.

Opportunities for incorporating features into the development that contribute to the objectives of sustainable development were explored during the design process, to ensure that where possible, the proposals achieve best practice.

3. PLANNING POLICY CONTEXT

National Planning Policy Framework (NPPF) 2024

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.
- New updates emphasised that when determining planning applications, local planning authorities should give significant weight to the need to support energy efficiency and low carbon heating improvements to existing buildings, both domestic and non-domestic.

The London Plan 2021

Policy SI 2 Minimising Greenhouse Gas Emissions:

- A. 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, iii) Be seen: monitor, verify and report on energy performance
- B. 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 i) off-site provided that an alternative proposal is identified, and delivery is certain.

Policy 5.3 Sustainable Design and Construction

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

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

London Borough of Haringey Local Plan Strategic Policies 2013-2026**SP4: Working Towards a Low Carbon Haringey**

Over the life time of the Local Plan, reducing energy use in buildings and working towards a low carbon borough will be one of the key challenges facing Haringey. The Council will promote the measures outlined below to reduce carbon emissions from new and existing buildings.

1. In line with London Plan policy, the Council will promote and require all new developments to take measures to reduce energy use and carbon emissions during design, construction and occupation, by incorporating the following measures:
 - a. From 2011 onwards, all new residential development will achieve a minimum 25% in emissions in total (regulated) CO₂ emissions in line with Code for Sustainable Homes Level 4** energy standards, and should aim to achieve Level 6**. All new residential development shall be zero carbon from 2016 onwards.
 2. The Council will promote low- and zero-carbon energy generation through the following measures:
 - a. Requiring all developments to assess, identify and implement, where viable, site-wide and area-wide decentralised energy facilities including the potential to link into a wider network;
 - d. All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on site renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.

SP5: Water Management and Flooding

The Council will require all development in Haringey to be water efficient during construction and operation and to reduce all forms of flood risk. All development shall:

- Improve the water environment, water quality and drainage systems;
- Minimise water use and illustrate how development would contribute to general and flash flooding;
- Take account of flood risk vulnerability classification as set out in paragraph 100 of the NPPF and will apply the NPPF Sequential Test and Exception Test;
- Implement measures to prevent (or mitigate as last resort) local surface water and downstream flooding;
- Implement Sustainable Drainage Systems from strategic to individual site level to improve water attenuation, quality and amenity;

SP6: Waste and Recycling

The Council supports the objectives of sustainable waste management set out by the Government in PPS10 Planning for Sustainable Waste Management and the Mayor's London Plan. To achieve these, the Council shall:

- Maximise self-sufficiency in waste management capacity;
- Seek to minimise waste creation, increase recycling rates in relation to commercial, industrial and municipal waste in order to achieve the Mayor's recycling targets;
- Address waste as a resource and look to disposal as the last option, in line with the Mayor's waste hierarchy;
- Require integrated, well-designed recycling facilities to be incorporated into all new developments;
- Monitor changes in the stock of waste management facilities, waste arisings, and the amount of waste recycled, recovered and going for disposal;

Haringey will require Site Waste Management Plans for all major applications to identify volume and types of demolition and construction waste and to demonstrate how waste will be minimised and managed during construction and occupation.

SP11: DESIGN

All new development should enhance and enrich Haringey's built environment and create places and buildings that are high quality, attractive, sustainable, safe and easy to use.

To achieve this all development shall:

- Be of the highest standard of design that respects its local context and character and historic significance, to contribute to the creation and enhancement of Haringey's sense of place and identity;
- Ensure impacts on health, climate change, natural resources and biodiversity are minimised by adopting and improving sustainable design and construction techniques;
- Incorporate solutions to reduce crime and the fear of crime, such as promoting social inclusion; creating well-connected and high quality public realm that is easy and safe to use; and by applying the principles set out in 'Secured by Design' and Safer Places;
- Promote high quality landscaping on and off site, including improvements to existing streets and public spaces;
- Seek the highest standards of access in all buildings and places; and
- Ensure buildings are designed to be flexible and adaptable – and able to integrate services and functions

**SP13: OPEN SPACE AND
BIODIVERSITY**

New development shall protect and improve Haringey's parks and open spaces. All new development shall:

- Protect and enhance, and when and where possible, extend the existing boundaries of the borough's Green Belt, designated Metropolitan Open Land, designated Open Spaces, Green Chains, allotments, river corridors and other open spaces from inappropriate development;
- Provide amenity space in accordance with the Council's Open Space and Recreational Standards Supplementary Planning Document (SPD);
- Manage the impact of such new developments in areas adjacent to designated open space;
- Secure improvements, enhancement and management in both quality and access to existing green spaces;
- Seek on-site or financial contributions towards open space from new developments as set out in the Open Space and Recreational Standards SPD;
- Seek to secure opportunities for additional publicly accessible open space especially in those identified areas of Open Space deficiency e.g. in the east of the borough where the quality and amount of provision is poorer as set out in the Council's Open Space and Recreational Standards SPD; and
- Conserve the historic significance of the borough's designated historic parks and gardens.

4. 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.

The following tables demonstrate the average carbon emissions and savings.

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

	Regulated Carbon dioxide emissions (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	4.6	
After Energy Demand Reduction (Be Lean)	3.3	
After Heat Network Connection (Be Clean)	3.3	
After Renewables (Be Green)	2.1	

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

	Regulated Carbon dioxide savings	
	Tonnes CO ₂ per annum	%
Be Lean: Savings from Energy Demand Reduction	1.2	27
Be Clean: Savings from Heat Network	0	0
Be Green: Savings from Renewable Energy	1.2	27
Cumulative on-site savings	2.4	54
Annual savings from off-set payment	2.1	
(Tonnes CO ₂)		
Cumulative savings for off-set payment	64	
Cash in-lieu contribution (£)	6,056	

a. Baseline Model

In accordance with London Plan Policy SI 2, a baseline model is run with Building Regulations Part L target values as set out in SAP 10.2 Appendix R. Any energy generating technologies that are to be included at Be 'Green' stage are also included in the baseline model. This 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 a gas boiler and any active cooling would be provided naturally through intermittent fans in kitchens and bathrooms. The comparative Be 'Lean' model assumes the same heating strategy.

b. 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 **27%** 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 2021 Standard	Specification
Basement Walls	0.18 W/m ² k	0.17W/m ² k
Wall	0.18 W/m ² k	0.17W/m ² k
Flat Roof	0.15 W/m ² k	0.11 W/m ² k
Zinc Flat Roof	0.15 W/m ² k	0.14 W/m ² k
Sloped/Mansard Roof	0.15 W/m ² k	0.14 W/ m ² k
Floor	0.18 W/m ² k	0.12 W/ m ² k
Windows & Doors	1.4 W/m ² k	1.2 W/ m ² k (G-value 0.76)

Table 4. Development Part L Fabric Energy Efficiency Standard (FEES)

	Target Fabric Energy Efficiency (MWh/year)	Design Fabric Energy Efficiency (MWh/year)	Improvement %
Development Total	55.73	47.86	14

Air Permeability – designed to achieve an air permeability score of 4.0

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 luminaries only.

Ventilation - The use of natural ventilation is proposed for the dwelling.

Space Heating & Cooling - Space heating will be provided by radiators and underfloor heating by the a Gas Combi Boiler.

Domestic Hot Water (DHW) system – domestic hot water is supplied for the dwelling direct from the gas combi boiler.

Energy Use Intensity and Space Heating Demand

Table 5. Energy Use Intensity (EUI) and Space Heating Demand

Building type	EUI	Space heating demand	EUI value from Table 4 of the guidance	Space heating demand from Table 4 of the guidance	Methodology used
	excluding renewable energy (kWh/m ² /year)				
Residential	28.0179	33.5791	35	15	SAP10.2

c. 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

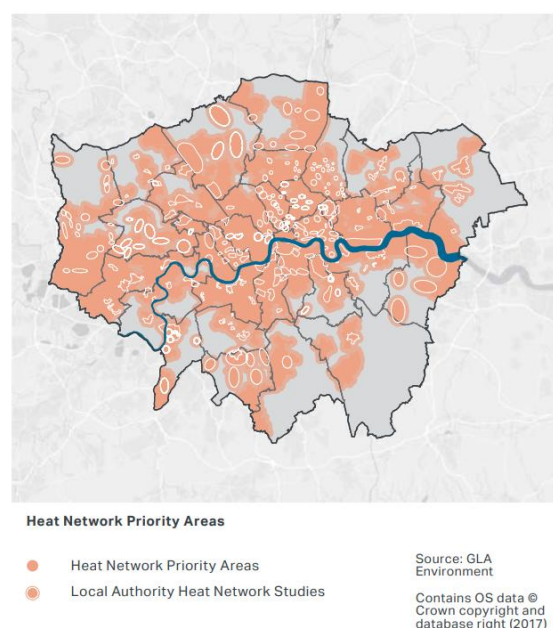
- A. Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.
- B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:
 1. Development proposals should not:
 - a. lead to further deterioration of existing poor air quality

- b. 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
 - c. create unacceptable risk of high levels of exposure to poor air quality.
 - 2. In order to meet the requirements in Part 1, as a minimum:
 - a. development proposals must be at least Air Quality Neutral
 - b. 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
 - c. 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.
- E. 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

- A. Boroughs and developers should engage at an early stage with relevant energy companies and bodies to establish the future energy and infrastructure requirements arising from large-scale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development.
- C. Development Plans should:
 - 1. identify the need for, and suitable sites for, any necessary energy infrastructure requirements including energy centres, energy storage and upgrades to existing infrastructure
 - 2. 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.

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. However, the development will be built ready to accommodate District Heating and Cooling should a local network be introduced in the future.

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 heatpump fed site-wide network is technically and financially unviable.

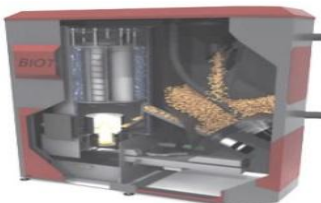
Air Quality

In line with London Plan Policy SI 1 all developments are required to demonstrate compliance with the Building Emission Benchmarks (BEB) set out in the Air Quality Neutral LPG. The BEB demonstrates the emissions from equipment used to supply heat and energy to the buildings.

d. 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 6. 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 impact • 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 CO₂ than conventional heating systems. • Cheaper • Provides heating and hot water • Less maintenance • Can be used as air-conditioning in the summer	• 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 CO₂	• Local wind speeds in the area is 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 CO₂ • 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 an air source heat pump in Flats 1 & 2 – basement flats only and PV connected, via Landlords supply/meter, only to Flats 3, 4 & 5 are to be incorporated in the design because it achieves an combined CO₂ percentage reduction of **27%** contributing to an overall reduction of **54%** in carbon emissions.

e. Be 'Seen' - Monitoring Performance

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

1.2.1 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.

1.2.2 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.

1.2.3 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.

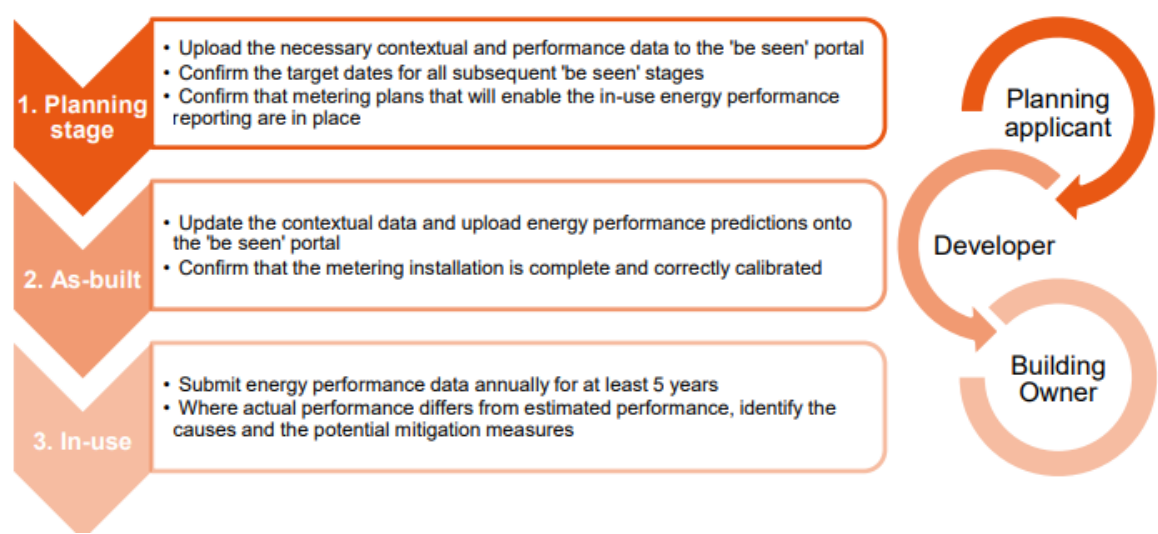
1.2.4 Ensuring that the actual energy and carbon performance of buildings is aligned with the estimated energy and carbon performance will also be a key factor in achieving a zero-carbon London.

1.2.5 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

1.2.6 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



As the flats average an EPC rating of C76, the operational running costs will be low due to the high performance. As the development includes renewable technologies it is less reliant on the main grid and will protect the consumer from high prices. 27p/kWh average electricity cost at time of writing 22/01/26

Smart metering equipment, although not proposed at this stage, could 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.

5. SUSTAINABILITY STRATEGY

a. Sustainable Design

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

- a. Minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)
- b. Avoiding internal overheating and contributing to the urban heat island effect
- c. Efficient use of natural resources (including water), including making the most of natural systems both within and around buildings
- d. Minimising pollution (including noise, air and urban runoff)
- e. Minimising the generation of waste and maximising reuse or recycling
- f. Avoiding impacts from natural hazards (including flooding)
- g. Ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions
- h. Securing sustainable procurement of materials, using local supplies where feasible, and
- i. 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 project aims to meet the sustainability objectives set out in the National Planning Framework 2024.

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).

b. 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.

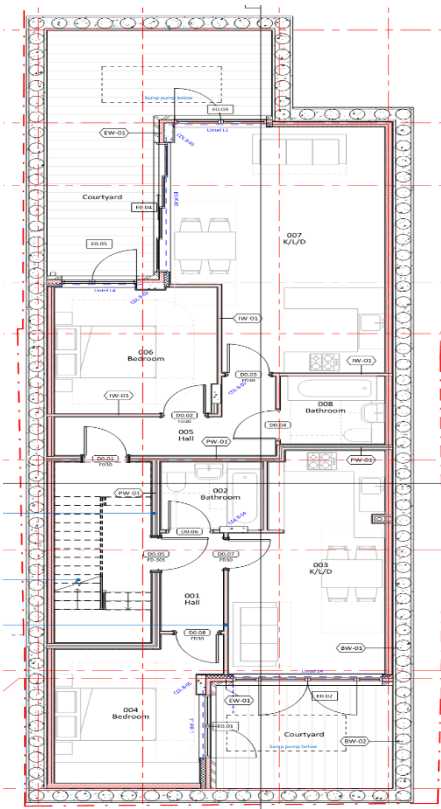
Minimise Heat Generation Through Energy Efficient Design

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, g-value of 0.76, addition of a more efficient heating and hot water source.

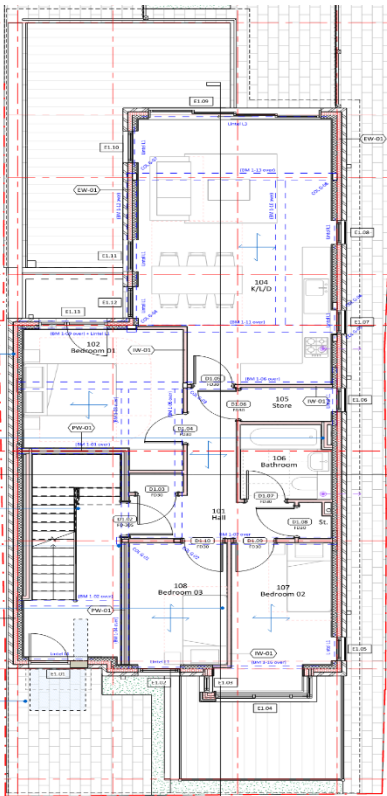
Daylight

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. No external lighting is required. The location and orientation of windows help to create a design that avoids overheating in the summer.

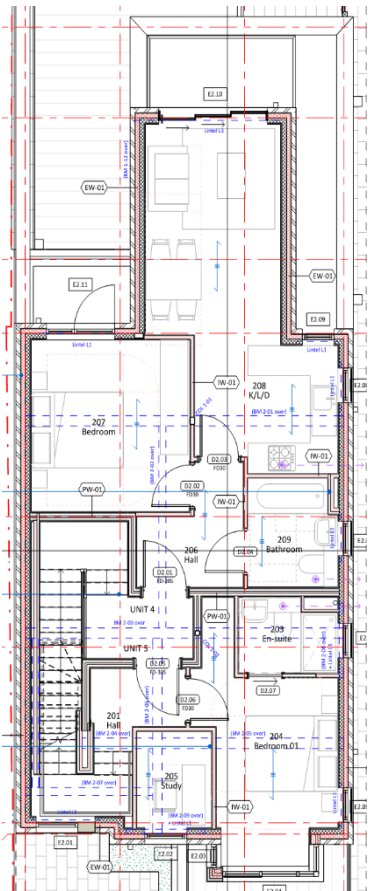
Figure 4. Internal layout



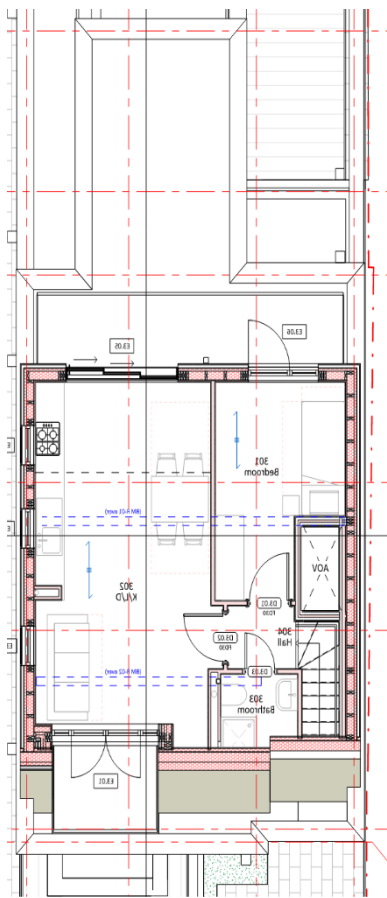
Basement Floor Plan



Ground Floor Plan



First Floor Plan



Second Floor Plan

c. Water Efficiency

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 10. 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

d. 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

e. Waste Management

Considerate Construction

All contractors would be 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 will be 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 will be considered;
- Reusable packing solutions with key product manufacturers will be explored at the earliest opportunity. Solutions may include flat pallets, bulk bags, steel stillages and returnable cable drums;
- Construction waste – minimum 80% diversion from landfill rate;
- Demolition waste – minimum 90% diversion from landfill rate;

Operational Waste

Target diversion from landfill rate to be set.

f. Flood Risk

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

g. Sustainable Procurement

It is expected that all timber used in the development will 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 Guide to Specification will be preferred.

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%.

h. Biodiversity and Green Infrastructure

The proposed development, in terms of biodiversity measures, does already have a garden with an array of greenery to the rear of the property should this be retained can be made use of for the ground floor and rear basement occupants. Scope for greening, for the other occupants within the site constraints would possibly be a green roof. Biodiversity could be encouraged through the inclusion of planters for the front patio/terraces and roof terraces on the first and second floors.

6. 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 **54%** from the notional emissions once energy efficiency measures and lean measures are taken into account.

The use of air source heat pumps and PV solar technology is to be incorporated in the design because they achieve a CO₂ percentage reduction of **27%** contributing to the overall reduction of **54%** in carbon emissions. The remainder is made up from a fabric first approach with U-values outlined in the specification column of Table 3 on Page 9 of this report.

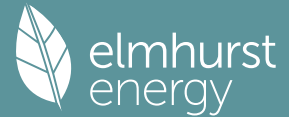
An appraisal of the proposed development has been undertaken against key sustainability objectives identified from relevant policy guidance. The framework for the appraisal was guided by the National Plan. This process has ensured that the development responds to the sustainable development objectives 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.

7. APPENDIX

A. SAP Calculations

i. Baseline

Full SAP Calculation Printout



Plot Reference	Flat 1				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 1-Baseline			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	63 D	DER	11.26	TER	18.83	
Environmental	92 A	% DER < TER				40.20
CO ₂ Emissions (t/year)	0.49	DFEE	80.85	TFEE	53.25	
Compliance Check	See BREL	% DFEE < TFEE				-51.85
% DPER < TPER	-15.99	DPER	116.64	TPER	100.56	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0500 (1b)	3.2200 (2b)	161.1610 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0500		161.1610 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 161.1610 (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) = 0.1241 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3741 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2899 (21)

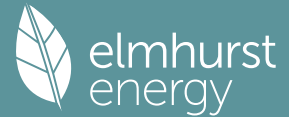
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3697	0.3624	0.3552	0.3189	0.3117	0.2754	0.2754	0.2682	0.2899	0.3117	0.3262	0.3407 (22b)
Effective ac	0.5683	0.5657	0.5631	0.5509	0.5486	0.5379	0.5379	0.5360	0.5420	0.5486	0.5532	0.5580 (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							
Glazed Door			16.8000	1.3258	22.2727		(27)
Heatloss Floor			50.0500	0.1800	9.0090	110.0000	5505.5000 (28)
External Wall	28.4600	16.8000	11.6600	0.1800	2.0988	60.0000	699.5999 (29a)
Basement Walls	52.0700		52.0700	0.1800	9.3726	60.0000	3124.2000 (29a)
Walls To CorridorStairwell	6.1800		6.1800	0.1700	1.0506	9.0000	55.6200 (29a)
External Roof	4.2200		4.2200	0.1500	0.6330	9.0000	37.9800 (30)
Total net area of external elements Aum(A, m ²)			140.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.4367		(33)
Main dwelling							
Party Wall			15.8400	0.0000	0.0000	110.0000	1742.4000 (32)
Party Ceiling			47.1500			30.0000	1414.5000 (32b)
Internal Wall			65.5200			9.0000	589.6800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13169.4799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.1265 (35)
Thermal bridges (Default value 0.200 * total exposed area)							28.1960 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		72.6327 (37)

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

Full SAP Calculation Printout



(38)m	Jan 30.2252	Feb 30.0841	Mar 29.9458	Apr 29.2962	May 29.1746	Jun 28.6089	Jul 28.6089	Aug 28.5041	Sep 28.8268	Oct 29.1746	Nov 29.4205	Dec 29.6776	(38)
Heat transfer coeff	102.8579	102.7168	102.5785	101.9289	101.8074	101.2416	101.2416	101.1368	101.4595	101.8074	102.0533	102.3103	(39)
Average = Sum(39)m / 12 =												101.9283	
HLP	Jan 2.0551	Feb 2.0523	Mar 2.0495	Apr 2.0365	May 2.0341	Jun 2.0228	Jul 2.0228	Aug 2.0207	Sep 2.0272	Oct 2.0341	Nov 2.0390	Dec 2.0442	(40)
HLP (average)												2.0365	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6916	(42)
Hot water usage for mixer showers	72.2997	71.2132	69.6299	66.6006	64.3650	61.8720	60.4549	62.0262	63.7486	66.4254	69.5198	72.0227	(42a)	
Hot water usage for baths	23.9316	23.5762	23.0757	22.1529	21.4619	20.6956	20.2818	20.7788	21.3199	22.1398	23.0816	23.8507	(42b)	
Hot water usage for other uses	33.6352	32.4121	31.1890	29.9659	28.7428	27.5197	27.5197	28.7428	29.9659	31.1890	32.4121	33.6352	(42c)	
Average daily hot water use (litres/day)												119.4237	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	129.8665	127.2014	123.8946	118.7193	114.5696	110.0873	108.2563	111.5477	115.0344	119.7542	125.0135	129.5086	(44)	
Energy content (annual)	205.6768	181.1332	190.4213	162.5208	154.2328	135.3651	130.9266	138.1194	141.8489	162.5053	178.1046	202.7791	(45)	
Distribution loss (46)m = 0.15 x (45)m	30.8515	27.1700	28.5632	24.3781	23.1349	20.3048	19.6390	20.7179	21.2773	24.3758	26.7157	30.4169	(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	205.6768	181.1332	190.4213	162.5208	154.2328	135.3651	130.9266	138.1194	141.8489	162.5053	178.1046	202.7791	(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	205.6768	181.1332	190.4213	162.5208	154.2328	135.3651	130.9266	138.1194	141.8489	162.5053	178.1046	202.7791	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1983.6339	(64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000	(64a)	
Heat gains from water heating, kWh/month	68.3875	60.2268	63.3151	54.0382	51.2824	45.0089	43.5331	45.9247	47.1648	54.0330	59.2198	67.4241	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 84.5787	Feb 84.5787	Mar 84.5787	Apr 84.5787	May 84.5787	Jun 84.5787	Jul 84.5787	Aug 84.5787	Sep 84.5787	Oct 84.5787	Nov 84.5787	Dec 84.5787	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.3281	82.2918	74.3281	76.8057	74.3281	76.8057	74.3281	74.3281	76.8057	74.3281	76.8057	74.3281	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.3638	148.8930	145.0395	136.8359	126.4804	116.7476	110.2455	108.7163	112.5698	120.7734	131.1290	140.8617	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	(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)	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	(71)
Water heating gains (Table 5)	91.9187	89.6232	85.1009	75.0530	68.9280	62.5124	58.5122	61.7267	65.5066	72.6250	82.2497	90.6237	(72)
Total internal gains	364.9842	372.1816	355.8421	340.0682	321.1100	304.4393	291.4595	293.1448	303.2557	319.1001	341.5580	357.1872	(73)

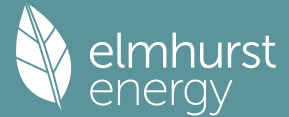
6. Solar gains

[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				7.8700	10.6334		0.7600		0.7000		0.7700		30.8526 (74)
West				8.9300	19.6403		0.7600		0.7000		0.7700		64.6612 (80)
Solar gains	95.5138	185.4518	308.5015	464.7406	589.1187	613.2246	579.5416	483.6012	362.7357	220.2774	118.6855		78.8944 (83)
Total gains	460.4980	557.6334	664.3437	804.8089	910.2287	917.6639	871.0011	776.7460	665.9915	539.3775	460.2435		436.0816 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	35.5655	35.6143	35.6623	35.8896	35.9325	36.1333	36.1333	36.1707	36.0556	35.9325	35.8459	35.7558
alpha	3.3710	3.3743	3.3775	3.3926	3.3955	3.4089	3.4089	3.4114	3.4037	3.3955	3.3897	3.3837
util living area	0.9913	0.9829	0.9625	0.9036	0.7875	0.6253	0.4846	0.5523	0.7918	0.9476	0.9850	0.9928 (86)
MIT	19.2293	19.4359	19.7788	20.2334	20.6021	20.8105	20.8784	20.8612	20.6786	20.1778	19.6208	19.1940 (87)
Th 2	19.9724	19.9739	19.9752	19.9817	19.9829	19.9886	19.9886	19.9896	19.9864	19.9829	19.9805	19.9779 (88)
util rest of house	0.9895	0.9794	0.9544	0.8824	0.7421	0.5489	0.3837	0.4481	0.7291	0.9320	0.9813	0.9913 (89)

Full SAP Calculation Printout



MIT 2	18.3414	18.5476	18.8870	19.3310	19.6682	19.8424	19.8865	19.8794	19.7467	19.2877	18.7379	18.3105 (90)
Living area fraction									FLA = Living area / (4) =			0.5415 (91)
MIT	18.8221	19.0286	19.3699	19.8196	20.1738	20.3666	20.4236	20.4110	20.2513	19.7697	19.2160	18.7888 (92)
Temperature adjustment												0.3000
adjusted MIT	19.1221	19.3286	19.6699	20.1196	20.4738	20.6666	20.7236	20.7110	20.5513	20.0697	19.5160	19.0888 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9876	0.9766	0.9516	0.8856	0.7652	0.6014	0.4581	0.5241	0.7662	0.9335	0.9792	0.9896	(94)
Useful gains	454.7870	544.6019	632.1892	712.7441	696.4744	551.9063	399.0375	407.0618	510.2633	503.5135	450.6666	431.5440	(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	1524.5740	1482.0585	1350.9468	1143.6051	893.2419	614.1883	417.4782	436.0017	654.5416	964.0803	1267.0915	1523.2824	(97)
Space heating kWh	795.9215	629.9708	534.7556	310.2199	146.3950	0.0000	0.0000	0.0000	0.0000	342.6617	587.8259	812.2534	(98a)
Space heating requirement - total per year (kWh/year)												4160.0038	
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	795.9215	629.9708	534.7556	310.2199	146.3950	0.0000	0.0000	0.0000	0.0000	342.6617	587.8259	812.2534	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4160.0038	
Space heating per m2										(98c) / (4) =		83.1170	(99)

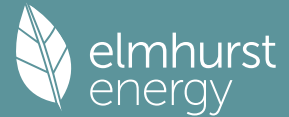
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)													170.0000 (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	795.9215	629.9708	534.7556	310.2199	146.3950	0.0000	0.0000	0.0000	0.0000	342.6617	587.8259	812.2534	(98)
Space heating efficiency (main heating system 1)	170.0000	170.0000	170.0000	170.0000	170.0000	0.0000	0.0000	0.0000	0.0000	170.0000	170.0000	170.0000	(210)
Space heating fuel (main heating system)	468.1891	370.5710	314.5621	182.4823	86.1147	0.0000	0.0000	0.0000	0.0000	201.5657	345.7800	477.7961	(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	205.6768	181.1332	190.4213	162.5208	154.2328	135.3651	130.9266	138.1194	141.8489	162.5053	178.1046	202.7791	(64)
Efficiency of water heater	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	(216)
Fuel for water heating, kWh/month	120.9863	106.5489	112.0126	95.6005	90.7252	79.6265	77.0157	81.2467	83.4405	95.5913	104.7674	119.2818	(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	17.0287	13.6610	12.3003	9.0117	6.9609	5.6871	6.3500	8.2539	10.7210	14.0666	15.8881	17.5020	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2447.0611	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												170.0000	
Water heating fuel used												1166.8435	(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)												137.4313	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3751.3358	(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	2447.0611	0.1548	378.7028	(261)
Total CO2 associated with community systems			0.0000	(373)

Full SAP Calculation Printout



Water heating (other fuel)	1166.8435	0.1416	165.1997 (264)
Space and water heating			543.9024 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	137.4313	0.1443	19.8356 (268)
Total CO2, kg/year			563.7380 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.2600 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2447.0611	1.5730	3849.1075 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1166.8435	1.5235	1777.7312 (278)
Space and water heating			5626.8387 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	137.4313	1.5338	210.7966 (282)
Total Primary energy kWh/year			5837.6354 (286)
Dwelling Primary energy Rate (DPER)			116.6400 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.0500 (1b)	x 3.2200 (2b)	= 161.1610 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 161.1610 (5)

2. Ventilation rate

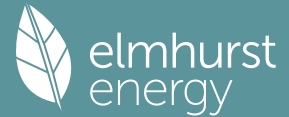
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) =	Air changes per hour 20.0000 / (5) = 0.1241 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3741 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2899 (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	0.3697	0.3624	0.3552	0.3189	0.3117	0.2754	0.2754	0.2682	0.2899	0.3117	0.3262	0.3407 (22b)
Effective ac	0.5683	0.5657	0.5631	0.5509	0.5486	0.5379	0.5379	0.5360	0.5420	0.5486	0.5532	0.5580 (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			12.5100	1.1450	14.3244		(27)
Heatloss Floor			50.0500	0.1300	6.5065		(28)
External Wall	28.4600	12.5100	15.9500	0.1800	2.8710		(29a)
Basement Walls	52.0700		52.0700	0.1800	9.3726		(29a)
Walls To CorridorStairwell	6.1800		6.1800	0.1800	1.1124		(29a)
External Roof	4.2200		4.2200	0.1100	0.4642		(30)
Total net area of external elements Aum(A, m2)			140.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 34.6511		(33)
Main dwelling							
Party Wall			15.8400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.1265 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							7.0490 (36)
Point Thermal bridges						(36a) = 0.0000	
Total fabric heat loss						(33) + (36) + (36a) = 41.7001	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	30.2252	30.0841	29.9458	29.2962	29.1746	28.6089	28.6089
Heat transfer coeff	71.9253	71.7842	71.6459	70.9963	70.8748	70.3090	70.3090
						70.2042	70.5269
							70.8748
							71.1207
							71.3777 (39)

Full SAP Calculation Printout



Average = Sum(39)m / 12 =

70.9957

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.4371	1.4343	1.4315	1.4185	1.4161	1.4048	1.4048	1.4027	1.4091	1.4161	1.4210	1.4261	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6916 (42)
Hot water usage for mixer showers												
52.5816	51.7914	50.6399	48.4368	46.8109	44.9978	43.9672	45.1099	46.3626	48.3094	50.5599	52.3801 (42a)	
Hot water usage for baths												
22.7350	22.3974	21.9219	21.0452	20.3888	19.6608	19.2677	19.7398	20.2539	21.0328	21.9275	22.6582 (42b)	
Hot water usage for other uses												
31.9534	30.7915	29.6295	28.4676	27.3056	26.1437	26.1437	27.3056	28.4676	29.6295	30.7915	31.9534 (42c)	
Average daily hot water use (litres/day)												98.6060 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	107.2700	104.9803	102.1914	97.9496	94.5053	90.8023	89.3785	92.1554	95.0841	98.9717	103.2789	106.9917 (44)
Energy content (annual)	169.8895	149.4905	157.0643	134.0881	127.2223	111.6520	108.0956	114.1076	117.2482	134.3037	147.1397	167.5232 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1637.8248
25.4834	22.4236	23.5596	20.1132	19.0833	16.7478	16.2143	17.1161	17.5872	20.1456	22.0710	25.1285 (46)	
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss												
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage												
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
216.4844	191.5762	203.6592	179.1799	173.8172	156.7439	154.6905	160.7025	162.3401	180.8986	192.2315	214.1181 (62)	
WWHRS	-24.0381	-21.2595	-22.2617	-18.4336	-17.1794	-14.7006	-13.7794	-14.6531	-15.2098	-17.9307	-20.3133	-23.5930 (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	192.4463	170.3167	181.3975	160.7463	156.6378	142.0433	140.9111	146.0495	147.1303	162.9679	171.9183	190.5251 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 1963.0901 (64)
Electric Shower(s)												1963 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
93.7642	83.3742	89.4998	80.6578	79.5773	73.1978	73.2177	75.2167	75.0585	81.9319	84.9974	92.9774 (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	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	74.3281	82.2918	74.3281	76.8057	74.3281	76.8057	74.3281	74.3281	76.8057	74.3281	76.8057	74.3281 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.3638	148.8930	145.0395	136.8359	126.4804	116.7476	110.2455	108.7163	112.5698	120.7734	131.1290	140.8617 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579 (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)												
	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629 (71)
Water heating gains (Table 5)												
	126.0271	124.0687	120.2954	112.0247	106.9588	101.6636	98.4109	101.0977	104.2479	110.1235	118.0520	124.9696 (72)
Total internal gains												
	399.0926	406.6271	391.0367	377.0399	359.1409	343.5905	331.3581	332.5158	341.9971	356.5986	377.3602	391.5330 (73)

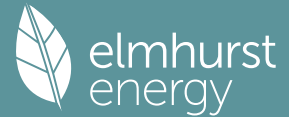
6. Solar gains

[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				5.8600	10.6334		0.6300		0.7000	0.7700		19.0433 (74)
West				6.6500	19.6403		0.6300		0.7000	0.7700		39.9154 (80)
Solar gains	58.9587	114.4757	190.4316	286.8741	363.6491	378.5287	357.7372	298.5160	223.9091	135.9728	73.2622	48.6999 (83)
Total gains	458.0513	521.1028	581.4683	663.9140	722.7900	722.1192	689.0953	631.0318	565.9062	492.5714	450.6224	440.2329 (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	50.8609	50.9609	51.0593	51.5265	51.6148	52.0302	52.0302	52.1078	51.8694	51.6148	51.4364	51.2511
alpha	4.3907	4.3974	4.4040	4.4351	4.4410	4.4687	4.4687	4.4739	4.4580	4.4410	4.4291	4.4167
util living area	0.9910	0.9832	0.9643	0.9039	0.7767	0.5925	0.4419	0.4990	0.7504	0.9377	0.9830	0.9924 (86)
MIT	19.5368	19.7396	20.0628	20.4913	20.8080	20.9564	20.9905	20.9841	20.8781	20.4592	19.9287	19.5047 (87)
Th 2	19.7350	19.7372	19.7393	19.7492	19.7510	19.7597	19.7597	19.7613	19.7563	19.7510	19.7473	19.7434 (88)
util rest of house	0.9879	0.9775	0.9517	0.8711	0.7091	0.4906	0.3210	0.3711	0.6535	0.9087	0.9761	0.9898 (89)

Full SAP Calculation Printout



MIT 2	18.0825	18.3402	18.7455	19.2654	19.6045	19.7381	19.7573	19.7567	19.6829	19.2443	18.5893	18.0474 (90)
Living area fraction									FLA = Living area / (4) =			0.5415 (91)
MIT	18.8699	19.0979	19.4588	19.9292	20.2561	20.3978	20.4250	20.4213	20.3300	19.9021	19.3145	18.8365 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8699	19.0979	19.4588	19.9292	20.2561	20.3978	20.4250	20.4213	20.3300	19.9021	19.3145	18.8365 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9850	0.9737	0.9483	0.8764	0.7383	0.5445	0.3867	0.4405	0.7014	0.9129	0.9729	0.9872	(94)
Useful gains	451.1608	507.4048	551.3968	581.8769	533.6423	393.2144	266.4710	277.9881	396.9212	449.6572	438.4288	434.5779	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1047.9484	1019.1887	928.4423	783.0318	606.4149	407.6353	268.9328	282.3100	439.3858	659.2827	868.7051	1044.7171	(97)
Space heating kWh	444.0099	343.9188	280.5218	144.8315	54.1428	0.0000	0.0000	0.0000	0.0000	155.9614	309.7990	453.9436	(98a)
Space heating requirement - total per year (kWh/year)												2187.1289	
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	444.0099	343.9188	280.5218	144.8315	54.1428	0.0000	0.0000	0.0000	0.0000	155.9614	309.7990	453.9436	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2187.1289	
Space heating per m2										(98c) / (4) =		43.6989	(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	444.0099	343.9188	280.5218	144.8315	54.1428	0.0000	0.0000	0.0000	0.0000	155.9614	309.7990	453.9436	(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)	481.0509	372.6098	303.9240	156.9139	58.6596	0.0000	0.0000	0.0000	0.0000	168.9723	335.6435	491.8132	(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	192.4463	170.3167	181.3975	160.7463	156.6378	142.0433	140.9111	146.0495	147.1303	162.9679	171.9183	190.5251	(64)
Efficiency of water heater													79.8000 (216)
(217)m	85.8716	85.6024	85.0339	83.8267	81.9330	79.8000	79.8000	79.8000	79.8000	83.9613	85.3641	85.9348	(217)
Fuel for water heating, kWh/month	224.1094	198.9625	213.3238	191.7602	191.1778	177.9991	176.5803	183.0194	184.3738	194.0988	201.3942	221.7090	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	15.4439	12.3897	11.1555	8.1730	6.3131	5.1578	5.7590	7.4858	9.7233	12.7575	14.4095	15.8731	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-13.5563	-20.1645	-30.5706	-36.3294	-40.9224	-38.8631	-38.4114	-35.4007	-30.3854	-23.9255	-15.2799	-11.6022	(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	-4.7645	-10.2539	-20.8107	-31.8891	-42.7781	-43.1855	-42.6557	-35.8177	-25.8781	-14.8467	-6.4212	-3.7492	(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													2369.5871 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													79.8000
Water heating fuel used													2358.5083 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													86.0000 (231)
Electricity for lighting (calculated in Appendix L)													124.6412 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-618.4617 (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													4320.2750 (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	2369.5871	0.2100	497.6133 (261)
Total CO2 associated with community systems			0.0000 (373)

Full SAP Calculation Printout

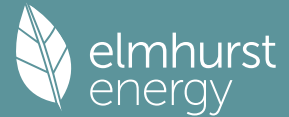


Water heating (other fuel)	2358.5083	0.2100	495.2867 (264)
Space and water heating			992.9000 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	124.6412	0.1443	17.9896 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-335.4114	0.1335	-44.7616
PV Unit electricity exported	-283.0503	0.1253	-35.4736
Total			-80.2352 (269)
Total CO2, kg/year			942.5837 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.8300 (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	2369.5871	1.1300	2677.6334 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2358.5083	1.1300	2665.1144 (278)
Space and water heating			5342.7478 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	124.6412	1.5338	191.1789 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-335.4114	1.4932	-500.8209
PV Unit electricity exported	-283.0503	0.4600	-130.2051
Total			-631.0260 (283)
Total Primary energy kWh/year			5033.0015 (286)
Target Primary Energy Rate (TPER)			100.5600 (287)

Full SAP Calculation Printout



Plot Reference	Flat 2				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 2-Baseline			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	65 D	DER	12.24	TER	21.02	
Environmental	93 A	% DER < TER				41.77
CO ₂ Emissions (t/year)	0.4	DFEE	84.14	TFEE	54.20	
Compliance Check	See BREL	% DFEE < TFEE				-55.24
% DPER < TPER	-12.55	DPER	126.83	TPER	112.69	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.7000 (1b)	3.2200 (2b)	121.3940 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.7000		121.3940 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 121.3940 (5)

2. Ventilation rate

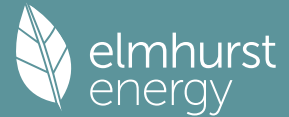
	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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) =	0.1648 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4148	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3214 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4098	0.4018	0.3938	0.3536	0.3455	0.3054	0.3054	0.2973	0.3214	0.3455	0.3616	0.3777 (22b)
Effective ac	0.5840	0.5807	0.5775	0.5625	0.5597	0.5466	0.5466	0.5442	0.5517	0.5597	0.5654	0.5713 (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							
Glazed Door			11.4000	1.3258	15.1136		(27)
Heatloss Floor			37.7900	0.1800	6.8022	110.0000	4156.9000 (28)
External Wall	22.3200	11.4000	10.9200	0.1800	1.9656	60.0000	655.2000 (29a)
Basement Walls	42.1800		42.1800	0.1800	7.5924	60.0000	2530.8000 (29a)
Walls To CorridorStairwell	24.1200		24.1200	0.1700	4.1004	9.0000	217.0800 (29a)
External Roof	10.3200		10.3200	0.1500	1.5480	9.0000	92.8800 (30)
Ceiling below communal area	2.0900		2.0900	0.1500	0.3135	9.0000	18.8100 (30)
Total net area of external elements Aum(A, m ²)			138.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	37.4357	(33)
Main dwelling							
Party Wall			15.2300	0.0000	0.0000	110.0000	1675.2999 (32)
Party Ceiling			47.1500			30.0000	1414.5000 (32b)
Internal Wall			66.7800			9.0000	601.0200 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 11362.4899 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							301.3923 (35)
Thermal bridges (Default value 0.200 * total exposed area)							27.7640 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	65.1997 (37)

Full SAP Calculation Printout



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	23.3942	23.2636	23.1355	22.5341	22.4216	21.8977	21.8977	21.8007	22.0995	22.4216	22.6492	22.8872 (38)
Average = Sum(39)m / 12 =	88.5940	88.4633	88.3353	87.7338	87.6213	87.0975	87.0975	87.0005	87.2992	87.6213	87.8489	88.0869 (39)
												87.7333
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.3500	2.3465	2.3431	2.3272	2.3242	2.3103	2.3103	2.3077	2.3156	2.3242	2.3302	2.3365 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

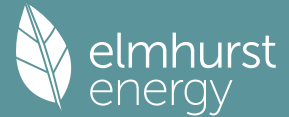
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.3466 (42)
Hot water usage for mixer showers												
	64.3474	63.3803	61.9712	59.2751	57.2854	55.0666	53.8054	55.2038	56.7368	59.1192	61.8732	64.1008 (42a)
Hot water usage for baths	21.3136	20.9971	20.5513	19.7294	19.1140	18.4316	18.0630	18.5057	18.9876	19.7178	20.5566	21.2416 (42b)
Hot water usage for other uses	29.9168	28.8289	27.7410	26.6531	25.5652	24.4773	24.4773	25.5652	26.6531	27.7410	28.8289	29.9168 (42c)
Average daily hot water use (litres/day)												106.2842 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	115.5777	113.2063	110.2635	105.6576	101.9647	97.9755	96.3457	99.2747	102.3775	106.5780	111.2587	115.2591 (44)
Energy content (annual)	183.0469	161.2043	169.4709	144.6400	137.2641	120.4724	116.5218	122.9228	126.2417	144.6253	158.5084	180.4680 (45)
Distribution loss (46)m = 0.15 x (45)m												
	27.4570	24.1806	25.4206	21.6960	20.5896	18.0709	17.4783	18.4384	18.9363	21.6938	23.7763	27.0702 (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												
	183.0469	161.2043	169.4709	144.6400	137.2641	120.4724	116.5218	122.9228	126.2417	144.6253	158.5084	180.4680 (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	183.0469	161.2043	169.4709	144.6400	137.2641	120.4724	116.5218	122.9228	126.2417	144.6253	158.5084	180.4680 (64)
12Total per year (kWh/year)												1765.3866 (64)
Electric shower(s)												1765 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	60.8631	53.6004	56.3491	48.0928	45.6403	40.0571	38.7435	40.8718	41.9754	48.0879	52.7041	60.0056 (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	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.4055	64.6633	58.4055	60.3524	58.4055	60.3524	58.4055	58.4055	60.3524	58.4055	60.3524	58.4055 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.7955	116.9971	113.9691	107.5229	99.3857	91.7379	86.6287	85.4271	88.4551	94.9013	103.0385	110.6863 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332 (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)	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655 (71)
Water heating gains (Table 5)	81.8052	79.7625	75.7380	66.7956	61.3445	55.6348	52.0746	54.9353	58.2991	64.6343	73.2001	80.6527 (72)
Total internal gains	302.2058	307.6224	294.3122	280.8704	265.3353	250.9246	240.3084	241.9675	250.3062	264.1407	282.7905	295.9441 (73)

6. Solar gains												
[Jan]			Area	Solar flux	g	FF		Access				Gains
			m2	Table 6a	Specific data	Specific data		factor				W
				W/m2	or Table 6b	or Table 6c		Table 6d				
East			4.3400	19.6403	0.7600	0.7000		0.7700				31.4255 (76)
South			7.0600	46.7521	0.7600	0.7000		0.7700				121.6887 (78)
Solar gains	153.1142	260.7697	355.1066	434.5770	479.9469	472.9786	457.4942	424.5114	382.9400	287.9033	183.4265	130.9931 (83)
Total gains	455.3200	568.3921	649.4188	715.4474	745.2822	723.9033	697.8026	666.4789	633.2462	552.0440	466.2170	426.9371 (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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	35.6260	35.6786	35.7303	35.9753	36.0215	36.2381	36.2381	36.2785	36.1544	36.0215	35.9281	35.8310
alpha	3.3751	3.3786	3.3820	3.3984	3.4014	3.4159	3.4159	3.4186	3.4103	3.4014	3.3952	3.3887
util living area	0.9870	0.9725	0.9478	0.8965	0.8060	0.6641	0.5148	0.5536	0.7536	0.9195	0.9761	0.9894 (86)
MIT	19.3181	19.5626	19.8806	20.2586	20.5776	20.7908	20.8726	20.8614	20.7155	20.2840	19.7234	19.2734 (87)
Th 2	19.8250	19.8267	19.8284	19.8364	19.8379	19.8449	19.8449	19.8461	19.8422	19.8379	19.8349	19.8317 (88)
util rest of house												

Full SAP Calculation Printout



MIT 2	0.9838	0.9661	0.9353	0.8706	0.7554	0.5755	0.3938	0.4332	0.6760	0.8938	0.9695	0.9869 (89)
Living area fraction	18.3017	18.5441	18.8565	19.2245	19.5149	19.6923	19.7426	19.7389	19.6384	19.2577	18.7120	18.2627 (90)
MIT	18.7811	19.0244	19.3395	19.7122	20.0161	20.2104	20.2755	20.2683	fLA = Living area / (4) =	19.7418	19.1890	0.4716 (91)
Temperature adjustment									20.1464			18.7394 (92)
adjusted MIT	19.0811	19.3244	19.6395	20.0122	20.3161	20.5104	20.5755	20.5683	20.4464	20.0418	19.4890	19.0394 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9814	0.9628	0.9329	0.8750	0.7778	0.6287	0.4723	0.5109	0.7191	0.8989	0.9671	0.9847 (94)	
Useful gains	446.8360	547.2683	605.8618	625.9827	579.6492	455.1346	329.5775	340.4954	455.3688	496.2465	450.8626	420.4052 (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	1309.5124	1276.0322	1160.6813	974.9139	754.9551	514.7778	346.2585	362.6437	554.0344	827.2992	1088.3592	1307.1538 (97)	
Space heating kWh	641.8312	489.7294	412.7857	251.2305	130.4276	0.0000	0.0000	0.0000	0.0000	246.3032	458.9975	659.7409 (98a)	
Space heating requirement - total per year (kWh/year)												3291.0460	
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	641.8312	489.7294	412.7857	251.2305	130.4276	0.0000	0.0000	0.0000	0.0000	246.3032	458.9975	659.7409 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												3291.0460	
Space heating per m2												(98c) / (4) =	87.2956 (99)

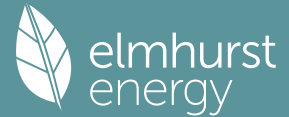
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)													170.0000 (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	641.8312	489.7294	412.7857	251.2305	130.4276	0.0000	0.0000	0.0000	0.0000	246.3032	458.9975	659.7409 (98)	
Space heating efficiency (main heating system 1)	170.0000	170.0000	170.0000	170.0000	170.0000	0.0000	0.0000	0.0000	0.0000	170.0000	170.0000	170.0000 (210)	
Space heating fuel (main heating system)	377.5478	288.0761	242.8151	147.7826	76.7221	0.0000	0.0000	0.0000	0.0000	144.8843	269.9986	388.0829 (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	183.0469	161.2043	169.4709	144.6400	137.2641	120.4724	116.5218	122.9228	126.2417	144.6253	158.5084	180.4680 (64)	
Efficiency of water heater	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000 (216)	
Fuel for water heating, kWh/month	107.6746	94.8260	99.6888	85.0824	80.7436	70.8661	68.5422	72.3076	74.2598	85.0737	93.2402	106.1576 (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	12.4166	9.9611	8.9689	6.5710	5.0756	4.1468	4.6301	6.0184	7.8173	10.2568	11.5850	12.7617 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												1935.9094 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												170.0000	
Water heating fuel used												1038.4627 (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)												100.2093 (232)	
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000 (233)	
Wind generation												0.0000 (234)	
Hydro-electric generation (Appendix N)												0.0000 (235a)	
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)	
Appendix Q - special features													
Energy saved or generated												-0.0000 (236)	
Energy used												0.0000 (237)	
Total delivered energy for all uses												3074.5815 (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	1935.9094	0.1548	299.7750 (261)	

Full SAP Calculation Printout



Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1038.4627	0.1416	147.0237 (264)
Space and water heating			446.7987 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	100.2093	0.1443	14.4633 (268)
Total CO2, kg/year			461.2620 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.2400 (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	1935.9094	1.5733	3045.7127 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1038.4627	1.5235	1582.1381 (278)
Space and water heating			4627.8507 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	100.2093	1.5338	153.7044 (282)
Total Primary energy kWh/year			4781.5551 (286)
Dwelling Primary energy Rate (DPER)			126.8300 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.7000 (1b)	3.2200 (2b)	121.3940 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	121.3940 (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) = 0.1648 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4148 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3214 (21)

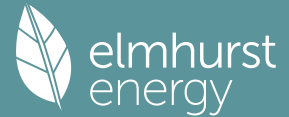
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4098	0.4018	0.3938	0.3536	0.3455	0.3054	0.3054	0.2973	0.3214	0.3455	0.3616	0.3777 (22b)
Effective ac	0.5840	0.5807	0.5775	0.5625	0.5597	0.5466	0.5466	0.5442	0.5517	0.5597	0.5654	0.5713 (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							
TER Opening Type			9.4300	1.1450	10.7977		(27)
Heatloss Floor			37.7900	0.1300	4.9127		(28)
External Wall	22.3200	9.4300	12.8900	0.1800	2.3202		(29a)
Basement Walls	42.1800		42.1800	0.1800	7.5924		(29a)
Walls To CorridorStairwell	24.1200		24.1200	0.1800	4.3416		(29a)
External Roof	10.3200		10.3200	0.1100	1.1352		(30)
Ceiling below communal area	2.0900		2.0900	0.1100	0.2299		(30)
Total net area of external elements Aum(A, m ²)			138.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.3297		(33)
Main dwelling							
Party Wall			15.2300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							301.3923 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							6.9410 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	38.2707 (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
	23.3942	23.2636	23.1355	22.5341	22.4216	21.8977	21.8977	21.8007	22.0995	22.4216	22.6492	22.8872 (38)

Full SAP Calculation Printout



Heat transfer coeff	61.6649	61.5343	61.4062	60.8048	60.6923	60.1684	60.1684	60.0714	60.3702	60.6923	60.9199	61.1579 (39)
Average = Sum(39)m / 12 =												60.8043
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.6357	1.6322	1.6288	1.6129	1.6099	1.5960	1.5960	1.5934	1.6013	1.6099	1.6159	1.6222 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3466 (42)
Hot water usage for mixer showers	46.7981	46.0948	45.0700	43.1092	41.6621	40.0484	39.1312	40.1482	41.2631	42.9958	44.9987	46.6188 (42a)
Hot water usage for baths	20.2479	19.9472	19.5238	18.7430	18.1583	17.5100	17.1599	17.5804	18.0382	18.7319	19.5288	20.1795 (42b)
Hot water usage for other uses	28.4209	27.3874	26.3539	25.3205	24.2870	23.2535	23.2535	24.2870	25.3205	26.3539	27.3874	28.4209 (42c)
Average daily hot water use (litres/day)												87.7565 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	95.4669	93.4295	90.9477	87.1726	84.1074	80.8119	79.5445	82.0156	84.6218	88.0816	91.9149	95.2192 (44)
Energy content (annual)	151.1963	133.0423	139.7832	119.3349	113.2248	99.3677	96.2022	101.5524	104.3472	119.5259	130.9496	149.0902 (45)
Distribution loss (46)m = 0.15 x (45)m	22.6794	19.9563	20.9675	17.9002	16.9837	14.9052	14.4303	15.2329	15.6521	17.9289	19.6424	22.3635 (46)
Water storage loss (or HIU loss):												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (55)												
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	197.7912	175.1280	186.3781	164.4268	159.8197	144.4595	142.7971	148.1473	149.4390	166.1208	176.0415	195.6851 (62)
WWHRS	-21.3941	-18.9211	-19.8131	-16.4061	-15.2899	-13.0836	-12.2638	-13.0413	-13.5368	-15.9584	-18.0790	-20.9979 (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	176.3971	156.2069	166.5650	148.0207	144.5298	131.3759	130.5333	135.1060	135.9022	150.1624	157.9625	174.6872 (64)
12Total per year (kWh/year)												1807.4489 (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	87.5487	77.9051	83.7538	75.7523	74.9232	69.1132	69.2632	71.0421	70.7689	77.0183	79.6142	86.8484 (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	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.4055	64.6633	58.4055	60.3524	58.4055	60.3524	58.4055	58.4055	60.3524	58.4055	60.3524	58.4055 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.7955	116.9971	113.9691	107.5229	99.3857	91.7379	86.6287	85.4271	88.4551	94.9013	103.0385	110.6863 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332 (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)	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655 (71)
Water heating gains (Table 5)	117.6730	115.9303	112.5724	105.2116	100.7032	95.9906	93.0956	95.4867	98.2901	103.5192	110.5753	116.7317 (72)
Total internal gains	338.0735	343.7902	331.1466	319.2864	304.6940	291.2804	281.3294	282.5189	290.2972	303.0256	320.1657	332.0231 (73)

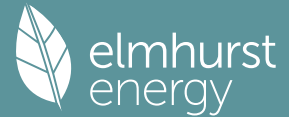
6. Solar gains

[Jan]												Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
East												3.5900		19.6403		0.6300		0.7000		0.7700		21.5483	(76)
South												5.8400		46.7521		0.6300		0.7000		0.7700		83.4421	(78)
Solar gains	104.9905	178.8098	243.4966	297.9893	329.0993	324.3212	313.7035	291.0873	262.5819	197.4153	125.7756			89.8220	(83)								
Total gains	443.0640	522.6000	574.6431	617.2757	633.7933	615.6016	595.0329	573.6062	552.8791	500.4409	445.9414			421.8451	(84)								

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	51.1838	51.2925	51.3994	51.9079	52.0041	52.4569	52.4569	52.5416	52.2815	52.0041	51.8098	51.6082
alpha	4.4123	4.4195	4.4266	4.4605	4.4669	4.4971	4.4971	4.5028	4.4854	4.4669	4.4540	4.4405
util living area	0.9861	0.9711	0.9437	0.8807	0.7668	0.5948	0.4384	0.4723	0.6872	0.8978	0.9719	0.9886 (86)
MIT	19.6523	19.9012	20.2080	20.5618	20.8211	20.9567	20.9911	20.9876	20.9164	20.5850	20.0577	19.6098 (87)
Th 2	19.5873	19.5898	19.5923	19.6039	19.6061	19.6163	19.6163	19.6182	19.6124	19.6061	19.6017	19.5971 (88)

Full SAP Calculation Printout



util rest of house	0.9807	0.9605	0.9230	0.8378	0.6892	0.4800	0.3040	0.3354	0.5757	0.8512	0.9596	0.9842 (89)
MIT 2	18.1051	18.4168	18.7937	19.2127	19.4801	19.5976	19.6145	19.6154	19.5699	19.2529	18.6257	18.0585 (90)
Living area fraction									fLA = Living area / (4) =			0.4716 (91)
MIT	18.8348	19.1169	19.4607	19.8490	20.1125	20.2386	20.2637	20.2625	20.2049	19.8812	19.3011	18.7901 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8348	19.1169	19.4607	19.8490	20.1125	20.2386	20.2637	20.2625	20.2049	19.8812	19.3011	18.7901 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9769	0.9560	0.9207	0.8463	0.7196	0.5335	0.3678	0.4004	0.6262	0.8619	0.9562	0.9807 (94)	
Useful gains	432.8321	499.6033	529.0809	522.4243	456.0658	328.4082	218.8384	229.6635	346.2136	431.3289	426.4084	413.7201 (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	896.2890	874.8252	795.8694	665.7508	510.5763	339.2660	220.4409	232.0266	368.5565	563.2956	743.2876	892.3022 (97)	
Space heating kWh	344.8119	252.1491	198.4907	103.1951	40.5558	0.0000	0.0000	0.0000	0.0000	98.1833	228.1530	356.0651 (98a)	
Space heating requirement - total per year (kWh/year)												1621.6039	
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	344.8119	252.1491	198.4907	103.1951	40.5558	0.0000	0.0000	0.0000	0.0000	98.1833	228.1530	356.0651 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1621.6039	
Space heating per m2										(98c) / (4) =		43.0134 (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	344.8119	252.1491	198.4907	103.1951	40.5558	0.0000	0.0000	0.0000	0.0000	98.1833	228.1530	356.0651 (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)	373.5774	273.1843	215.0495	111.8040	43.9391	0.0000	0.0000	0.0000	0.0000	106.3741	247.1863	385.7693 (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	176.3971	156.2069	166.5650	148.0207	144.5298	131.3759	130.5333	135.1060	135.9022	150.1624	157.9625	174.6872 (64)
Efficiency of water heater (217)m	85.5351	85.1274	84.4541	83.2667	81.6125	79.8000	79.8000	79.8000	79.8000	83.1310	84.8835	79.8000 (216)
Fuel for water heating, kWh/month	206.2276	183.4977	197.2256	177.7670	177.0928	164.6315	163.5756	169.3057	170.3035	180.6335	186.0933	204.0221 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041 (231)
Lighting	12.1355	9.7356	8.7658	6.4222	4.9607	4.0529	4.5253	5.8822	7.6403	10.0246	11.3227	12.4728 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-10.3166	-15.4033	-23.4437	-27.9815	-31.6393	-30.1066	-29.7720	-27.3882	-23.4233	-18.3417	-11.6532	-8.8242 (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	-3.4835	-7.5093	-15.2590	-23.4039	-31.4078	-31.6962	-31.2915	-26.2568	-18.9571	-10.8634	-4.6931	-2.7392 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1756.8840 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2180.3758 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												97.9406 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-465.8542 (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												3655.3461 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
--	-----------------	----------------------------	-----------------------

Full SAP Calculation Printout

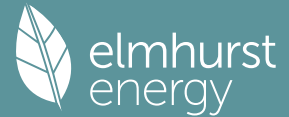


Space heating - main system 1	1756.8840	0.2100	368.9456 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2180.3758	0.2100	457.8789 (264)
Space and water heating			826.8246 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	97.9406	0.1443	14.1358 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-258.2935	0.1334	-34.4458
PV Unit electricity exported	-207.5608	0.1253	-26.0099
Total			-60.4557 (269)
Total CO2, kg/year			792.4339 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			21.0200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1756.8840	1.1300	1985.2789 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2180.3758	1.1300	2463.8247 (278)
Space and water heating			4449.1036 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	97.9406	1.5338	150.2245 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-258.2935	1.4928	-385.5811
PV Unit electricity exported	-207.5608	0.4600	-95.4691
Total			-481.0502 (283)
Total Primary energy kWh/year			4248.3787 (286)
Target Primary Energy Rate (TPER)			112.6900 (287)

Full SAP Calculation Printout



Plot Reference	Flat 3				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 3-Baseline			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	41 E	DER	14.77	TER	14.10	
Environmental	88 B	% DER < TER				-4.75
CO ₂ Emissions (t/year)	1	DFEE	61.72	TFEE	41.38	
Compliance Check	See BREL	% DFEE < TFEE				-49.14
% DPER < TPER	-105.42	DPER	153.51	TPER	74.73	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	76.3500		217.5975
Dwelling volume			217.5975

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) =	0.0919 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3419	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3163 (21)

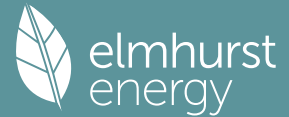
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4032	0.3953	0.3874	0.3479	0.3400	0.3005	0.3005	0.2925	0.3163	0.3400	0.3558	0.3716 (22b)
Effective ac	0.5813	0.5781	0.5751	0.5605	0.5578	0.5451	0.5451	0.5428	0.5500	0.5578	0.5633	0.5690 (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			22.9600	1.3258	30.4394		(27)
Glazed Door			12.4600	1.3258	16.5189		(27)
Floor above communal area			1.4700	0.1800	0.2646	0.0000	0.0000 (28b)
External Wall	107.3900	35.4200	71.9700	0.1800	12.9546	60.0000	4318.2000 (29a)
Walls To CorridorStairwell	24.4000		24.4000	0.1700	4.1480	9.0000	219.6000 (29a)
External Roof	14.1100		14.1100	0.1500	2.1165	9.0000	126.9900 (30)
Ceiling Under Communal Space	1.4700		1.4700	0.1306	0.1920	9.0000	13.2300 (30)
Total net area of external elements Aum(A, m ²)			148.8400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	66.6341	(33)
Main dwelling							
Party Floor 1			74.8800			40.0000	2995.2000 (32d)
Party Ceiling			64.9000			30.0000	1947.0000 (32b)
Internal Wall			168.8300			9.0000	1519.4700 (32c)
Ceiling below communal area			1.4700			9.0000	13.2300 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11152.9200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		146.0762 (35)
Thermal bridges (Default value 0.200 * total exposed area)		29.7680 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	96.4021 (37)

Full SAP Calculation Printout



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	41.7417	41.5150	41.2928	40.2491	40.0538	39.1447	39.1447	38.9764	39.4949	40.0538	40.4488	40.8618	(38)
Heat transfer coeff	138.1437	137.9170	137.6948	136.6511	136.4558	135.5468	135.5468	135.3784	135.8969	136.4558	136.8509	137.2639	(39)
Average = Sum(39)m / 12 =												136.6502	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8093	1.8064	1.8035	1.7898	1.7872	1.7753	1.7753	1.7731	1.7799	1.7872	1.7924	1.7978	(40)
HLP (average)												1.7898	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3900 (42)
Hot water usage for mixer showers													
88.4007	87.0722	85.1364	81.4324	78.6990	75.6507	73.9181	75.8393	77.9453	81.2183	85.0018	88.0620	(42a)	
Hot water usage for baths													
29.2323	28.7981	28.1868	27.0595	26.2155	25.2795	24.7740	25.3811	26.0421	27.0436	28.1940	29.1334	(42b)	
Hot water usage for other uses													
41.1638	39.6669	38.1700	36.6732	35.1763	33.6794	33.6794	35.1763	36.6732	38.1700	39.6669	41.1638	(42c)	
Average daily hot water use (litres/day)												146.0270	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
158.7968	155.5373	151.4932	145.1651	140.0908	134.6097	132.3715	136.3967	140.6606	146.4318	152.8626	158.3592	(44)	
Energy content (annual)	251.4952	221.4830	232.8393	198.7238	188.5891	165.5183	160.0919	168.8876	173.4485	198.7066	217.7809	247.9523	(45)
Energy content (annual)										Total = Sum(45)m =		2425.5166	
Distribution loss (46)m = 0.15 x (45)m													
37.7243	33.2224	34.9259	29.8086	28.2884	24.8277	24.0138	25.3331	26.0173	29.8060	32.6671	37.1928	(46)	
Water storage loss (or HIU loss):													
Store volume												185.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												1.2840	(55)
Total storage loss													
39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040	(56)	
If cylinder contains dedicated solar storage													
39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040	(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													
291.2992	257.4350	272.6433	237.2438	228.3931	204.0383	199.8959	208.6916	211.9685	238.5106	256.3009	287.7563	(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													
291.2992	257.4350	272.6433	237.2438	228.3931	204.0383	199.8959	208.6916	211.9685	238.5106	256.3009	287.7563	(64)	
12Total per year (kWh/year)												2894.1766	(64)
Electric shower(s)												2894	(64a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
115.4654	102.4047	109.2623	96.8917	94.5491	85.8508	85.0737	87.9983	88.4876	97.9131	103.2281	114.2873	(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	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.7498	118.1873	106.7498	110.3082	106.7498	110.3082	106.7498	106.7498	110.3082	106.7498	110.3082	106.7498	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	211.6435	213.8397	208.3053	196.5234	181.6508	167.6726	158.3343	156.1381	161.6725	173.4544	188.3271	202.3052	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	(71)
Water heating gains (Table 5)	155.1954	152.3879	146.8579	134.5718	127.0821	119.2373	114.3464	118.2773	122.8995	131.6037	143.3724	153.6120	(72)
Total internal gains	535.4381	546.2643	523.7625	503.2527	477.3321	456.0674	438.2800	440.0147	453.7295	473.6574	503.8570	524.5164	(73)

6. Solar gains

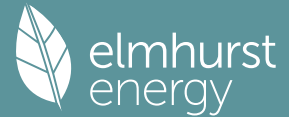
[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W
East	8.1600	19.6403	0.7600	0.7000	0.7700	59.0857	(76)
South	7.1500	46.7521	0.7600	0.7000	0.7700	123.2400	(78)
West	7.6500	19.6403	0.7600	0.7000	0.7700	55.3928	(80)
North	12.4600	10.6334	0.7600	0.7000	0.7700	48.8466	(74)

Solar gains	286.5652	519.1281	784.5286	1083.2481	1305.2169	1333.6362	1270.2016	1100.5091	888.2234	594.5463	349.0813	241.3533	(83)
Total gains	822.0033	1065.3924	1308.2911	1586.5007	1782.5490	1789.7036	1708.4816	1540.5237	1341.9529	1068.2036	852.9383	765.8697	(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	22.4262	22.4630	22.4993	22.6711	22.7036	22.8558	22.8558	22.8842	22.7969	22.7036	22.6380	22.5699		

Full SAP Calculation Printout



alpha	2.4951	2.4975	2.5000	2.5114	2.5136	2.5237	2.5237	2.5256	2.5198	2.5136	2.5092	2.5047
util living area	0.9496	0.9100	0.8448	0.7298	0.5867	0.4412	0.3327	0.3787	0.5797	0.8082	0.9216	0.9569 (86)
MIT	18.2922	18.7794	19.4168	20.1169	20.6019	20.8606	20.9500	20.9297	20.7148	20.0090	19.0122	18.2018 (87)
Th 2	20.0953	20.0968	20.0983	20.1051	20.1064	20.1123	20.1123	20.1134	20.1100	20.1064	20.1038	20.1011 (88)
util rest of house	0.9436	0.8999	0.8280	0.7024	0.5473	0.3894	0.2706	0.3131	0.5261	0.7810	0.9110	0.9517 (89)
MIT 2	17.6005	18.0781	18.6965	19.3624	19.8006	20.0223	20.0876	20.0769	19.9122	19.2809	18.3184	17.5153 (90)
Living area fraction	17.8713	18.3527	18.9785	19.6578	20.1143	20.3505	20.4253	20.4108	fLA = Living area / (4) =			
MIT	18.3713	18.8527	19.4785	20.1578	20.6143	20.8505	20.9253	20.9108	20.2264	19.5659	18.5900	17.7840 (92)
Temperature adjustment												0.5000
adjusted MIT												18.2840 (93)

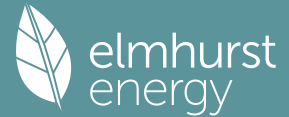
8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9291	0.8833	0.8150	0.7041	0.5701	0.4327	0.3276	0.3724	0.5640	0.7796	0.8966	0.9382 (94)
Ext temp.	763.7256	941.0490	1066.3216	1117.0823	1016.3104	774.4331	559.7645	573.6339	756.8069	832.7861	764.7497	718.5392 (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	1943.8592	1924.3099	1787.0679	1538.3842	1216.4105	847.2385	586.2746	610.6636	900.5086	1291.6832	1640.8437	1933.2305 (97)
Space heating requirement - total per year (kWh/year)	878.0194	660.7513	536.2353	303.3374	148.8744	0.0000	0.0000	0.0000	0.0000	341.4195	630.7876	903.7303 (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)	878.0194	660.7513	536.2353	303.3374	148.8744	0.0000	0.0000	0.0000	0.0000	341.4195	630.7876	903.7303 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4403.1553
Space heating per m2												(98c) / (4) = 57.6707 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	878.0194	660.7513	536.2353	303.3374	148.8744	0.0000	0.0000	0.0000	0.0000	341.4195	630.7876	903.7303 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	878.0194	660.7513	536.2353	303.3374	148.8744	0.0000	0.0000	0.0000	0.0000	341.4195	630.7876	903.7303 (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	291.2992	257.4350	272.6433	237.2438	228.3931	204.0383	199.8959	208.6916	211.9685	238.5106	256.3009	287.7563 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	291.2992	257.4350	272.6433	237.2438	228.3931	204.0383	199.8959	208.6916	211.9685	238.5106	256.3009	287.7563 (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	4.5268	4.0888	4.5268	4.3808	4.5268	4.3808	4.5268	4.3808	4.5268	4.3808	4.5268	4.5268 (231)
Lighting	24.5883	19.7256	17.7607	13.0123	10.0511	8.2118	9.1689	11.9181	15.4804	20.3111	22.9414	25.2716 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												4403.1553 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												2894.1766 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												53.3000 (230c)
Total electricity for the above, kWh/year												53.3000 (231)
Electricity for lighting (calculated in Appendix L)												198.4413 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												7549.0731 (238)

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	4403.1553	0.1551	682.9001 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2894.1766	0.1411	408.4094 (264)
Space and water heating			1091.3094 (265)
Pumps, fans and electric keep-hot	53.3000	0.1387	7.3934 (267)
Energy for lighting	198.4413	0.1443	28.6412 (268)
Total CO2, kg/year			1127.3440 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.7700 (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	4403.1553	1.5742	6931.3088 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2894.1766	1.5218	4404.3575 (278)
Space and water heating			11335.6663 (279)
Pumps, fans and electric keep-hot	53.3000	1.5128	80.6322 (281)
Energy for lighting	198.4413	1.5338	304.3759 (282)
Total Primary energy kWh/year			11720.6744 (286)
Dwelling Primary energy Rate (DPER)			153.5100 (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	76.3500 (1b)	x 2.8500 (2b)	= 217.5975 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	76.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	217.5975 (5)

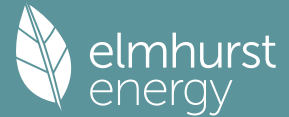
2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1379 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3879	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3588 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000	(22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750	(22a)
Adj infilt rate	0.4574 0.4485 0.4395 0.3947 0.3857 0.3408 0.3408 0.3319 0.3588 0.3857 0.4036 0.4216	(22b)
Effective ac	0.6046 0.6006 0.5966 0.5779 0.5744 0.5581 0.5581 0.5551 0.5644 0.5744 0.5815 0.5889	(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			19.0800	1.1450	21.8473		(27)
Floor above communal area			1.4700	0.1300	0.1911		(28b)
External Wall	107.3900	19.0800	88.3100	0.1800	15.8958		(29a)
Walls To Corridor/Stairwell	24.4000		24.4000	0.1800	4.3920		(29a)
External Roof	14.1100		14.1100	0.1100	1.5521		(30)
Ceiling Under Communal Space	1.4700		1.4700	0.1100	0.1617		(30)
Total net area of external elements Aum(A, m2)			148.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.0400		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							146.0762 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							7.4420 (36)
Point Thermal bridges						(36a) =	0.0000

Full SAP Calculation Printout



Total fabric heat loss (33) + (36) + (36a) = 51.4820 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	43.4166	43.1248	42.8389	41.4957	41.2444	40.0746	40.0746	39.8579	40.5252	41.2444	41.7528	42.2843 (38)
Average = Sum(39)m / 12 =	94.8986	94.6069	94.3209	92.9777	92.7264	91.5566	91.5566	91.3400	92.0072	92.7264	93.2348	93.7663 (39)
												92.9765
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2429	1.2391	1.2354	1.2178	1.2145	1.1992	1.1992	1.1963	1.2051	1.2145	1.2212	1.2281 (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	2.3900 (42)											
Hot water usage for mixer showers	64.0451 (42a)											
Hot water usage for baths	27.6768 (42b)											
Hot water usage for other uses	39.1056 (42c)											
Average daily hot water use (litres/day)	120.5728 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	131.1677	128.3670	124.9563	119.7696	115.5578	111.0297	109.2894	112.6854	116.2670	121.0207	126.2873	130.8275 (44)
Energy content (annual)	207.7375	182.7929	192.0532	163.9586	155.5630	136.5240	132.1760	139.5280	143.3688	164.2240	179.9194	204.8442 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m = 2002.6898											
Combi loss	31.1606	27.4189	28.8080	24.5938	23.3345	20.4786	19.8264	20.9292	21.5053	24.6336	26.9879	30.7266 (46)
Water storage loss (or HIU loss):												
Store volume	150.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.3938 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.7527 (55)											
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	254.3324	224.8787	238.6481	209.0505	202.1579	181.6159	178.7709	186.1229	188.4607	210.8189	225.0113	251.4391 (62)
WWHRS	-29.3914	-25.9940	-27.2194	-22.5387	-21.0053	-17.9744	-16.8481	-17.9163	-18.5970	-21.9238	-24.8370	-28.8471 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	224.9411	198.8847	211.4287	186.5118	181.1527	163.6415	161.9228	168.2067	169.8637	188.8951	200.1743	222.5920 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 2278.2149 (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	106.3486	94.4472	101.1336	90.5897	89.0006	81.4677	81.2244	83.6690	83.7436	91.8804	95.8967	105.3866 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)												

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	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.7498	118.1873	106.7498	110.3082	106.7498	110.3082	106.7498	106.7498	110.3082	106.7498	110.3082	106.7498 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	211.6435	213.8397	208.3053	196.5234	181.6508	167.6726	158.3343	156.1381	161.6725	173.4544	188.3271	202.3052 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984 (71)
Water heating gains (Table 5)	142.9417	140.5465	135.9323	125.8191	119.6245	113.1496	109.1726	112.4583	116.3106	123.4952	133.1898	141.6487 (72)
Total internal gains	523.1844	534.4229	512.8368	494.5000	469.8745	449.9797	433.1062	434.1957	447.1406	465.5488	493.6744	512.5531 (73)

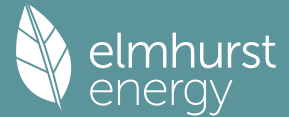
6. Solar gains

[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				6.7100	10.6334		0.6300		0.7000		0.7700		21.8055 (74)
East				4.4000	19.6403		0.6300		0.7000		0.7700		26.4102 (76)
South				3.8500	46.7521		0.6300		0.7000		0.7700		55.0089 (78)
West				4.1200	19.6403		0.6300		0.7000		0.7700		24.7296 (80)
Solar gains	127.9542	231.8022	350.3213	483.7229	582.8486	595.5406	567.2132	491.4334	396.6296	265.4816	155.8695	107.7658	(83)
Total gains	651.1387	766.2250	863.1581	978.2228	1052.7231	1045.5204	1000.3194	925.6290	843.7701	731.0304	649.5440	620.3189	(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	32.6457	32.7464	32.8457	33.3202	33.4105	33.8374	33.8374	33.9176	33.6716	33.4105	33.2283	33.0399
alpha	3.1764	3.1831	3.1897	3.2213	3.2274	3.2558	3.2558	3.2612	3.2448	3.2274	3.2152	3.2027
util living area	0.9642	0.9409	0.9006	0.8134	0.6826	0.5196	0.3900	0.4344	0.6468	0.8566	0.9428	0.9687 (86)
MIT	19.0479	19.3619	19.7934	20.3238	20.7045	20.9118	20.9738	20.9627	20.8165	20.3049	19.5975	19.0047 (87)
Th 2	19.8858	19.8888	19.8918	19.9058	19.9084	19.9207	19.9207	19.9229	19.9159	19.9084	19.9031	19.8976 (88)
util rest of house	0.9573	0.9299	0.8821	0.7800	0.6288	0.4444	0.2995	0.3403	0.5723	0.8225	0.9302	0.9627 (89)
MIT 2	17.6459	18.0402	18.5758	19.2200	19.6468	19.8610	19.9090	19.9050	19.7779	19.2179	18.3512	17.5989 (90)
Living area fraction									FLA = Living area /	(4) =		0.3915 (91)
MIT	18.1948	18.5576	19.0525	19.6521	20.0609	20.2724	20.3258	20.3191	20.1845	19.6434	18.8391	18.1493 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1948	18.5576	19.0525	19.6521	20.0609	20.2724	20.3258	20.3191	20.1845	19.6434	18.8391	18.1493 (93)

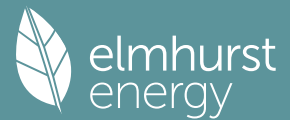
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9432	0.9131	0.8653	0.7713	0.6368	0.4697	0.3342	0.3758	0.5920	0.8129	0.9146	0.9496 (94)
Useful gains	614.1521	699.6453	746.8665	754.5320	670.3593	491.1241	334.2842	347.8832	499.4764	594.2718	594.0613	589.0517 (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	1318.5955	1292.1048	1183.9637	999.7051	775.2725	519.3454	341.1243	357.9665	559.8154	838.5658	1094.4931	1307.9701 (97)
Space heating kWh	524.1059	398.1327	325.2003	176.5246	78.0554	0.0000	0.0000	0.0000	0.0000	181.7547	360.3109	534.8753 (98a)
Space heating requirement - total per year (kWh/year)												2578.9600
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	524.1059	398.1327	325.2003	176.5246	78.0554	0.0000	0.0000	0.0000	0.0000	181.7547	360.3109	534.8753 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2578.9600
Space heating per m2										(98c) / (4) =		33.7781 (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	524.1059	398.1327	325.2003	176.5246	78.0554	0.0000	0.0000	0.0000	0.0000	181.7547	360.3109	534.8753 (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)	567.8287	431.3464	352.3297	191.2509	84.5671	0.0000	0.0000	0.0000	0.0000	196.9174	390.3693	579.4966 (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	224.9411	198.8847	211.4287	186.5118	181.1527	163.6415	161.9228	168.2067	169.8637	188.8951	200.1743	222.5920 (64)
Efficiency of water heater (217)m	85.8910	85.5845	85.0220	83.9365	82.3122	79.8000	79.8000	79.8000	79.8000	83.9734	85.3617	79.8000 (216)
Fuel for water heating, kWh/month	261.8914	232.3840	248.6753	222.2057	220.0801	205.0645	202.9108	210.7853	212.8618	224.9463	234.5013	258.9744 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.1805	17.7940	16.0215	11.7381	9.0668	7.4077	8.2711	10.7510	13.9645	18.3222	20.6949	22.7970 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-20.3899	-30.1734	-45.5001	-53.7517	-60.2356	-57.0531	-56.3519	-52.0654	-44.9091	-35.6289	-22.9160	-17.4653 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-7.5580	-16.2292	-32.8807	-50.3140	-67.4473	-68.1100	-67.3139	-56.5764	-40.9195	-23.5171	-10.1886	-5.9528 (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												2794.1061 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2735.2808 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												179.0094 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-943.4475 (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												4850.9488 (238)

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	2794.1061	0.2100	586.7623 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2735.2808	0.2100	574.4090 (264)
Space and water heating			1161.1713 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	179.0094	0.1443	25.8366 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.4402	0.1336	-66.3147
PV Unit electricity exported	-447.0073	0.1254	-56.0330
Total			-122.3477 (269)
Total CO2, kg/year			1076.5894 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.1000 (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	2794.1061	1.1300	3157.3399 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2735.2808	1.1300	3090.8673 (278)
Space and water heating			6248.2072 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	179.0094	1.5338	274.5706 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.4402	1.4936	-741.4999
PV Unit electricity exported	-447.0073	0.4601	-205.6678
Total			-947.1677 (283)
Total Primary energy kWh/year			5705.7109 (286)
Target Primary Energy Rate (TPER)			74.7300 (287)

Full SAP Calculation Printout



Plot Reference	Flat 4			Issued on Date	16/02/2026	
Assessment Reference	As Design-Flat 4-Baseline		Plot Type Ref	As Design - Proposed		
Plot Address	105, Raleigh Road, London, N8 0JD			SAP Version	10.2	
SAP Rating	41 E	DER	19.41	TER	18.97	
Environmental	88 B	% DER < TER			-2.32	
CO ₂ Emissions (t/year)	0.71	DFEE	71.77	TFEE	47.95	
Compliance Check	See BREL	% DFEE < TFEE			-49.68	
% DPER < TPER	-99.44	DPER	202.49	TPER	101.53	
Assessor Details	Mr. Paul Rothwell			Assessor ID	EU45-0001	
Client	105 Raleigh Road, J. Michealides					

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	41.3300	2.8500	117.7905
Ground floor	41.3300 (1b)	x	2.8500 (2b) = 117.7905 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.3300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	117.7905 (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) =	0.1698 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4198	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3883 (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	0.4951	0.4854	0.4757	0.4271	0.4174	0.3689	0.3689	0.3592	0.3883	0.4174	0.4368	0.4563 (22b)
Effective ac	0.6226	0.6178	0.6131	0.5912	0.5871	0.5680	0.5680	0.5645	0.5754	0.5871	0.5954	0.6041 (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			8.4900	1.3258	11.2557		(27)
Glazed Door			5.6600	1.3258	7.5038		(27)
External Wall	66.9200	14.1500	52.7700	0.1800	9.4986	60.0000	3166.1999 (29a)
Walls To Corridor/Stairwell	14.3100		14.3100	0.1700	2.4327	9.0000	128.7900 (29a)
External Rear Roof	21.9300		21.9300	0.1500	3.2895	9.0000	197.3700 (30)
External Front Roof	4.8900		4.8900	0.1500	0.7335	9.0000	44.0100 (30)
External Front Zinc Roof	0.7800		0.7800	0.1500	0.1170	9.0000	7.0200 (30)
Total net area of external elements A _{um} (A, m ²)			108.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	34.8308	(33)
Main dwelling							
Party Wall			8.9200	0.0000	0.0000	180.0000	1605.6000 (32)
Party Floor 1			41.3300			40.0000	1653.2000 (32d)
Party Ceiling			19.1400			30.0000	574.2000 (32b)
Internal Wall			65.4900			9.0000	589.4100 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7965.7999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		192.7365 (35)
Thermal bridges (Default value 0.200 * total exposed area)		21.7660 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	56.5968 (37)

Full SAP Calculation Printout



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	24.1994	24.0144	23.8331	22.9814	22.8220	22.0802	22.0802	21.9429	22.3660	22.8220	23.1444	23.4814	(38)
Heat transfer coeff	80.7962	80.6112	80.4298	79.5782	79.4188	78.6770	78.6770	78.5396	78.9627	79.4188	79.7412	80.0782	(39)
Average = Sum(39)m / 12 =												79.5774	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.9549	1.9504	1.9460	1.9254	1.9216	1.9036	1.9036	1.9003	1.9105	1.9216	1.9294	1.9375	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4421 (42)
Hot water usage for mixer showers													
66.5486	65.5485	64.0912	61.3028	59.2451	56.9503	55.6460	57.0923	58.6777	61.1416	63.9898	66.2936	(42a)	
Hot water usage for baths													
22.0383	21.7110	21.2501	20.4003	19.7639	19.0583	18.6772	19.1349	19.6332	20.3882	21.2555	21.9638	(42b)	
Hot water usage for other uses													
30.9460	29.8207	28.6954	27.5701	26.4448	25.3195	25.3195	26.4448	27.5701	28.6954	29.8207	30.9460	(42c)	
Average daily hot water use (litres/day)												109.9213	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
119.5329	117.0802	114.0367	109.2732	105.4538	101.3281	99.6426	102.6719	105.8810	110.2252	115.0661	119.2034	(44)	
Energy conte	189.3109	166.7207	175.2701	149.5895	141.9611	124.5947	120.5091	127.1293	130.5619	149.5746	163.9327	186.6438	(45)
Energy content (annual)										Total = Sum(45)m =		1825.7985	
Distribution loss (46)m = 0.15 x (45)m													
28.3966	25.0081	26.2905	22.4384	21.2942	18.6892	18.0764	19.0694	19.5843	22.4362	24.5899	27.9966	(46)	
Water storage loss (or HIU loss):													
Store volume												185.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												1.2840	(55)
Total storage loss													
39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040	(56)	
If cylinder contains dedicated solar storage													
39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040	(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													
229.1149	202.6727	215.0741	188.1095	181.7651	163.1147	160.3131	166.9333	169.0819	189.3786	202.4527	226.4478	(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	229.1149	202.6727	215.0741	188.1095	181.7651	163.1147	160.3131	166.9333	169.0819	189.3786	202.4527	226.4478	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2294.4585	(64)
Electric shower(s)												2294	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													
Heat gains from water heating, kWh/month													
94.7891	84.1962	90.1205	80.5545	79.0453	72.2438	71.9125	74.1137	74.2278	81.5767	85.3236	93.9023	(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	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	62.9939	69.7432	62.9939	65.0937	62.9939	65.0937	62.9939	62.9939	65.0937	62.9939	65.0937	62.9939	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	124.8924	126.1884	122.9225	115.9699	107.1934	98.9448	93.4342	92.1382	95.4041	102.3567	111.1332	119.3818	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	(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)	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	(71)
Water heating gains (Table 5)	127.4047	125.2920	121.1297	111.8813	106.2436	100.3385	96.6566	99.6152	103.0942	109.6462	118.5051	126.2127	(72)
Total internal gains	362.9227	368.8553	354.6778	340.5766	324.0627	309.0088	297.7164	299.3791	308.2237	322.6285	342.3636	356.2201	(73)

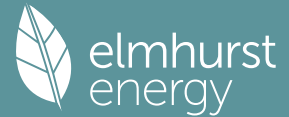
6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W
North						5.1800	10.6334	0.7600	0.7000	0.7700		20.3070 (74)
East						3.3100	19.6403	0.7600	0.7000	0.7700		23.9674 (76)
West						5.6600	19.6403	0.7600	0.7000	0.7700		40.9835 (80)
Solar gains	85.2578	165.8654	275.1896	411.0952	516.6880	535.6073	507.1073	426.2405	322.6474	196.9601	106.0374	70.3413 (83)
Total gains	448.1805	534.7207	629.8675	751.6718	840.7507	844.6160	804.8238	725.6195	630.8711	519.5886	448.4010	426.5615 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	27.3865	27.4493	27.5112	27.8056	27.8614	28.1241	28.1241	28.1733	28.0224	27.8614	27.7488	27.6320
alpha	2.8258	2.8300	2.8341	2.8537	2.8574	2.8749	2.8749	2.8782	2.8682	2.8574	2.8499	2.8421

Full SAP Calculation Printout



util living area	0.9699	0.9505	0.9114	0.8240	0.6911	0.5333	0.4076	0.4619	0.6849	0.8815	0.9534	0.9736 (86)
MIT	19.0488	19.2995	19.6967	20.1966	20.5732	20.7852	20.8564	20.8402	20.6640	20.1467	19.5139	19.0122 (87)
Th 2	20.0225	20.0248	20.0270	20.0373	20.0392	20.0482	20.0482	20.0498	20.0447	20.0392	20.0353	20.0312 (88)
util rest of house	0.9653	0.9431	0.8980	0.7980	0.6472	0.4692	0.3271	0.3781	0.6244	0.8577	0.9452	0.9695 (89)
MIT 2	18.2263	18.4748	18.8646	19.3495	19.6923	19.8756	19.9252	19.9182	19.7843	19.3156	18.6975	18.1967 (90)
Living area fraction	18.6249	18.8745	19.2679	19.7601	20.1192	20.3164	20.3765	20.3651	20.2107	19.7184	19.0932	18.5919 (91)
MIT	18.6249	18.8745	19.2679	19.7601	20.1192	20.3164	20.3765	20.3651	20.2107	19.7184	19.0932	18.5919 (92)
Temperature adjustment	19.1249	19.3745	19.7679	20.2601	20.6192	20.8164	20.8765	20.8651	20.7107	20.2184	19.5932	19.0919 (93)
adjusted MIT	19.1249	19.3745	19.7679	20.2601	20.6192	20.8164	20.8765	20.8651	20.7107	20.2184	19.5932	19.0919 (93)

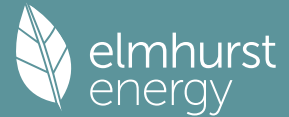
8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9602	0.9373	0.8940	0.8044	0.6744	0.5215	0.3975	0.4505	0.6678	0.8626	0.9407	0.9647 (94)
Useful gains	430.3269	501.1967	563.0989	604.6796	567.0056	440.4308	319.9437	326.9192	421.2672	448.1961	421.8252	411.5232 (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	1197.7963	1166.8064	1067.1341	904.0124	708.3506	489.0911	336.4609	350.6838	521.9951	763.8790	996.2200	1192.5198 (97)
Space heating kWh	570.9973	447.2897	375.0022	215.5197	105.1607	0.0000	0.0000	0.0000	0.0000	234.8680	413.5643	581.0615 (98a)
Space heating requirement - total per year (kWh/year)												2943.4633
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	570.9973	447.2897	375.0022	215.5197	105.1607	0.0000	0.0000	0.0000	0.0000	234.8680	413.5643	581.0615 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2943.4633
Space heating per m2										(98c) / (4) =		71.2186 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	570.9973	447.2897	375.0022	215.5197	105.1607	0.0000	0.0000	0.0000	0.0000	234.8680	413.5643	581.0615 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	570.9973	447.2897	375.0022	215.5197	105.1607	0.0000	0.0000	0.0000	0.0000	234.8680	413.5643	581.0615 (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	229.1149	202.6727	215.0741	188.1095	181.7651	163.1147	160.3131	166.9333	169.0819	189.3786	202.4527	226.4478 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	229.1149	202.6727	215.0741	188.1095	181.7651	163.1147	160.3131	166.9333	169.0819	189.3786	202.4527	226.4478 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	4.5268	4.0888	4.5268	4.3808	4.5268	4.3808	4.5268	4.3808	4.3808	4.5268	4.3808	4.5268 (231)
Lighting	13.4501	10.7901	9.7153	7.1179	5.4980	4.4919	5.0155	6.5193	8.4680	11.1104	12.5492	13.8239 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2943.4633 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												2294.4585 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												53.3000 (230c)
Total electricity for the above, kWh/year												53.3000 (231)
Electricity for lighting (calculated in Appendix L)												108.5498 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												5399.7716 (238)

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	2943.4633	0.1549	455.8181 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2294.4585	0.1410	323.5022 (264)
Space and water heating			779.3203 (265)
Pumps, fans and electric keep-hot	53.3000	0.1387	7.3934 (267)
Energy for lighting	108.5498	0.1443	15.6671 (268)
Total CO2, kg/year			802.3807 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			19.4100 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2943.4633	1.5733	4630.9899 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2294.4585	1.5213	3490.6634 (278)
Space and water heating			8121.6533 (279)
Pumps, fans and electric keep-hot	53.3000	1.5128	80.6322 (281)
Energy for lighting	108.5498	1.5338	166.4972 (282)
Total Primary energy kWh/year			8368.7828 (286)
Dwelling Primary energy Rate (DPER)			202.4900 (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	41.3300 (1b)	x 2.8500 (2b)	= 117.7905 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.3300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	117.7905 (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) = 0.1698 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4198 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3883 (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	0.4951	0.4854	0.4757	0.4271	0.4174	0.3689	0.3689	0.3592	0.3883	0.4174	0.4368	0.4563 (22b)
Effective ac	0.6226	0.6178	0.6131	0.5912	0.5871	0.5680	0.5680	0.5645	0.5754	0.5871	0.5954	0.6041 (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			10.3400	1.1450	11.8397		(27)
External Wall	66.9200	10.3400	56.5800	0.1800	10.1844		(29a)
Walls To Corridor/Stairwell	14.3100		14.3100	0.1800	2.5758		(29a)
External Rear Roof	21.9300		21.9300	0.1100	2.4123		(30)
External Front Roof	4.8900		4.8900	0.1100	0.5379		(30)
External Front Zinc Roof	0.7800		0.7800	0.1100	0.0858		(30)
Total net area of external elements Aum(A, m2)			108.8300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		27.6359		(33)
Main dwelling							
Party Wall			8.9200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							192.7365 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.4415 (36)

$$(33) + (36) + (36a) = 33.0774 \quad (37)$$
[illegible]

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	98.7341	96.6268	94.0600	90.1557	86.9856	83.5773	82.2666	84.8223	87.5178	91.0961	95.0605	98.4779 (44)
Energy conte	156.3707	137.5952	144.5667	123.4187	117.0993	102.7681	99.4944	105.0278	107.9182	123.6165	135.4311	154.1926 (45)
Energy content (annual)										Total =	Sum(45)m =	1507.4992

Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
--------------------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

[illegible]

	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)

[illegible][illegible]

202.9656	179.6809	191.1616	168.5105	163.6942	147.8599	146.0893	151.6227	153.0101	170.2114	180.5230	200.7875 (62)
22 1260	19 5684	20 4009	16 9673	15 9129	13 5312	12 6834	13 4875	13 9999	16 5044	18 6974	21 7163 (63)

[illegible][illegible][illegible]

Output from w/h

180.8396	160.1125	170.6707	151.5432	147.8813	134.3287	133.4059	138.1352	139.0102	153.7070	161.8255	179.0712 (64)
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	---------------

$$\text{Total per year (kWh/year)} = \text{Sum}(64)m = 1850.5311 \quad (64)$$

12Total per year (kWh/year)	1851 (64)
Electric shaver(s)	

[illegible]

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

Heat gains from water heating, kWh/month	80	70	85	77	76	70	70	72	71	78	81	88
	2602	4100	3443	1102	2115	2430	3578	1077	0562	3784	1043	5440 (65)

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

[illegible]

(66)m 72.1059 72.1059 72.1059 72.1059 72.1059 72.1059 72.1059 72.1059 72.1059 72.1059 72.1059 72.1059 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

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

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

124.8924 126.1884 122.9225 115.9699 107.1934 98.9448 93.4342 92.1382 95.4041 102.3567 111.1332 119.3818 (68)

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

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

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)

Water heating gains (Table 5)

Total internal gains	119.9854	118.1830	114.7101	107.0975	102.4348	97.5609	94.5669	97.0399	99.9393	105.3473	112.6449	119.0120 (72)
----------------------	----------	----------	----------	----------	----------	---------	---------	---------	---------	----------	----------	---------------

Total internal gains	355.5034	361.7463	348.2583	335.7928	320.2538	306.2311	295.6268	296.8037	305.0688	318.3297	336.5035	349.0194 (73)
----------------------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	---------------

355.5034	361.7463	348.2583	335.7928	320.2538	306.2311	295.6268	296.8037	305.0688	318.3297	336.5035	349.0194	(73)
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	------

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	3.7900	10.6334	0.6300	0.7000	0.7700	12.3164 (74)
East	2.4200	19.6403	0.6300	0.7000	0.7700	14.5256 (76)
West	4.1300	19.6403	0.6300	0.7000	0.7700	24.7896 (80)

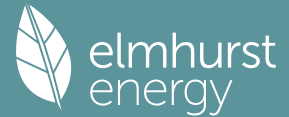
Solar gains	51.6316	100.4461	166.6534	248.9661	312.9263	324.3903	307.1269	258.1423	195.3960	119.2768	64.2153	42.5984 (83)
Total gains	407.1350	462.1924	514.9117	584.7588	633.1801	630.6215	602.7537	554.9460	500.4648	437.6065	400.7187	391.6179 (84)

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)

Full SAP Calculation Printout



tau	38.6321	38.7573	38.8808	39.4715	39.5840	40.1163	40.1163	40.2165	39.9096	39.5840	39.3570	39.1225
alpha	3.5755	3.5838	3.5921	3.6314	3.6389	3.6744	3.6744	3.6811	3.6606	3.6389	3.6238	3.6082
util living area	0.9724	0.9558	0.9220	0.8381	0.7014	0.5285	0.3940	0.4419	0.6701	0.8799	0.9546	0.9756 (86)
MIT	19.3128	19.5619	19.9433	20.4301	20.7705	20.9399	20.9842	20.9761	20.8566	20.4050	19.7929	19.2840 (87)
Th 2	19.7742	19.7776	19.7810	19.7969	19.7999	19.8139	19.8139	19.8164	19.8085	19.7999	19.7939	19.7876 (88)
util rest of house	0.9655	0.9451	0.9031	0.8009	0.6389	0.4418	0.2918	0.3345	0.5831	0.8428	0.9418	0.9695 (89)
MIT 2	17.8696	18.1831	18.6559	19.2430	19.6123	19.7789	19.8084	19.8074	19.7124	19.2343	18.4883	17.8422 (90)
Living area fraction									FLA = Living area / (4) =			0.4846 (91)
MIT	18.5691	18.8513	19.2798	19.8183	20.1736	20.3416	20.3782	20.3738	20.2669	19.8017	19.1206	18.5410 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5691	18.8513	19.2798	19.8183	20.1736	20.3416	20.3782	20.3738	20.2669	19.8017	19.1206	18.5410 (93)

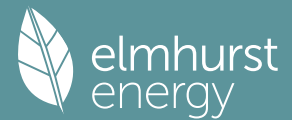
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9567	0.9349	0.8938	0.8016	0.6595	0.4815	0.3411	0.3861	0.6186	0.8429	0.9328	0.9613 (94)
Useful gains	389.4937	432.1249	460.2209	468.7479	417.5748	303.6209	205.6255	214.2859	309.5821	368.8515	373.7714	376.4483 (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	817.2864	796.5053	727.3056	612.0675	473.6672	316.6908	208.3980	218.6381	341.9143	514.3686	675.8185	811.1079 (97)
Space heating kWh	318.2778	244.8636	198.7110	103.1901	41.7327	0.0000	0.0000	0.0000	0.0000	108.2647	217.4739	323.3867 (98a)
Space heating requirement - total per year (kWh/year)												1555.9005
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	318.2778	244.8636	198.7110	103.1901	41.7327	0.0000	0.0000	0.0000	0.0000	108.2647	217.4739	323.3867 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1555.9005
Space heating per m2										(98c) / (4) =		37.6458 (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	318.2778	244.8636	198.7110	103.1901	41.7327	0.0000	0.0000	0.0000	0.0000	108.2647	217.4739	323.3867 (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)	344.8296	265.2910	215.2882	111.7986	45.2142	0.0000	0.0000	0.0000	0.0000	117.2965	235.6164	350.3648 (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	180.8396	160.1125	170.6707	151.5432	147.8813	134.3287	133.4059	138.1352	139.0102	153.7070	161.8255	179.0712 (64)
Efficiency of water heater (217)m	85.3138	85.0094	84.4018	83.2166	81.6207	79.8000	79.8000	79.8000	79.8000	83.2886	84.7233	79.8000 (216)
Fuel for water heating, kWh/month	211.9698	188.3468	202.2121	182.1070	181.1812	168.3317	167.1753	173.1018	174.1982	184.5476	191.0047	209.7622 (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	13.0889	10.5004	9.4544	6.9267	5.3504	4.3713	4.8808	6.3443	8.2406	10.8121	12.2122	13.4527 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-11.2678	-16.8004	-25.5341	-30.4288	-34.3600	-32.6732	-32.3047	-29.7377	-25.4653	-19.9802	-12.7179	-9.6399 (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	-3.8611	-8.3183	-16.8952	-25.9043	-34.7576	-35.0805	-34.6385	-29.0726	-20.9957	-12.0369	-5.2024	-3.0368 (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												1685.6993 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2233.9384 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												105.6348 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-510.7097 (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												3600.5628 (238)

Full SAP Calculation Printout



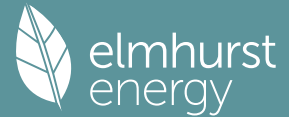
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1685.6993	0.2100	353.9969 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2233.9384	0.2100	469.1271 (264)
Space and water heating			823.1239 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	105.6348	0.1443	15.2464 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-280.9099	0.1334	-37.4713
PV Unit electricity exported	-229.7998	0.1253	-28.7981
Total			-66.2694 (269)
Total CO2, kg/year			784.0302 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.9700 (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	1685.6993	1.1300	1904.8402 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2233.9384	1.1300	2524.3504 (278)
Space and water heating			4429.1907 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	105.6348	1.5338	162.0261 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-280.9099	1.4929	-419.3781
PV Unit electricity exported	-229.7998	0.4600	-105.7029
Total			-525.0811 (283)
Total Primary energy kWh/year			4196.2365 (286)
Target Primary Energy Rate (TPER)			101.5300 (287)

Full SAP Calculation Printout



Plot Reference	Flat 5			Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 5-Baseline	Plot Type Ref	As Design - Proposed		
Plot Address	105, Raleigh Road, London, N8 0JD			SAP Version	10.2
SAP Rating	35 F	DER	18.21	TER	16.17
Environmental	86 B	% DER < TER			-12.62
CO ₂ Emissions (t/year)	0.98	DFEE	72.67	TFEE	45.60
Compliance Check	See BREL	% DFEE < TFEE			-59.37
% DPER < TPER	-119.71	DPER	189.04	TPER	86.04
Assessor Details	Mr. Paul Rothwell			Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	24.2900 (1b)	x 2.8500 (2b)	= 69.2265 (1b) - (3b)
First floor	36.2800 (1c)	x 2.7000 (2c)	= 97.9560 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	167.1825 (5)

2. Ventilation rate

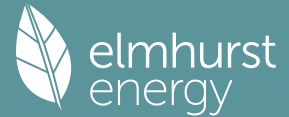
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3328 (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	0.4243	0.4160	0.4077	0.3661	0.3578	0.3162	0.3162	0.3079	0.3328	0.3578	0.3744	0.3911 (22b)
Effective ac	0.5900	0.5865	0.5831	0.5670	0.5640	0.5500	0.5500	0.5474	0.5554	0.5640	0.5701	0.5765 (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			33.1100	1.3258	43.8958		(27)
Floor Above Comm Stairwell-LF			4.9500	0.1651	0.8174	20.0000	99.0000 (28b)
Floor Above Comm Stairwell-UF			6.9200	0.1651	1.1428	20.0000	138.4000 (28b)
External Wall-Lower Floor	40.3600	16.1700	24.1900	0.1800	4.3542	60.0000	1451.4000 (29a)
External Wall-Upper Floor	64.8000	16.9400	47.8600	0.1800	8.6148	60.0000	2871.6002 (29a)
Wall To Corridor/Stairwell	10.9200		10.9200	0.1300	1.4196	9.0000	98.2800 (29a)
Wall to Lightwell	10.8000		10.8000	0.1800	1.9440	9.0000	97.2000 (29a)
External Roof-Crown Roof	35.9300		35.9300	0.1500	5.3895	9.0000	323.3700 (30)
External Roof-Mansard Roof	8.4500		8.4500	0.1500	1.2675	9.0000	76.0500 (30)
Total net area of external elements A _{um} (A, m ²)			183.1300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	68.8456		(33)
Main dwelling							
Party Wall			8.3500	0.0000	0.0000	180.0000	1503.0001 (32)
Party Floor-Lower Floor			19.3300			40.0000	773.2000 (32d)
Party Floor-Upper Floor			18.7600			40.0000	750.4000 (32d)
Internal Wall-Lower Floor			74.8400			9.0000	673.5600 (32c)
Internal Wall-Upper Floor			72.9000			9.0000	656.1000 (32c)
Internal Ceiling			12.0300			9.0000	108.2700 (32e)

Full SAP Calculation Printout



Heat capacity $C_m = \text{Sum}(A \times k)$ (28)...(30) + (32) + (32a)...(32e) = 9619.8303 (34)
Thermal mass parameter (TMP = C_m / TFA) in kJ/m²K 158.8217 (35)
Thermal bridges (Default value 0.200 * total exposed area) 36.6260 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 105.4716 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	32.5523	32.3594	32.1704	31.2824	31.1162	30.3428	30.3428	30.1995	30.6407	31.1162	31.4523	31.8037 (38)
Heat transfer coeff	138.0239	137.8311	137.6420	136.7540	136.5878	135.8144	135.8144	135.6712	136.1123	136.5878	136.9239	137.2753 (39)
Average = $\text{Sum}(39)\text{m} / 12 =$												136.7532
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.2788	2.2756	2.2724	2.2578	2.2550	2.2423	2.2423	2.2399	2.2472	2.2550	2.2606	2.2664 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9977 (42)
Hot water usage for mixer showers												
79.3574	78.1649	76.4270	73.1020	70.6482	67.9118	66.3564	68.0810	69.9716	72.9097	76.3062	79.0534 (42a)	
Hot water usage for baths												
26.2551	25.8652	25.3161	24.3037	23.5456	22.7049	22.2509	22.7961	23.3898	24.2893	25.3226	26.1663 (42b)	
Hot water usage for other uses												
36.9352	35.5921	34.2490	32.9059	31.5628	30.2197	30.2197	31.5628	32.9059	34.2490	35.5921	36.9352 (42c)	
Average daily hot water use (litres/day)												131.0850 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
142.5478	139.6222	135.9922	130.3116	125.7566	120.8364	118.8270	122.4400	126.2674	131.4481	137.2209	142.1550 (44)	
Energy content	225.7609	198.8201	209.0149	178.3900	169.2926	148.5825	143.7109	151.6063	155.7003	178.3738	195.4963	222.5804 (45)
Energy content (annual)												
Total = Sum(45)m =												2177.3291
Distribution loss (46)m = 0.15 x (45)m												
33.8641	29.8230	31.3522	26.7585	25.3939	22.2874	21.5566	22.7409	23.3550	26.7561	29.3245	33.3871 (46)	
Water storage loss (or HIU loss):												
Store volume												185.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												1.2840 (55)
Total storage loss												
39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040 (56)	
If cylinder contains dedicated solar storage												
39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040 (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												
265.5649	234.7721	248.8189	216.9100	209.0966	187.1025	183.5149	191.4103	194.2203	218.1778	234.0163	262.3844 (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												
265.5649	234.7721	248.8189	216.9100	209.0966	187.1025	183.5149	191.4103	194.2203	218.1778	234.0163	262.3844 (64)	
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2645.9891 (64)
Electric shower(s)												2646 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
106.9087	94.8693	101.3406	90.1307	88.1330	80.2197	79.6271	82.2523	82.5864	91.1525	95.8185	105.8512 (65)	

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

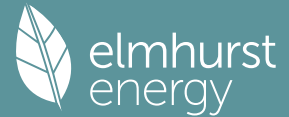
Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.9558	97.3796	87.9558	90.8876	87.9558	90.8876	87.9558	87.9558	90.8876	87.9558	90.8876	87.9558 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.3822	176.1917	171.6317	161.9241	149.6699	138.1527	130.4585	128.6489	133.2089	142.9166	155.1708	166.6880 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082 (71)
Water heating gains (Table 5)	143.6945	141.1745	136.2105	125.1815	118.4583	111.4162	107.0257	110.5542	114.7033	122.5168	133.0813	142.2731 (72)
Total internal gains	461.9980	470.7114	451.7636	433.9588	412.0495	393.4221	378.4054	380.1244	391.7654	409.3547	435.1053	452.8824 (73)

6. Solar gains

[Jan]												
	Area		Solar flux		g		FF		Access		Gains	
	m ²		Table 6a		W/m ²		Specific data		factor		W	
			or Table 6b				or Table 6c		Table 6d			
North	8.0200		10.6334		0.7600		0.7000		0.7700		31.4406 (74)	
East	8.3500		19.6403		0.7600		0.7000		0.7700		60.4615 (76)	
South	15.6400		46.7521		0.7600		0.7000		0.7700		269.5767 (78)	
West	1.1000		19.6403		0.7600		0.7000		0.7700		7.9650 (80)	
Solar gains	369.4438	635.4385	884.9305	1121.1209	1277.2890	1277.2712	1227.6081	1109.8596	966.6215	706.5513	443.6462	315.4201 (83)
Total gains	831.4418	1106.1499	1336.6941	1555.0797	1689.3385	1670.6933	1606.0136	1489.9840	1358.3868	1115.9060	878.7514	768.3025 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	19.3602	19.3873	19.4140	19.5400	19.5638	19.6752	19.6752	19.6960	19.6321	19.5638	19.5158	19.4658
alpha	2.2907	2.2925	2.2943	2.3027	2.3043	2.3117	2.3117	2.3131	2.3088	2.3043	2.3011	2.2977
util living area	0.9359	0.8869	0.8204	0.7186	0.5935	0.4580	0.3474	0.3844	0.5623	0.7762	0.9014	0.9452 (86)
MIT	18.6574	19.0743	19.5642	20.0867	20.4784	20.7164	20.8102	20.7932	20.6125	20.0617	19.2537	18.5752 (87)
Th 2	19.8606	19.8622	19.8638	19.8711	19.8725	19.8789	19.8789	19.8800	19.8764	19.8725	19.8697	19.8668 (88)
util rest of house	0.9271	0.8724	0.7981	0.6846	0.5451	0.3922	0.2668	0.3014	0.4963	0.7402	0.8861	0.9375 (89)
MIT 2	17.7350	18.1404	18.6114	19.1055	19.4559	19.6570	19.7224	19.7144	19.5811	19.0995	18.3287	17.6591 (90)
Living area fraction	fLA = Living area / (4) = 0.3730 (91)											
MIT	18.0790	18.4887	18.9667	19.4715	19.8372	20.0521	20.1281	20.1168	19.9658	19.4584	18.6737	18.0008 (92)
Temperature adjustment	0.5000											
adjusted MIT	18.5790	18.9887	19.4667	19.9715	20.3372	20.5521	20.6281	20.6168	20.4658	19.9584	19.1737	18.5008 (93)

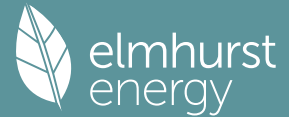
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9150	0.8595	0.7894	0.6878	0.5658	0.4326	0.3215	0.3570	0.5322	0.7432	0.8751	0.9261 (94)
Useful gains	760.7439	950.7613	1055.1970	1069.6532	955.7576	722.7434	516.2785	531.9065	722.9236	829.2964	768.9579	711.5608 (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	1970.8440	1941.8620	1784.7667	1514.0682	1179.7411	808.3848	547.0698	572.0966	866.4606	1278.2428	1653.1741	1963.1441 (97)
Space heating kWh	900.3145	666.0197	542.7999	319.9788	166.6437	0.0000	0.0000	0.0000	0.0000	334.0161	636.6357	931.1780 (98a)
Space heating requirement - total per year (kWh/year)												4497.5864
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	900.3145	666.0197	542.7999	319.9788	166.6437	0.0000	0.0000	0.0000	0.0000	334.0161	636.6357	931.1780 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4497.5864
Space heating per m2												(98c) / (4) = 74.2544 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	900.3145	666.0197	542.7999	319.9788	166.6437	0.0000	0.0000	0.0000	0.0000	334.0161	636.6357	931.1780 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	900.3145	666.0197	542.7999	319.9788	166.6437	0.0000	0.0000	0.0000	0.0000	334.0161	636.6357	931.1780 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	265.5649	234.7721	248.8189	216.9100	209.0966	187.1025	183.5149	191.4103	194.2203	218.1778	234.0163	262.3844 (64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	265.5649	234.7721	248.8189	216.9100	209.0966	187.1025	183.5149	191.4103	194.2203	218.1778	234.0163	262.3844 (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	4.5268	4.0888	4.5268	4.3808	4.5268	4.3808	4.5268	4.5268	4.3808	4.5268	4.3808	4.5268 (231)
Lighting	21.2794	17.0712	15.3707	11.2612	8.6985	7.1067	7.9351	10.3143	13.3972	17.5779	19.8542	21.8709 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												4497.5864 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												2645.9891 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												53.3000 (230c)
Total electricity for the above, kWh/year												53.3000 (231)
Electricity for lighting (calculated in Appendix L)												171.7372 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)

Full SAP Calculation Printout



Appendix Q - special features
Energy saved or generated
Energy used
Total delivered energy for all uses

-0.0000 (236)
0.0000 (237)
7368.6126 (238)

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	4497.5864	0.1551	697.4569 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	2645.9891	0.1411	373.2714 (264)
Space and water heating			1070.7283 (265)
Pumps, fans and electric keep-hot	53.3000	0.1387	7.3934 (267)
Energy for lighting	171.7372	0.1443	24.7870 (268)
Total CO ₂ , kg/year			1102.9087 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			18.2100 (273)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	4497.5864	1.5741	7079.5983 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2645.9891	1.5216	4026.2340 (278)
Space and water heating			11105.8323 (279)
Pumps, fans and electric keep-hot	53.3000	1.5128	80.6322 (281)
Energy for lighting	171.7372	1.5338	263.4163 (282)
Total Primary energy kWh/year			11449.8809 (286)
Dwelling Primary energy Rate (DPER)			189.0400 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	24.2900 (1b)	x 2.8500 (2b)	= 69.2265 (1b) - (3b)
First floor	36.2800 (1c)	x 2.7000 (2c)	= 97.9560 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 167.1825 (5)

2. Ventilation rate

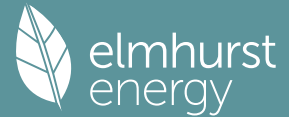
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1196 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3696 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2865 (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	0.3652	0.3581	0.3509	0.3151	0.3079	0.2721	0.2721	0.2650	0.2865	0.3079	0.3223	0.3366 (22b)
Effective ac	0.5667	0.5641	0.5616	0.5496	0.5474	0.5370	0.5370	0.5351	0.5410	0.5474	0.5519	0.5566 (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							
TER Opening Type			15.1400	1.1450	17.3359		(27)
Floor Above Comm Stairwell-LF			4.9500	0.1300	0.6435		(28b)
Floor Above Comm Stairwell-UF			6.9200	0.1300	0.8996		(28b)
External Wall-Lower Floor	40.3600	7.3800	32.9800	0.1800	5.9364		(29a)
External Wall-Upper Floor	64.8000	7.7600	57.0400	0.1800	10.2672		(29a)
Wall To Corridor/Stairwell	10.9200		10.9200	0.1800	1.9656		(29a)

Full SAP Calculation Printout



Wall to Lightwell	10.8000	10.8000	0.1800	1.9440	(29a)
External Roof-Crown Roof	35.9300	35.9300	0.1100	3.9523	(30)
External Roof-Mansard Roof	8.4500	8.4500	0.1100	0.9295	(30)
Total net area of external elements Aum(A, m2)	183.1300	183.1300			(31)
Fabric heat loss, W/K = Sum (A x U)		(26)...(30) + (32) =	43.8740		(33)
Main dwelling					
Party Wall	8.3500	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	158.8217	(35)
Thermal bridges (User defined value 0.050 * total exposed area)	9.1565	(36)
Point Thermal bridges	0.0000	(36a) =
Total fabric heat loss	53.0305	(33) + (36) + (36a) = (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	31.2650	31.1221	30.9820	30.3241	30.2011	29.6281	29.6281	29.5220	29.8488	30.2011	30.4501	30.7104	(38)
Average = Sum(39)m / 12 =	84.2955	84.1526	84.0125	83.3546	83.2315	82.6585	82.6585	82.5524	82.8793	83.2315	83.4805	83.7409	(39)
												83.3540	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3917	1.3893	1.3870	1.3762	1.3741	1.3647	1.3647	1.3629	1.3683	1.3741	1.3782	1.3825	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.9977 (42)
Hot water usage for mixer showers	57.7145	56.8472	55.5833	53.1651	51.3805	49.3904	48.2592	49.5135	50.8884	53.0253	55.4954	57.4934 (42a)	
Hot water usage for baths	24.9424	24.5719	24.0503	23.0885	22.3683	21.5697	21.1383	21.6563	22.2203	23.0748	24.0565	24.8580 (42b)	
Hot water usage for other uses	35.0885	33.8125	32.5366	31.2607	29.9847	28.7088	28.7088	29.9847	31.2607	32.5366	33.8125	35.0885 (42c)	
Average daily hot water use (litres/day)												108.2350 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	117.7453	115.2316	112.1702	107.5142	103.7335	99.6688	98.1063	101.1545	104.3694	108.6367	113.3644	117.4399 (44)	
Distribution loss (46)m = 0.15 x (45)m	186.4798	164.0883	172.4014	147.1816	139.6452	122.5544	118.6510	125.2504	128.6979	147.4190	161.5084	183.8825 (45)	
Water storage loss (or HIU loss):	27.9720	24.6132	25.8602	22.0772	20.9468	18.3832	17.7977	18.7876	19.3047	22.1128	24.2263	27.5824 (46)	
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	233.0747	206.1740	218.9963	192.2734	186.2401	167.6463	165.2459	171.8453	173.7898	194.0139	206.6002	230.4774 (62)	
WWHRS	-26.3847	-23.3348	-24.4349	-20.2330	-18.8565	-16.1356	-15.1246	-16.0835	-16.6945	-19.6810	-22.2962	-25.8961 (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	206.6901	182.8392	194.5614	172.0404	167.3837	151.5107	150.1214	155.7619	157.0953	174.3329	184.3040	204.5813 (64)	
12Total per year (kWh/year)												2101.2221 (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	99.2805	88.2279	94.5994	85.0113	83.7080	76.8228	76.7274	78.9217	78.8655	86.2927	89.7750	98.4169 (65)	

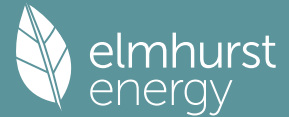
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.9558	87.3796	87.9558	90.8876	87.9558	90.8876	87.9558	87.9558	90.8876	87.9558	90.8876	87.9558	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.3822	176.1917	171.6317	161.9241	149.6699	138.1527	130.4585	128.6489	133.2089	142.9166	155.1708	166.6880	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	(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)	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	(71)
Water heating gains (Table 5)	133.4415	131.2916	127.1497	118.0713	112.5107	106.6984	103.1282	106.0775	109.5355	115.9848	124.6875	132.2807	(72)
Total internal gains	451.7450	460.8285	442.7028	426.8486	406.1019	388.7042	374.5080	375.6478	386.5976	402.8228	426.7115	442.8900	(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	3.6800	10.6334	0.6300	0.7000	0.7700	11.9589 (74)
East	3.8100	19.6403	0.6300	0.7000	0.7700	22.8688 (76)
South	7.1500	46.7521	0.6300	0.7000	0.7700	102.1595 (78)
West	0.5000	19.6403	0.6300	0.7000	0.7700	3.0012 (80)

Full SAP Calculation Printout



Solar gains	139.9884	240.7722	335.3019	424.8059	484.0029	484.0096	465.1844	420.5465	366.2567	267.7150	168.1035	119.5190 (83)
Total gains	591.7334	701.6006	778.0047	851.6544	890.1048	872.7139	839.6924	796.1943	752.8542	670.5378	594.8150	562.4090 (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	31.7001	31.7539	31.8069	32.0579	32.1053	32.3279	32.3279	32.3694	32.2418	32.1053	32.0096	31.9100
alpha	3.1133	3.1169	3.1205	3.1372	3.1404	3.1552	3.1552	3.1580	3.1495	3.1404	3.1340	3.1273
util living area	0.9598	0.9336	0.8941	0.8181	0.7031	0.5500	0.4151	0.4517	0.6467	0.8451	0.9359	0.9651 (86)
MIT	19.0333	19.3601	19.7749	20.2670	20.6515	20.8843	20.9642	20.9526	20.7999	20.2970	19.5816	18.9719 (87)
Th 2	19.7697	19.7715	19.7733	19.7817	19.7832	19.7905	19.7905	19.7919	19.7877	19.7832	19.7800	19.7767 (88)
util rest of house	0.9515	0.9203	0.8728	0.7816	0.6442	0.4636	0.3084	0.3432	0.5636	0.8056	0.9207	0.9577 (89)
MIT 2	17.5428	17.9500	18.4614	19.0536	19.4833	19.7164	19.7762	19.7713	19.6454	19.1068	18.2398	17.4704 (90)
Living area fraction									fLA = Living area / (4) =			0.3730 (91)
MIT	18.0987	18.4759	18.9513	19.5061	19.9190	20.1520	20.2193	20.2119	20.0760	19.5507	18.7403	18.0304 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0987	18.4759	18.9513	19.5061	19.9190	20.1520	20.2193	20.2119	20.0760	19.5507	18.7403	18.0304 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9361	0.9025	0.8556	0.7723	0.6513	0.4906	0.3473	0.3822	0.5848	0.7968	0.9041	0.9434 (94)
Useful gains	553.9373	633.1769	665.6964	657.6984	579.7253	428.1547	291.6425	304.3167	440.2866	534.2787	537.7676	530.5780 (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	1163.1702	1142.4443	1046.0631	884.0694	684.0779	458.9210	299.1662	314.6821	495.2832	744.9776	971.7350	1158.1696 (97)
Space heating kWh	453.2693	342.2276	282.9928	162.9872	77.6383	0.0000	0.0000	0.0000	0.0000	156.7600	312.4565	466.9281 (98a)
Space heating requirement - total per year (kWh/year)												2255.2598
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	453.2693	342.2276	282.9928	162.9872	77.6383	0.0000	0.0000	0.0000	0.0000	156.7600	312.4565	466.9281 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2255.2598
Space heating per m2										(98c) / (4) =		37.2339 (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	453.2693	342.2276	282.9928	162.9872	77.6383	0.0000	0.0000	0.0000	0.0000	156.7600	312.4565	466.9281 (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)	491.0827	370.7775	306.6011	176.5841	84.1152	0.0000	0.0000	0.0000	0.0000	169.8374	338.5227	505.8809 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	206.6901	182.8392	194.5614	172.0404	167.3837	151.5107	150.1214	155.7619	157.0953	174.3329	184.3040	204.5813 (64)
Efficiency of water heater (217)m	85.7704	85.4443	84.8990	83.9387	82.4478	79.8000	79.8000	79.8000	79.8000	83.8223	85.2335	85.8502 (217)
Fuel for water heating, kWh/month	240.9806	213.9863	229.1681	204.9595	203.0178	189.8630	188.1220	195.1903	196.8612	207.9791	216.2342	238.3004 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	18.2755	14.6613	13.2008	9.6715	7.4705	6.1035	6.8149	8.8582	11.5060	15.0965	17.0514	18.7834 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-16.3112	-24.2113	-36.6245	-43.4160	-48.7975	-46.2879	-45.7349	-42.1943	-36.2920	-28.6673	-18.3626	-13.9646 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-5.8604	-12.6008	-25.5565	-39.1414	-52.4959	-53.0065	-52.3717	-43.9935	-31.7975	-18.2544	-7.8999	-4.6134 (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												2443.4018 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2524.6625 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												147.4935 (232)

Full SAP Calculation Printout



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

PV generation	-748.4560 (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	4453.1018 (238)

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

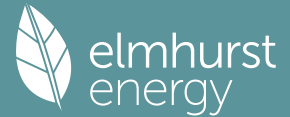
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2443.4018	0.2100	513.1144 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2524.6625	0.2100	530.1791 (264)
Space and water heating			1043.2935 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	147.4935	0.1443	21.2879 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-400.8642	0.1335	-53.5181
PV Unit electricity exported	-347.5918	0.1253	-43.5648
Total			-97.0829 (269)
Total CO2, kg/year			979.4277 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.1700 (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	2443.4018	1.1300	2761.0440 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2524.6625	1.1300	2852.8687 (278)
Space and water heating			5613.9126 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	147.4935	1.5338	226.2305 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-400.8642	1.4934	-598.6333
PV Unit electricity exported	-347.5918	0.4600	-159.9036
Total			-758.5369 (283)
Total Primary energy kWh/year			5211.7070 (286)
Target Primary Energy Rate (TPER)			86.0400 (287)

ii. Be Lean

Full SAP Calculation Printout



Plot Reference	Flat 1			Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 1-Be Lean	Plot Type Ref	As Design - Proposed		
Plot Address	105, Raleigh Road, London, N8 0JD			SAP Version	10.2
SAP Rating	66 D	DER	10.44	TER	18.83
Environmental	93 A	% DER < TER			44.56
CO ₂ Emissions (t/year)	0.46	DFEE	73.13	TFEE	53.25
Compliance Check	See BREL	% DFEE < TFEE			-37.34
% DPER < TPER	-7.63	DPER	108.24	TPER	100.56
Assessor Details	Mr. Paul Rothwell			Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0500 (1b)	3.2200 (2b)	161.1610 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0500		161.1610 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 161.1610 (5)

2. Ventilation rate

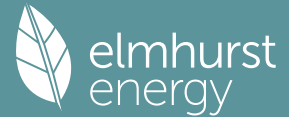
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1241 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3241 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2512 (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	0.3203	0.3140	0.3077	0.2763	0.2700	0.2386	0.2386	0.2323	0.2512	0.2700	0.2826	0.2951 (22b)
Effective ac	0.5513	0.5493	0.5473	0.5382	0.5365	0.5285	0.5285	0.5270	0.5315	0.5365	0.5399	0.5436 (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							
Glazed Door			16.8000	1.1450	19.2366		(27)
Heatloss Floor			50.0500	0.1200	6.0060	110.0000	5505.5000 (28)
External Wall	28.4600	16.8000	11.6600	0.1700	1.9822	60.0000	699.5999 (29a)
Basement Walls	52.0700		52.0700	0.1700	8.8519	60.0000	3124.2000 (29a)
Walls To CorridorStairwell	6.1800		6.1800	0.1600	0.9888	9.0000	55.6200 (29a)
External Roof	4.2200		4.2200	0.1100	0.4642	9.0000	37.9800 (30)
Total net area of external elements Aum(A, m ²)			140.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 37.5297		(33)
Main dwelling							
Party Wall			15.8400	0.0000	0.0000	110.0000	1742.4000 (32)
Party Ceiling			47.1500			30.0000	1414.5000 (32b)
Internal Wall			65.5200			9.0000	589.6800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		13169.4799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.1265 (35)
Thermal bridges (Default value 0.200 * total exposed area)							28.1960 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		65.7257 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							

Full SAP Calculation Printout



(38)m	Jan 29.3188	Feb 29.2129	Mar 29.1091	Apr 28.6215	May 28.5303	Jun 28.1057	Jul 28.1057	Aug 28.0270	Sep 28.2692	Oct 28.5303	Nov 28.7149	Dec 28.9078	(38)
Heat transfer coeff	95.0446	94.9386	94.8348	94.3473	94.2561	93.8314	93.8314	93.7528	93.9950	94.2561	94.4406	94.6335	(39)
Average = Sum(39)m / 12 =												94.3468	

HLP	Jan 1.8990	Feb 1.8969	Mar 1.8948	Apr 1.8851	May 1.8832	Jun 1.8748	Jul 1.8748	Aug 1.8732	Sep 1.8780	Oct 1.8832	Nov 1.8869	Dec 1.8908	(40)
HLP (average)												1.8851	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6916	(42)
Hot water usage for mixer showers	72.2997	71.2132	69.6299	66.6006	64.3650	61.8720	60.4549	62.0262	63.7486	66.4254	69.5198	72.0227	(42a)	
Hot water usage for baths	23.9316	23.5762	23.0757	22.1529	21.4619	20.6956	20.2818	20.7788	21.3199	22.1398	23.0816	23.8507	(42b)	
Hot water usage for other uses	33.6352	32.4121	31.1890	29.9659	28.7428	27.5197	27.5197	28.7428	29.9659	31.1890	32.4121	33.6352	(42c)	
Average daily hot water use (litres/day)												119.4237	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	129.8665	127.2014	123.8946	118.7193	114.5696	110.0873	108.2563	111.5477	115.0344	119.7542	125.0135	129.5086	(44)	
Energy content (annual)	205.6768	181.1332	190.4213	162.5208	154.2328	135.3651	130.9266	138.1194	141.8489	162.5053	178.1046	202.7791	(45)	
Distribution loss (46)m = 0.15 x (45)m	30.8515	27.1700	28.5632	24.3781	23.1349	20.3048	19.6390	20.7179	21.2773	24.3758	26.7157	30.4169	(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	205.6768	181.1332	190.4213	162.5208	154.2328	135.3651	130.9266	138.1194	141.8489	162.5053	178.1046	202.7791	(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	205.6768	181.1332	190.4213	162.5208	154.2328	135.3651	130.9266	138.1194	141.8489	162.5053	178.1046	202.7791	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1983.6339	(64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000	(64a)	
Heat gains from water heating, kWh/month	68.3875	60.2268	63.3151	54.0382	51.2824	45.0089	43.5331	45.9247	47.1648	54.0330	59.2198	67.4241	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 84.5787	Feb 84.5787	Mar 84.5787	Apr 84.5787	May 84.5787	Jun 84.5787	Jul 84.5787	Aug 84.5787	Sep 84.5787	Oct 84.5787	Nov 84.5787	Dec 84.5787	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.3281	82.2918	74.3281	76.8057	74.3281	76.8057	74.3281	74.3281	76.8057	74.3281	76.8057	74.3281	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.3638	148.8930	145.0395	136.8359	126.4804	116.7476	110.2455	108.7163	112.5698	120.7734	131.1290	140.8617	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	(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)	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	(71)
Water heating gains (Table 5)	91.9187	89.6232	85.1009	75.0530	68.9280	62.5124	58.5122	61.7267	65.5066	72.6250	82.2497	90.6237	(72)
Total internal gains	364.9842	372.1816	355.8421	340.0682	321.1100	304.4393	291.4595	293.1448	303.2557	319.1001	341.5580	357.1872	(73)

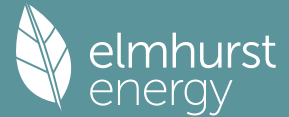
6. Solar gains

[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				7.8700	10.6334		0.7600		0.7000		0.7700		30.8526 (74)
West				8.9300	19.6403		0.7600		0.7000		0.7700		64.6612 (80)
Solar gains	95.5138	185.4518	308.5015	464.7406	589.1187	613.2246	579.5416	483.6012	362.7357	220.2774	118.6855	78.8944	(83)
Total gains	460.4980	557.6334	664.3437	804.8089	910.2287	917.6639	871.0011	776.7460	665.9915	539.3775	460.2435	436.0816	(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	38.4892	38.5321	38.5743	38.7737	38.8112	38.9868	38.9868	39.0195	38.9190	38.8112	38.7353	38.6564
alpha	3.5659	3.5688	3.5716	3.5849	3.5874	3.5991	3.5991	3.6013	3.5946	3.5874	3.5824	3.5771
util living area	0.9914	0.9824	0.9601	0.8945	0.7671	0.5971	0.4565	0.5234	0.7719	0.9436	0.9847	0.9929 (86)
MIT	19.3716	19.5759	19.9077	20.3377	20.6702	20.8424	20.8935	20.8806	20.7302	20.2698	19.7396	19.3342 (87)
Th 2	20.0505	20.0516	20.0526	20.0575	20.0584	20.0626	20.0626	20.0634	20.0610	20.0584	20.0565	20.0546 (88)
util rest of house	0.9896	0.9789	0.9519	0.8730	0.7224	0.5260	0.3662	0.4288	0.7104	0.9277	0.9810	0.9914 (89)

Full SAP Calculation Printout



MIT 2	18.5441	18.7476	19.0754	19.4930	19.7944	19.9361	19.9689	19.9636	19.8560	19.4378	18.9156	18.5101 (90)
Living area fraction									FLA = Living area / (4) =			0.5415 (91)
MIT	18.9922	19.1961	19.5260	19.9504	20.2686	20.4268	20.4695	20.4601	20.3293	19.8883	19.3618	18.9563 (92)
Temperature adjustment												0.3000
adjusted MIT	19.2922	19.4961	19.8260	20.2504	20.5686	20.7268	20.7695	20.7601	20.6293	20.1883	19.6618	19.2563 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9879	0.9764	0.9496	0.8778	0.7476	0.5773	0.4349	0.5002	0.7493	0.9302	0.9791	0.9899	(94)
Useful gains	454.9147	544.4893	630.8791	706.4341	680.4575	529.7372	378.8276	388.5326	499.0412	501.7096	450.6421	431.6812	(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	1424.9232	1385.7314	1263.7735	1070.8803	835.9220	574.8881	391.2306	408.7744	613.7257	903.7541	1186.3420	1424.8350	(97)
Space heating kWh	721.6863	565.3147	470.8734	262.4012	115.6656	0.0000	0.0000	0.0000	0.0000	299.1211	529.7039	738.9064	(98a)
Space heating requirement - total per year (kWh/year)												3703.6726	
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	721.6863	565.3147	470.8734	262.4012	115.6656	0.0000	0.0000	0.0000	0.0000	299.1211	529.7039	738.9064	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3703.6726	
Space heating per m2										(98c) / (4) =		73.9995	(99)

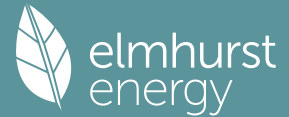
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)													170.0000 (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	721.6863	565.3147	470.8734	262.4012	115.6656	0.0000	0.0000	0.0000	0.0000	299.1211	529.7039	738.9064	(98)
Space heating efficiency (main heating system 1)	170.0000	170.0000	170.0000	170.0000	170.0000	0.0000	0.0000	0.0000	0.0000	170.0000	170.0000	170.0000	(210)
Space heating fuel (main heating system)	424.5214	332.5381	276.9844	154.3537	68.0386	0.0000	0.0000	0.0000	0.0000	175.9536	311.5905	434.6508	(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	205.6768	181.1332	190.4213	162.5208	154.2328	135.3651	130.9266	138.1194	141.8489	162.5053	178.1046	202.7791	(64)
Efficiency of water heater	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	(216)
Fuel for water heating, kWh/month	120.9863	106.5489	112.0126	95.6005	90.7252	79.6265	77.0157	81.2467	83.4405	95.5913	104.7674	119.2818	(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	17.0287	13.6610	12.3003	9.0117	6.9609	5.6871	6.3500	8.2539	10.7210	14.0666	15.8881	17.5020	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2178.6310	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												170.0000	
Water heating fuel used												1166.8435	(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)												137.4313	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												3482.9057	(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	2178.6310	0.1550	337.6633	(261)
Total CO2 associated with community systems			0.0000	(373)

Full SAP Calculation Printout



Water heating (other fuel)	1166.8435	0.1416	165.1997 (264)
Space and water heating			502.8629 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	137.4313	0.1443	19.8356 (268)
Total CO2, kg/year			522.6985 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.4400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2178.6310	1.5738	3428.7345 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1166.8435	1.5235	1777.7312 (278)
Space and water heating			5206.4657 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	137.4313	1.5338	210.7966 (282)
Total Primary energy kWh/year			5417.2623 (286)
Dwelling Primary energy Rate (DPER)			108.2400 (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	50.0500 (1b)	x 3.2200 (2b)	= 161.1610 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 161.1610 (5)

2. Ventilation rate

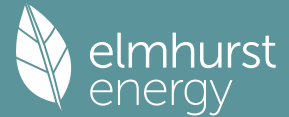
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) =	Air changes per hour 20.0000 / (5) = 0.1241 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3741 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2899 (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	0.3697	0.3624	0.3552	0.3189	0.3117	0.2754	0.2754	0.2682	0.2899	0.3117	0.3262	0.3407 (22b)
Effective ac	0.5683	0.5657	0.5631	0.5509	0.5486	0.5379	0.5379	0.5360	0.5420	0.5486	0.5532	0.5580 (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			12.5100	1.1450	14.3244		(27)
Heatloss Floor			50.0500	0.1300	6.5065		(28)
External Wall	28.4600	12.5100	15.9500	0.1800	2.8710		(29a)
Basement Walls	52.0700		52.0700	0.1800	9.3726		(29a)
Walls To CorridorStairwell	6.1800		6.1800	0.1800	1.1124		(29a)
External Roof	4.2200		4.2200	0.1100	0.4642		(30)
Total net area of external elements Aum(A, m2)			140.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 34.6511		(33)
Main dwelling							
Party Wall			15.8400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.1265 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							7.0490 (36)
Point Thermal bridges						(36a) = 0.0000	
Total fabric heat loss						(33) + (36) + (36a) = 41.7001	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	30.2252	30.0841	29.9458	29.2962	29.1746	28.6089	28.6089
Heat transfer coeff	71.9253	71.7842	71.6459	70.9963	70.8748	70.3090	70.3090
						70.2042	70.2042
						70.5269	70.5269
						70.8748	70.8748
						71.1207	71.1207
						71.3777	71.3777

Full SAP Calculation Printout



Average = Sum(39)m / 12 =

70.9957

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.4371	1.4343	1.4315	1.4185	1.4161	1.4048	1.4048	1.4027	1.4091	1.4161	1.4210	1.4261	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6916 (42)
Hot water usage for mixer showers												
52.5816	51.7914	50.6399	48.4368	46.8109	44.9978	43.9672	45.1099	46.3626	48.3094	50.5599	52.3801 (42a)	
Hot water usage for baths												
22.7350	22.3974	21.9219	21.0452	20.3888	19.6608	19.2677	19.7398	20.2539	21.0328	21.9275	22.6582 (42b)	
Hot water usage for other uses												
31.9534	30.7915	29.6295	28.4676	27.3056	26.1437	26.1437	27.3056	28.4676	29.6295	30.7915	31.9534 (42c)	
Average daily hot water use (litres/day)												98.6060 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	107.2700	104.9803	102.1914	97.9496	94.5053	90.8023	89.3785	92.1554	95.0841	98.9717	103.2789	106.9917 (44)
Energy content (annual)	169.8895	149.4905	157.0643	134.0881	127.2223	111.6520	108.0956	114.1076	117.2482	134.3037	147.1397	167.5232 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1637.8248
25.4834	22.4236	23.5596	20.1132	19.0833	16.7478	16.2143	17.1161	17.5872	20.1456	22.0710	25.1285 (46)	
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	216.4844	191.5762	203.6592	179.1799	173.8172	156.7439	154.6905	160.7025	162.3401	180.8986	192.2315	214.1181 (62)
WWHRS	-24.0381	-21.2595	-22.2617	-18.4336	-17.1794	-14.7006	-13.7794	-14.6531	-15.2098	-17.9307	-20.3133	-23.5930 (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	192.4463	170.3167	181.3975	160.7463	156.6378	142.0433	140.9111	146.0495	147.1303	162.9679	171.9183	190.5251 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 1963 (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	93.7642	83.3742	89.4998	80.6578	79.5773	73.1978	73.2177	75.2167	75.0585	81.9319	84.9974	92.9774 (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	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	74.3281	82.2918	74.3281	76.8057	74.3281	76.8057	74.3281	74.3281	76.8057	74.3281	76.8057	74.3281 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.3638	148.8930	145.0395	136.8359	126.4804	116.7476	110.2455	108.7163	112.5698	120.7734	131.1290	140.8617 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579 (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)												
	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629 (71)
Water heating gains (Table 5)												
	126.0271	124.0687	120.2954	112.0247	106.9588	101.6636	98.4109	101.0977	104.2479	110.1235	118.0520	124.9696 (72)
Total internal gains												
	399.0926	406.6271	391.0367	377.0399	359.1409	343.5905	331.3581	332.5158	341.9971	356.5986	377.3602	391.5330 (73)

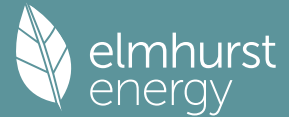
6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
North					5.8600	10.6334	0.6300	0.7000	0.7700	19.0433 (74)		
West					6.6500	19.6403	0.6300	0.7000	0.7700	39.9154 (80)		
Solar gains	58.9587	114.4757	190.4316	286.8741	363.6491	378.5287	357.7372	298.5160	223.9091	135.9728	73.2622	48.6999 (83)
Total gains	458.0513	521.1028	581.4683	663.9140	722.7900	722.1192	689.0953	631.0318	565.9062	492.5714	450.6224	440.2329 (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	50.8609	50.9609	51.0593	51.5265	51.6148	52.0302	52.0302	52.1078	51.8694	51.6148	51.4364	51.2511
alpha	4.3907	4.3974	4.4040	4.4351	4.4410	4.4687	4.4687	4.4739	4.4580	4.4410	4.4291	4.4167
util living area	0.9910	0.9832	0.9643	0.9039	0.7767	0.5925	0.4419	0.4990	0.7504	0.9377	0.9830	0.9924 (86)
MIT	19.5368	19.7396	20.0628	20.4913	20.8080	20.9564	20.9905	20.9841	20.8781	20.4592	19.9287	19.5047 (87)
Th 2	19.7350	19.7372	19.7393	19.7492	19.7510	19.7597	19.7597	19.7613	19.7563	19.7510	19.7473	19.7434 (88)
util rest of house	0.9879	0.9775	0.9517	0.8711	0.7091	0.4906	0.3210	0.3711	0.6535	0.9087	0.9761	0.9898 (89)

Full SAP Calculation Printout



MIT 2	18.0825	18.3402	18.7455	19.2654	19.6045	19.7381	19.7573	19.7567	19.6829	19.2443	18.5893	18.0474 (90)
Living area fraction									FLA = Living area / (4) =			0.5415 (91)
MIT	18.8699	19.0979	19.4588	19.9292	20.2561	20.3978	20.4250	20.4213	20.3300	19.9021	19.3145	18.8365 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8699	19.0979	19.4588	19.9292	20.2561	20.3978	20.4250	20.4213	20.3300	19.9021	19.3145	18.8365 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9850	0.9737	0.9483	0.8764	0.7383	0.5445	0.3867	0.4405	0.7014	0.9129	0.9729	0.9872	(94)
Useful gains	451.1608	507.4048	551.3968	581.8769	533.6423	393.2144	266.4710	277.9881	396.9212	449.6572	438.4288	434.5779	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1047.9484	1019.1887	928.4423	783.0318	606.4149	407.6353	268.9328	282.3100	439.3858	659.2827	868.7051	1044.7171	(97)
Space heating kWh	444.0099	343.9188	280.5218	144.8315	54.1428	0.0000	0.0000	0.0000	0.0000	155.9614	309.7990	453.9436	(98a)
Space heating requirement - total per year (kWh/year)												2187.1289	
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	444.0099	343.9188	280.5218	144.8315	54.1428	0.0000	0.0000	0.0000	0.0000	155.9614	309.7990	453.9436	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2187.1289	
Space heating per m2										(98c) / (4) =		43.6989	(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	444.0099	343.9188	280.5218	144.8315	54.1428	0.0000	0.0000	0.0000	0.0000	155.9614	309.7990	453.9436	(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)	481.0509	372.6098	303.9240	156.9139	58.6596	0.0000	0.0000	0.0000	0.0000	168.9723	335.6435	491.8132	(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	192.4463	170.3167	181.3975	160.7463	156.6378	142.0433	140.9111	146.0495	147.1303	162.9679	171.9183	190.5251	(64)
Efficiency of water heater													79.8000 (216)
(217)m	85.8716	85.6024	85.0339	83.8267	81.9330	79.8000	79.8000	79.8000	79.8000	83.9613	85.3641	85.9348	(217)
Fuel for water heating, kWh/month	224.1094	198.9625	213.3238	191.7602	191.1778	177.9991	176.5803	183.0194	184.3738	194.0988	201.3942	221.7090	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	15.4439	12.3897	11.1555	8.1730	6.3131	5.1578	5.7590	7.4858	9.7233	12.7575	14.4095	15.8731	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-13.5563	-20.1645	-30.5706	-36.3294	-40.9224	-38.8631	-38.4114	-35.4007	-30.3854	-23.9255	-15.2799	-11.6022	(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	-4.7645	-10.2539	-20.8107	-31.8891	-42.7781	-43.1855	-42.6557	-35.8177	-25.8781	-14.8467	-6.4212	-3.7492	(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													2369.5871 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													79.8000
Water heating fuel used													2358.5083 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													86.0000 (231)
Electricity for lighting (calculated in Appendix L)													124.6412 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-618.4617 (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													4320.2750 (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	2369.5871	0.2100	497.6133	(261)
Total CO2 associated with community systems			0.0000	(373)

Full SAP Calculation Printout

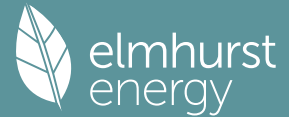


Water heating (other fuel)	2358.5083	0.2100	495.2867 (264)
Space and water heating			992.9000 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	124.6412	0.1443	17.9896 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-335.4114	0.1335	-44.7616
PV Unit electricity exported	-283.0503	0.1253	-35.4736
Total			-80.2352 (269)
Total CO2, kg/year			942.5837 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.8300 (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	2369.5871	1.1300	2677.6334 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2358.5083	1.1300	2665.1144 (278)
Space and water heating			5342.7478 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	124.6412	1.5338	191.1789 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-335.4114	1.4932	-500.8209
PV Unit electricity exported	-283.0503	0.4600	-130.2051
Total			-631.0260 (283)
Total Primary energy kWh/year			5033.0015 (286)
Target Primary Energy Rate (TPER)			100.5600 (287)

Full SAP Calculation Printout



Plot Reference	Flat 2				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 2-Be Lean			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	68 D	DER	11.37	TER	21.02	
Environmental	93 A	% DER < TER				45.91
CO ₂ Emissions (t/year)	0.38	DFEE	76.02	TFEE	54.20	
Compliance Check	See BREL	% DFEE < TFEE				-40.25
% DPER < TPER	-4.71	DPER	118.00	TPER	112.69	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.7000 (1b)	3.2200 (2b)	121.3940 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.7000		121.3940 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 121.3940 (5)

2. Ventilation rate

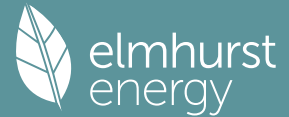
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1648 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3648 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2827 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3604	0.3534	0.3463	0.3110	0.3039	0.2685	0.2685	0.2615	0.2827	0.3039	0.3180	0.3322 (22b)
Effective ac	0.5650	0.5624	0.5600	0.5483	0.5462	0.5361	0.5361	0.5342	0.5400	0.5462	0.5506	0.5552 (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							
Glazed Door			11.4000	1.1450	13.0534		(27)
Heatloss Floor			37.7900	0.1200	4.5348	110.0000	4156.9000 (28)
External Wall	22.3200	11.4000	10.9200	0.1700	1.8564	60.0000	655.2000 (29a)
Basement Walls	42.1800		42.1800	0.1700	7.1706	60.0000	2530.8000 (29a)
Walls To CorridorStairwell	24.1200		24.1200	0.1600	3.8592	9.0000	217.0800 (29a)
External Roof	10.3200		10.3200	0.1100	1.1352	9.0000	92.8800 (30)
Ceiling below communal area	2.0900		2.0900	0.1200	0.2508	9.0000	18.8100 (30)
Total net area of external elements Aum(A, m ²)			138.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 31.8604		(33)
Main dwelling							
Party Wall			15.2300	0.0000	0.0000	110.0000	1675.2999 (32)
Party Ceiling			47.1500			30.0000	1414.5000 (32b)
Internal Wall			66.7800			9.0000	601.0200 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 11362.4899 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							301.3923 (35)
Thermal bridges (Default value 0.200 * total exposed area)							27.7640 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 59.6244 (37)

Full SAP Calculation Printout



Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 22.6320	Feb 22.5309	Mar 22.4319	Apr 21.9667	May 21.8797	Jun 21.4745	Jul 21.4745	Aug 21.3995	Sep 21.6306	Oct 21.8797	Nov 22.0558	Dec 22.2398 (38)
Heat transfer coeff	82.2564	82.1554	82.0563	81.5912	81.5041	81.0990	81.0990	81.0240	81.2550	81.5041	81.6802	81.8643 (39)
Average = Sum(39)m / 12 =												81.5908
HLP	Jan 2.3819	Feb 2.1792	Mar 2.1766	Apr 2.1642	May 2.1619	Jun 2.1512	Jul 2.1512	Aug 2.1492	Sep 2.1553	Oct 2.1619	Nov 2.1666	Dec 2.1715 (40)
HLP (average)												2.1642
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

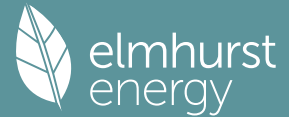
-----Water heating energy requirements (kWh/year)-----												
Assumed occupancy												1.3466 (42)
Hot water usage for mixer showers												
	64.3474	63.3803	61.9712	59.2751	57.2854	55.0666	53.8054	55.2038	56.7368	59.1192	61.8732	64.1008 (42a)
Hot water usage for baths												
	21.3136	20.9971	20.5513	19.7294	19.1140	18.4316	18.0630	18.5057	18.9876	19.7178	20.5566	21.2416 (42b)
Hot water usage for other uses												
	29.9168	28.8289	27.7410	26.6531	25.5652	24.4773	24.4773	25.5652	26.6531	27.7410	28.8289	29.9168 (42c)
Average daily hot water use (litres/day)												106.2842 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	115.5777	113.2063	110.2635	105.6576	101.9647	97.9755	96.3457	99.2747	102.3775	106.5780	111.2587	115.2591 (44)
Energy conte	183.0469	161.2043	169.4709	144.6400	137.2641	120.4724	116.5218	122.9228	126.2417	144.6253	158.5084	180.4680 (45)
Energy content (annual)	Total = Sum(45)m =										1765.3866	
Distribution loss (46)m = 0.15 x (45)m												
	27.4570	24.1806	25.4206	21.6960	20.5896	18.0709	17.4783	18.4384	18.9363	21.6938	23.7763	27.0702 (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												
	183.0469	161.2043	169.4709	144.6400	137.2641	120.4724	116.5218	122.9228	126.2417	144.6253	158.5084	180.4680 (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												
	183.0469	161.2043	169.4709	144.6400	137.2641	120.4724	116.5218	122.9228	126.2417	144.6253	158.5084	180.4680 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 1765.3866 (64)
Electric shower(s)												1765 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	60.8631	53.6004	56.3491	48.0928	45.6403	40.0571	38.7435	40.8718	41.9754	48.0879	52.7041	60.0056 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan 67.3319	Feb 67.3319	Mar 67.3319	Apr 67.3319	May 67.3319	Jun 67.3319	Jul 67.3319	Aug 67.3319	Sep 67.3319	Oct 67.3319	Nov 67.3319	Dec 67.3319 (66)
(66)m												
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.4055	64.6633	58.4055	60.3524	58.4055	60.3524	58.4055	58.4055	60.3524	58.4055	60.3524	58.4055 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.7955	116.9971	113.9691	107.5229	99.3857	91.7379	86.6287	85.4271	88.4551	94.9013	103.0385	110.6863 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332 (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)	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655 (71)
Water heating gains (Table 5)	81.8052	79.7625	75.7380	66.7956	61.3445	55.6348	52.0746	54.9353	58.2991	64.6343	73.2001	80.6527 (72)
Total internal gains	302.2058	307.6224	294.3122	280.8704	265.3353	250.9246	240.3084	241.9675	250.3062	264.1407	282.7905	295.9441 (73)

6. Solar gains												
[Jan]			Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d		Gains W		
East			4.3400	19.6403	0.7600	0.7000		0.7700		31.4255 (76)		
South			7.0600	46.7521	0.7600	0.7000		0.7700		121.6887 (78)		
Solar gains	153.1142	260.7697	355.1066	434.5770	479.9469	472.9786	457.4942	424.5114	382.9400	287.9033	183.4265	130.9931 (83)
Total gains	455.3200	568.3921	649.4188	715.4474	745.2822	723.9033	697.8026	666.4789	633.2462	552.0440	466.2170	426.9371 (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	38.3708	38.4180	38.4644	38.6837	38.7250	38.9185	38.9185	38.9545	38.8437	38.7250	38.6415	38.5546
alpha	3.5581	3.5612	3.5643	3.5789	3.5817	3.5946	3.5946	3.5970	3.5896	3.5817	3.5761	3.5703
util living area	0.9868	0.9712	0.9440	0.8872	0.7883	0.6386	0.4879	0.5265	0.7322	0.9127	0.9751	0.9894 (86)
MIT	19.4537	19.6960	20.0021	20.3559	20.6440	20.8243	20.8883	20.8797	20.7605	20.3696	19.8366	19.4068 (87)
Th 2	19.9091	19.9104	19.9117	19.9179	19.9190	19.9244	19.9244	19.9254	19.9223	19.9190	19.9167	19.9143 (88)
util rest of house												

Full SAP Calculation Printout



MIT 2	0.9837	0.9648	0.9313	0.8610	0.7383	0.5551	0.3785	0.4167	0.6572	0.8866	0.9685	0.9869 (89)
Living area fraction	18.5022	18.7421	19.0419	19.3838	19.6435	19.7911	19.8300	19.8272	19.7462	19.4053	18.8885	18.4599 (90)
MIT	18.5022	19.1920	19.4947	19.8423	20.1154	20.2784	20.3291	20.3236	fLA = Living area / (4) =			0.4716 (91)
Temperature adjustment									20.2246	19.8601	19.3356	18.9065 (92)
adjusted MIT	19.2509	19.4920	19.7947	20.1423	20.4154	20.5784	20.6291	20.6236	20.5246	20.1601	19.6356	19.2065 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9814	0.9619	0.9297	0.8669	0.7626	0.6075	0.4515	0.4896	0.7012	0.8931	0.9664	0.9849	(94)
Useful gains	446.8706	546.7143	603.7646	620.2484	568.3486	439.7956	315.0331	326.3301	444.0587	493.0436	450.5536	420.4865	(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	1229.8113	1198.8103	1090.9167	917.2724	710.3402	484.8419	326.7544	342.2113	522.0281	779.1870	1023.9133	1228.4945	(97)
Space heating kWh	582.5079	438.2085	362.4412	213.8573	105.6417	0.0000	0.0000	0.0000	0.0000	212.8907	412.8190	601.1579	(98a)
Space heating requirement - total per year (kWh/year)												2929.5242	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	582.5079	438.2085	362.4412	213.8573	105.6417	0.0000	0.0000	0.0000	0.0000	212.8907	412.8190	601.1579	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2929.5242	
Space heating per m2											(98c) / (4) =	77.7062	(99)

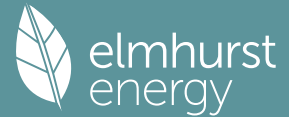
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)													170.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	582.5079	438.2085	362.4412	213.8573	105.6417	0.0000	0.0000	0.0000	0.0000	212.8907	412.8190	601.1579	(98)
Space heating efficiency (main heating system 1)	170.0000	170.0000	170.0000	170.0000	170.0000	0.0000	0.0000	0.0000	0.0000	170.0000	170.0000	170.0000	(210)
Space heating fuel (main heating system)	342.6517	257.7697	213.2007	125.7984	62.1422	0.0000	0.0000	0.0000	0.0000	125.2298	242.8347	353.6223	(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	183.0469	161.2043	169.4709	144.6400	137.2641	120.4724	116.5218	122.9228	126.2417	144.6253	158.5084	180.4680	(64)
Efficiency of water heater (217)m	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	(216)
Fuel for water heating, kWh/month	107.6746	94.8260	99.6888	85.0824	80.7436	70.8661	68.5422	72.3076	74.2598	85.0737	93.2402	106.1576	(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	12.4166	9.9611	8.9689	6.5710	5.0756	4.1468	4.6301	6.0184	7.8173	10.2568	11.5850	12.7617	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													1723.2496 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													170.0000
Water heating fuel used													1038.4627 (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)													100.2093 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													2861.9216 (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	1723.2496	0.1551	267.2468 (261)	

Full SAP Calculation Printout



Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1038.4627	0.1416	147.0237 (264)
Space and water heating			414.2705 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	100.2093	0.1443	14.4633 (268)
Total CO2, kg/year			428.7338 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.3700 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1723.2496	1.5741	2712.6232 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1038.4627	1.5235	1582.1381 (278)
Space and water heating			4294.7612 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	100.2093	1.5338	153.7044 (282)
Total Primary energy kWh/year			4448.4656 (286)
Dwelling Primary energy Rate (DPER)			118.0000 (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			
Ground floor	37.7000 (1b)	3.2200 (2b)	121.3940 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	121.3940 (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) = 0.1648 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4148 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3214 (21)

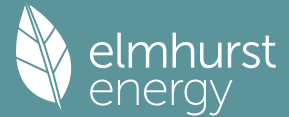
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4098	0.4018	0.3938	0.3536	0.3455	0.3054	0.3054	0.2973	0.3214	0.3455	0.3616	0.3777 (22b)
Effective ac	0.5840	0.5807	0.5775	0.5625	0.5597	0.5466	0.5466	0.5442	0.5517	0.5597	0.5654	0.5713 (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			9.4300	1.1450	10.7977		(27)
Heatloss Floor			37.7900	0.1300	4.9127		(28)
External Wall	22.3200	9.4300	12.8900	0.1800	2.3202		(29a)
Basement Walls	42.1800		42.1800	0.1800	7.5924		(29a)
Walls To CorridorStairwell	24.1200		24.1200	0.1800	4.3416		(29a)
External Roof	10.3200		10.3200	0.1100	1.1352		(30)
Ceiling below communal area	2.0900		2.0900	0.1100	0.2299		(30)
Total net area of external elements Aum(A, m2)			138.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.3297		(33)
Main dwelling							
Party Wall			15.2300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							301.3923 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							6.9410 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	38.2707 (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
	23.3942	23.2636	23.1355	22.5341	22.4216	21.8977	21.8977	21.8007	22.0995	22.4216	22.6492	22.8872 (38)

Full SAP Calculation Printout



Heat transfer coeff	61.6649	61.5343	61.4062	60.8048	60.6923	60.1684	60.1684	60.0714	60.3702	60.6923	60.9199	61.1579 (39)
Average = Sum(39)m / 12 =												60.8043
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.6357	1.6322	1.6288	1.6129	1.6099	1.5960	1.5960	1.5934	1.6013	1.6099	1.6159	1.6222 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	1.6128 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3466 (42)
Hot water usage for mixer showers	46.7981	46.0948	45.0700	43.1092	41.6621	40.0484	39.1312	40.1482	41.2631	42.9958	44.9987	46.6188 (42a)
Hot water usage for baths	20.2479	19.9472	19.5238	18.7430	18.1583	17.5100	17.1599	17.5804	18.0382	18.7319	19.5288	20.1795 (42b)
Hot water usage for other uses	28.4209	27.3874	26.3539	25.3205	24.2870	23.2535	23.2535	24.2870	25.3205	26.3539	27.3874	28.4209 (42c)
Average daily hot water use (litres/day)												87.7565 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	95.4669	93.4295	90.9477	87.1726	84.1074	80.8119	79.5445	82.0156	84.6218	88.0816	91.9149	95.2192 (44)
Energy content (annual)	151.1963	133.0423	139.7832	119.3349	113.2248	99.3677	96.2022	101.5524	104.3472	119.5259	130.9496	149.0902 (45)
Distribution loss (46)m = 0.15 x (45)m	22.6794	19.9563	20.9675	17.9002	16.9837	14.9052	14.4303	15.2329	15.6521	17.9289	19.6424	22.3635 (46)
Water storage loss (or HIU loss):												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (55)												
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	197.7912	175.1280	186.3781	164.4268	159.8197	144.4595	142.7971	148.1473	149.4390	166.1208	176.0415	195.6851 (62)
WWHRS	-21.3941	-18.9211	-19.8131	-16.4061	-15.2899	-13.0836	-12.2638	-13.0413	-13.5368	-15.9584	-18.0790	-20.9979 (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	176.3971	156.2069	166.5650	148.0207	144.5298	131.3759	130.5333	135.1060	135.9022	150.1624	157.9625	174.6872 (64)
12Total per year (kWh/year)												1807.4489 (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	87.5487	77.9051	83.7538	75.7523	74.9232	69.1132	69.2632	71.0421	70.7689	77.0183	79.6142	86.8484 (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	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.4055	64.6633	58.4055	60.3524	58.4055	60.3524	58.4055	58.4055	60.3524	58.4055	60.3524	58.4055 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.7955	116.9971	113.9691	107.5229	99.3857	91.7379	86.6287	85.4271	88.4551	94.9013	103.0385	110.6863 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332 (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)	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655 (71)
Water heating gains (Table 5)	117.6730	115.9303	112.5724	105.2116	100.7032	95.9906	93.0956	95.4867	98.2901	103.5192	110.5753	116.7317 (72)
Total internal gains	338.0735	343.7902	331.1466	319.2864	304.6940	291.2804	281.3294	282.5189	290.2972	303.0256	320.1657	332.0231 (73)

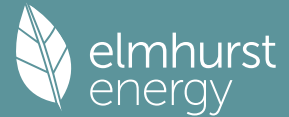
6. Solar gains

[Jan]												Area m2		Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
East												3.5900		19.6403		0.6300		0.7000		0.7700		21.5483	(76)
South												5.8400		46.7521		0.6300		0.7000		0.7700		83.4421	(78)
Solar gains	104.9905	178.8098	243.4966	297.9893	329.0993	324.3212	313.7035	291.0873	262.5819	197.4153	125.7756			89.8220	(83)								
Total gains	443.0640	522.6000	574.6431	617.2757	633.7933	615.6016	595.0329	573.6062	552.8791	500.4409	445.9414			421.8451	(84)								

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	51.1838	51.2925	51.3994	51.9079	52.0041	52.4569	52.4569	52.5416	52.2815	52.0041	51.8098	51.6082
alpha	4.4123	4.4195	4.4266	4.4605	4.4669	4.4971	4.4971	4.5028	4.4854	4.4669	4.4540	4.4405
util living area	0.9861	0.9711	0.9437	0.8807	0.7668	0.5948	0.4384	0.4723	0.6872	0.8978	0.9719	0.9886 (86)
MIT	19.6523	19.9012	20.2080	20.5618	20.8211	20.9567	20.9911	20.9876	20.9164	20.5850	20.0577	19.6098 (87)
Th 2	19.5873	19.5898	19.5923	19.6039	19.6061	19.6163	19.6163	19.6182	19.6124	19.6061	19.6017	19.5971 (88)

Full SAP Calculation Printout



util rest of house	0.9807	0.9605	0.9230	0.8378	0.6892	0.4800	0.3040	0.3354	0.5757	0.8512	0.9596	0.9842 (89)
MIT 2	18.1051	18.4168	18.7937	19.2127	19.4801	19.5976	19.6145	19.6154	19.5699	19.2529	18.6257	18.0585 (90)
Living area fraction									fLA = Living area / (4) =			0.4716 (91)
MIT	18.8348	19.1169	19.4607	19.8490	20.1125	20.2386	20.2637	20.2625	20.2049	19.8812	19.3011	18.7901 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8348	19.1169	19.4607	19.8490	20.1125	20.2386	20.2637	20.2625	20.2049	19.8812	19.3011	18.7901 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9769	0.9560	0.9207	0.8463	0.7196	0.5335	0.3678	0.4004	0.6262	0.8619	0.9562	0.9807 (94)	
Useful gains	432.8321	499.6033	529.0809	522.4243	456.0658	328.4082	218.8384	229.6635	346.2136	431.3289	426.4084	413.7201 (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	896.2890	874.8252	795.8694	665.7508	510.5763	339.2660	220.4409	232.0266	368.5565	563.2956	743.2876	892.3022 (97)	
Space heating kWh	344.8119	252.1491	198.4907	103.1951	40.5558	0.0000	0.0000	0.0000	0.0000	98.1833	228.1530	356.0651 (98a)	
Space heating requirement - total per year (kWh/year)												1621.6039	
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	344.8119	252.1491	198.4907	103.1951	40.5558	0.0000	0.0000	0.0000	0.0000	98.1833	228.1530	356.0651 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1621.6039	
Space heating per m2										(98c) / (4) =		43.0134 (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	344.8119	252.1491	198.4907	103.1951	40.5558	0.0000	0.0000	0.0000	0.0000	98.1833	228.1530	356.0651 (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)	373.5774	273.1843	215.0495	111.8040	43.9391	0.0000	0.0000	0.0000	0.0000	106.3741	247.1863	385.7693 (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	176.3971	156.2069	166.5650	148.0207	144.5298	131.3759	130.5333	135.1060	135.9022	150.1624	157.9625	174.6872 (64)
Efficiency of water heater (217)m	85.5351	85.1274	84.4541	83.2667	81.6125	79.8000	79.8000	79.8000	79.8000	83.1310	84.8835	79.8000 (216)
Fuel for water heating, kWh/month	206.2276	183.4977	197.2256	177.7670	177.0928	164.6315	163.5756	169.3057	170.3035	180.6335	186.0933	204.0221 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041 (231)
Lighting	12.1355	9.7356	8.7658	6.4222	4.9607	4.0529	4.5253	5.8822	7.6403	10.0246	11.3227	12.4728 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-10.3166	-15.4033	-23.4437	-27.9815	-31.6393	-30.1066	-29.7720	-27.3882	-23.4233	-18.3417	-11.6532	-8.8242 (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	-3.4835	-7.5093	-15.2590	-23.4039	-31.4078	-31.6962	-31.2915	-26.2568	-18.9571	-10.8634	-4.6931	-2.7392 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1756.8840 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2180.3758 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												97.9406 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-465.8542 (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												3655.3461 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
--	-----------------	----------------------------	-----------------------

Full SAP Calculation Printout

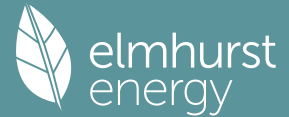


Space heating - main system 1	1756.8840	0.2100	368.9456 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2180.3758	0.2100	457.8789 (264)
Space and water heating			826.8246 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	97.9406	0.1443	14.1358 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-258.2935	0.1334	-34.4458
PV Unit electricity exported	-207.5608	0.1253	-26.0099
Total			-60.4557 (269)
Total CO2, kg/year			792.4339 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			21.0200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1756.8840	1.1300	1985.2789 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2180.3758	1.1300	2463.8247 (278)
Space and water heating			4449.1036 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	97.9406	1.5338	150.2245 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-258.2935	1.4928	-385.5811
PV Unit electricity exported	-207.5608	0.4600	-95.4691
Total			-481.0502 (283)
Total Primary energy kWh/year			4248.3787 (286)
Target Primary Energy Rate (TPER)			112.6900 (287)

Full SAP Calculation Printout



Plot Reference	Flat 3				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 3-Be Lean			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	44 E	DER	14.17	TER	14.10	
Environmental	88 B	% DER < TER				-0.50
CO ₂ Emissions (t/year)	0.96	DFEE	56.42	TFEE	41.38	
Compliance Check	See BREL	% DFEE < TFEE				-36.34
% DPER < TPER	-97.14	DPER	147.33	TPER	74.73	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	76.3500		217.5975
Dwelling volume			217.5975

2. Ventilation rate

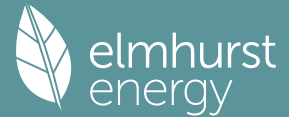
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.0919 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2919 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2700 (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	0.3443	0.3375	0.3308	0.2970	0.2903	0.2565	0.2565	0.2498	0.2700	0.2903	0.3038	0.3173 (22b)
Effective ac	0.5593	0.5570	0.5547	0.5441	0.5421	0.5329	0.5329	0.5312	0.5365	0.5421	0.5461	0.5503 (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			22.9600	1.1450	26.2901		(27)
Glazed Door			12.4600	1.1450	14.2672		(27)
Floor above communal area			1.4700	0.1200	0.1764	0.0000	0.0000 (28b)
External Wall	107.3900	35.4200	71.9700	0.1700	12.2349	60.0000	4318.2000 (29a)
Walls To CorridorStairwell	24.4000		24.4000	0.1600	3.9040	9.0000	219.6000 (29a)
External Roof	14.1100		14.1100	0.1100	1.5521	9.0000	126.9900 (30)
Ceiling below communal area	1.4700		1.4700	0.1200	0.1764	9.0000	13.2300 (30)
Total net area of external elements Aum(A, m ²)			148.8400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	58.6011	(33)
Main dwelling							
Party Floor 1			74.8800			40.0000	2995.2000 (32d)
Party Ceiling			64.9000			30.0000	1947.0000 (32b)
Internal Wall			168.8300			9.0000	1519.4700 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 11139.6900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							145.9029 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.7680 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 88.3691 (37)

Full SAP Calculation Printout



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	40.1591	39.9938	39.8318	39.0711	38.9287	38.2661	38.2661	38.1434	38.5213	38.9287	39.2167	39.5177	(38)
Heat transfer coeff	128.5281	128.3629	128.2009	127.4401	127.2978	126.6352	126.6352	126.5124	126.8904	127.2978	127.5857	127.8868	(39)
Average = Sum(39)m / 12 =												127.4394	
HLP	1.6834	1.6812	1.6791	1.6692	1.6673	1.6586	1.6586	1.6570	1.6620	1.6673	1.6711	1.6750	(40)
HLP (average)												1.6691	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3900 (42)
Hot water usage for mixer showers	88.4007	87.0722	85.1364	81.4324	78.6990	75.6507	73.9181	75.8393	77.9453	81.2183	85.0018	88.0620	(42a)
Hot water usage for baths	29.2323	28.7981	28.1868	27.0595	26.2155	25.2795	24.7740	25.3811	26.0421	27.0436	28.1940	29.1334	(42b)
Hot water usage for other uses	41.1638	39.6669	38.1700	36.6732	35.1763	33.6794	33.6794	35.1763	36.6732	38.1700	39.6669	41.1638	(42c)
Average daily hot water use (litres/day)												146.0270	(43)
Daily hot water use	158.7968	155.5373	151.4932	145.1651	140.0908	134.6097	132.3715	136.3967	140.6606	146.4318	152.8626	158.3592	(44)
Energy conte	251.4952	221.4830	232.8393	198.7238	188.5891	165.5183	160.0919	168.8876	173.4485	198.7066	217.7809	247.9523	(45)
Energy content (annual)										Total =	Sum(45)m =	2425.5166	
Distribution loss (46)m = 0.15 x (45)m	37.7243	33.2224	34.9259	29.8086	28.2884	24.8277	24.0138	25.3331	26.0173	29.8060	32.6671	37.1928	(46)
Water storage loss (or HIU loss):													
Store volume												185.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												1.2840	(55)
Total storage loss	39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040	(56)
If cylinder contains dedicated solar storage	39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040	(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	291.2992	257.4350	272.6433	237.2438	228.3931	204.0383	199.8959	208.6916	211.9685	238.5106	256.3009	287.7563	(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	291.2992	257.4350	272.6433	237.2438	228.3931	204.0383	199.8959	208.6916	211.9685	238.5106	256.3009	287.7563	(64)
12Total per year (kWh/year)										Total per year (kWh/year) =	Sum(64)m =	2894.1766	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) =										Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	115.4654	102.4047	109.2623	96.8917	94.5491	85.8508	85.0737	87.9983	88.4876	97.9131	103.2281	114.2873	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.7498	118.1873	106.7498	110.3082	106.7498	110.3082	106.7498	106.7498	110.3082	106.7498	110.3082	106.7498	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	211.6435	213.8397	208.3053	196.5234	181.6508	167.6726	158.3343	156.1381	161.6725	173.4544	188.3271	202.3052	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	(71)
Water heating gains (Table 5)	155.1954	152.3879	146.8579	134.5718	127.0821	119.2373	114.3464	118.2773	122.8995	131.6037	143.3724	153.6120	(72)
Total internal gains	535.4381	546.2643	523.7625	503.2527	477.3321	456.0674	438.2800	440.0147	453.7295	473.6574	503.8570	524.5164	(73)

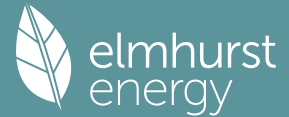
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
East				8.1600	19.6403	0.7600	0.7000	0.7700	59.0857 (76)				
South				7.1500	46.7521	0.7600	0.7000	0.7700	123.2400 (78)				
West				7.6500	19.6403	0.7600	0.7000	0.7700	55.3928 (80)				
North				12.4600	10.6334	0.7600	0.7000	0.7700	48.8466 (74)				
Solar gains	286.5652	519.1281	784.5286	1083.2481	1305.2169	1333.6362	1270.2016	1100.5091	888.2234	594.5463	349.0813	241.3533	(83)
Total gains	822.0033	1065.3924	1308.2911	1586.5007	1782.5490	1789.7036	1708.4816	1540.5237	1341.9529	1068.2036	852.9383	765.8697	(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	24.0753	24.1063	24.1368	24.2809	24.3080	24.4352	24.4352	24.4589	24.3861	24.3080	24.2532	24.1961	
alpha	2.6050	2.6071	2.6091	2.6187	2.6205	2.6290	2.6290	2.6306	2.6257	2.6205	2.6169	2.6131	

Full SAP Calculation Printout



util living area	0.9477	0.9052	0.8351	0.7133	0.5654	0.4201	0.3144	0.3591	0.5586	0.7963	0.9177	0.9555 (86)
MIT	19.0076	19.3705	19.8309	20.3185	20.6409	20.8028	20.8559	20.8439	20.7099	20.2317	19.5207	18.9365 (87)
Th 2	20.1583	20.1594	20.1604	20.1654	20.1664	20.1707	20.1707	20.1715	20.1690	20.1664	20.1645	20.1625 (88)
util rest of house												
MIT 2	0.9418	0.8951	0.8184	0.6866	0.5283	0.3728	0.2587	0.2998	0.5082	0.7694	0.9072	0.9503 (89)
Living area fraction	18.3075	18.6631	19.1091	19.5720	19.8624	20.0015	20.0402	20.0340	19.9310	19.5046	18.8194	18.2407 (90)
MIT	18.5816	18.9401	19.3917	19.8643	20.1671	20.3152	20.3595	20.3511	20.2359	19.7892	19.0939	18.5131 (91)
Temperature adjustment												0.5000
adjusted MIT	19.0816	19.4401	19.8917	20.3643	20.6671	20.8152	20.8595	20.8511	20.7359	20.2892	19.5939	19.0131 (93)

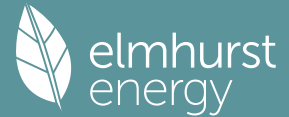
8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9327	0.8853	0.8126	0.6932	0.5509	0.4098	0.3051	0.3487	0.5432	0.7736	0.8990	0.9419 (94)
Useful gains	766.7184	943.2189	1063.1571	1099.8037	982.0822	733.4772	521.3144	537.1343	728.8913	826.3651	766.7661	721.3837 (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	1899.8536	1866.4035	1716.8227	1461.0079	1141.4968	787.0593	539.4063	563.1143	842.0342	1233.4196	1594.0495	1894.3968 (97)
Space heating kWh	843.0526	620.3800	486.3272	260.0670	118.6044	0.0000	0.0000	0.0000	0.0000	302.8485	595.6441	872.7217 (98a)
Space heating requirement - total per year (kWh/year)												4099.6456
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	843.0526	620.3800	486.3272	260.0670	118.6044	0.0000	0.0000	0.0000	0.0000	302.8485	595.6441	872.7217 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4099.6456
Space heating per m2										(98c) / (4) =		53.6954 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	843.0526	620.3800	486.3272	260.0670	118.6044	0.0000	0.0000	0.0000	0.0000	302.8485	595.6441	872.7217 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	843.0526	620.3800	486.3272	260.0670	118.6044	0.0000	0.0000	0.0000	0.0000	302.8485	595.6441	872.7217 (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	291.2992	257.4350	272.6433	237.2438	228.3931	204.0383	199.8959	208.6916	211.9685	238.5106	256.3009	287.7563 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	291.2992	257.4350	272.6433	237.2438	228.3931	204.0383	199.8959	208.6916	211.9685	238.5106	256.3009	287.7563 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	4.5268	4.0888	4.5268	4.3808	4.5268	4.3808	4.5268	4.5268	4.3808	4.5268	4.3808	4.5268 (231)
Lighting	24.5883	19.7256	17.7607	13.0123	10.0511	8.2118	9.1689	11.9181	15.4804	20.3111	22.9414	25.2716 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												4099.6456 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												2894.1766 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												53.3000 (230c)
Total electricity for the above, kWh/year												53.3000 (231)
Electricity for lighting (calculated in Appendix L)												198.4413 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												7245.5635 (238)

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	4099.6456	0.1555	637.3151 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2894.1766	0.1411	408.4094 (264)
Space and water heating			1045.7245 (265)
Pumps, fans and electric keep-hot	53.3000	0.1387	7.3934 (267)
Energy for lighting	198.4413	0.1443	28.6412 (268)
Total CO2, kg/year			1081.7591 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.1700 (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	4099.6456	1.5755	6459.0074 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2894.1766	1.5218	4404.3575 (278)
Space and water heating			10863.3649 (279)
Pumps, fans and electric keep-hot	53.3000	1.5128	80.6322 (281)
Energy for lighting	198.4413	1.5338	304.3759 (282)
Total Primary energy kWh/year			11248.3730 (286)
Dwelling Primary energy Rate (DPER)			147.3300 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	76.3500 (1b)	x 2.8500 (2b)	= 217.5975 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	76.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	217.5975 (5)

2. Ventilation rate

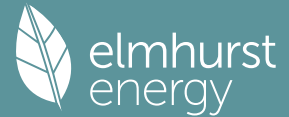
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1379 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3879 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3588 (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	0.4574	0.4485	0.4395	0.3947	0.3857	0.3408	0.3408	0.3319	0.3588	0.3857	0.4036	0.4216 (22b)
Effective ac	0.6046	0.6006	0.5966	0.5779	0.5744	0.5581	0.5581	0.5551	0.5644	0.5744	0.5815	0.5889 (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			19.0800	1.1450	21.8473		(27)
Floor above communal area			1.4700	0.1300	0.1911		(28b)
External Wall	107.3900	19.0800	88.3100	0.1800	15.8958		(29a)
Walls To CorridorStairwell	24.4000		24.4000	0.1800	4.3920		(29a)
External Roof	14.1100		14.1100	0.1100	1.5521		(30)
Ceiling below communal area	1.4700		1.4700	0.1100	0.1617		(30)
Total net area of external elements Aum(A, m2)			148.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.0400		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							145.9029 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							7.4420 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	51.4820 (37)

Full SAP Calculation Printout



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	43.4166	43.1248	42.8389	41.4957	41.2444	40.0746	40.0746	39.8579	40.5252	41.2444	41.7528	42.2843	(38)
Heat transfer coeff	94.8986	94.6069	94.3209	92.9777	92.7264	91.5566	91.5566	91.3400	92.0072	92.7264	93.2348	93.7663	(39)
Average = Sum(39)m / 12 =												92.9765	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2429	1.2391	1.2354	1.2178	1.2145	1.1992	1.1992	1.1963	1.2051	1.2145	1.2212	1.2281	(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													2.3900 (42)
Hot water usage for mixer showers													
64.2914	63.3253	61.9174	59.2236	57.2356	55.0187	53.7586	55.1559	56.6875	59.0678	61.8195	64.0451	(42a)	
Hot water usage for baths													
27.7706	27.3582	26.7774	25.7065	24.9047	24.0156	23.5353	24.1120	24.7400	25.6914	26.7843	27.6768	(42b)	
Hot water usage for other uses													
39.1056	37.6835	36.2615	34.8395	33.4175	31.9955	31.9955	33.4175	34.8395	36.2615	37.6835	39.1056	(42c)	
Average daily hot water use (litres/day)												120.5728	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
131.1677	128.3670	124.9563	119.7696	115.5578	111.0297	109.2894	112.6854	116.2670	121.0207	126.2873	130.8275	(44)	
Energy content (annual)	207.7375	182.7929	192.0532	163.9586	155.5630	136.5240	132.1760	139.5280	143.3688	164.2240	179.9194	204.8442	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2002.6898	
31.1606	27.4189	28.8080	24.5938	23.3345	20.4786	19.8264	20.9292	21.5053	24.6336	26.9879	30.7266	(46)	
Water storage loss (or HIU loss):													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
254.3324	224.8787	238.6481	209.0505	202.1579	181.6159	178.7709	186.1229	188.4607	210.8189	225.0113	251.4391	(62)	
WWHRS	-29.3914	-25.9940	-27.2194	-22.5387	-21.0053	-17.9744	-16.8481	-17.9163	-18.5970	-21.9238	-24.8370	-28.8471	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
224.9411	198.8847	211.4287	186.5118	181.1527	163.6415	161.9228	168.2067	169.8637	188.8951	200.1743	222.5920	(64)	
12Total per year (kWh/year)												2278.2149	(64)
Electric shower(s)												2278	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
106.3486	94.4472	101.1336	90.5897	89.0006	81.4677	81.2244	83.6690	83.7436	91.8804	95.8967	105.3866	(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	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.7498	118.1873	106.7498	110.3082	106.7498	110.3082	106.7498	106.7498	110.3082	106.7498	110.3082	106.7498	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	211.6435	213.8397	208.3053	196.5234	181.6508	167.6726	158.3343	156.1381	161.6725	173.4544	188.3271	202.3052	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	(71)
Water heating gains (Table 5)	142.9417	140.5465	135.9323	125.8191	119.6245	113.1496	109.1726	112.4583	116.3106	123.4952	133.1898	141.6487	(72)
Total internal gains	523.1844	534.4229	512.8368	494.5000	469.8745	449.9797	433.1062	434.1957	447.1406	465.5488	493.6744	512.5531	(73)

6. Solar gains

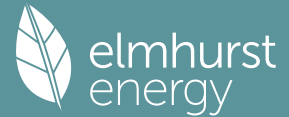
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	6.7100	10.6334	0.6300	0.7000	0.7700	21.8055 (74)
East	4.4000	19.6403	0.6300	0.7000	0.7700	26.4102 (76)
South	3.8500	46.7521	0.6300	0.7000	0.7700	55.0089 (78)
West	4.1200	19.6403	0.6300	0.7000	0.7700	24.7296 (80)

Solar gains	127.9542	231.8022	350.3213	483.7229	582.8486	595.5406	567.2132	491.4334	396.6296	265.4816	155.8695	107.7658	(83)
Total gains	651.1387	766.2250	863.1581	978.2228	1052.7231	1045.5204	1000.3194	925.6290	843.7701	731.0304	649.5440	620.3189	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	32.6070	32.7075	32.8067	33.2806	33.3708	33.7972	33.7972	33.8774	33.6317	33.3708	33.1889	33.0007

Full SAP Calculation Printout



alpha	3.1738	3.1805	3.1871	3.2187	3.2247	3.2531	3.2531	3.2585	3.2421	3.2247	3.2126	3.2000
util living area	0.9641	0.9408	0.9004	0.8133	0.6824	0.5195	0.3900	0.4343	0.6467	0.8564	0.9427	0.9687 (86)
MIT	19.0463	19.3604	19.7922	20.3229	20.7039	20.9116	20.9737	20.9625	20.8161	20.3042	19.5962	19.0030 (87)
Th 2	19.8858	19.8888	19.8918	19.9058	19.9084	19.9207	19.9207	19.9229	19.9159	19.9084	19.9031	19.8976 (88)
util rest of house	0.9572	0.9298	0.8819	0.7798	0.6287	0.4443	0.2995	0.3403	0.5722	0.8224	0.9301	0.9626 (89)
MIT 2	17.6440	18.0385	18.5745	19.2190	19.6463	19.8609	19.9089	19.9049	19.7776	19.2170	18.3497	17.5969 (90)
Living area fraction	18.1929	18.5560	19.0512	19.6512	20.0603	20.2722	20.3258	20.3190	20.1842	19.6426	18.8377	18.1474 (92)
MIT	18.1929	18.5560	19.0512	19.6512	20.0603	20.2722	20.3258	20.3190	20.1842	19.6426	18.8377	18.1474 (93)
Temperature adjustment												0.0000
adjusted MIT	18.1929	18.5560	19.0512	19.6512	20.0603	20.2722	20.3258	20.3190	20.1842	19.6426	18.8377	18.1474 (93)

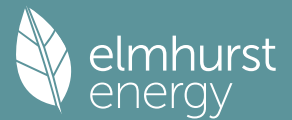
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9431	0.9130	0.8651	0.7711	0.6366	0.4697	0.3342	0.3758	0.5918	0.8127	0.9144	0.9495 (94)
Useful gains	614.0690	699.5259	746.7118	754.3549	670.2144	491.0541	334.2590	347.8502	499.3769	594.1365	593.9608	588.9775 (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	1318.4213	1291.9510	1183.8397	999.6209	775.2252	519.3277	341.1186	357.9588	559.7857	838.4891	1094.3644	1307.7950 (97)
Space heating kWh	524.0381	398.1097	325.2232	176.5916	78.1280	0.0000	0.0000	0.0000	0.0000	181.7984	360.2906	534.8002 (98a)
Space heating requirement - total per year (kWh/year)												2578.9797
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	524.0381	398.1097	325.2232	176.5916	78.1280	0.0000	0.0000	0.0000	0.0000	181.7984	360.2906	534.8002 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2578.9797
Space heating per m2										(98c) / (4) =		33.7784 (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	524.0381	398.1097	325.2232	176.5916	78.1280	0.0000	0.0000	0.0000	0.0000	181.7984	360.2906	534.8002 (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)	567.7552	431.3215	352.3545	191.3235	84.6457	0.0000	0.0000	0.0000	0.0000	196.9646	390.3474	579.4152 (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	224.9411	198.8847	211.4287	186.5118	181.1527	163.6415	161.9228	168.2067	169.8637	188.8951	200.1743	222.5920 (64)
Efficiency of water heater (217)m	85.8907	85.5844	85.0222	83.9374	82.3138	79.8000	79.8000	79.8000	79.8000	83.9740	85.3616	79.8000 (216)
Fuel for water heating, kWh/month	261.8921	232.3844	248.6748	222.2035	220.0756	205.0645	202.9108	210.7853	212.8618	224.9448	234.5017	258.9752 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.1805	17.7940	16.0215	11.7381	9.0668	7.4077	8.2711	10.7510	13.9645	18.3222	20.6949	22.7970 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-20.3899	-30.1734	-45.5001	-53.7517	-60.2356	-57.0531	-56.3519	-52.0654	-44.9091	-35.6289	-22.9160	-17.4653 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.5580	-16.2292	-32.8807	-50.3140	-67.4473	-68.1100	-67.3139	-56.5764	-40.9195	-23.5171	-10.1886	-5.9528 (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												2794.1275 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2735.2744 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												179.0094 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-943.4475 (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												4850.9639 (238)

Full SAP Calculation Printout



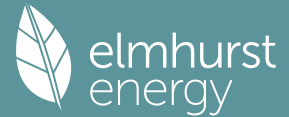
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2794.1275	0.2100	586.7668 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2735.2744	0.2100	574.4076 (264)
Space and water heating			1161.1744 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	179.0094	0.1443	25.8366 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.4402	0.1336	-66.3147
PV Unit electricity exported	-447.0073	0.1254	-56.0330
Total			-122.3477 (269)
Total CO2, kg/year			1076.5926 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.1000 (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	2794.1275	1.1300	3157.3641 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2735.2744	1.1300	3090.8601 (278)
Space and water heating			6248.2242 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	179.0094	1.5338	274.5706 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-496.4402	1.4936	-741.4999
PV Unit electricity exported	-447.0073	0.4601	-205.6678
Total			-947.1677 (283)
Total Primary energy kWh/year			5705.7279 (286)
Target Primary Energy Rate (TPER)			74.7300 (287)

Full SAP Calculation Printout



Plot Reference	Flat 4			Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 4-Be Lean	Plot Type Ref	As Design - Proposed		
Plot Address	105, Raleigh Road, London, N8 0JD			SAP Version	10.2
SAP Rating	44 E	DER	18.31	TER	18.97
Environmental	89 B	% DER < TER			3.48
CO ₂ Emissions (t/year)	0.67	DFEE	65.88	TFEE	47.95
Compliance Check	See BREL	% DFEE < TFEE			-37.40
% DPER < TPER	-88.29	DPER	191.18	TPER	101.53
Assessor Details	Mr. Paul Rothwell			Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides				

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	41.3300	2.8500	117.7905
Ground floor	41.3300 (1b)	x	117.7905 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.3300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	117.7905 (5)

2. Ventilation rate

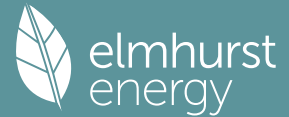
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1698 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3698 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3421 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4361	0.4276	0.4190	0.3763	0.3677	0.3250	0.3250	0.3164	0.3421	0.3677	0.3848	0.4019 (22b)
Effective ac	0.5951	0.5914	0.5878	0.5708	0.5676	0.5528	0.5528	0.5501	0.5585	0.5676	0.5740	0.5808 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			8.4900	1.1450	9.7214		(27)
Glazed Door			5.6600	1.1450	6.4809		(27)
External Wall	66.9200	14.1500	52.7700	0.1700	8.9709	60.0000	3166.1999 (29a)
Walls To Corridor/Stairwell	14.3100		14.3100	0.1600	2.2896	9.0000	128.7900 (29a)
External Rear Roof	21.9300		21.9300	0.1100	2.4123	9.0000	197.3700 (30)
External Front Roof	4.8900		4.8900	0.1100	0.5379	9.0000	44.0100 (30)
External Front Zinc Roof	0.7800		0.7800	0.1400	0.1092	9.0000	7.0200 (30)
Total net area of external elements A _{um} (A, m ²)			108.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 30.5222		(33)
Main dwelling							
Party Wall			8.9200	0.0000	0.0000	180.0000	1605.6000 (32)
Party Floor 1			41.3300			40.0000	1653.2000 (32d)
Party Ceiling			19.1400			30.0000	574.2000 (32b)
Internal Wall			65.4900			9.0000	589.4100 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		7965.7999 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							192.7365 (35)
Thermal bridges (Default value 0.200 * total exposed area)							21.7660 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		52.2882 (37)

Full SAP Calculation Printout



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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.1321	22.9886	22.8479	22.1870	22.0634	21.4877	21.4877	21.3811	21.7095	22.0634	22.3135	22.5750	(38)
Heat transfer coeff	75.4203	75.2768	75.1361	74.4752	74.3515	73.7759	73.7759	73.6693	73.9976	74.3515	74.6017	74.8632	(39)
Average = Sum(39)m / 12 =												74.4746	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.8248	1.8214	1.8180	1.8020	1.7990	1.7850	1.7850	1.7825	1.7904	1.7990	1.8050	1.8114	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4421 (42)
Hot water usage for mixer showers													
66.5486	65.5485	64.0912	61.3028	59.2451	56.9503	55.6460	57.0923	58.6777	61.1416	63.9898	66.2936	(42a)	
Hot water usage for baths													
22.0383	21.7110	21.2501	20.4003	19.7639	19.0583	18.6772	19.1349	19.6332	20.3882	21.2555	21.9638	(42b)	
Hot water usage for other uses													
30.9460	29.8207	28.6954	27.5701	26.4448	25.3195	25.3195	26.4448	27.5701	28.6954	29.8207	30.9460	(42c)	
Average daily hot water use (litres/day)												109.9213	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
119.5329	117.0802	114.0367	109.2732	105.4538	101.3281	99.6426	102.6719	105.8810	110.2252	115.0661	119.2034	(44)	
Energy content (annual)	189.3109	166.7207	175.2701	149.5895	141.9611	124.5947	120.5091	127.1293	130.5619	149.5746	163.9327	186.6438	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1825.7985	
28.3966	25.0081	26.2905	22.4384	21.2942	18.6892	18.0764	19.0694	19.5843	22.4362	24.5899	27.9966	(46)	
Water storage loss (or HIU loss):													
Store volume												185.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												1.2840	(55)
Total storage loss													
39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040	(56)	
If cylinder contains dedicated solar storage													
39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040	(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													
229.1149	202.6727	215.0741	188.1095	181.7651	163.1147	160.3131	166.9333	169.0819	189.3786	202.4527	226.4478	(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	229.1149	202.6727	215.0741	188.1095	181.7651	163.1147	160.3131	166.9333	169.0819	189.3786	202.4527	226.4478	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2294.4585	(64)
Electric shower(s)												2294	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
94.7891	84.1962	90.1205	80.5545	79.0453	72.2438	71.9125	74.1137	74.2278	81.5767	85.3236	93.9023	(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	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	62.9939	69.7432	62.9939	65.0937	62.9939	65.0937	62.9939	62.9939	65.0937	62.9939	65.0937	62.9939	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	124.8924	126.1884	122.9225	115.9699	107.1934	98.9448	93.4342	92.1382	95.4041	102.3567	111.1332	119.3818	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	(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)													
	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	(71)
Water heating gains (Table 5)													
	127.4047	125.2920	121.1297	111.8813	106.2436	100.3385	96.6566	99.6152	103.0942	109.6462	118.5051	126.2127	(72)
Total internal gains													
	362.9227	368.8553	354.6778	340.5766	324.0627	309.0088	297.7164	299.3791	308.2237	322.6285	342.3636	356.2201	(73)

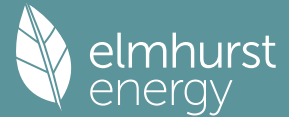
6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W
North					5.1800	10.6334		0.7600	0.7000	0.7700		20.3070 (74)
East					3.3100	19.6403		0.7600	0.7000	0.7700		23.9674 (76)
West					5.6600	19.6403		0.7600	0.7000	0.7700		40.9835 (80)
Solar gains	85.2578	165.8654	275.1896	411.0952	516.6880	535.6073	507.1073	426.2405	322.6474	196.9601	106.0374	70.3413 (83)
Total gains	448.1805	534.7207	629.8675	751.6718	840.7507	844.6160	804.8238	725.6195	630.8711	519.5886	448.4010	426.5615 (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	
29.3385	29.3945	29.4495	29.7109	29.7603	29.9925	29.9925	30.0359	29.9026	29.7603	29.6605	29.5569	29.5569	
alpha	2.9559	2.9596	2.9633	2.9807	2.9840	2.9995	2.9995	3.0024	2.9935	2.9840	2.9774	2.9705	

Full SAP Calculation Printout



util living area	0.9691	0.9484	0.9061	0.8121	0.6718	0.5113	0.3871	0.4405	0.6657	0.8740	0.9515	0.9730 (86)
MIT	19.1918	19.4395	19.8236	20.2939	20.6342	20.8137	20.8704	20.8576	20.7090	20.2346	19.6315	19.1517 (87)
Th 2	20.0876	20.0893	20.0910	20.0990	20.1005	20.1075	20.1075	20.1088	20.1048	20.1005	20.0975	20.0943 (88)
util rest of house												
MIT 2	0.9645	0.9409	0.8927	0.7863	0.6295	0.4517	0.3142	0.3638	0.6075	0.8502	0.9433	0.9690 (89)
Living area fraction	18.4173	18.6623	19.0383	19.4919	19.7997	19.9535	19.9928	19.9872	19.8752	19.4483	18.8609	18.3829 (90)
MIT	18.7927	19.0390	19.4189	19.8806	20.2042	20.3704	20.4181	20.4090	20.2793	19.8294	19.2344	18.7555 (91)
Temperature adjustment												0.5000 (92)
adjusted MIT	19.2927	19.5390	19.9189	20.3806	20.7042	20.8704	20.9181	20.9090	20.7793	20.3294	19.7344	19.2555 (93)

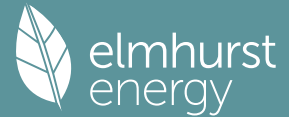
8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9598	0.9358	0.8898	0.7948	0.6585	0.5030	0.3806	0.4329	0.6522	0.8567	0.9394	0.9646 (94)
Useful gains	430.1700	500.3806	560.4797	597.4177	553.6130	424.8123	306.3319	314.1390	411.4644	445.1352	421.2462	411.4523 (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	1130.7516	1101.9756	1008.2423	855.0181	669.4740	462.6016	318.5755	332.1766	494.2543	723.3942	942.5461	1127.1011 (97)
Space heating kWh	521.2327	404.2718	333.1353	185.4723	86.2006	0.0000	0.0000	0.0000	0.0000	207.0247	375.3359	532.4427 (98a)
Space heating requirement - total per year (kWh/year)												2645.1160
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	521.2327	404.2718	333.1353	185.4723	86.2006	0.0000	0.0000	0.0000	0.0000	207.0247	375.3359	532.4427 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2645.1160
Space heating per m2										(98c) / (4) =		63.9999 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	521.2327	404.2718	333.1353	185.4723	86.2006	0.0000	0.0000	0.0000	0.0000	207.0247	375.3359	532.4427 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	521.2327	404.2718	333.1353	185.4723	86.2006	0.0000	0.0000	0.0000	0.0000	207.0247	375.3359	532.4427 (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	229.1149	202.6727	215.0741	188.1095	181.7651	163.1147	160.3131	166.9333	169.0819	189.3786	202.4527	226.4478 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	229.1149	202.6727	215.0741	188.1095	181.7651	163.1147	160.3131	166.9333	169.0819	189.3786	202.4527	226.4478 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	4.5268	4.0888	4.5268	4.3808	4.5268	4.3808	4.5268	4.5268	4.3808	4.5268	4.3808	4.5268 (231)
Lighting	13.4501	10.7901	9.7153	7.1179	5.4980	4.4919	5.0155	6.5193	8.4680	11.1104	12.5492	13.8239 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2645.1160 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												2294.4585 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												53.3000 (230c)
Total electricity for the above, kWh/year												53.3000 (231)
Electricity for lighting (calculated in Appendix L)												108.5498 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												5101.4242 (238)

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	2645.1160	0.1551	410.1344 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2294.4585	0.1410	323.5022 (264)
Space and water heating			733.6366 (265)
Pumps, fans and electric keep-hot	53.3000	0.1387	7.3934 (267)
Energy for lighting	108.5498	0.1443	15.6671 (268)
Total CO2, kg/year			756.6971 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			18.3100 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2645.1160	1.5740	4163.5054 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2294.4585	1.5213	3490.6634 (278)
Space and water heating			7654.1688 (279)
Pumps, fans and electric keep-hot	53.3000	1.5128	80.6322 (281)
Energy for lighting	108.5498	1.5338	166.4972 (282)
Total Primary energy kWh/year			7901.2983 (286)
Dwelling Primary energy Rate (DPER)			191.1800 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	41.3300 (1b)	x 2.8500 (2b)	= 117.7905 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.3300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	117.7905 (5)

2. Ventilation rate

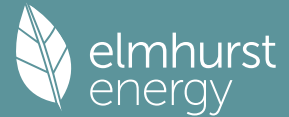
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1698 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4198 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3883 (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	0.4951	0.4854	0.4757	0.4271	0.4174	0.3689	0.3689	0.3592	0.3883	0.4174	0.4368	0.4563 (22b)
Effective ac	0.6226	0.6178	0.6131	0.5912	0.5871	0.5680	0.5680	0.5645	0.5754	0.5871	0.5954	0.6041 (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			10.3400	1.1450	11.8397		(27)
External Wall	66.9200	10.3400	56.5800	0.1800	10.1844		(29a)
Walls To Corridor/Stairwell	14.3100		14.3100	0.1800	2.5758		(29a)
External Rear Roof	21.9300		21.9300	0.1100	2.4123		(30)
External Front Roof	4.8900		4.8900	0.1100	0.5379		(30)
External Front Zinc Roof	0.7800		0.7800	0.1100	0.0858		(30)
Total net area of external elements Aum(A, m2)			108.8300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		27.6359		(33)
Main dwelling							
Party Wall			8.9200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							192.7365 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.4415 (36)

Full SAP Calculation Printout



Point Thermal bridges
Total fabric heat loss (33) + (36) + (36a) = 0.0000
33.0774 (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	24.1994	24.0144	23.8331	22.9814	22.8220	22.0802	22.0802	21.9429	22.3660	22.8220	23.1444	23.4814 (38)
Average = Sum(39)m / 12 =	57.2768	57.0918	56.9105	56.0588	55.8994	55.1576	55.1576	55.0203	55.4434	55.8994	56.2218	56.5588 (39)
	56.0580											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3858	1.3814	1.3770	1.3564	1.3525	1.3346	1.3346	1.3312	1.3415	1.3525	1.3603	1.3685 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

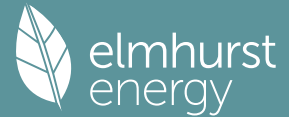
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.4421 (42)
Hot water usage for mixer showers	48.3990	47.6716	46.6118	44.5839	43.0873	41.4184	40.4698	41.5217	42.6747	44.4666	46.5381	48.2135 (42a)
Hot water usage for baths	20.9364	20.6254	20.1876	19.3802	18.7757	18.1054	17.7433	18.1781	18.6515	19.3688	20.1928	20.8656 (42b)
Hot water usage for other uses	29.3987	28.3297	27.2606	26.1916	25.1225	24.0535	24.0535	25.1225	26.1916	27.2606	28.3297	29.3987 (42c)
Average daily hot water use (litres/day)												90.7597 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	98.7341	96.6268	94.0600	90.1557	86.9856	83.5773	82.2666	84.8223	87.5178	91.0961	95.0605	98.4779 (44)
Energy content (annual)	156.3707	137.5952	144.5667	123.4187	117.0993	102.7681	99.4944	105.0278	107.9182	123.6165	135.4311	154.1926 (45)
Distribution loss (46)m = 0.15 x (45)m	23.4556	20.6393	21.6850	18.5128	17.5649	15.4152	14.9242	15.7542	16.1877	18.5425	20.3147	23.1289 (46)
Water storage loss (or HIU loss):												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (55)												
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	202.9656	179.6809	191.1616	168.5105	163.6942	147.8599	146.0893	151.6227	153.0101	170.2114	180.5230	200.7875 (62)
WWHRS	-22.1260	-19.5684	-20.4909	-16.9673	-15.8129	-13.5312	-12.6834	-13.4875	-13.9999	-16.5044	-18.6974	-21.7163 (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	180.8396	160.1125	170.6707	151.5432	147.8813	134.3287	133.4059	138.1352	139.0102	153.7070	161.8255	179.0712 (64)
12Total per year (kWh/year)												1850.5311 (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	89.2692	79.4190	85.3443	77.1102	76.2115	70.2439	70.3578	72.1977	71.9563	78.3784	81.1043	88.5449 (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	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	62.9939	69.7432	62.9939	65.0937	62.9939	65.0937	62.9939	62.9939	65.0937	62.9939	65.0937	62.9939 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	124.8924	126.1884	122.9225	115.9699	107.1934	98.9448	93.4342	92.1382	95.4041	102.3567	111.1332	119.3818 (68)
Pumps, fans	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106 (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)	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847 (71)
Total internal gains	119.9854	118.1830	114.7101	107.0975	102.4348	97.5609	94.5669	97.0399	99.9393	105.3473	112.6449	119.0120 (72)
	355.5034	361.7463	348.2583	335.7928	320.2538	306.2311	295.6268	296.8037	305.0688	318.3297	336.5035	349.0194 (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			3.7900	10.6334	0.6300	0.7000	0.7700	12.3164 (74)				
East			2.4200	19.6403	0.6300	0.7000	0.7700	14.5256 (76)				
West			4.1300	19.6403	0.6300	0.7000	0.7700	24.7896 (80)				
Solar gains	51.6316	100.4461	166.6534	248.9661	312.9263	324.3903	307.1269	258.1423	195.3960	119.2768	64.2153	42.5984 (83)
Total gains	407.1350	462.1924	514.9117	584.7588	633.1801	630.6215	602.7537	554.9460	500.4648	437.6065	400.7187	391.6179 (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	38.6321	38.7573	38.8808	39.4715	39.5840	40.1163	40.1163	40.2165	39.9096	39.5840	39.3570	39.1225
alpha	3.5755	3.5838	3.5921	3.6314	3.6389	3.6744	3.6744	3.6811	3.6606	3.6389	3.6238	3.6082
util living area	0.9724	0.9558	0.9220	0.8381	0.7014	0.5285	0.3940	0.4419	0.6701	0.8799	0.9546	0.9756 (86)
MIT	19.3128	19.5619	19.9433	20.4301	20.7705	20.9399	20.9842	20.9761	20.8566	20.4050	19.7929	19.2840 (87)
Th 2	19.7742	19.7776	19.7810	19.7969	19.7999	19.8139	19.8139	19.8164	19.8085	19.7999	19.7939	19.7876 (88)
util rest of house	0.9655	0.9451	0.9031	0.8009	0.6389	0.4418	0.2918	0.3345	0.5831	0.8428	0.9418	0.9695 (89)
MIT 2	17.8696	18.1831	18.6559	19.2430	19.6123	19.7789	19.8084	19.8074	19.7124	19.2343	18.4883	17.8422 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	18.5691	18.8513	19.2798	19.8183	20.1736	20.3416	20.3782	20.3738	20.2669	19.8017	19.1206	18.5410 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5691	18.8513	19.2798	19.8183	20.1736	20.3416	20.3782	20.3738	20.2669	19.8017	19.1206	18.5410 (93)

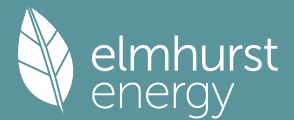
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9567	0.9349	0.8938	0.8016	0.6595	0.4815	0.3411	0.3861	0.6186	0.8429	0.9328	0.9613 (94)
Useful gains	389.4937	432.1249	460.2209	468.7479	417.5748	303.6209	205.6255	214.2859	309.5821	368.8515	373.7714	376.4483 (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	817.2864	796.5053	727.3056	612.0675	473.6672	316.6908	208.3980	218.6381	341.9143	514.3686	675.8185	811.1079 (97)
Space heating kWh	318.2778	244.8636	198.7110	103.1901	41.7327	0.0000	0.0000	0.0000	0.0000	108.2647	217.4739	323.3867 (98a)
Space heating requirement - total per year (kWh/year)												1555.9005
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	318.2778	244.8636	198.7110	103.1901	41.7327	0.0000	0.0000	0.0000	0.0000	108.2647	217.4739	323.3867 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1555.9005
Space heating per m2										(98c) / (4) =		37.6458 (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	318.2778	244.8636	198.7110	103.1901	41.7327	0.0000	0.0000	0.0000	0.0000	108.2647	217.4739	323.3867 (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)	344.8296	265.2910	215.2882	111.7986	45.2142	0.0000	0.0000	0.0000	0.0000	117.2965	235.6164	350.3648 (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	180.8396	160.1125	170.6707	151.5432	147.8813	134.3287	133.4059	138.1352	139.0102	153.7070	161.8255	179.0712 (64)
Efficiency of water heater (217)m	85.3138	85.0094	84.4018	83.2166	81.6207	79.8000	79.8000	79.8000	79.8000	83.2886	84.7233	79.8000 (216)
Fuel for water heating, kWh/month	211.9698	188.3468	202.2121	182.1070	181.1812	168.3317	167.1753	173.1018	174.1982	184.5476	191.0047	209.7622 (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	13.0889	10.5004	9.4544	6.9267	5.3504	4.3713	4.8808	6.3443	8.2406	10.8121	12.2122	13.4527 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-11.2678	-16.8004	-25.5341	-30.4288	-34.3600	-32.6732	-32.3047	-29.7377	-25.4653	-19.9802	-12.7179	-9.6399 (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	-3.8611	-8.3183	-16.8952	-25.9043	-34.7576	-35.0805	-34.6385	-29.0726	-20.9957	-12.0369	-5.2024	-3.0368 (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												1685.6993 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2233.9384 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												105.6348 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-510.7097 (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												3600.5628 (238)

Full SAP Calculation Printout



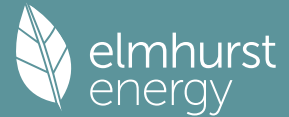
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1685.6993	0.2100	353.9969 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2233.9384	0.2100	469.1271 (264)
Space and water heating			823.1239 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	105.6348	0.1443	15.2464 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-280.9099	0.1334	-37.4713
PV Unit electricity exported	-229.7998	0.1253	-28.7981
Total			-66.2694 (269)
Total CO2, kg/year			784.0302 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.9700 (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	1685.6993	1.1300	1904.8402 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2233.9384	1.1300	2524.3504 (278)
Space and water heating			4429.1907 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	105.6348	1.5338	162.0261 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-280.9099	1.4929	-419.3781
PV Unit electricity exported	-229.7998	0.4600	-105.7029
Total			-525.0811 (283)
Total Primary energy kWh/year			4196.2365 (286)
Target Primary Energy Rate (TPER)			101.5300 (287)

Full SAP Calculation Printout



Plot Reference	Flat 5				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 5-Be Lean			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	42 E	DER	16.14	TER	16.17	
Environmental	88 B	% DER < TER				0.19
CO ₂ Emissions (t/year)	0.86	DFEE	66.27	TFEE	45.60	
Compliance Check	See BREL	% DFEE < TFEE				-45.33
% DPER < TPER	-94.28	DPER	167.18	TPER	86.05	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	24.2900 (1b)	x 2.8500 (2b)	= 69.2265 (1b) - (3b)
First floor	36.2800 (1c)	x 2.7000 (2c)	= 97.9560 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	167.1825 (5)

2. Ventilation rate

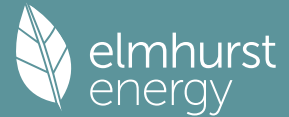
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 30.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3794 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2941 (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	0.3749	0.3676	0.3602	0.3235	0.3161	0.2794	0.2794	0.2720	0.2941	0.3161	0.3308	0.3455 (22b)
Effective ac	0.5703	0.5676	0.5649	0.5523	0.5500	0.5390	0.5390	0.5370	0.5432	0.5500	0.5547	0.5597 (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			33.1100	1.1450	37.9122		(27)
Floor Above Comm Stairwell-LF			4.9500	0.1132	0.5604	20.0000	99.0000 (28b)
Floor Above Comm Stairwell-UF			6.9200	0.1132	0.7834	0.0000	0.0000 (28b)
External Wall-Lower Floor	40.3600	16.1700	24.1900	0.1700	4.1123	60.0000	1451.4000 (29a)
External Wall-Upper Floor	64.8000	16.9400	47.8600	0.1700	8.1362	60.0000	2871.6002 (29a)
Wall To Corridor/Stairwell	10.9200		10.9200	0.1300	1.4196	9.0000	98.2800 (29a)
Wall to Lightwell	10.8000		10.8000	0.1700	1.8360	9.0000	97.2000 (29a)
External Roof-Crown Roof	35.9300		35.9300	0.1100	3.9523	9.0000	323.3700 (30)
External Roof-Mansard Roof	8.4500		8.4500	0.1400	1.1830	9.0000	76.0500 (30)
Total net area of external elements A _{um} (A, m ²)			183.1300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		59.8954		(33)
Main dwelling							
Party Wall			8.3500	0.0000	0.0000	180.0000	1503.0001 (32)
Party Floor-Lower Floor			19.3300			40.0000	773.2000 (32d)
Party Floor-Upper Floor			18.7600			40.0000	750.4000 (32d)
Internal Wall-Lower Floor			74.8400			9.0000	673.5600 (32c)
Internal Wall-Upper Floor			72.9000			9.0000	656.1000 (32c)
Internal Ceiling			12.0300			9.0000	108.2700 (32e)

Full SAP Calculation Printout



Heat capacity $C_m = \text{Sum}(A \times k)$ (28)...(30) + (32) + (32a)...(32e) = 9481.4303 (34)
 Thermal mass parameter (TMP = C_m / TFA) in kJ/m²K 156.5367 (35)
 Thermal bridges (Default value 0.200 * total exposed area) 36.6260 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 96.5214 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	31.4630	31.3124	31.1648	30.4715	30.3418	29.7380	29.7380	29.6262	29.9706	30.3418	30.6042	30.8786 (38)
Heat transfer coeff	127.9844	127.8338	127.6862	126.9929	126.8632	126.2594	126.2594	126.1476	126.4920	126.8632	127.1256	127.3999 (39)
Average = $\text{Sum}(39)\text{m} / 12 =$												126.9923
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.1130	2.1105	2.1081	2.0966	2.0945	2.0845	2.0845	2.0827	2.0884	2.0945	2.0988	2.1034 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9977 (42)
Hot water usage for mixer showers												
	79.3574	78.1649	76.4270	73.1020	70.6482	67.9118	66.3564	68.0810	69.9716	72.9097	76.3062	79.0534 (42a)
Hot water usage for baths												
	26.2551	25.8652	25.3161	24.3037	23.5456	22.7049	22.2509	22.7961	23.3898	24.2893	25.3226	26.1663 (42b)
Hot water usage for other uses												
	36.9352	35.5921	34.2490	32.9059	31.5628	30.2197	30.2197	31.5628	32.9059	34.2490	35.5921	36.9352 (42c)
Average daily hot water use (litres/day)												131.0850 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	142.5478	139.6222	135.9922	130.3116	125.7566	120.8364	118.8270	122.4400	126.2674	131.4481	137.2209	142.1550 (44)
Energy conte	225.7609	198.8201	209.0149	178.3900	169.2926	148.5825	143.7109	151.6063	155.7003	178.3738	195.4963	222.5804 (45)
Energy content (annual)												Total = $\text{Sum}(45)\text{m} =$ 2177.3291
Distribution loss (46)m = $0.15 \times (45)\text{m}$												
	33.8641	29.8230	31.3522	26.7585	25.3939	22.2874	21.5566	22.7409	23.3550	26.7561	29.3245	33.3871 (46)
Water storage loss (or HIU loss):												
Store volume												185.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0000 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												0.0000 (55)
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												
	225.7609	198.8201	209.0149	178.3900	169.2926	148.5825	143.7109	151.6063	155.7003	178.3738	195.4963	222.5804 (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												
	225.7609	198.8201	209.0149	178.3900	169.2926	148.5825	143.7109	151.6063	155.7003	178.3738	195.4963	222.5804 (64)
12Total per year (kWh/year)												2177.3291 (64)
Electric shower(s)												2177 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = $\text{Sum}(64a)\text{m} =$												0.0000 (64a)
Heat gains from water heating, kWh/month												
	75.0655	66.1077	69.4974	59.3147	56.2898	49.4037	47.7839	50.4091	51.7704	59.3093	65.0025	74.0080 (65)

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

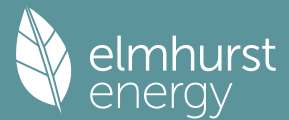
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	87.9558	87.3796	87.9558	90.8876	87.9558	90.8876	87.9558	87.9558	90.8876	87.9558	90.8876	87.9558 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	174.3822	176.1917	171.6317	161.9241	149.6699	138.1527	130.4585	128.6489	133.2089	142.9166	155.1708	166.6880 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082 (71)
Water heating gains (Table 5)												
	100.8945	98.3745	93.4105	82.3815	75.6583	68.6162	64.2257	67.7542	71.9033	79.7168	90.2813	99.4731 (72)
Total internal gains												
	419.1980	427.9114	408.9636	391.1588	369.2495	350.6221	335.6054	337.3244	348.9654	366.5547	392.3053	410.0824 (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					8.0200	10.6334		0.7600	0.7000		0.7700		31.4406 (74)	
East					8.3500	19.6403		0.7600	0.7000		0.7700		60.4615 (76)	
South					15.6400	46.7521		0.7600	0.7000		0.7700		269.5767 (78)	
West					1.1000	19.6403		0.7600	0.7000		0.7700		7.9650 (80)	
Solar gains	369.4438	635.4385	884.9305	1121.1209	1277.2890	1277.2712	1227.6081	1109.8596	966.6215	706.5513	443.6462	315.4201	(83)	
Total gains	788.6418	1063.3499	1293.8941	1512.2797	1646.5385	1627.8933	1563.2136	1447.1840	1315.5868	1073.1060	835.9514	725.5025	(84)	

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	20.5785	20.6028	20.6266	20.7392	20.7604	20.8597	20.8597	20.8782	20.8213	20.7604	20.7175	20.6729
alpha	2.3719	2.3735	2.3751	2.3826	2.3840	2.3906	2.3906	2.3919	2.3881	2.3840	2.3812	2.3782
util living area	0.9386	0.8870	0.8167	0.7100	0.5809	0.4447	0.3355	0.3727	0.5518	0.7732	0.9037	0.9482 (86)
MIT	18.7636	19.1885	19.6714	20.1711	20.5336	20.7446	20.8250	20.8102	20.6495	20.1304	19.3411	18.6761 (87)
Th 2	19.9435	19.9447	19.9460	19.9517	19.9528	19.9577	19.9577	19.9587	19.9558	19.9528	19.9506	19.9483 (88)
util rest of house	0.9305	0.8733	0.7954	0.6777	0.5355	0.3842	0.2624	0.2969	0.4902	0.7390	0.8895	0.9413 (89)
MIT 2	17.9014	18.3149	18.7789	19.2503	19.5744	19.7525	19.8090	19.8018	19.6827	19.2288	18.4756	17.8194 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.2230	18.6407	19.1117	19.5937	19.9322	20.1226	20.1880	20.1779	20.0433	19.5650	18.7984	18.1389 (92)
Temperature adjustment												
adjusted MIT	18.7230	19.1407	19.6117	20.0937	20.4322	20.6226	20.6880	20.6779	20.5433	20.0650	19.2984	18.6389 (93)

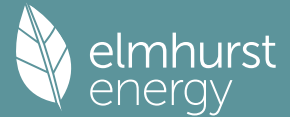
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9192	0.8613	0.7880	0.6823	0.5569	0.4235	0.3142	0.3500	0.5259	0.7430	0.8792	0.9308 (94)
Useful gains	724.9254	915.8736	1019.5361	1031.7980	916.9687	689.3534	491.1113	506.5128	691.8738	797.2811	734.9793	675.2641 (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	1845.9135	1820.4432	1674.1878	1421.5224	1107.7901	760.4041	516.1432	539.6503	815.0239	1200.7662	1550.7341	1839.5202 (97)
Space heating kWh	834.0152	607.8708	487.0608	280.6015	141.9711	0.0000	0.0000	0.0000	0.0000	300.1929	587.3435	866.2065 (98a)
Space heating requirement - total per year (kWh/year)	4105.2624											
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	834.0152	607.8708	487.0608	280.6015	141.9711	0.0000	0.0000	0.0000	0.0000	300.1929	587.3435	866.2065 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4105.2624											
Space heating per m2	(98c) / (4) = 67.7772 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	834.0152	607.8708	487.0608	280.6015	141.9711	0.0000	0.0000	0.0000	0.0000	300.1929	587.3435	866.2065 (98)	
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)	
Space heating fuel (main heating system)	834.0152	607.8708	487.0608	280.6015	141.9711	0.0000	0.0000	0.0000	0.0000	300.1929	587.3435	866.2065 (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	225.7609	198.8201	209.0149	178.3900	169.2926	148.5825	143.7109	151.6063	155.7003	178.3738	195.4963	222.5804 (64)	
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)	
Fuel for water heating, kWh/month	225.7609	198.8201	209.0149	178.3900	169.2926	148.5825	143.7109	151.6063	155.7003	178.3738	195.4963	222.5804 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	4.5268	4.0888	4.5268	4.3808	4.5268	4.3808	4.5268	4.5268	4.3808	4.5268	4.3808	4.5268 (231)	
Lighting	21.2794	17.0712	15.3707	11.2612	8.6985	7.1067	7.9351	10.3143	13.3972	17.5779	19.8542	21.8709 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													4105.2624 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													100.0000
Water heating fuel used													2177.3291 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													53.3000 (230c)
Total electricity for the above, kWh/year													53.3000 (231)
Electricity for lighting (calculated in Appendix L)													171.7372 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)

Full SAP Calculation Printout



Appendix Q - special features
Energy saved or generated
Energy used
Total delivered energy for all uses

-0.0000 (236)
0.0000 (237)
6507.6286 (238)

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	4105.2624	0.1552	637.2971 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	2177.3291	0.1416	308.2625 (264)
Space and water heating			945.5595 (265)
Pumps, fans and electric keep-hot	53.3000	0.1387	7.3934 (267)
Energy for lighting	171.7372	0.1443	24.7870 (268)
Total CO ₂ , kg/year			977.7399 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			16.1400 (273)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	4105.2624	1.5747	6464.5398 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2177.3291	1.5235	3317.2452 (278)
Space and water heating			9781.7850 (279)
Pumps, fans and electric keep-hot	53.3000	1.5128	80.6322 (281)
Energy for lighting	171.7372	1.5338	263.4163 (282)
Total Primary energy kWh/year			10125.8335 (286)
Dwelling Primary energy Rate (DPER)			167.1800 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	24.2900 (1b)	x 2.8500 (2b)	= 69.2265 (1b) - (3b)
First floor	36.2800 (1c)	x 2.7000 (2c)	= 97.9560 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 167.1825 (5)

2. Ventilation rate

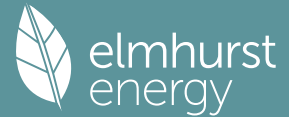
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1196 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3696 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2865 (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	0.3652	0.3581	0.3509	0.3151	0.3079	0.2721	0.2721	0.2650	0.2865	0.3079	0.3223	0.3366 (22b)
Effective ac	0.5667	0.5641	0.5616	0.5496	0.5474	0.5370	0.5370	0.5351	0.5410	0.5474	0.5519	0.5566 (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							
TER Opening Type			15.1400	1.1450	17.3359		(27)
Floor Above Comm Stairwell-LF			4.9500	0.1300	0.6435		(28b)
Floor Above Comm Stairwell-UF			6.9200	0.1300	0.8996		(28b)
External Wall-Lower Floor	40.3600	7.3800	32.9800	0.1800	5.9364		(29a)
External Wall-Upper Floor	64.8000	7.7600	57.0400	0.1800	10.2672		(29a)
Wall To Corridor/Stairwell	10.9200		10.9200	0.1800	1.9656		(29a)

Full SAP Calculation Printout



Wall to Lightwell	10.8000	10.8000	0.1800	1.9440	(29a)
External Roof-Crown Roof	35.9300	35.9300	0.1100	3.9523	(30)
External Roof-Mansard Roof	8.4500	8.4500	0.1100	0.9295	(30)
Total net area of external elements Aum(A, m2)	183.1300	183.1300			(31)
Fabric heat loss, W/K = Sum (A x U)		(26)...(30) + (32) =	43.8740		(33)
Main dwelling					
Party Wall	8.3500	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	156.5367	(35)
Thermal bridges (User defined value 0.050 * total exposed area)	9.1565	(36)
Point Thermal bridges	0.0000	(36a) =
Total fabric heat loss	53.0305	(33) + (36) + (36a) = (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	31.2650	31.1221	30.9820	30.3241	30.2011	29.6281	29.6281	29.5220	29.8488	30.2011	30.4501	30.7104	(38)
Average = Sum(39)m / 12 =	84.2955	84.1526	84.0125	83.3546	83.2315	82.6585	82.6585	82.5524	82.8793	83.2315	83.4805	83.7409	(39)
												83.3540	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3917	1.3893	1.3870	1.3762	1.3741	1.3647	1.3647	1.3629	1.3683	1.3741	1.3782	1.3825	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.9977 (42)
Hot water usage for mixer showers	57.7145	56.8472	55.5833	53.1651	51.3805	49.3904	48.2592	49.5135	50.8884	53.0253	55.4954	57.4934 (42a)	
Hot water usage for baths	24.9424	24.5719	24.0503	23.0885	22.3683	21.5697	21.1383	21.6563	22.2203	23.0748	24.0565	24.8580 (42b)	
Hot water usage for other uses	35.0885	33.8125	32.5366	31.2607	29.9847	28.7088	28.7088	29.9847	31.2607	32.5366	33.8125	35.0885 (42c)	
Average daily hot water use (litres/day)												108.2350 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	117.7453	115.2316	112.1702	107.5142	103.7335	99.6688	98.1063	101.1545	104.3694	108.6367	113.3644	117.4399 (44)	
Distribution loss (46)m = 0.15 x (45)m	186.4798	164.0883	172.4014	147.1816	139.6452	122.5544	118.6510	125.2504	128.6979	147.4190	161.5084	183.8825 (45)	
Water storage loss (or HIU loss):	27.9720	24.6132	25.8602	22.0772	20.9468	18.3832	17.7977	18.7876	19.3047	22.1128	24.2263	27.5824 (46)	
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	233.0747	206.1740	218.9963	192.2734	186.2401	167.6463	165.2459	171.8453	173.7898	194.0139	206.6002	230.4774 (62)	
WWHRS	-26.3847	-23.3348	-24.4349	-20.2330	-18.8565	-16.1356	-15.1246	-16.0835	-16.6945	-19.6810	-22.2962	-25.8961 (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	206.6901	182.8392	194.5614	172.0404	167.3837	151.5107	150.1214	155.7619	157.0953	174.3329	184.3040	204.5813 (64)	
12Total per year (kWh/year)												2101.2221 (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	99.2805	88.2279	94.5994	85.0113	83.7080	76.8228	76.7274	78.9217	78.8655	86.2927	89.7750	98.4169 (65)	

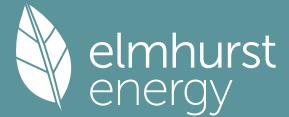
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.9558	87.3796	87.9558	90.8876	87.9558	90.8876	87.9558	87.9558	90.8876	87.9558	90.8876	87.9558	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.3822	176.1917	171.6317	161.9241	149.6699	138.1527	130.4585	128.6489	133.2089	142.9166	155.1708	166.6880	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	(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)	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	(71)
Water heating gains (Table 5)	133.4415	131.2916	127.1497	118.0713	112.5107	106.6984	103.1282	106.0775	109.5355	115.9848	124.6875	132.2807	(72)
Total internal gains	451.7450	460.8285	442.7028	426.8486	406.1019	388.7042	374.5080	375.6478	386.5976	402.8228	426.7115	442.8900	(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	3.6800	10.6334	0.6300	0.7000	0.7700	11.9589 (74)
East	3.8100	19.6403	0.6300	0.7000	0.7700	22.8688 (76)
South	7.1500	46.7521	0.6300	0.7000	0.7700	102.1595 (78)
West	0.5000	19.6403	0.6300	0.7000	0.7700	3.0012 (80)

Full SAP Calculation Printout



Solar gains	139.9884	240.7722	335.3019	424.8059	484.0029	484.0096	465.1844	420.5465	366.2567	267.7150	168.1035	119.5190 (83)
Total gains	591.7334	701.6006	778.0047	851.6544	890.1048	872.7139	839.6924	796.1943	752.8542	670.5378	594.8150	562.4090 (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	31.2440	31.2971	31.3493	31.5967	31.6434	31.8628	31.8628	31.9037	31.7779	31.6434	31.5490	31.4510	
alpha	3.0829	3.0865	3.0900	3.1064	3.1096	3.1242	3.1242	3.1269	3.1185	3.1096	3.1033	3.0967	
util living area	0.9587	0.9321	0.8924	0.8162	0.7015	0.5489	0.4146	0.4511	0.6453	0.8432	0.9345	0.9641 (86)	
MIT	19.0128	19.3418	19.7598	20.2560	20.6446	20.8811	20.9629	20.9510	20.7954	20.2872	19.5659	18.9509 (87)	
Th 2	19.7697	19.7715	19.7733	19.7817	19.7832	19.7905	19.7905	19.7919	19.7877	19.7832	19.7800	19.7767 (88)	
util rest of house	0.9502	0.9187	0.8710	0.7798	0.6428	0.4629	0.3082	0.3429	0.5625	0.8037	0.9192	0.9566 (89)	
MIT 2	17.5191	17.9290	18.4444	19.0417	19.4765	19.7139	19.7756	19.7705	19.6416	19.0964	18.2221	17.4461 (90)	
Living area fraction									fLA =	Living area / (4) =			0.3730 (91)
MIT	18.0762	18.4559	18.9350	19.4946	19.9122	20.1493	20.2184	20.2107	20.0719	19.5405	18.7233	18.0074 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.0762	18.4559	18.9350	19.4946	19.9122	20.1493	20.2184	20.2107	20.0719	19.5405	18.7233	18.0074 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9345	0.9005	0.8534	0.7700	0.6495	0.4896	0.3469	0.3817	0.5834	0.7945	0.9021	0.9418 (94)
Useful gains	552.9527	631.7726	663.9589	655.7902	578.1281	427.3126	291.3258	303.9222	439.1941	532.7535	536.5849	529.6982 (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	1161.2719	1140.7677	1044.6973	883.1090	683.5133	458.6933	299.0905	314.5858	494.9453	744.1295	970.3160	1156.2404 (97)
Space heating kWh	452.5895	342.0447	283.2693	163.6695	78.4065	0.0000	0.0000	0.0000	0.0000	157.2637	312.2864	466.1474 (98a)
Space heating requirement - total per year (kWh/year)												2255.6771
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	452.5895	342.0447	283.2693	163.6695	78.4065	0.0000	0.0000	0.0000	0.0000	157.2637	312.2864	466.1474 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2255.6771
Space heating per m2										(98c) / (4) =		37.2408 (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	452.5895	342.0447	283.2693	163.6695	78.4065	0.0000	0.0000	0.0000	0.0000	157.2637	312.2864	466.1474 (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)	490.3461	370.5793	306.9007	177.3234	84.9475	0.0000	0.0000	0.0000	0.0000	170.3832	338.3385	505.0351 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	206.6901	182.8392	194.5614	172.0404	167.3837	151.5107	150.1214	155.7619	157.0953	174.3329	184.3040	204.5813 (64)
Efficiency of water heater	85.7674	85.4432	84.9012	83.9480	82.4662	79.8000	79.8000	79.8000	79.8000	83.8294	85.2324	85.8469 (216)
Fuel for water heating, kWh/month	240.9890	213.9892	229.1623	204.9367	202.9724	189.8630	188.1220	195.1903	196.8612	207.9614	216.2371	238.3096 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	18.2755	14.6613	13.2008	9.6715	7.4705	6.1035	6.8149	8.8582	11.5060	15.0965	17.0514	18.7834 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-16.3112	-24.2113	-36.6245	-43.4160	-48.7975	-46.2879	-45.7349	-42.1943	-36.2920	-28.6673	-18.3626	-13.9646 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-5.8604	-12.6008	-25.5565	-39.1414	-52.4959	-53.0065	-52.3717	-43.9935	-31.7975	-18.2544	-7.8999	-4.6134 (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												2443.8538 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2524.5943 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												147.4935 (232)

Full SAP Calculation Printout



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

PV generation	-748.4560 (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	4453.4857 (238)

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

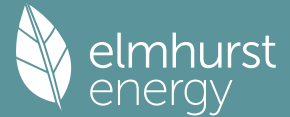
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2443.8538	0.2100	513.2093 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2524.5943	0.2100	530.1648 (264)
Space and water heating			1043.3741 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	147.4935	0.1443	21.2879 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-400.8642	0.1335	-53.5181
PV Unit electricity exported	-347.5918	0.1253	-43.5648
Total			-97.0829 (269)
Total CO2, kg/year			979.5083 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.1700 (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	2443.8538	1.1300	2761.5548 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2524.5943	1.1300	2852.7915 (278)
Space and water heating			5614.3464 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	147.4935	1.5338	226.2305 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-400.8642	1.4934	-598.6333
PV Unit electricity exported	-347.5918	0.4600	-159.9036
Total			-758.5369 (283)
Total Primary energy kWh/year			5212.1407 (286)
Target Primary Energy Rate (TPER)			86.0500 (287)

iii. Be Green

Full SAP Calculation Printout



Plot Reference	Flat 1				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 1-Be Green			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	70 C	DER	9.00	TER	19.50	
Environmental	94 A	% DER < TER				53.85
CO ₂ Emissions (t/year)	0.41	DFEE	49.35	TFEE	55.64	
Compliance Check	See BREL	% DFEE < TFEE				11.31
% DPER < TPER	9.06	DPER	94.70	TPER	104.13	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.0500 (1b)	3.2200 (2b)	161.1610 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0500		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 161.1610 (5)

2. Ventilation rate

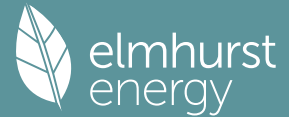
	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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) =	0.1241 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.3241	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2512 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Effective ac	0.3203	0.3140	0.3077	0.2763	0.2700	0.2386	0.2386	0.2323	0.2512	0.2700	0.2826	0.2951 (22b)
	0.5513	0.5493	0.5473	0.5382	0.5365	0.5285	0.5285	0.5270	0.5315	0.5365	0.5399	0.5436 (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							
Glazed Door			16.8000	1.1450	19.2366		(27)
Heatloss Floor			50.0500	0.1200	6.0060	110.0000	5505.5000 (28)
External Wall	28.4600	16.8000	11.6600	0.1700	1.9822	60.0000	699.5999 (29a)
Basement Walls	52.0700		52.0700	0.1700	8.8519	60.0000	3124.2000 (29a)
Walls To CorridorStairwell	6.1800		6.1800	0.1600	0.9888	9.0000	55.6200 (29a)
External Roof	4.2200		4.2200	0.1100	0.4642	9.0000	37.9800 (30)
Total net area of external elements Aum(A, m ²)			140.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.5297		(33)
Main dwelling							
Party Wall			15.8400	0.0000	0.0000	110.0000	1742.4000 (32)
Party Ceiling			47.1500			30.0000	1414.5000 (32b)
Internal Wall			65.5200			9.0000	589.6800 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =	13169.4799	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K						263.1265	(35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				7.0000	0.0160	0.1120	
E4 Jamb				14.4000	0.0120	0.1728	
E22 Basement floor				31.8500	0.0020	0.0637	

Full SAP Calculation Printout



E7 Party floor between dwellings (in blocks of flats)	23.3300	0.1020	2.3797											
E15 Flat roof with parapet	3.7500	0.0800	0.3000											
E16 Corner (normal)	12.8800	0.0430	0.5538											
E17 Corner (inverted - internal area greater than external area)	3.2200	-0.0760	-0.2447											
E18 Party wall between dwellings	6.4400	0.1150	0.7406											
E25 Staggered party wall between dwellings	6.4400	0.0470	0.3027											
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.7200	0.0000	0.0000											
R6 Flat ceiling	3.7400	0.1200	0.4488											
E3 Sill	7.0000	0.0110	0.0770											
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.9064 (36)										
Point Thermal bridges				0.0000										
Total fabric heat loss		(33) + (36) + (36a) =		42.4361 (37)										
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat transfer coeff	29.3188	29.2129	29.1091	28.6215	28.5303	28.1057	28.1057	28.0270	28.2692	28.5303	28.7149	28.9078	(38)	
Average = Sum(39)m / 12 =	71.7549	71.6490	71.5452	71.0576	70.9664	70.5418	70.5418	70.4631	70.7053	70.9664	71.1510	71.3439	(39)	
												71.0572		
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.4337	1.4315	1.4295	1.4197	1.4179	1.4094	1.4094	1.4079	1.4127	1.4179	1.4216	1.4255	(40)	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		
												1.4197		
												31		

4. Water heating energy requirements (kWh/year)														

Assumed occupancy													1.6916 (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	23.9316	23.5762	23.0757	22.1529	21.4619	20.6956	20.2818	20.7788	21.3199	22.1398	23.0816	23.8507	(42b)	
Hot water usage for other uses	33.6352	32.4121	31.1890	29.9659	28.7428	27.5197	27.5197	28.7428	29.9659	31.1890	32.4121	33.6352	(42c)	
Average daily hot water use (litres/day)												52.7658	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	57.5668	55.9883	54.2647	52.1187	50.2046	48.2153	47.8014	49.5215	51.2858	53.3288	55.4937	57.4859	(44)	
Energy conte	91.1717	79.7265	83.4028	71.3479	67.5851	59.2863	57.8117	61.3180	63.2405	72.3666	79.0609	90.0090	(45)	
Energy content (annual)										Total = Sum(45)m =		876.3271		
Distribution loss (46)m = 0.15 x (45)m	13.6758	11.9590	12.5104	10.7022	10.1378	8.8930	8.6718	9.1977	9.4861	10.8550	11.8591	13.5013	(46)	
Water storage loss (or HIU loss):														
Store volume													185.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):													1.9000 (48)	
Temperature factor from Table 2b													0.7800 (49)	
Enter (49) or (54) in (55)													1.4820 (55)	
Total storage loss	45.9420	41.4960	45.9420	44.4600	45.9420	44.4600	45.9420	45.9420	44.4600	45.9420	44.4600	45.9420	(56)	
If cylinder contains dedicated solar storage	45.9420	41.4960	45.9420	44.4600	45.9420	44.4600	45.9420	45.9420	44.4600	45.9420	44.4600	45.9420	(57)	
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month	243.4350	217.2547	235.6661	218.6995	219.8484	139.8411	141.0516	144.5580	143.7953	224.6299	226.4125	242.2723	(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	243.4350	217.2547	235.6661	218.6995	219.8484	139.8411	141.0516	144.5580	143.7953	224.6299	226.4125	242.2723	(64)	
									Total per year (kWh/year) = Sum(64)m =			2397.4646	(64)	
12Total per year (kWh/year)												2397	(64)	
Electric shower(s)	42.1091	37.5196	40.9699	39.0971	39.8307	37.9947	39.2611	39.8307	39.0971	40.9699	40.1995	42.1091	(64a)	
												478.9886	(64a)	
Heat gains from water heating, kWh/month	125.8989	112.7147	123.0310	115.8107	117.4868	58.0872	58.8760	60.1843	59.6776	119.3614	118.6509	125.5123	(65)	

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

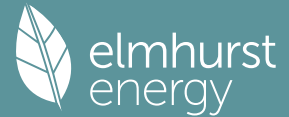
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.3281	82.2918	74.3281	76.8057	74.3281	76.8057	74.3281	74.3281	76.8057	74.3281	76.8057	74.3281	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.3638	148.8930	145.0395	136.8359	126.4804	116.7476	110.2455	108.7163	112.5698	120.7734	131.1290	140.8617	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	(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)	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	(71)	
Water heating gains (Table 5)	169.2190	167.7302	165.3642	160.8483	157.9123	80.6767	79.1345	80.8929	82.8855	160.4320	164.7929	168.6994	(72)	
Total internal gains	439.2845	447.2886	433.1054	422.8635	407.0944	322.6036	312.0817	312.3109	320.6347	403.9072	421.1012	432.2628	(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				7.8700		10.6334		0.7600		0.7000		0.7700		30.8526 (74)
West				8.9300		19.6403		0.7600		0.7000		0.7700		64.6612 (80)

Solar gains	95.5138	185.4518	308.5015	464.7406	589.1187	613.2246	579.5416	483.6012	362.7357	220.2774	118.6855	78.8944	(83)	
Total gains	534.7983	632.7405	741.6069	887.6041	996.2131	935.8282	891.6233	795.9121	683.3704	624.1846	539.7867	511.1572	(84)	

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	50.9817	51.0571	51.1312	51.4820	51.5482	51.8585	51.8585	51.9164	51.7385	51.5482	51.4145	51.2754
alpha	4.3988	4.4038	4.4087	4.4321	4.4365	4.4572	4.4572	4.4611	4.4492	4.4365	4.4276	4.4184
util living area	0.9839	0.9666	0.9225	0.8027	0.6222	0.4725	0.3460	0.4028	0.6597	0.8773	0.9677	0.9866 (86)
Living	19.9420	20.1332	20.4103	20.7132	20.8712	20.9170	20.9279	20.9255	20.8758	20.6497	20.2431	19.9084
Non living	18.5455	18.7848	19.1220	19.4671	19.6191	19.6608	19.6664	19.6670	19.6339	19.4142	18.9316	18.5081
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	20.4588	20.1332	20.4103	20.7132	20.8712	20.9170	20.9279	20.9255	20.8758	20.6497	20.2431	20.0611 (87)
Th 2	19.7376	19.7392	19.7408	19.7482	19.7496	19.7561	19.7561	19.7573	19.7536	19.7496	19.7468	19.7439 (88)
util rest of house	0.9786	0.9562	0.8995	0.7542	0.5516	0.3851	0.2493	0.2963	0.5613	0.8318	0.9556	0.9821 (89)
MIT 2	19.2624	18.7848	19.1220	19.4671	19.6191	19.6608	19.6664	19.6670	19.6339	19.4142	18.9316	18.7308 (90)
Living area fraction	19.9102	19.5149	19.8196	20.1418	20.2971	20.3410	20.3495	20.3484	20.3063	fLA = Living area / (4) =	19.6417	19.4511 (92)
MIT	19.9102	19.5149	19.8196	20.1418	20.2971	20.3410	20.3495	20.3484	20.3063	20.0832	19.6417	19.4511 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9102	19.5149	19.8196	20.1418	20.2971	20.3410	20.3495	20.3484	20.3063	20.0832	19.6417	19.4511 (93)

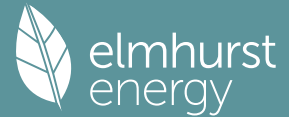
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9794	0.9539	0.9011	0.7705	0.5835	0.4268	0.2957	0.3475	0.6070	0.8454	0.9544	0.9809 (94)
Useful gains	523.7803	603.5862	668.2609	683.9146	581.2413	399.4277	263.6662	276.5467	414.7883	527.6809	515.1465	501.3706 (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	1120.1072	1047.1440	952.9517	798.8168	610.1021	404.9783	264.4937	278.2162	438.8219	672.9863	892.3552	1088.0725 (97)
Space heating kWh	443.6672	298.0708	211.8100	82.7296	21.4724	0.0000	0.0000	0.0000	0.0000	108.1072	271.5903	436.5063 (98a)
Space heating requirement - total per year (kWh/year)												1873.9538
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	443.6672	298.0708	211.8100	82.7296	21.4724	0.0000	0.0000	0.0000	0.0000	108.1072	271.5903	436.5063 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1873.9538
Space heating per m2										(98c) / (4) =		37.4416 (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 %)												185.9079 (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	443.6672	298.0708	211.8100	82.7296	21.4724	0.0000	0.0000	0.0000	0.0000	108.1072	271.5903	436.5063 (98)
Space heating efficiency (main heating system 1)	185.9079	185.9079	185.9079	185.9079	185.9079	0.0000	0.0000	0.0000	0.0000	185.9079	185.9079	185.9079 (210)
Space heating fuel (main heating system)	238.6489	160.3325	113.9328	44.5003	11.5500	0.0000	0.0000	0.0000	0.0000	58.1509	146.0886	234.7970 (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	243.4350	217.2547	235.6661	218.6995	219.8484	139.8411	141.0516	144.5580	143.7953	224.6299	226.4125	242.2723 (64)
Efficiency of water heater (217)m	165.5769	165.5769	165.5769	165.5769	165.5769	165.5769	165.5769	165.5769	165.5769	165.5769	165.5769	165.5769 (216)
Fuel for water heating, kWh/month	147.0224	131.2108	142.3303	132.0834	132.7772	84.4569	85.1880	87.3056	86.8450	135.6650	136.7416	146.3201 (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	17.0287	13.6610	12.3003	9.0117	6.9609	5.6871	6.3500	8.2539	10.7210	14.0666	15.8881	17.5020 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1008.0010 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												165.5769
Water heating fuel used												1447.9466 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	137.4313 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3072.3674 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1008.0010	0.1569	158.1126	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1447.9466	0.1423	206.0621	(264)
Energy for instantaneous electric shower(s)	478.9886	0.1391	66.6379	(264a)
Space and water heating			364.1747	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	137.4313	0.1443	19.8356	(268)
Total CO2, kg/year			450.6482	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.0000	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1008.0010	1.5807	1593.3115	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1447.9466	1.5263	2210.0500	(278)
Energy for instantaneous electric shower(s)	478.9886	1.5143	725.3488	(278a)
Space and water heating			3803.3615	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	137.4313	1.5338	210.7966	(282)
Total Primary energy kWh/year			4739.5069	(286)
Dwelling Primary energy Rate (DPER)			94.7000	(287)

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

1. Overall dwelling characteristics

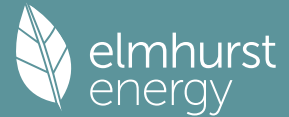
	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling	50.0500	3.2200	161.1610	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.0500			(5)
Dwelling volume				(5)

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)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1241 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3741	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2899 (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	0.3697	0.3624	0.3552	0.3189	0.3117	0.2754	0.2754	0.2682	0.2899	0.3117	0.3262	0.3407 (22b)
Effective ac	0.5683	0.5657	0.5631	0.5509	0.5486	0.5379	0.5379	0.5360	0.5420	0.5486	0.5532	0.5580 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			12.5100	1.1450	14.3244		(27)
Heatloss Floor			50.0500	0.1300	6.5065		(28)
External Wall	28.4600	12.5100	15.9500	0.1800	2.8710		(29a)
Basement Walls	52.0700		52.0700	0.1800	9.3726		(29a)
Walls To CorridorStairwell	6.1800		6.1800	0.1800	1.1124		(29a)
External Roof	4.2200		4.2200	0.1100	0.4642		(30)
Total net area of external elements Aum(A, m2)			140.9800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.6511		(33)
Main dwelling							
Party Wall			15.8400	0.0000	0.0000		(32)

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

263.1265 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	7.0000	0.0500	0.3500
E2 Other lintels (including other steel lintels)			
E4 Jamb	14.4000	0.0500	0.7200
E22 Basement floor	31.8500	0.0700	2.2295
E7 Party floor between dwellings (in blocks of flats)	23.3300	0.0700	1.6331
E15 Flat roof with parapet	3.7500	0.5600	2.1000
E16 Corner (normal)	12.8800	0.0900	1.1592
E17 Corner (inverted - internal area greater than external area)	3.2200	-0.0900	-0.2898
E18 Party wall between dwellings	6.4400	0.0600	0.3864
E25 Staggered party wall between dwellings	6.4400	0.0600	0.3864
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.7200	0.0000	0.0000
R6 Flat ceiling	3.7400	0.0600	0.2244
E3 Sill	7.0000	0.0500	0.3500
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.2492 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 43.9003 (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	30.2252	30.0841	29.9458	29.2962	29.1746	28.6089	28.6089	28.5041	28.8268	29.1746	29.4205	29.6776 (38)
Heat transfer coeff	74.1255	73.9844	73.8461	73.1965	73.0750	72.5092	72.5092	72.4044	72.7271	73.0750	73.3209	73.5779 (39)
Average = Sum(39)m / 12 =												73.1959
HLP	1.4810	1.4782	1.4754	1.4625	1.4600	1.4487	1.4487	1.4466	1.4531	1.4600	1.4650	1.4701 (40)
HLP (average)												1.4625
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

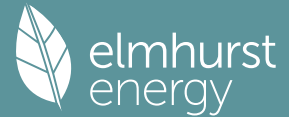
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6916 (42)
Hot water usage for mixer showers	52.5816	51.7914	50.6399	48.4368	46.8109	44.9978	43.9672	45.1099	46.3626	48.3094	50.5599	52.3801 (42a)
Hot water usage for baths	22.7350	22.3974	21.9219	21.0452	20.3888	19.6608	19.2677	19.7398	20.2539	21.0328	21.9275	22.6582 (42b)
Hot water usage for other uses	31.9534	30.7915	29.6295	28.4676	27.3056	26.1437	26.1437	27.3056	28.4676	29.6295	30.7915	31.9534 (42c)
Average daily hot water use (litres/day)												98.6060 (43)
Daily hot water use	107.2700	104.9803	102.1914	97.9496	94.5053	90.8023	89.3785	92.1554	95.0841	98.9717	103.2789	106.9917 (44)
Energy conte	169.8895	149.4905	157.0643	134.0881	127.2223	111.6520	108.0956	114.1076	117.2482	134.3037	147.1397	167.5232 (45)
Energy content (annual)										Total = Sum(45)m =		1637.8248
Distribution loss (46)m = 0.15 x (45)m	25.4834	22.4236	23.5596	20.1132	19.0833	16.7478	16.2143	17.1161	17.5872	20.1456	22.0710	25.1285 (46)
Water storage loss (or HIU loss):												
Store volume												185.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5775 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8518 (55)
Total storage loss	26.4067	23.8512	26.4067	25.5549	26.4067	25.5549	26.4067	26.4067	25.5549	26.4067	25.5549	26.4067 (56)
If cylinder contains dedicated solar storage	26.4067	23.8512	26.4067	25.5549	26.4067	25.5549	26.4067	26.4067	25.5549	26.4067	25.5549	26.4067 (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	219.5587	194.3529	206.7334	182.1550	176.8915	159.7189	157.7647	163.7768	165.3151	183.9728	195.2066	217.1923 (62)
WWHRS	-24.0381	-21.2595	-22.2617	-18.4336	-17.1794	-14.7006	-13.7794	-14.6531	-15.2098	-17.9307	-20.3133	-23.5930 (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	195.5205	173.0934	184.4717	163.7214	159.7120	145.0184	143.9853	149.1237	150.1053	166.0421	174.8933	193.5993 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1999.2866 (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	96.2236	85.5955	91.9592	83.0378	82.0367	75.5778	75.6771	77.6761	77.4385	84.3913	87.3775	95.4368 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787	84.5787 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.3281	82.2918	74.3281	76.8057	74.3281	76.8057	74.3281	74.3281	76.8057	74.3281	76.8057	74.3281 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.3638	148.8930	145.0395	136.8359	126.4804	116.7476	110.2455	108.7163	112.5698	120.7734	131.1290	140.8617 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579	31.4579 (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)	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629	-67.6629 (71)

Full SAP Calculation Printout



Water heating gains (Table 5)	129.3328	127.3743	123.6011	115.3303	110.2644	104.9692	101.7165	104.4033	107.5535	113.4291	121.3576	128.2752 (72)
Total internal gains	402.3983	409.9327	394.3423	380.3455	362.4465	346.8961	334.6638	335.8214	345.3027	359.9042	380.6659	394.8386 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	
North				5.8600	10.6334	0.6300	0.7000			0.7700	19.0433 (74)	
West				6.6500	19.6403	0.6300	0.7000			0.7700	39.9154 (80)	
Solar gains	58.9587	114.4757	190.4316	286.8741	363.6491	378.5287	357.7372	298.5160	223.9091	135.9728	73.2622	48.6999 (83)
Total gains	461.3570	524.4084	584.7739	667.2197	726.0956	725.4248	692.4009	634.3374	569.2118	495.8770	453.9280	443.5386 (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	49.3513	49.4454	49.5380	49.9776	50.0608	50.4514	50.4514	50.5244	50.3002	50.0608	49.8929	49.7186
alpha	4.2901	4.2964	4.3025	4.3318	4.3374	4.3634	4.3634	4.3683	4.3533	4.3374	4.3262	4.3146
util living area	0.9909	0.9833	0.9650	0.9072	0.7848	0.6036	0.4522	0.5096	0.7587	0.9392	0.9830	0.9923 (86)
MIT	19.4823	19.6863	20.0145	20.4533	20.7859	20.9488	20.9884	20.9809	20.8634	20.4260	19.8833	19.4498 (87)
Th 2	19.7018	19.7039	19.7060	19.7158	19.7176	19.7262	19.7262	19.7278	19.7229	19.7176	19.7139	19.7100 (88)
util rest of house	0.9877	0.9775	0.9525	0.8747	0.7168	0.4985	0.3257	0.3764	0.6606	0.9105	0.9760	0.9896 (89)
MIT 2	17.9906	18.2499	18.6618	19.1952	19.5538	19.7009	19.7232	19.7223	19.6404	19.1800	18.5089	17.9551 (90)
Living area fraction									f _{LA} = Living area / (4) =			0.5415 (91)
MIT	18.7983	19.0276	19.3943	19.8764	20.2210	20.3766	20.4083	20.4037	20.3026	19.8547	19.2530	18.7644 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7983	19.0276	19.3943	19.8764	20.2210	20.3766	20.4083	20.4037	20.3026	19.8547	19.2530	18.7644 (93)

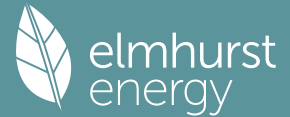
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9847	0.9736	0.9488	0.8794	0.7455	0.5539	0.3944	0.4488	0.7086	0.9142	0.9727	0.9868 (94)
Useful gains	454.2789	510.5531	554.8196	586.7461	541.2882	401.8483	273.1052	284.6649	403.3362	453.3173	441.5523	437.7045 (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	1074.6940	1045.2247	952.1910	803.4354	622.6683	418.8562	276.1337	289.8884	451.0974	676.2848	891.0719	1071.6201 (97)
Space heating kWh	461.5888	359.2993	295.6443	156.0163	60.5468	0.0000	0.0000	0.0000	0.0000	165.8878	323.6541	471.6332 (98a)
Space heating requirement - total per year (kWh/year)												2294.2705
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	461.5888	359.2993	295.6443	156.0163	60.5468	0.0000	0.0000	0.0000	0.0000	165.8878	323.6541	471.6332 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2294.2705
Space heating per m ²											(98c) / (4) =	45.8396 (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	461.5888	359.2993	295.6443	156.0163	60.5468	0.0000	0.0000	0.0000	0.0000	165.8878	323.6541	471.6332 (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)	500.0962	389.2734	320.3080	169.0317	65.5978	0.0000	0.0000	0.0000	0.0000	179.7268	350.6545	510.9785 (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	195.5205	173.0934	184.4717	163.7214	159.7120	145.0184	143.9853	149.1237	150.1053	166.0421	174.8933	193.5993 (64)
Efficiency of water heater	85.9168	85.6590	85.1118	83.9518	82.0870	79.8000	79.8000	79.8000	79.8000	84.0577	85.4204	85.9780 (216)
Fuel for water heating, kWh/month	227.5696	202.0725	216.7404	195.0183	194.5644	181.7273	180.4327	186.8718	188.1019	197.5335	204.7443	225.1731 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	15.4439	12.3897	11.1555	8.1730	6.3131	5.1578	7.4858	9.7233	12.7575	14.4095	15.8731	15.8731 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-13.5563	-20.1645	-30.5706	-36.3294	-40.9224	-38.8631	-38.4114	-35.4007	-30.3854	-23.9255	-15.2799	-11.6022 (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)

Full SAP Calculation Printout



Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-4.7645	-10.2539	-20.8107	-31.8891	-42.7781	-43.1855	-42.6557	-35.8177	-25.8781	-14.8467	-6.4212	-3.7492 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2485.6669 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2400.5499 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												124.6412 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-618.4617 (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												4478.3964 (238)

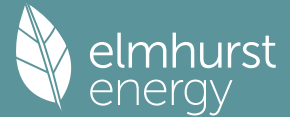
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2485.6669	0.2100	521.9900 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2400.5499	0.2100	504.1155 (264)
Space and water heating			1026.1055 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	124.6412	0.1443	17.9896 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-335.4114	0.1335	-44.7616
PV Unit electricity exported	-283.0503	0.1253	-35.4736
Total			-80.2352 (269)
Total CO2, kg/year			975.7892 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			19.5000 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2485.6669	1.1300	2808.8036 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2400.5499	1.1300	2712.6214 (278)
Space and water heating			5521.4250 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	124.6412	1.5338	191.1789 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-335.4114	1.4932	-500.8209
PV Unit electricity exported	-283.0503	0.4600	-130.2051
Total			-631.0260 (283)
Total Primary energy kWh/year			5211.6787 (286)
Target Primary Energy Rate (TPER)			104.1300 (287)

Full SAP Calculation Printout



Plot Reference	Flat 2				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 2-Be Green			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	70 C	DER	10.07	TER	21.25	
Environmental	94 A	% DER < TER				52.61
CO ₂ Emissions (t/year)	0.35	DFEE	45.98	TFEE	55.25	
Compliance Check	See BREL	% DFEE < TFEE				16.77
% DPER < TPER	6.76	DPER	106.22	TPER	113.92	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.7000 (1b)	3.2200 (2b)	121.3940 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.7000		121.3940 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 121.3940 (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) =	0.1648 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.3648	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2827 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3604	0.3534	0.3463	0.3110	0.3039	0.2685	0.2685	0.2615	0.2827	0.3039	0.3180	0.3322 (22b)
Effective ac	0.5650	0.5624	0.5600	0.5483	0.5462	0.5361	0.5361	0.5342	0.5400	0.5462	0.5506	0.5552 (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							
Glazed Door			11.4000	1.1450	13.0534		(27)
Heatloss Floor			37.7900	0.1200	4.5348	110.0000	4156.9000 (28)
External Wall	22.3200	11.4000	10.9200	0.1700	1.8564	60.0000	655.2000 (29a)
Basement Walls	42.1800		42.1800	0.1700	7.1706	60.0000	2530.8000 (29a)
Walls To CorridorStairwell	24.1200		24.1200	0.1600	3.8592	9.0000	217.0800 (29a)
External Roof	10.3200		10.3200	0.1100	1.1352	9.0000	92.8800 (30)
Ceiling below communal area	2.0900		2.0900	0.1200	0.2508	9.0000	18.8100 (30)
Total net area of external elements Aum(A, m ²)			138.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.8604	(33)
Main dwelling							
Party Wall			15.2300	0.0000	0.0000	110.0000	1675.2999 (32)
Party Ceiling			47.1500			30.0000	1414.5000 (32b)
Internal Wall			66.7800			9.0000	601.0200 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 11362.4899 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							301.3923 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.7500	0.0160	0.0760	
E4 Jamb				9.6000	0.0120	0.1152	

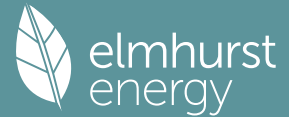
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 22.6320	Feb 22.5309	Mar 22.4319	Apr 21.9667	May 21.8797	Jun 21.4745	Jul 21.4745	Aug 21.3995	Sep 21.6306	Oct 21.8797	Nov 22.0558	Dec 22.2398 (38)
Heat transfer coeff	59.4781	59.3771	59.2781	58.8129	58.7259	58.3207	58.3207	58.2457	58.4768	58.7259	58.9019	59.0860 (39)
Average = Sum(39)m / 12 =												58.8125
HLP	Jan 1.5777	Feb 1.5750	Mar 1.5724	Apr 1.5600	May 1.5577	Jun 1.5470	Jul 1.5470	Aug 1.5450	Sep 1.5511	Oct 1.5577	Nov 1.5624	Dec 1.5673 (40)
HLP (average)												1.5600
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy											1.3466 (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 (42a)	
Hot water usage for baths	21.3136	20.9971	20.5513	19.7294	19.1140	18.4316	18.0630	18.5057	18.9876	19.7178	20.5566 (42b)	
Hot water usage for other uses	29.9168	28.8289	27.7410	26.6531	25.5652	24.4773	24.4773	25.5652	26.6531	27.7410	28.8289 (42c)	
Average daily hot water use (litres/day)											46.9581 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	51.2304	49.8260	48.2923	46.3826	44.6793	42.9090	42.5404	44.0709	45.6407	47.4588	49.3855	51.1583 (44)
Energy content (annual)	81.1364	70.9515	74.2235	63.4954	60.1469	52.7616	51.4489	54.5690	56.2796	64.4011	70.3587	80.1016 (45)
Distribution loss (46)m = 0.15 x (45)m	12.1705	10.6427	11.1335	9.5243	9.0220	7.9142	7.7173	8.1853	8.4419	9.6602	10.5538	12.0152 (46)
Water storage loss (or HIU loss):												
Store volume											150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):											1.7700 (48)	
Temperature factor from Table 2b											0.7800 (49)	
Enter (49) or (54) in (55)											1.3806 (55)	
Total storage loss	42.7986	38.6568	42.7986	41.4180	42.7986	41.4180	42.7986	42.7986	41.4180	42.7986	41.4180	42.7986 (56)
If cylinder contains dedicated solar storage	42.7986	38.6568	42.7986	41.4180	42.7986	41.4180	42.7986	42.7986	41.4180	42.7986	41.4180	42.7986 (57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213 (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	230.2563	205.6405	223.3434	207.8050	209.2668	130.2744	131.5455	134.6655	133.7924	213.5211	214.6683	229.2215 (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	230.2563	205.6405	223.3434	207.8050	209.2668	130.2744	131.5455	134.6655	133.7924	213.5211	214.6683	229.2215 (64)
12Total per year (kWh/year)											2264.0005 (64)	
Electric shower(s)	37.4775	33.3927	36.4636	34.7967	35.4497	33.8156	34.9428	35.4497	34.7967	36.4636	35.7779	37.4775 (64a)
Heat gains from water heating, kWh/month	121.4043	108.7653	118.8523	112.1247	113.9183	54.8730	55.6808	56.8450	56.2880	115.5863	114.6520	121.0602 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.4055	64.6633	58.4055	60.3524	58.4055	60.3524	58.4055	58.4055	60.3524	58.4055	60.3524	58.4055 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.7955	116.9971	113.9691	107.5229	99.3857	91.7379	86.6287	85.4271	88.4551	94.9013	103.0385	110.6863 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332 (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)	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655 (71)
Water heating gains (Table 5)	163.1778	161.8531	159.7477	155.7287	153.1160	76.2124	74.8398	76.4045	78.1778	155.3580	159.2389	162.7153 (72)
Total internal gains	380.5784	386.7130	375.3219	366.8036	354.1068	271.5023	263.0736	263.4367	270.1848	351.8644	365.8293	375.0067 (73)

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
East	4.3400	19.6403	0.7600	0.7000	0.7700	31.4255 (76)
South	7.0600	46.7521	0.7600	0.7000	0.7700	121.6887 (78)

Full SAP Calculation Printout



Solar gains	153.1142	260.7697	355.1066	434.5770	479.9469	472.9786	457.4942	424.5114	382.9400	287.9033	183.4265	130.9931 (83)
Total gains	533.6926	647.4827	730.4285	801.3806	834.0537	744.4809	720.5678	687.9482	653.1248	639.7676	549.2559	505.9997 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	53.0657	53.1560	53.2448	53.6659	53.7454	54.1188	54.1188	54.1885	53.9744	53.7454	53.5848	53.4179
alpha	4.5377	4.5437	4.5497	4.5777	4.5830	4.6079	4.6079	4.6126	4.5983	4.5830	4.5723	4.5612
util living area	0.9715	0.9379	0.8796	0.7688	0.6190	0.4908	0.3541	0.3864	0.5901	0.8013	0.9405	0.9768 (86)
Living	20.1155	20.3322	20.5585	20.7678	20.8810	20.9192	20.9304	20.9293	20.9015	20.7634	20.4117	20.0740
Non living	18.6629	18.9262	19.1901	19.4205	19.5248	19.5608	19.5658	19.5671	19.5482	19.4262	19.0359	18.6178
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	20.5475	20.3322	20.5585	20.7678	20.8810	20.9192	20.9304	20.9293	20.9015	20.7634	20.4117	20.2035 (87)
Th 2	19.6298	19.6317	19.6337	19.6428	19.6445	19.6525	19.6525	19.6539	19.6494	19.6445	19.6410	19.6374 (88)
util rest of house	0.9615	0.9184	0.8449	0.7119	0.5415	0.3924	0.2468	0.2750	0.4866	0.7372	0.9181	0.9685 (89)
MIT 2	19.2443	18.9262	19.1901	19.4205	19.5248	19.5608	19.5658	19.5671	19.5482	19.4262	19.0359	18.8016 (90)
Living area fraction	19.8589	19.5893	19.8355	20.0559	20.1644	20.2014	20.2094	20.2095	20.1865	20.0568	19.6848	19.4628 (91)
MIT	19.8589	19.5893	19.8355	20.0559	20.1644	20.2014	20.2094	20.2095	20.1865	20.0568	19.6848	19.4628 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8589	19.5893	19.8355	20.0559	20.1644	20.2014	20.2094	20.2095	20.1865	20.0568	19.6848	19.4628 (93)

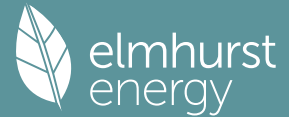
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9634	0.9177	0.8506	0.7304	0.5722	0.4332	0.2914	0.3213	0.5292	0.7584	0.9190	0.9672 (94)
Useful gains	514.1795	594.1760	621.3181	585.2931	477.2389	322.5189	209.9874	221.0718	345.6414	485.2112	504.7589	489.4176 (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	925.4152	872.2070	790.5013	656.1097	497.0796	326.6794	210.5015	221.8866	355.9181	555.3615	741.2670	901.8151 (97)
Space heating kWh	305.9594	186.8369	125.8723	50.9879	14.7614	0.0000	0.0000	0.0000	0.0000	52.1918	170.2858	306.8237 (98a)
Space heating requirement - total per year (kWh/year)												1213.7193
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	305.9594	186.8369	125.8723	50.9879	14.7614	0.0000	0.0000	0.0000	0.0000	52.1918	170.2858	306.8237 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1213.7193
Space heating per m2										(98c) / (4) =		32.1941 (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 %)												171.3829 (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	305.9594	186.8369	125.8723	50.9879	14.7614	0.0000	0.0000	0.0000	0.0000	52.1918	170.2858	306.8237 (98)
Space heating efficiency (main heating system 1)	171.3829	171.3829	171.3829	171.3829	171.3829	0.0000	0.0000	0.0000	0.0000	171.3829	171.3829	171.3829 (210)
Space heating fuel (main heating system)	178.5239	109.0172	73.4451	29.7509	8.6131	0.0000	0.0000	0.0000	0.0000	30.4534	99.3599	179.0282 (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	230.2563	205.6405	223.3434	207.8050	209.2668	130.2744	131.5455	134.6655	133.7924	213.5211	214.6683	229.2215 (64)
Efficiency of water heater (217)m	165.8344	165.8344	165.8344	165.8344	165.8344	165.8344	165.8344	165.8344	165.8344	165.8344	165.8344	165.8344 (216)
Fuel for water heating, kWh/month	138.8471	124.0035	134.6785	125.3087	126.1902	78.5569	79.3234	81.2048	80.6783	128.7556	129.4473	138.2231 (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	12.4166	9.9611	8.9689	6.5710	5.0756	4.1468	4.6301	6.0184	7.8173	10.2568	11.5850	12.7617 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												708.1918 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												165.8344
Water heating fuel used												1365.2173 (219)

Full SAP Calculation Printout



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)	100.2093 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2599.9224 (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	708.1918	0.1574	111.4972 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1365.2173	0.1424	194.4118 (264)
Energy for instantaneous electric shower(s)	426.3039	0.1391	59.3083 (264a)
Space and water heating			305.9089 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	100.2093	0.1443	14.4633 (268)
Total CO2, kg/year			379.6806 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.0700 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	708.1918	1.5828	1120.9142 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1365.2173	1.5267	2084.2424 (278)
Energy for instantaneous electric shower(s)	426.3039	1.5143	645.5666 (278a)
Space and water heating			3205.1566 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	100.2093	1.5338	153.7044 (282)
Total Primary energy kWh/year			4004.4276 (286)
Dwelling Primary energy Rate (DPER)			106.2200 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	37.7000 (1b)	x 3.2200 (2b)	= 121.3940 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 121.3940 (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) = 0.1648 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4148 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3214 (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	0.4098	0.4018	0.3938	0.3536	0.3455	0.3054	0.3054	0.2973	0.3214	0.3455	0.3616	0.3777 (22b)
Effective ac	0.5840	0.5807	0.5775	0.5625	0.5597	0.5466	0.5466	0.5442	0.5517	0.5597	0.5654	0.5713 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opening Type			9.4300	1.1450	10.7977		(27)
Heatloss Floor			37.7900	0.1300	4.9127		(28)
External Wall	22.3200	9.4300	12.8900	0.1800	2.3202		(29a)
Basement Walls	42.1800		42.1800	0.1800	7.5924		(29a)
Walls To CorridorStairwell	24.1200		24.1200	0.1800	4.3416		(29a)
External Roof	10.3200		10.3200	0.1100	1.1352		(30)
Ceiling below communal area	2.0900		2.0900	0.1100	0.2299		(30)
Total net area of external elements Aum(A, m2)			138.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.3297	(33)
Main dwelling							
Party Wall			15.2300	0.0000	0.0000		(32)

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

301.3923 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.7500	0.0500	0.2375
E4 Jamb	9.6000	0.0500	0.4800
E22 Basement floor	32.2500	0.0700	2.2575
E7 Party floor between dwellings (in blocks of flats)	15.8800	0.0700	1.1116
E14 Flat roof	10.3100	0.0800	0.8248
E16 Corner (normal)	16.1000	0.0900	1.4490
E17 Corner (inverted - internal area greater than external area)	6.4400	-0.0900	-0.5796
E18 Party wall between dwellings	6.4400	0.0600	0.3864
E25 Staggered party wall between dwellings	6.4400	0.0600	0.3864
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.6900	0.0000	0.0000
R6 Flat ceiling	2.9900	0.0600	0.1794
E21 Exposed floor (inverted)	2.2400	0.3200	0.7168
E3 Sill	4.7500	0.0500	0.2375

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

7.6873 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 39.0170 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	23.3942	23.2636	23.1355	22.5341	22.4216	21.8977	21.8977	21.8007	22.0995	22.4216	22.6492	22.8872 (38)
Heat transfer coeff	62.4112	62.2806	62.1525	61.5511	61.4386	60.9147	60.9147	60.8177	61.1165	61.4386	61.6662	61.9042 (39)
Average = Sum(39)m / 12 =												61.5506

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.6555	1.6520	1.6486	1.6327	1.6297	1.6158	1.6158	1.6132	1.6211	1.6297	1.6357	1.6420 (40)
HLP (average)												1.6326
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

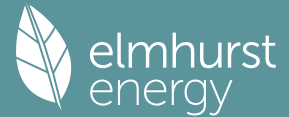
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3466 (42)
Hot water usage for mixer showers												46.6188 (42a)
Hot water usage for baths												20.1795 (42b)
Hot water usage for other uses												28.4209 (42c)
Average daily hot water use (litres/day)												87.7565 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	95.4669	93.4295	90.9477	87.1726	84.1074	80.8119	79.5445	82.0156	84.6218	88.0816	91.9149	95.2192 (44)
Energy conte	151.1963	133.0423	139.7832	119.3349	113.2248	99.3677	96.2022	101.5524	104.3472	119.5259	130.9496	149.0902 (45)
Energy content (annual)										Total = Sum(45)m =		1457.6168
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss												
If cylinder contains dedicated solar storage												
Primary loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
Combi loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Total heat required for water heating calculated for each month												
WWHRS	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)
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 (61)
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	176.3971	156.2069	166.5650	148.0207	144.5298	131.3759	130.5333	135.1060	135.9022	150.1624	157.9625	174.6872 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1807.4489 (64)
Electric shower(s)												1807 (64)
Heat gains from water heating, kWh/month												
Heat gains from water heating, kWh/month	87.5487	77.9051	83.7538	75.7523	74.9232	69.1132	69.2632	71.0421	70.7689	77.0183	79.6142	86.8484 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319	67.3319 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												

Full SAP Calculation Printout



Pumps, fans	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332	29.7332 (69)
Losses e.g. evaporation	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
(negative values) (Table 5)	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655	-53.8655 (71)
Water heating gains (Table 5)	117.6730	115.9303	112.5724	105.2116	100.7032	95.9906	93.0956	95.4867	98.2901	103.5192	110.5753	116.7317 (72)
Total internal gains	338.0735	343.7902	331.1466	319.2864	304.6940	291.2804	281.3294	282.5189	290.2972	303.0256	320.1657	332.0231 (73)

6. Solar gains

[Jan]														
				Area m2			Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c	Access factor Table 6d		Gains W	
East				3.5900			19.6403	0.6300		0.7000	0.7700		21.5483 (76)	
South				5.8400			46.7521	0.6300		0.7000	0.7700		83.4421 (78)	
Solar gains	104.9905	178.8098	243.4966	297.9893	329.0993	324.3212	313.7035	291.0873	262.5819	197.4153	125.7756	89.8220 (83)		
Total gains	443.0640	522.6000	574.6431	617.2757	633.7933	615.6016	595.0329	573.6062	552.8791	500.4409	445.9414	421.8451 (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	50.5718	50.6779	50.7823	51.2785	51.3724	51.8142	51.8142	51.8968	51.6431	51.3724	51.1828	50.9860
alpha	4.3715	4.3785	4.3855	4.4186	4.4248	4.4543	4.4543	4.4598	4.4429	4.4248	4.4122	4.3991
util living area	0.9862	0.9715	0.9447	0.8830	0.7711	0.6002	0.4433	0.4774	0.6923	0.8999	0.9723	0.9887 (86)
MIT	19.6281	19.8776	20.1871	20.5459	20.8119	20.9536	20.9903	20.9864	20.9113	20.5709	20.0373	19.5854 (87)
Th 2	19.5729	19.5754	19.5779	19.5895	19.5916	19.6018	19.6018	19.6037	19.5979	19.5916	19.5873	19.5827 (88)
util rest of house	0.9809	0.9610	0.9243	0.8405	0.6933	0.4838	0.3062	0.3379	0.5798	0.8536	0.9601	0.9843 (89)
MIT 2	18.0647	18.3773	18.7578	19.1835	19.4590	19.5817	19.5998	19.6006	19.5527	19.2260	18.5901	18.0178 (90)
Living area fraction	18.8020	19.0849	19.4319	19.8260	20.0970	20.2287	20.2556	20.2542	20.1934	19.8602	19.2726	18.7571 (92)
MIT	18.8020	19.0849	19.4319	19.8260	20.0970	20.2287	20.2556	20.2542	20.1934	19.8602	19.2726	18.7571 (93)
Temperature adjustment												0.0000
adjusted MIT	18.8020	19.0849	19.4319	19.8260	20.0970	20.2287	20.2556	20.2542	20.1934	19.8602	19.2726	18.7571 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9770	0.9564	0.9217	0.8486	0.7234	0.5380	0.3713	0.4041	0.6306	0.8639	0.9566	0.9808 (94)
Useful gains	432.8834	499.8200	529.6528	523.8201	458.5067	331.1859	220.9222	231.8220	348.6356	432.3198	426.5941	413.7519 (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	905.0881	883.4416	803.7484	672.5091	515.9016	342.8714	222.6792	234.4031	372.4095	568.9361	750.6400	901.1470 (97)
Space heating kWh	351.3203	257.7938	203.9271	107.0561	42.7019	0.0000	0.0000	0.0000	0.0000	101.6425	233.3130	362.6219 (98a)
Space heating requirement - total per year (kWh/year)												1660.3766
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	351.3203	257.7938	203.9271	107.0561	42.7019	0.0000	0.0000	0.0000	0.0000	101.6425	233.3130	362.6219 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1660.3766
Space heating per m ²										(98c) / (4) =		44.0418 (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	351.3203	257.7938	203.9271	107.0561	42.7019	0.0000	0.0000	0.0000	0.0000	101.6425	233.3130	362.6219 (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)	380.6288	279.2998	220.9394	115.9871	46.2642	0.0000	0.0000	0.0000	0.0000	110.1219	252.7768	392.8732 (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	176.3971	156.2069	166.5650	148.0207	144.5298	131.3759	130.5333	135.1060	135.9022	150.1624	157.9625	174.6872 (64)
Efficiency of water heater (217)m	85.5739	85.1755	84.5147	83.3453	81.6882	79.8000	79.8000	79.8000	79.8000	83.2040	84.9329	79.8000 (216)
Fuel for water heating, kWh/month	206.1341	183.3942	197.0839	177.5994	176.9285	164.6315	163.5756	169.3057	170.3035	180.4751	185.9851	203.9329 (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	12.1355	9.7356	8.7658	6.4222	4.9607	4.0529	4.5253	5.8822	7.6403	10.0246	11.3227	12.4728 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-10.3166	-15.4033	-23.4437	-27.9815	-31.6393	-30.1066	-29.7720	-27.3882	-23.4233	-18.3417	-11.6532	-8.8242 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	-3.4835	-7.5093	-15.2590	-23.4039	-31.4078	-31.6962	-31.2915	-26.2568	-18.9571	-10.8634	-4.6931	-2.7392	(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												1798.8912	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2179.3495	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												97.9406	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-465.8542	(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												3696.3270	(238)

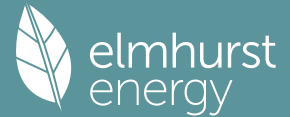
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1798.8912	0.2100	377.7672	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2179.3495	0.2100	457.6634	(264)
Space and water heating			835.4305	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	97.9406	0.1443	14.1358	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-258.2935	0.1334	-34.4458	
PV Unit electricity exported	-207.5608	0.1253	-26.0099	
Total			-60.4557	(269)
Total CO2, kg/year			801.0399	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			21.2500	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1798.8912	1.1300	2032.7471	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2179.3495	1.1300	2462.6649	(278)
Space and water heating			4495.4120	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	97.9406	1.5338	150.2245	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-258.2935	1.4928	-385.5811	
PV Unit electricity exported	-207.5608	0.4600	-95.4691	
Total			-481.0502	(283)
Total Primary energy kWh/year			4294.6871	(286)
Target Primary Energy Rate (TPER)			113.9200	(287)

Full SAP Calculation Printout



Plot Reference	Flat 3				Issued on Date	16/02/2026	
Assessment Reference	As Design-Flat 3-Be Green			Plot Type Ref	As Design - Proposed		
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2	
SAP Rating	71 C	DER	6.66	TER	15.78		
Environmental	95 A	% DER < TER				57.79	
CO ₂ Emissions (t/year)	0.39	DFEE	46.65	TFEE	49.08		
Compliance Check	See BREL	% DFEE < TFEE				4.96	
% DPER < TPER	4.27	DPER	80.17	TPER	83.75		
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001	
Client	105 Raleigh Road, J. Michealides						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	76.3500 (1b)	x 2.8500 (2b)	= 217.5975 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	76.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 217.5975 (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) = 0.0919 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2919 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2700 (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	0.3443	0.3375	0.3308	0.2970	0.2903	0.2565	0.2565	0.2498	0.2700	0.2903	0.3038	0.3173 (22b)
Effective ac	0.5593	0.5570	0.5547	0.5441	0.5421	0.5329	0.5329	0.5312	0.5365	0.5421	0.5461	0.5503 (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			22.9600	1.1450	26.2901		(27)
Glazed Door			12.4600	1.1450	14.2672		(27)
Floor above communal area			1.4700	0.1200	0.1764	0.0000	0.0000 (28b)
External Wall	107.3900	35.4200	71.9700	0.1700	12.2349	60.0000	4318.2000 (29a)
Walls To Corridor/Stairwell	24.4000		24.4000	0.1600	3.9040	9.0000	219.6000 (29a)
External Roof	14.1100		14.1100	0.1100	1.5521	9.0000	126.9900 (30)
Ceiling below communal area	1.4700		1.4700	0.1200	0.1764	9.0000	13.2300 (30)
Total net area of external elements A _{um} (A, m ²)			148.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		58.6011		(33)
Main dwelling							
Party Floor 1			74.8800			40.0000	2995.2000 (32d)
Party Ceiling			64.9000			30.0000	1947.0000 (32b)
Internal Wall			168.8300			9.0000	1519.4700 (32c)
Heat capacity C _m = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 11139.6900 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							145.9029 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				14.7600	0.0160	0.2362	
E4 Jamb				62.4000	0.0120	0.7488	

Ventilation heat loss calculated monthly (39)m = 0.33 x (25)m x (5)												
(39)m	Jan 40.1591	Feb 39.9938	Mar 39.8318	Apr 39.0711	May 38.9287	Jun 38.2661	Jul 38.2661	Aug 38.1434	Sep 38.5213	Oct 38.9287	Nov 39.2167	Dec 39.5177 (39)
Heat transfer coeff	110.9642	110.7990	110.6370	109.8762	109.7339	109.0713	109.0713	108.9486	109.3265	109.7339	110.0219	110.3229 (39)
Average = Sum(39)m / 12 =												109.8756
HLP	Jan 1.4534	Feb 1.4512	Mar 1.4491	Apr 1.4391	May 1.4372	Jun 1.4286	Jul 1.4286	Aug 1.4270	Sep 1.4319	Oct 1.4372	Nov 1.4410	Dec 1.4450 (40)
HLP (average)												1.4391
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

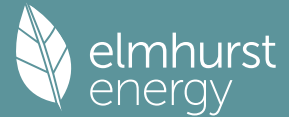
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												
Hot water usage for mixer showers											2.3900 (42)	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)	
Hot water usage for baths	29.2323	28.7981	28.1868	27.0595	26.2155	25.2795	24.7740	25.3811	26.0421	27.0436	28.1940 (42b)	
Hot water usage for other uses	41.1638	39.6669	38.1700	36.6732	35.1763	33.6794	33.6794	35.1763	36.6732	38.1700	41.1638 (42c)	
Average daily hot water use (litres/day)											64.5245 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	70.3960	68.4650	66.3568	63.7327	61.3918	58.9590	58.4534	60.5574	62.7152	65.2136	67.8609	70.2972 (44)
Energy content (annual)	111.4901	97.4933	101.9879	87.2469	82.6451	72.4969	70.6943	74.9827	77.3342	88.4942	96.6803	110.0684 (45)
Distribution loss (46)m = 0.15 x (45)m											Total = Sum(45)m =	1071.6143
Water storage loss (or HIU loss):	16.7235	14.6240	15.2982	13.0870	12.3968	10.8745	10.6042	11.2474	11.6001	13.2741	14.5020	16.5103 (46)
Store volume											185.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):											2.1400 (48)	
Temperature factor from Table 2b											0.6000 (49)	
Enter (49) or (54) in (55)											1.2840 (55)	
Total storage loss	39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040 (56)
If cylinder contains dedicated solar storage	39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040 (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	151.2941	133.4453	141.7919	125.7669	122.4491	111.0169	110.4983	114.7867	115.8542	128.2982	135.2003	149.8724 (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	151.2941	133.4453	141.7919	125.7669	122.4491	111.0169	110.4983	114.7867	115.8542	128.2982	135.2003	149.8724 (64)
12Total per year (kWh/year)											Total per year (kWh/year) = Sum(64)m =	1540.2743 (64)
Electric shower(s)	51.4867	45.8751	50.0939	47.8039	48.7010	46.4560	48.0045	48.7010	47.8039	50.0939	49.1519	51.4867 (64a)
											585.6586 (64a)	
Heat gains from water heating, kWh/month	81.7853	72.6469	78.2776	71.7766	71.4979	66.5352	67.3502	68.9502	68.4806	73.7910	75.2502	81.3126 (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	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.7498	118.1873	106.7498	110.3082	106.7498	110.3082	106.7498	106.7498	110.3082	106.7498	110.3082	106.7498	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	211.6435	213.8397	208.3053	196.5234	181.6508	167.6726	158.3343	156.1381	161.6725	173.4544	188.3271	202.3052	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	(71)
Water heating gains (Table 5)	109.9265	108.1055	105.2119	99.6897	96.0994	92.4100	90.5245	92.6750	95.1119	99.1814	104.5141	109.2912	(72)
Total internal gains	490.1692	501.9819	482.1164	468.3706	446.3494	429.2402	414.4580	414.4123	425.9420	441.2351	464.9987	480.1956	(73)

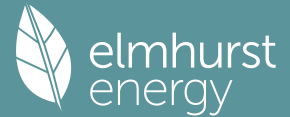
6. Solar gains													
[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d			Gains W	
East					8.1600	19.6403	0.7600	0.7000	0.7700			59.0857 (76)	
South					7.1500	46.7521	0.7600	0.7000	0.7700			123.2400 (78)	
West					7.6500	19.6403	0.7600	0.7000	0.7700			55.3928 (80)	
North					12.4600	10.6334	0.7600	0.7000	0.7700			48.8466 (74)	
Solar gains	286.5652	519.1281	784.5286	1083.2481	1305.2169	1333.6362	1270.2016	1100.5091	888.2234	594.5463	349.0813	241.3533 (83)	
Total gains	776.7344	1021.1100	1266.6451	1551.6187	1751.5663	1762.8764	1684.6596	1514.9214	1314.1654	1035.7814	814.0801	721.5489 (84)	

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	27.8861	27.9277	27.9686	28.1622	28.1987	28.3701	28.3701	28.4020	28.3038	28.1987	28.1249	28.0482
alpha	2.8591	2.8618	2.8646	2.8775	2.8799	2.8913	2.8913	2.8935	2.8869	2.8799	2.8750	2.8699
util living area	0.9499	0.9020	0.8214	0.6824	0.5241	0.3791	0.2794	0.3217	0.5183	0.7771	0.9164	0.9582 (86)
MIT	19.2753	19.6408	20.0743	20.4993	20.7442	20.8505	20.8805	20.8737	20.7870	20.4037	19.7538	19.2043 (87)
Th 2	19.7227	19.7243	19.7259	19.7335	19.7349	19.7415	19.7415	19.7427	19.7390	19.7349	19.7320	19.7290 (88)
util rest of house	0.9401	0.8845	0.7921	0.6374	0.4662	0.3101	0.2018	0.2374	0.4395	0.7300	0.8982	0.9498 (89)
MIT 2	17.7591	18.2101	18.7315	19.2207	19.4764	19.5789	19.6002	19.5982	19.5299	19.1380	18.3656	17.6750 (90)
Living area fraction	fLA = Living area / (4) = 0.3915 (91)											
MIT	18.3526	18.7702	19.2572	19.7213	19.9727	20.0767	20.1014	20.0976	20.0220	19.6335	18.9091	18.2737 (92)
Temperature adjustment	-0.1000											
adjusted MIT	18.2526	18.6702	19.1572	19.6213	19.8727	19.9767	20.0014	19.9976	19.9220	19.5335	18.8091	18.1737 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9254	0.8670	0.7772	0.6331	0.4727	0.3233	0.2181	0.2549	0.4516	0.7215	0.8816	0.9364 (94)
Useful gains	718.8286	885.2941	984.4216	982.4010	828.0418	569.9794	367.3464	386.1099	593.4539	747.3122	717.7297	675.6771 (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	1548.2440	1525.7286	1400.3568	1178.0140	896.8253	586.4445	370.9984	391.9517	636.5032	980.3066	1288.2557	1541.6197 (97)
Space heating kWh	617.0850	430.3720	309.4558	140.8413	51.1749	0.0000	0.0000	0.0000	0.0000	173.3478	410.7787	644.2613 (98a)
Space heating requirement - total per year (kWh/year)												2777.3168
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	617.0850	430.3720	309.4558	140.8413	51.1749	0.0000	0.0000	0.0000	0.0000	173.3478	410.7787	644.2613 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2777.3168
Space heating per m2	(98c) / (4) =											36.3761 (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 %)												94.0000 (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	617.0850	430.3720	309.4558	140.8413	51.1749	0.0000	0.0000	0.0000	0.0000	173.3478	410.7787	644.2613 (98)
Space heating efficiency (main heating system 1)	94.0000	94.0000	94.0000	94.0000	94.0000	0.0000	0.0000	0.0000	0.0000	94.0000	94.0000	94.0000 (210)
Space heating fuel (main heating system)	656.4734	457.8425	329.2083	149.8312	54.4414	0.0000	0.0000	0.0000	0.0000	184.4126	436.9986	685.3844 (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	151.2941	133.4453	141.7919	125.7669	122.4491	111.0169	110.4983	114.7867	115.8542	128.2982	135.2003	149.8724 (64)
Efficiency of water heater (217)m	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000 (216)
Fuel for water heating, kWh/month	152.2073	134.2508	142.6478	126.5260	123.1882	111.6871	111.1653	115.4796	116.5535	129.0727	136.0164	150.7771 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	24.5883	19.7256	17.7607	13.0123	10.0511	8.2118	9.1689	11.9181	15.4804	20.3111	22.9414	25.2716 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-38.0079	-63.6839	-107.1445	-130.3243	-141.5055	-127.5886	-125.8031	-115.0160	-94.4554	-75.2829	-44.1643	-31.3846 (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	-8.4177	-23.4073	-64.2731	-128.8757	-201.3297	-218.0114	-211.6753	-165.3232	-104.2646	-42.5667	-12.8597	-6.1130 (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												2954.5923 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												99.4000
Water heating fuel used												1549.5717 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans: central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												41.0000 (231)
Electricity for lighting (calculated in Appendix L)												198.4413 (232)

Full SAP Calculation Printout



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

PV generation	-2281.4784 (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	3047.7855 (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	2954.5923	0.1564	462.0255 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1549.5717	0.1407	218.0332 (264)
Energy for instantaneous electric shower(s)	585.6586	0.1391	81.4781 (264a)
Space and water heating			680.0587 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	198.4413	0.1443	28.6412 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1094.3608	0.1332	-145.7960
PV Unit electricity exported	-1187.1176	0.1194	-141.7138
Total			-287.5098 (269)
Total CO2, kg/year			508.3553 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.6600 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2954.5923	1.5789	4664.9651 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1549.5717	1.5203	2355.7631 (278)
Energy for instantaneous electric shower(s)	585.6586	1.5143	886.8828 (278a)
Space and water heating			7020.7282 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	198.4413	1.5338	304.3759 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1094.3608	1.4923	-1633.1497
PV Unit electricity exported	-1187.1176	0.4378	-519.7704
Total			-2152.9201 (283)
Total Primary energy kWh/year			6121.0916 (286)
Dwelling Primary energy Rate (DPER)			80.1700 (287)

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

1. Overall dwelling characteristics

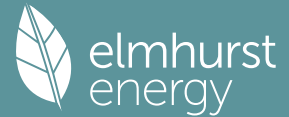
	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	76.3500 (1b)	x 2.8500 (2b)	= 217.5975 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	76.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 217.5975 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	30.0000 / (5) = 0.1379 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3879 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3588 (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	0.4574	0.4485	0.4395	0.3947	0.3857	0.3408	0.3408	0.3319	0.3588	0.3857	0.4036	0.4216 (22b)

Full SAP Calculation Printout



Effective ac 0.6046 0.6006 0.5966 0.5779 0.5744 0.5581 0.5581 0.5551 0.5644 0.5744 0.5815 0.5889 (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			19.0800	1.1450	21.8473		(27)
Floor above communal area			1.4700	0.1300	0.1911		(28b)
External Wall	107.3900	19.0800	88.3100	0.1800	15.8958		(29a)
Walls To CorridorStairwell	24.4000		24.4000	0.1800	4.3920		(29a)
External Roof	14.1100		14.1100	0.1100	1.5521		(30)
Ceiling below communal area	1.4700		1.4700	0.1100	0.1617		(30)
Total net area of external elements Aum(A, m2)			148.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.0400		(33)

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

145.9029 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	14.7600	0.0500	0.7380
E2 Other lintels (including other steel lintels)	62.4000	0.0500	3.1200
E4 Jamb	76.2800	0.0700	5.3396
E7 Party floor between dwellings (in blocks of flats)	11.4800	0.5600	6.4288
E15 Flat roof with parapet	22.8000	0.0900	2.0520
E16 Corner (normal)	11.4000	-0.0900	-1.0260
E17 Corner (inverted - internal area greater than external area)	12.8800	0.0600	0.7728
R6 Flat ceiling	14.7600	0.0500	0.7380
E3 Sill	4.7500	0.3200	1.5200
E21 Exposed floor (inverted)			

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

19.6832 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 63.7232 (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
	43.4166	43.1248	42.8389	41.4957	41.2444	40.0746	40.0746	39.8579	40.5252	41.2444	41.7528	42.2843
Heat transfer coeff	107.1398	106.8481	106.5621	105.2189	104.9676	103.7978	103.7978	103.5812	104.2484	104.9676	105.4760	106.0075
Average = Sum(39)m / 12 =												105.2177

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.4033	1.3995	1.3957	1.3781	1.3748	1.3595	1.3595	1.3567	1.3654	1.3748	1.3815	1.3884
HLP (average)												1.3781
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy

2.3900 (42)

Hot water usage for mixer showers

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	64.2914	63.3253	61.9174	59.2236	57.2356	55.0187	53.7586	55.1559	56.6875	59.0678	61.8195	64.0451
Hot water usage for baths	27.7706	27.3582	26.7774	25.7065	24.9047	24.0156	23.5353	24.1120	24.7400	25.6914	26.7843	27.6768
Hot water usage for other uses	39.1056	37.6835	36.2615	34.8395	33.4175	31.9955	31.9955	33.4175	34.8395	36.2615	37.6835	39.1056
Average daily hot water use (litres/day)												120.5728

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	131.1677	128.3670	124.9563	119.7696	115.5578	111.0297	109.2894	112.6854	116.2670	121.0207	126.2873	130.8275
Energy conte	207.7375	182.7929	192.0532	163.9586	155.5630	136.5240	132.1760	139.5280	143.3688	164.2240	179.9194	204.8442
Energy content (annual)										Total = Sum(45)m =		2002.6898
Distribution loss (46)m = 0.15 x (45)m	31.1606	27.4189	28.8080	24.5938	23.3345	20.4786	19.8264	20.9292	21.5053	24.6336	26.9879	30.7266

Water storage loss (or HIU loss):

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

Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	254.3324	224.8787	238.6481	209.0505	202.1579	181.6159	178.7709	186.1229	188.4607	210.8189	225.0113	251.4391

WWHRS	-29.3914	-25.9940	-27.2194	-22.5387	-21.0053	-17.9744	-16.8481	-17.9163	-18.5970	-21.9238	-24.8370	-28.8471
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	224.9411	198.8847	211.4287	186.5118	181.1527	163.6415	161.9228	168.2067	169.8637	188.8951	200.1743	222.5920
Total per year (kWh/year)												2278.2149
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000

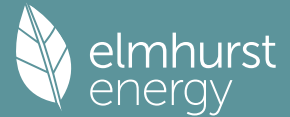
Heat gains from water heating, kWh/month	106.3486	94.4472	101.1336	90.5897	89.0006	81.4677	81.2244	83.6690	83.7436	91.8804	95.8967	105.3866
--	----------	---------	----------	---------	---------	---------	---------	---------	---------	---------	---------	----------

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	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980	119.4980
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.7498	118.1873	106.7498	110.3082	106.7498	110.3082	106.7498	106.7498	110.3082	106.7498	110.3082	106.7498
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	211.6435	213.8397	208.3053	196.5234	181.6508	167.6726	158.3343	156.1381	161.6725	173.4544	188.3271	202.3052
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498	34.9498
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
Losses e.g. evaporation (negative values) (Table 5)												

Full SAP Calculation Printout



Water heating gains (Table 5)	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	-95.5984	(71)
Total internal gains	142.9417	140.5465	135.9323	125.8191	119.6245	113.1496	109.1726	112.4583	116.3106	123.4952	133.1898	(72)
	523.1844	534.4229	512.8368	494.5000	469.8745	449.9797	433.1062	434.1957	447.1406	465.5488	493.6744	(73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		FF Access factor Table 6d		Gains W	
North	6.7100		10.6334		0.6300		0.7000		0.7700		21.8055 (74)	
East	4.4000		19.6403		0.6300		0.7000		0.7700		26.4102 (76)	
South	3.8500		46.7521		0.6300		0.7000		0.7700		55.0089 (78)	
West	4.1200		19.6403		0.6300		0.7000		0.7700		24.7296 (80)	
Solar gains	127.9542	231.8022	350.3213	483.7229	582.8486	595.5406	567.2132	491.4334	396.6296	265.4816	155.8695	107.7658 (83)
Total gains	651.1387	766.2250	863.1581	978.2228	1052.7231	1045.5204	1000.3194	925.6290	843.7701	731.0304	649.5440	620.3189 (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	28.8815	28.9604	29.0381	29.4088	29.4792	29.8114	29.8114	29.8738	29.6825	29.4792	29.3371	29.1900
util living area	2.9254	2.9307	2.9359	2.9606	2.9653	2.9874	2.9874	2.9916	2.9788	2.9653	2.9558	2.9460
	0.9663	0.9459	0.9111	0.8361	0.7189	0.5639	0.4316	0.4779	0.6862	0.8736	0.9477	0.9704 (86)
MIT	18.7283	19.0487	19.5114	20.1028	20.5673	20.8520	20.9506	20.9324	20.7225	20.1064	19.3251	18.6825 (87)
Th 2	19.7608	19.7638	19.7666	19.7802	19.7827	19.7945	19.7945	19.7967	19.7900	19.7827	19.7776	19.7722 (88)
util rest of house	0.9594	0.9352	0.8932	0.8029	0.6625	0.4785	0.3232	0.3668	0.6061	0.8402	0.9354	0.9643 (89)
MIT 2	17.1682	17.5714	18.1484	18.8714	19.4004	19.6957	19.7735	19.7653	19.5824	18.8977	17.9340	17.1172 (90)
Living area fraction	17.7790	18.1497	18.6820	19.3534	19.8572	20.1484	20.2343	20.2222	20.0288	19.3709	18.4786	17.3300 (91)
MIT	17.7790	18.1497	18.6820	19.3534	19.8572	20.1484	20.2343	20.2222	20.0288	19.3709	18.4786	17.3300 (92)
Temperature adjustment												0.0000
adjusted MIT	17.7790	18.1497	18.6820	19.3534	19.8572	20.1484	20.2343	20.2222	20.0288	19.3709	18.4786	17.3300 (93)

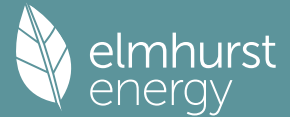
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9441	0.9166	0.8735	0.7895	0.6662	0.5049	0.3641	0.4078	0.6233	0.8266	0.9180	0.9501 (94)
Ext temp.	614.7632	702.3522	753.9695	772.3194	701.3611	527.8966	364.2077	377.4314	525.9641	604.2393	596.3110	589.3888 (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	1444.1332	1415.7079	1298.1371	1099.8993	856.2442	575.9094	377.2314	395.9105	618.0646	920.6575	1200.1723	1434.2812 (97)
Space heating requirement - total per year (kWh/year)	617.0513	479.3750	404.8607	235.8575	115.2330	0.0000	0.0000	0.0000	0.0000	235.4151	434.7801	628.5999 (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)	617.0513	479.3750	404.8607	235.8575	115.2330	0.0000	0.0000	0.0000	0.0000	235.4151	434.7801	628.5999 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3151.1727 (99)
Space heating per m2										(98c) / (4) =		

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	617.0513	479.3750	404.8607	235.8575	115.2330	0.0000	0.0000	0.0000	0.0000	235.4151	434.7801	628.5999 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	668.5279	519.3662	438.6356	255.5336	124.8461	0.0000	0.0000	0.0000	0.0000	255.0543	471.0511	681.0400 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (total)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	224.9411	198.8847	211.4287	186.5118	181.1527	163.6415	161.9228	168.2067	169.8637	188.8951	200.1743	222.5920 (64)
Efficiency of water heater (217)m	86.2027	85.9573	85.4922	84.5873	83.0735	79.8000	79.8000	79.8000	79.8000	84.5546	85.7511	79.8000 (216)
Fuel for water heating, kWh/month	260.9443	231.3761	247.3077	220.4961	218.0631	205.0645	202.9108	210.7853	212.8618	223.4000	233.4364	258.0596 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.1805	17.7940	16.0215	11.7381	9.0668	7.4077	8.2711	10.7510	13.9645	18.3222	20.6949	22.7970 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-20.3899	-30.1734	-45.5001	-53.7517	-60.2356	-57.0531	-56.3519	-52.0654	-44.9091	-35.6289	-22.9160	-17.4653 (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)												

Full SAP Calculation Printout



(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-7.5580	-16.2292	-32.8807	-50.3140	-67.4473	-68.1100	-67.3139	-56.5764	-40.9195	-23.5171	-10.1886	-5.9528	(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												3414.0549	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2724.7059	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												179.0094	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-943.4475	(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												5460.3227	(238)

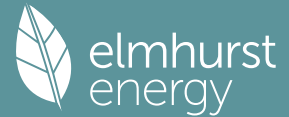
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3414.0549	0.2100	716.9515	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2724.7059	0.2100	572.1882	(264)
Space and water heating			1289.1398	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	179.0094	0.1443	25.8366	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-496.4402	0.1336	-66.3147	
PV Unit electricity exported	-447.0073	0.1254	-56.0330	
Total			-122.3477	(269)
Total CO2, kg/year			1204.5579	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.7800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3414.0549	1.1300	3857.8821	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2724.7059	1.1300	3078.9176	(278)
Space and water heating			6936.7997	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	179.0094	1.5338	274.5706	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-496.4402	1.4936	-741.4999	
PV Unit electricity exported	-447.0073	0.4601	-205.6678	
Total			-947.1677	(283)
Total Primary energy kWh/year			6394.3034	(286)
Target Primary Energy Rate (TPER)			83.7500	(287)

Full SAP Calculation Printout



Plot Reference	Flat 4				Issued on Date	16/02/2026
Assessment Reference	As Design-Flat 4-Be Green			Plot Type Ref	As Design - Proposed	
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2
SAP Rating	70 C	DER	9.15	TER	21.70	
Environmental	94 A	% DER < TER				57.83
CO ₂ Emissions (t/year)	0.3	DFEE	48.94	TFEE	60.45	
Compliance Check	See BREL	% DFEE < TFEE				19.04
% DPER < TPER	9.08	DPER	105.65	TPER	116.21	
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001
Client	105 Raleigh Road, J. Michealides					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.3300 (1b)	2.8500 (2b)	117.7905 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.3300		117.7905 (4)
Dwelling volume			117.7905 (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) = 0.1698 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3698 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3421 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4361	0.4276	0.4190	0.3763	0.3677	0.3250	0.3250	0.3164	0.3421	0.3677	0.3848	0.4019 (22b)
Effective ac	0.5951	0.5914	0.5878	0.5708	0.5676	0.5528	0.5528	0.5501	0.5585	0.5676	0.5740	0.5808 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			8.4900	1.1450	9.7214		(27)
Glazed Door			5.6600	1.1450	6.4809		(27)
External Wall	66.9200	14.1500	52.7700	0.1700	8.9709	60.0000	3166.1999 (29a)
Walls To Corridor/Stairwell	14.3100		14.3100	0.1600	2.2896	9.0000	128.7900 (29a)
External Rear Roof	21.9300		21.9300	0.1100	2.4123	9.0000	197.3700 (30)
External Front Roof	4.8900		4.8900	0.1100	0.5379	9.0000	44.0100 (30)
External Front Zinc Roof	0.7800		0.7800	0.1400	0.1092	9.0000	7.0200 (30)
Total net area of external elements Aum(A, m ²)			108.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	30.5222	(33)
Main dwelling							
Party Wall			8.9200	0.0000	0.0000	180.0000	1605.6000 (32)
Party Floor 1			41.3300			40.0000	1653.2000 (32d)
Party Ceiling			19.1400			30.0000	574.2000 (32b)
Internal Wall			65.4900			9.0000	589.4100 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 7965.7999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							192.7365 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				5.8900	0.0160	0.0942	

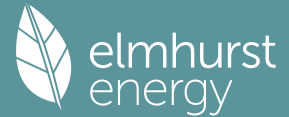
Ventilation heat loss calculated monthly (39)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	23.1321	22.9886	22.8479	22.1870	22.0634	21.4877	21.4877	21.3811	21.7095	22.0634	22.3135	22.5750 (38)
Heat transfer coeff												
	60.6310	60.4875	60.3468	59.6859	59.5623	58.9866	58.9866	58.8800	59.2084	59.5623	59.8124	60.0739 (39)
Average = Sum(39)m / 12 =												59.6853
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.4670	1.4635	1.4601	1.4441	1.4411	1.4272	1.4272	1.4246	1.4326	1.4411	1.4472	1.4535 (40)
HLP (average)												1.4441
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												1.4421 (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	22.0383	21.7110	21.2501	20.4003	19.7639	19.0583	18.6772	19.1349	19.6332	20.3882	21.2555	21.9638 (42b)
Hot water usage for other uses	30.9460	29.8207	28.6954	27.5701	26.4448	25.3195	25.3195	26.4448	27.5701	28.6954	29.8207	30.9460 (42c)
Average daily hot water use (litres/day)												48.5657 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	52.9843	51.5317	49.9455	47.9704	46.2087	44.3778	43.9967	45.5797	47.2033	49.0836	51.0763	52.9098 (44)
Energy content (annual)	83.9142	73.3805	76.7644	65.6690	62.2058	54.5677	53.2101	56.4371	58.2064	66.6060	72.7675	82.8440 (45)
Distribution loss (46)m = 0.15 x (45)m	12.5871	11.0071	11.5147	9.8504	9.3309	8.1852	7.9815	8.4656	8.7310	9.9909	10.9151	12.4266 (46)
Water storage loss (or HIU loss):												
Store volume												185.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1400 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												1.2840 (55)
Total storage loss	39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040 (56)
If cylinder contains dedicated solar storage	39.8040	35.9520	39.8040	38.5200	39.8040	38.5200	39.8040	39.8040	38.5200	39.8040	38.5200	39.8040 (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	123.7182	109.3325	116.5684	104.1890	102.0098	93.0877	93.0141	96.2411	96.7264	106.4100	111.2875	122.6480 (62)
VVHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	123.7182	109.3325	116.5684	104.1890	102.0098	93.0877	93.0141	96.2411	96.7264	106.4100	111.2875	122.6480 (64)
12Total per year (kWh/year)												1275.2327 (64)
Electric shower(s)	38.7595	34.5351	37.7110	35.9871	36.6624	34.9724	36.1381	36.6624	35.9871	37.7110	37.0018	38.7595 (64a)
												440.8873 (64a)
Heat gains from water heating, kWh/month	69.4346	61.7944	66.7951	61.6477	61.6922	57.7028	58.5701	59.7741	59.1664	63.4174	64.2617	69.0787 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	62.9939	69.7432	62.9939	65.0937	62.9939	65.0937	62.9939	62.9939	65.0937	62.9939	65.0937	62.9939 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	124.8924	126.1884	122.9225	115.9699	107.1934	98.9448	93.4342	92.1382	95.4041	102.3567	111.1332	119.3818 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106 (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)	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847 (71)
Water heating gains (Table 5)	93.3260	91.9559	89.7783	85.6218	82.9197	80.1428	78.7233	80.3416	82.1756	85.2385	89.2523	92.8477 (72)
Total internal gains	328.8440	335.5192	323.3265	314.3171	300.7387	288.8131	279.7831	280.1055	287.3051	298.2208	313.1109	322.8551 (73)

[Jan					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c		Access factor Table 6d	Gains W	
North					5.1800	10.6334	0.7600	0.7000		0.7700	20.3070 (74)	
East					3.3100	19.6403	0.7600	0.7000		0.7700	23.9674 (76)	
West					5.6600	19.6403	0.7600	0.7000		0.7700	40.9835 (80)	
Solar gains	85.2578	165.8654	275.1896	411.0952	516.6880	535.6073	507.1073	426.2405	322.6474	196.9601	106.0374	70.3413 (83)

Full SAP Calculation Printout



Total gains 414.1019 501.3846 598.5161 725.4124 817.4267 824.4203 786.8905 706.3459 609.9525 495.1810 419.1483 393.1965 (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	36.4949	36.5815	36.6668	37.0728	37.1497	37.5123	37.5123	37.5802	37.3718	37.1497	36.9944	36.8333
alpha	3.4330	3.4388	3.4445	3.4715	3.4766	3.5008	3.5008	3.5053	3.4915	3.4766	3.4663	3.4556
util living area	0.9720	0.9478	0.8952	0.7746	0.6092	0.4413	0.3252	0.3751	0.6044	0.8545	0.9516	0.9761 (86)
MIT	19.5567	19.8032	20.1568	20.5540	20.7866	20.8814	20.9039	20.8990	20.8227	20.4734	19.9474	19.5192 (87)
Th 2	19.7123	19.7150	19.7175	19.7297	19.7319	19.7425	19.7425	19.7445	19.7384	19.7319	19.7273	19.7225 (88)
util rest of house	0.9650	0.9353	0.8712	0.7296	0.5438	0.3608	0.2344	0.2765	0.5150	0.8116	0.9377	0.9701 (89)
MIT 2	18.0743	18.3829	18.8153	19.2808	19.5212	19.6128	19.6270	19.6271	19.5686	19.2116	18.5777	18.0347 (90)
Living area fraction									fLA = Living area / (4) =			0.4846 (91)
MIT	18.7927	19.0712	19.4654	19.8978	20.1345	20.2276	20.2459	20.2435	20.1764	19.8232	19.2415	18.7542 (92)
Temperature adjustment												-0.1000
adjusted MIT	18.6927	18.9712	19.3654	19.7978	20.0345	20.1276	20.1459	20.1435	20.0764	19.7232	19.1415	18.6542 (93)

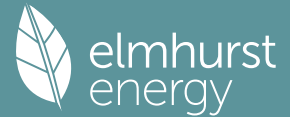
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9578	0.9264	0.8636	0.7323	0.5601	0.3861	0.2639	0.3084	0.5403	0.8112	0.9297	0.9635 (94)
Useful gains	396.6223	464.4709	516.8712	531.2003	457.8594	318.2731	207.6704	217.8451	329.5478	401.7058	389.6918	378.8514 (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	872.6465	851.1318	776.3882	650.4476	496.4195	326.0550	209.1595	220.4166	353.8513	543.3954	720.2303	868.3183 (97)
Space heating kWh	354.1620	259.8361	193.0807	85.8581	28.6887	0.0000	0.0000	0.0000	0.0000	105.4170	237.9877	364.1634 (98a)
Space heating requirement - total per year (kWh/year)												1629.1937
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	354.1620	259.8361	193.0807	85.8581	28.6887	0.0000	0.0000	0.0000	0.0000	105.4170	237.9877	364.1634 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1629.1937
Space heating per m2										(98c) / (4) =		39.4192 (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 %)												94.0000 (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	354.1620	259.8361	193.0807	85.8581	28.6887	0.0000	0.0000	0.0000	0.0000	105.4170	237.9877	364.1634 (98)
Space heating efficiency (main heating system 1)	94.0000	94.0000	94.0000	94.0000	94.0000	0.0000	0.0000	0.0000	0.0000	94.0000	94.0000	94.0000 (210)
Space heating fuel (main heating system)	376.7681	276.4214	205.4050	91.3384	30.5199	0.0000	0.0000	0.0000	0.0000	112.1458	253.1784	387.4079 (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	123.7182	109.3325	116.5684	104.1890	102.0098	93.0877	93.0141	96.2411	96.7264	106.4100	111.2875	122.6480 (64)
Efficiency of water heater												99.4000 (216)
(217)m	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000 (217)
Fuel for water heating, kWh/month	124.4650	109.9924	117.2720	104.8179	102.6256	93.6496	93.5756	96.8221	97.3102	107.0523	111.9593	123.3883 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	13.4501	10.7901	9.7153	7.1179	5.4980	4.4919	5.0155	6.5193	8.4680	11.1104	12.5492	13.8239 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-20.8160	-35.3401	-60.6340	-75.6716	-84.4025	-78.0754	-77.0000	-69.5554	-55.9894	-42.6008	-24.3442	-17.1471 (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	-4.2539	-11.6891	-31.9315	-64.2964	-100.7285	-108.5486	-105.2383	-81.8278	-51.3194	-21.0380	-6.4488	-3.1016 (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												1733.1848 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												99.4000
Water heating fuel used												1282.9303 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												41.0000 (231)
Electricity for lighting (calculated in Appendix L)												108.5498 (232)

Full SAP Calculation Printout



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

PV generation	-1231.9983 (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	2374.5538 (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	1733.1848	0.1562	270.7868 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1282.9303	0.1405	180.2828 (264)
Energy for instantaneous electric shower(s)	440.8873	0.1391	61.3372 (264a)
Space and water heating			451.0696 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	108.5498	0.1443	15.6671 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-641.5763	0.1326	-85.0882
PV Unit electricity exported	-590.4221	0.1194	-70.5214
Total			-155.6095 (269)
Total CO2, kg/year			378.1515 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.1500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1733.1848	1.5784	2735.6490 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1282.9303	1.5196	1949.5258 (278)
Energy for instantaneous electric shower(s)	440.8873	1.5143	667.6507 (278a)
Space and water heating			4685.1748 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	108.5498	1.5338	166.4972 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-641.5763	1.4901	-955.9927
PV Unit electricity exported	-590.4221	0.4381	-258.6586
Total			-1214.6514 (283)
Total Primary energy kWh/year			4366.6962 (286)
Dwelling Primary energy Rate (DPER)			105.6500 (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	41.3300 (1b)	x 2.8500 (2b)	= 117.7905 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.3300		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 117.7905 (5)

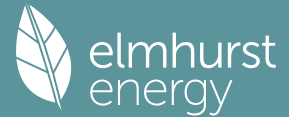
2. Ventilation rate

	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) =	0.1698 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4198	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3883 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												

Full SAP Calculation Printout



Effective ac	0.4951	0.4854	0.4757	0.4271	0.4174	0.3689	0.3689	0.3592	0.3883	0.4174	0.4368	0.4563 (22b)
	0.6226	0.6178	0.6131	0.5912	0.5871	0.5680	0.5680	0.5645	0.5754	0.5871	0.5954	0.6041 (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			10.3400	1.1450	11.8397		(27)
External Wall	66.9200	10.3400	56.5800	0.1800	10.1844		(29a)
Walls To CorridorStairwell	14.3100		14.3100	0.1800	2.5758		(29a)
External Rear Roof	21.9300		21.9300	0.1100	2.4123		(30)
External Front Roof	4.8900		4.8900	0.1100	0.5379		(30)
External Front Zinc Roof	0.7800		0.7800	0.1100	0.0858		(30)
Total net area of external elements Aum(A, m2)			108.8300				(31)
Fabric heat loss, W/K = Sum (A x U)					27.6359		(33)
Main dwelling							
Party Wall			8.9200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							192.7365 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.8900	0.0500	0.2945
E4 Jamb	24.0000	0.0500	1.2000
E7 Party floor between dwellings (in blocks of flats)	38.9900	0.0700	2.7293
E15 Flat roof with parapet	18.0300	0.5600	10.0968
E16 Corner (normal)	14.2500	0.0900	1.2825
E17 Corner (inverted - internal area greater than external area)	8.5500	-0.0900	-0.7695
R6 Flat ceiling	6.8300	0.0600	0.4098
E3 Sill	5.8900	0.0500	0.2945
E18 Party wall between dwellings	2.8500	0.0600	0.1710
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	6.2600	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			15.7089 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 43.3448 (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	24.1994	24.0144	23.8331	22.9814	22.8220	22.0802	22.0802	21.9429	22.3660	22.8220	23.1444	23.4814 (38)
Heat transfer coeff	67.5442	67.3592	67.1779	66.3262	66.1668	65.4250	65.4250	65.2877	65.7108	66.1668	66.4892	66.8262 (39)
Average = Sum(39)m / 12 =												66.3254
HLP	1.6343	1.6298	1.6254	1.6048	1.6009	1.5830	1.5830	1.5797	1.5899	1.6009	1.6087	1.6169 (40)
HLP (average)												1.6048
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

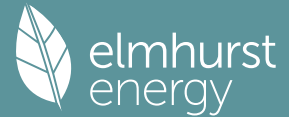
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4421 (42)
Hot water usage for mixer showers												
48.3990	47.6716	46.6118	44.5839	43.0873	41.4184	40.4698	41.5217	42.6747	44.4666	46.5381	48.2135 (42a)	
Hot water usage for baths												
20.9364	20.6254	20.1876	19.3802	18.7757	18.1054	17.7433	18.1781	18.6515	19.3688	20.1928	20.8656 (42b)	
Hot water usage for other uses												
29.3987	28.3297	27.2606	26.1916	25.1225	24.0535	24.0535	25.1225	26.1916	27.2606	28.3297	29.3987 (42c)	
Average daily hot water use (litres/day)												90.7597 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
98.7341	96.6268	94.0600	90.1557	86.9856	83.5773	82.2666	84.8223	87.5178	91.0961	95.0605	98.4779 (44)	
Energy conte	156.3707	137.5952	144.5667	123.4187	117.0993	102.7681	99.4944	105.0278	107.9182	123.6165	135.4311	154.1926 (45)
Energy content (annual)										Total = Sum(45)m =		1507.4992
Distribution loss (46)m = 0.15 x (45)m												
23.4556	20.6393	21.6850	18.5128	17.5649	15.4152	14.9242	15.7542	16.1877	18.5425	20.3147	23.1289 (46)	
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss												
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage												
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
202.9656	179.6809	191.1616	168.5105	163.6942	147.8599	146.0893	151.6227	153.0101	170.2114	180.5230	200.7875 (62)	
WWHRS	-22.1260	-19.5684	-20.4909	-16.9673	-15.8129	-13.5312	-12.6834	-13.4875	-13.9999	-16.5044	-18.6974	-21.7163 (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												
180.8396	160.1125	170.6707	151.5432	147.8813	134.3287	133.4059	138.1352	139.0102	153.7070	161.8255	179.0712 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1850.5311 (64)
Electric shower(s)												1851 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Heat gains from water heating, kWh/month												
89.2692	79.4190	85.3443	77.1102	76.2115	70.2439	70.3578	72.1977	71.9563	78.3784	81.1043	88.5449 (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	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059	72.1059 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	62.9939	69.7432	62.9939	65.0937	62.9939	65.0937	62.9939	62.9939	65.0937	62.9939	65.0937	62.9939 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	124.8924	126.1884	122.9225	115.9699	107.1934	98.9448	93.4342	92.1382	95.4041	102.3567	111.1332	119.3818 (68)

Full SAP Calculation Printout



Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5											
	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106	30.2106 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)											
	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847	-57.6847 (71)
Water heating gains (Table 5)											
	119.9854	118.1830	114.7101	107.0975	102.4348	97.5609	94.5669	97.0399	99.9393	105.3473	112.6449
Total internal gains											
	355.5034	361.7463	348.2583	335.7928	320.2538	306.2311	295.6268	296.8037	305.0688	318.3297	336.5035
											349.0194 (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			3.7900	10.6334		0.6300	0.7000		0.7700	12.3164	(74)
East			2.4200	19.6403		0.6300	0.7000		0.7700	14.5256	(76)
West			4.1300	19.6403		0.6300	0.7000		0.7700	24.7896	(80)

Solar gains	51.6316	100.4461	166.6534	248.9661	312.9263	324.3903	307.1269	258.1423	195.3960	119.2768	64.2153
Total gains	407.1350	462.1924	514.9117	584.7588	633.1801	630.6215	602.7537	554.9460	500.4648	437.6065	400.7187
											391.6179 (84)

7. Mean internal temperature (heating season)											

Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	32.7596	32.8496	32.9383	33.3612	33.4416	33.8207	33.8207	33.8919	33.6737	33.4416	33.2794
alpha	3.1840	3.1900	3.1959	3.2241	3.2294	3.2547	3.2547	3.2595	3.2449	3.2294	3.2186
util living area											
	0.9747	0.9611	0.9340	0.8674	0.7525	0.5926	0.4541	0.5050	0.7254	0.9010	0.9604
											0.9775 (86)
MIT	18.9095	19.1677	19.5874	20.1506	20.6003	20.8700	20.9590	20.9419	20.7393	20.1542	19.4499
Th 2	19.5883	19.5916	19.5948	19.6098	19.6126	19.6258	19.6258	19.6283	19.6207	19.6126	19.6069
util rest of house											
	0.9681	0.9510	0.9163	0.8315	0.6866	0.4894	0.3225	0.3696	0.6306	0.8658	0.9482
MIT 2	17.2457	17.5716	18.0956	18.7827	19.2847	19.5511	19.6126	19.6073	19.4461	18.8094	17.9415
Living area fraction											
MIT	18.0520	18.3451	18.8186	19.4456	19.9223	20.1903	20.2651	20.2541	20.0728	19.4611	18.6725
Temperature adjustment											
adjusted MIT	18.0520	18.3451	18.8186	19.4456	19.9223	20.1903	20.2651	20.2541	20.0728	19.4611	18.6725
											18.0193 (93)

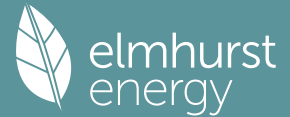
8. Space heating requirement											

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Utilisation	0.9580	0.9391	0.9040	0.8266	0.7028	0.5341	0.3857	0.4339	0.6648	0.8611	0.9373
Useful gains	390.0476	434.0390	465.4551	483.3365	444.9730	336.8090	232.4557	240.8100	332.6850	376.8138	375.5982
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W											
	928.8700	905.6534	827.5380	699.4494	544.0421	365.7458	239.7899	251.6244	392.4797	586.3120	769.4462
Space heating kWh											
	400.8839	316.9249	269.3897	155.6014	73.7074	0.0000	0.0000	0.0000	0.0000	155.8667	283.5706
Space heating requirement - total per year (kWh/year)											
											406.7227 (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
Solar heating contribution - total per year (kWh/year)											
											0.0000 (98b)
Space heating kWh											
	400.8839	316.9249	269.3897	155.6014	73.7074	0.0000	0.0000	0.0000	0.0000	155.8667	283.5706
Space heating requirement after solar contribution - total per year (kWh/year)											
											2062.6672 (98c)
Space heating per m2											
											49.9073 (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
Space heating requirement											
	400.8839	316.9249	269.3897	155.6014	73.7074	0.0000	0.0000	0.0000	0.0000	155.8667	283.5706
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
Space heating fuel (main heating system)											
	434.3270	343.3639	291.8632	168.5822	79.8564	0.0000	0.0000	0.0000	0.0000	168.8696	307.2270
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
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
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
Water heating											
Water heating requirement											
	180.8396	160.1125	170.6707	151.5432	147.8813	134.3287	133.4059	138.1352	139.0102	153.7070	161.8255
Efficiency of water heater											
(217)m	85.7921	85.5612	85.0786	84.1191	82.5841	79.8000	79.8000	79.8000	79.8000	84.0911	85.3045
Fuel for water heating, kWh/month											
	210.7881	187.1323	200.6035	180.1531	179.0675	168.3317	167.1753	173.1018	174.1982	182.7863	189.7034
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
Pumps and Fa											
	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.3041
Lighting											
	13.0889	10.5004	9.4544	6.9267	5.3504	4.3713	4.8808	6.3443	8.2406	10.8121	12.2122
Electricity generated by PVs (Appendix M) (negative quantity)											
(233a)m	-11.2678	-16.8004	-25.5341	-30.4288	-34.3600	-32.6732	-32.3047	-29.7377	-25.4653	-19.9802	-12.7179
											-9.6399 (233a)

Full SAP Calculation Printout



Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.8611	-8.3183	-16.8952	-25.9043	-34.7576	-35.0805	-34.6385	-29.0726	-20.9957	-12.0369	-5.2024	-3.0368	(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												2234.7423	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2221.6505	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												105.6348	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-510.7097	(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												4137.3178	(238)

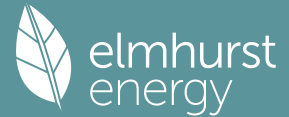
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2234.7423	0.2100	469.2959	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2221.6505	0.2100	466.5466	(264)
Space and water heating			935.8425	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	105.6348	0.1443	15.2464	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-280.9099	0.1334	-37.4713	
PV Unit electricity exported	-229.7998	0.1253	-28.7981	
Total			-66.2694	(269)
Total CO2, kg/year			896.7487	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			21.7000	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2234.7423	1.1300	2525.2588	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2221.6505	1.1300	2510.4650	(278)
Space and water heating			5035.7238	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	105.6348	1.5338	162.0261	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-280.9099	1.4929	-419.3781	
PV Unit electricity exported	-229.7998	0.4600	-105.7029	
Total			-525.0811	(283)
Total Primary energy kWh/year			4802.7697	(286)
Target Primary Energy Rate (TPER)			116.2100	(287)

Full SAP Calculation Printout



Plot Reference	Flat 5				Issued on Date	16/02/2026	
Assessment Reference	As Design-Flat 5-Be Green			Plot Type Ref	As Design - Proposed		
Plot Address	105, Raleigh Road, London, N8 0JD				SAP Version	10.2	
SAP Rating	73 C	DER	6.74	TER	19.54		
Environmental	95 A	% DER < TER				65.51	
CO ₂ Emissions (t/year)	0.31	DFEE	48.60	TFEE	61.25		
Compliance Check	See BREL	% DFEE < TFEE				20.65	
% DPER < TPER	22.57	DPER	80.66	TPER	104.16		
Assessor Details	Mr. Paul Rothwell				Assessor ID	EU45-0001	
Client	105 Raleigh Road, J. Michealides						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	24.2900 (1b)	x 2.8500 (2b)	= 69.2265 (1b) - (3b)
First floor	36.2800 (1c)	x 2.7000 (2c)	= 97.9560 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	167.1825 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 30.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3794 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2941 (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	0.3749	0.3676	0.3602	0.3235	0.3161	0.2794	0.2794	0.2720	0.2941	0.3161	0.3308	0.3455 (22b)
Effective ac	0.5703	0.5676	0.5649	0.5523	0.5500	0.5390	0.5390	0.5370	0.5432	0.5500	0.5547	0.5597 (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			33.1100	1.1450	37.9122		(27)
Floor Above Comm Stairwell-LF			4.9500	0.1132	0.5604	20.0000	99.0000 (28b)
Floor Above Comm Stairwell-UF			6.9200	0.1132	0.7834	0.0000	0.0000 (28b)
External Wall-Lower Floor	40.3600	16.1700	24.1900	0.1700	4.1123	60.0000	1451.4000 (29a)
External Wall-Upper Floor	64.8000	16.9400	47.8600	0.1700	8.1362	60.0000	2871.6002 (29a)
Wall To Corridor/Stairwell	10.9200		10.9200	0.1300	1.4196	9.0000	98.2800 (29a)
Wall to Lightwell	10.8000		10.8000	0.1700	1.8360	9.0000	97.2000 (29a)
External Roof-Crown Roof	35.9300		35.9300	0.1100	3.9523	9.0000	323.3700 (30)
External Roof-Mansard Roof	8.4500		8.4500	0.1400	1.1830	9.0000	76.0500 (30)
Total net area of external elements A _{um} (A, m ²)			183.1300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		59.8954		(33)
Main dwelling							
Party Wall			8.3500	0.0000	0.0000	180.0000	1503.0001 (32)
Party Floor-Lower Floor			19.3300			40.0000	773.2000 (32d)
Party Floor-Upper Floor			18.7600			40.0000	750.4000 (32d)
Internal Wall-Lower Floor			74.8400			9.0000	673.5600 (32c)
Internal Wall-Upper Floor			72.9000			9.0000	656.1000 (32c)
Internal Ceiling			12.0300			9.0000	108.2700 (32e)

$$\begin{aligned} (28) \dots (30) + (32) + (32a) \dots (32e) &= 9481.4303 \quad (34) \\ &156.5367 \quad (35) \end{aligned}$$

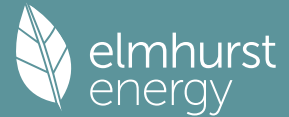
Ventilation heat loss calculated monthly (39)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	31.4630	31.3124	31.1648	30.4715	30.3418	29.7380	29.7380	29.6262	29.9706	30.3418	30.6042	30.8786 (38)
Heat transfer coeff	101.4241	101.2735	101.1259	100.4326	100.3029	99.6991	99.6991	99.5873	99.9317	100.3029	100.5653	100.8396 (39)
Average = Sum(39)m / 12 =												100.4320
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.6745	1.6720	1.6696	1.6581	1.6560	1.6460	1.6460	1.6442	1.6499	1.6560	1.6603	1.6648 (40)
HLP (average)												1.6581
Days in mopt.	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												1.9977 (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	26.2551	25.8652	25.3161	24.3037	23.5456	22.7049	22.2509	22.7961	23.3898	24.2893	25.3226	26.1663 (42b)
Hot water usage for other uses	36.9352	35.5921	34.2490	32.9059	31.5628	30.2197	30.2197	31.5628	32.9059	34.2490	35.5921	36.9352 (42c)
Average daily hot water use (litres/day)												57.9201 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	63.1904	61.4573	59.5651	57.2096	55.1084	52.9247	52.4706	54.3590	56.2958	58.5384	60.9147	63.1016 (44)
Energy content (annual)	100.0781	87.5144	91.5494	78.3171	74.1865	65.0771	63.4587	67.3078	69.4183	79.4360	86.7842	98.8019 (45)
Distribution loss (46)m = 0.15 x (45)m	15.0117	13.1272	13.7324	11.7476	11.1280	9.7616	9.5188	10.0962	10.4127	11.9154	13.0176	14.8203 (46)
Water storage loss (or HIU loss):												
Store volume												185.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.0000 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												0.0000 (55)
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	100.0781	87.5144	91.5494	78.3171	74.1865	65.0771	63.4587	67.3078	69.4183	79.4360	86.7842	98.8019 (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	100.0781	87.5144	91.5494	78.3171	74.1865	65.0771	63.4587	67.3078	69.4183	79.4360	86.7842	98.8019 (64)
12Total per year (kWh/year)												962 (64)
Electric shower(s)	46.2197	41.1821	44.9693	42.9137	43.7189	41.7036	43.0937	43.7189	42.9137	44.9693	44.1237	46.2197 (64a)
												525.7464 (64a)
Heat gains from water heating, kWh/month	44.8309	39.3941	41.6825	36.7688	35.5967	32.0640	31.8734	33.3096	33.8100	37.6548	39.8867	44.4065 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.9558	87.9558	87.9558	87.9558	87.9558	87.9558	87.9558	87.9558	87.9558	87.9558	87.9558	87.9558 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.3822	174.3822	174.3822	174.3822	174.3822	174.3822	174.3822	174.3822	174.3822	174.3822	174.3822	174.3822 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885 (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)	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082 (71)
Water heating gains (Table 5)	60.2566	58.6221	56.0249	51.0678	47.8451	44.5334	42.8407	44.7709	46.9583	50.6113	55.3982	59.6862 (72)
Total internal gains	378.5601	388.1590	371.5779	359.8451	341.4363	326.5392	314.2204	314.3412	324.0204	337.4492	357.4221	370.2955 (73)

[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	

Full SAP Calculation Printout



North	8.0200	10.6334	0.7600	0.7000	0.7700	31.4406 (74)
East	8.3500	19.6403	0.7600	0.7000	0.7700	60.4615 (76)
South	15.6400	46.7521	0.7600	0.7000	0.7700	269.5767 (78)
West	1.1000	19.6403	0.7600	0.7000	0.7700	7.9650 (80)

Solar gains	369.4438	635.4385	884.9305	1121.1209	1277.2890	1277.2712	1227.6081	1109.8596	966.6215	706.5513	443.6462	315.4201 (83)
Total gains	748.0039	1023.5975	1256.5084	1480.9660	1618.7253	1603.8104	1541.8285	1424.2008	1290.6419	1044.0005	801.0683	685.7157 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	25.9675	26.0061	26.0441	26.2239	26.2578	26.4168	26.4168	26.4465	26.3553	26.2578	26.1893	26.1180
alpha	2.7312	2.7337	2.7363	2.7483	2.7505	2.7611	2.7611	2.7631	2.7570	2.7505	2.7460	2.7412
util living area	0.9371	0.8735	0.7861	0.6572	0.5149	0.3784	0.2781	0.3120	0.4854	0.7331	0.8943	0.9484 (86)
MIT	19.2405	19.6654	20.0930	20.4856	20.7230	20.8370	20.8726	20.8662	20.7837	20.4257	19.7541	19.1525 (87)
Th 2	19.5592	19.5610	19.5627	19.5710	19.5725	19.5798	19.5798	19.5811	19.5770	19.5725	19.5694	19.5661 (88)
util rest of house	0.9240	0.8503	0.7504	0.6066	0.4506	0.3011	0.1910	0.2197	0.4002	0.6769	0.8703	0.9374 (89)
MIT 2	17.5917	18.1083	18.6131	19.0575	19.3008	19.4081	19.4319	19.4304	19.3683	19.0162	18.2368	17.4879 (90)
Living area fraction	18.2066	18.6890	19.1651	19.5901	19.8312	19.9410	19.9692	19.9659	19.8962	19.5419	18.8027	0.3730 (91)
MIT	18.2066	18.6890	19.1651	19.5901	19.8312	19.9410	19.9692	19.9659	19.8962	19.5419	18.8027	18.1087 (92)
Temperature adjustment	18.1066	18.5890	19.0651	19.4901	19.7312	19.8410	19.8692	19.8659	19.7962	19.4419	18.7027	-0.1000
adjusted MIT	18.1066	18.5890	19.0651	19.4901	19.7312	19.8410	19.8692	19.8659	19.7962	19.4419	18.7027	18.0087 (93)

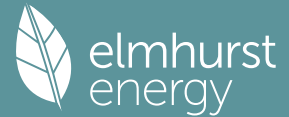
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9070	0.8315	0.7364	0.6035	0.4581	0.3157	0.2091	0.2387	0.4140	0.6711	0.8523	0.9217 (94)
Useful gains	678.4411	851.1689	925.3420	893.8258	741.5215	506.3635	322.4047	339.9263	534.3140	700.6281	682.7462	631.9955 (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	1400.3257	1386.3353	1270.6528	1063.5954	805.5537	522.5277	325.9345	345.1594	569.2297	886.8669	1166.8269	1392.4667 (97)
Space heating kWh	537.0822	359.6318	256.9113	122.2341	47.6400	0.0000	0.0000	0.0000	0.0000	138.5617	348.5381	565.7905 (98a)
Space heating requirement - total per year (kWh/year)												2376.3896
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	537.0822	359.6318	256.9113	122.2341	47.6400	0.0000	0.0000	0.0000	0.0000	138.5617	348.5381	565.7905 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2376.3896
Space heating per m2										(98c) / (4) =		39.2338 (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 %)												94.0000 (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	537.0822	359.6318	256.9113	122.2341	47.6400	0.0000	0.0000	0.0000	0.0000	138.5617	348.5381	565.7905 (98)
Space heating efficiency (main heating system 1)	94.0000	94.0000	94.0000	94.0000	94.0000	0.0000	0.0000	94.0000	0.0000	94.0000	94.0000	94.0000 (210)
Space heating fuel (main heating system)	571.3640	382.5870	273.3099	130.0363	50.6808	0.0000	0.0000	0.0000	0.0000	147.4061	370.7852	601.9048 (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	100.0781	87.5144	91.5494	78.3171	74.1865	65.0771	63.4587	67.3078	69.4183	79.4360	86.7842	98.8019 (64)
Water heating requirement	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000 (216)
Efficiency of water heater	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000	99.4000 (217)
Fuel for water heating, kWh/month	100.6822	88.0427	92.1020	78.7898	74.6343	65.4699	63.8417	67.7141	69.8373	79.9155	87.3081	99.3982 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (221)
Lighting	21.2794	17.0712	15.3707	11.2612	8.6985	7.1067	7.9351	10.3143	13.3972	17.5779	19.8542	21.8709 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-30.3113	-50.7108	-85.2606	-103.8105	-112.2277	-99.6182	-98.0509	-89.9136	-74.1612	-59.5673	-35.1657	-25.0294 (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)	-6.5197	-18.3815	-50.7307	-101.8215	-159.7549	-174.5578	-169.6819	-132.4888	-83.4900	-33.9267	-10.0733	-4.7187 (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												2528.0741 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

Full SAP Calculation Printout



Efficiency of water heater	99.4000	
Water heating fuel used	967.7358 (219)	
Space cooling fuel	0.0000 (221)	
Electricity for pumps and fans:		
central heating pump	41.0000 (230c)	
Total electricity for the above, kWh/year	41.0000 (231)	
Electricity for lighting (calculated in Appendix L)	171.7372 (232)	
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1809.9729 (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	2424.3206 (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	2528.0741	0.1565	395.5940 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	967.7358	0.1416	137.0092 (264)
Energy for instantaneous electric shower(s)	525.7464	0.1391	73.1429 (264a)
Space and water heating			532.6032 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	171.7372	0.1443	24.7870 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-863.8273	0.1334	-115.2051
PV Unit electricity exported	-946.1455	0.1192	-112.7684
Total			-227.9735 (269)
Total CO2, kg/year			408.2469 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.7400 (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	2528.0741	1.5793	3992.4914 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	967.7358	1.5235	1474.3773 (278)
Energy for instantaneous electric shower(s)	525.7464	1.5143	796.1557 (278a)
Space and water heating			5466.8687 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	171.7372	1.5338	263.4163 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-863.8273	1.4929	-1289.5761
PV Unit electricity exported	-946.1455	0.4371	-413.5862
Total			-1703.1624 (283)
Total Primary energy kWh/year			4885.3031 (286)
Dwelling Primary energy Rate (DPER)			80.6600 (287)

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

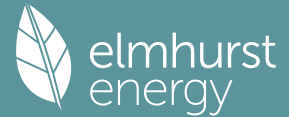
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	24.2900 (1b)	x 2.8500 (2b)	= 69.2265 (1b) - (3b)
First floor	36.2800 (1c)	x 2.7000 (2c)	= 97.9560 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 167.1825 (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) = 0.1196 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3696 (18)
Number of sides sheltered	3 (19)

Full SAP Calculation Printout



Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.7750 \quad (20)$$

$$(21) = (18) \times (20) = 0.2865 \quad (21)$$

	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 infiltr rate													
Effective ac	0.3652	0.3581	0.3509	0.3151	0.3079	0.2721	0.2721	0.2650	0.2865	0.3079	0.3223	0.3366	(22b)
	0.5667	0.5641	0.5616	0.5496	0.5474	0.5370	0.5370	0.5351	0.5410	0.5474	0.5519	0.5566	(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			15.1400	1.1450	17.3359			(27)
Floor Above Comm Stairwell-LF			4.9500	0.1300	0.6435			(28b)
Floor Above Comm Stairwell-UF			6.9200	0.1300	0.8996			(28b)
External Wall-Lower Floor	40.3600	7.3800	32.9800	0.1800	5.9364			(29a)
External Wall-Upper Floor	64.8000	7.7600	57.0400	0.1800	10.2672			(29a)
Wall To Corridor/Stairwell	10.9200		10.9200	0.1800	1.9656			(29a)
Wall to Lightwell	10.8000		10.8000	0.1800	1.9440			(29a)
External Roof-Crown Roof	35.9300		35.9300	0.1100	3.9523			(30)
External Roof-Mansard Roof	8.4500		8.4500	0.1100	0.9295			(30)
Total net area of external elements Aum(A, m2)			183.1300					(31)
Fabric heat loss, W/K = Sum (A x U)								(32)
Main dwelling								
Party Wall			8.3500	0.0000	0.0000			(32)

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

156.5367 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	14.8900	0.0500	0.7445	
E2 Other lintels (including other steel lintels)	70.7400	0.0500	3.5370	
E4 Jamb	31.3100	0.0700	2.1917	
E7 Party floor between dwellings (in blocks of flats)	31.2600	0.5600	17.5056	
E15 Flat roof with parapet	33.3000	0.0900	2.9970	
E16 Corner (normal)	16.8000	-0.0900	-1.5120	
E17 Corner (inverted - internal area greater than external area)	3.9100	0.0800	0.3128	
R10 All other roof or room-in-roof junctions	14.8900	0.0500	0.7445	
E3 Sill	2.8500	0.0600	0.1710	
E18 Party wall between dwellings	8.0100	0.3200	2.5632	
E21 Exposed floor (inverted)	18.7200	0.0000	0.0000	
E6 Intermediate floor within a dwelling	2.8500	0.0600	0.1710	
E25 Staggered party wall between dwellings				

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

29.4263 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 73.3003 (37)

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

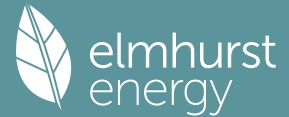
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	31.2650	31.1221	30.9820	30.3241	30.2011	29.6281	29.6281	29.5220	29.8488	30.2011	30.4501	30.7104	(38)
Heat transfer coeff	104.5653	104.4224	104.2823	103.6244	103.5013	102.9283	102.9283	102.8222	103.1491	103.5013	103.7503	104.0107	(39)
Average = Sum(39)m / 12 =													103.6238

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7264	1.7240	1.7217	1.7108	1.7088	1.6993	1.6993	1.6976	1.7030	1.7088	1.7129	1.7172	(40)
HLP (average)													1.7108
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.9977 (42)
Hot water usage for mixer showers	57.7145	56.8472	55.5833	53.1651	51.3805	49.3904	48.2592	49.5135	50.8884	53.0253	55.4954	57.4934	(42a)
Hot water usage for baths	24.9424	24.5719	24.0503	23.0885	22.3683	21.5697	21.1383	21.6563	22.2203	23.0748	24.0565	24.8580	(42b)
Hot water usage for other uses	35.0885	33.8125	32.5366	31.2607	29.9847	28.7088	28.7088	29.9847	31.2607	32.5366	33.8125	35.0885	(42c)
Average daily hot water use (litres/day)													108.2350 (43)
Daily hot water use	117.7453	115.2316	112.1702	107.5142	103.7335	99.6688	98.1063	101.1545	104.3694	108.6367	113.3644	117.4399	(44)
Energy conte	186.4798	164.0883	172.4014	147.1816	139.6452	122.5544	118.6510	125.2504	128.6979	147.4190	161.5084	183.8825	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	27.9720	24.6132	25.8602	22.0772	20.9468	18.3832	17.7977	18.7876	19.3047	22.1128	24.2263	27.5824	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	233.0747	206.1740	218.9963	192.2734	186.2401	167.6463	165.2459	171.8453	173.7898	194.0139	206.6002	230.4774	(62)
WWHRS	-26.3847	-23.3348	-24.4349	-20.2330	-18.8565	-16.1356	-15.1246	-16.0835	-16.6945	-19.6810	-22.2962	-25.8961	(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	206.6901	182.8392	194.5614	172.0404	167.3837	151.5107	150.1214	155.7619	157.0953	174.3329	184.3040	204.5813	(64)
12Total per year (kWh/year)													2101.2221 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													

Full SAP Calculation Printout



99.2805 88.2279 94.5994 85.0113 83.7080 76.8228 76.7274 78.9217 78.8655 86.2927 89.7750 98.4169 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	99.8852	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.9558	87.3796	87.9558	90.8876	87.9558	90.8876	87.9558	87.9558	90.8876	87.9558	90.8876	87.9558	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	174.3822	176.1917	171.6317	161.9241	149.6699	138.1527	130.4585	128.6489	133.2089	142.9166	155.1708	166.6880	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	32.9885	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	-79.9082	(71)
Water heating gains (Table 5)	133.4415	131.2916	127.1497	118.0713	112.5107	106.6984	103.1282	106.0775	109.5355	115.9848	124.6875	132.2807	(72)
Total internal gains	451.7450	460.8285	442.7028	426.8486	406.1019	388.7042	374.5080	375.6478	386.5976	402.8228	426.7115	442.8900	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Access factor Table 6d	Gains W			
North				3.6800	10.6334	0.6300	0.7000	0.7700	11.9589 (74)			
East				3.8100	19.6403	0.6300	0.7000	0.7700	22.8688 (76)			
South				7.1500	46.7521	0.6300	0.7000	0.7700	102.1595 (78)			
West				0.5000	19.6403	0.6300	0.7000	0.7700	3.0012 (80)			
Solar gains	139.9884	240.7722	335.3019	424.8059	484.0029	484.0096	465.1844	420.5465	366.2567	267.7150	168.1035	119.5190 (83)
Total gains	591.7334	701.6006	778.0047	851.6544	890.1048	872.7139	839.6924	796.1943	752.8542	670.5378	594.8150	562.4090 (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, n _{l,m} (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	25.1874	25.2219	25.2558	25.4161	25.4463	25.5880	25.5880	25.6144	25.5333	25.4463	25.3853	25.3217	
alpha	2.6792	2.6815	2.6837	2.6944	2.6964	2.7059	2.7059	2.7076	2.7022	2.6964	2.6924	2.6881	
util living area	0.9629	0.9417	0.9107	0.8512	0.7573	0.6213	0.4873	0.5252	0.7091	0.8726	0.9437	0.9673	(86)
MIT	18.4277	18.7675	19.2411	19.8395	20.3668	20.7436	20.9039	20.8793	20.6090	19.9215	19.0683	18.3634	(87)
Th 2	19.5220	19.5237	19.5253	19.5331	19.5345	19.5413	19.5413	19.5426	19.5387	19.5345	19.5316	19.5285	(88)
util rest of house	0.9545	0.9288	0.8901	0.8152	0.6946	0.5176	0.3456	0.3841	0.6159	0.8338	0.9289	0.9598	(89)
MIT 2	16.6409	17.0663	17.6554	18.3856	18.9921	19.3806	19.5059	19.4937	19.2642	18.5046	17.4568	16.5638	(90)
Living area fraction	17.3073	17.7008	18.2468	18.9278	19.5048	19.8890	20.0273	20.0105	19.7658	19.0331	18.0578	17.2350	(91)
MIT	17.3073	17.7008	18.2468	18.9278	19.5048	19.8890	20.0273	20.0105	19.7658	19.0331	18.0578	17.2350	(92)
Temperature adjustment	17.3073	17.7008	18.2468	18.9278	19.5048	19.8890	20.0273	20.0105	19.7658	19.0331	18.0578	17.2350	(93)
adjusted MIT	17.3073	17.7008	18.2468	18.9278	19.5048	19.8890	20.0273	20.0105	19.7658	19.0331	18.0578	17.2350	(93)

8. Space heating requirement

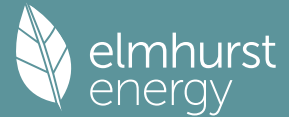
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9363	0.9070	0.8671	0.7972	0.6932	0.5446	0.3958	0.4328	0.6323	0.8172	0.9083	0.9428	(94)
Ext temp.	554.0143	636.3275	674.6335	678.9528	617.0121	475.2445	332.3724	344.5556	476.0187	547.9454	540.2480	530.2449	(95)
Heat loss rate 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	1360.1093	1336.6866	1224.9869	1039.1271	807.8070	544.3837	352.7681	371.2365	584.4168	872.8332	1136.8756	1355.7780	(97)
Space heating requirement - total per year (kWh/year)	599.7347	470.6413	409.4629	259.3255	141.9514	0.0000	0.0000	0.0000	0.0000	241.7165	429.5719	614.1967	(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)	599.7347	470.6413	409.4629	259.3255	141.9514	0.0000	0.0000	0.0000	0.0000	241.7165	429.5719	614.1967	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	599.7347	470.6413	409.4629	259.3255	141.9514	0.0000	0.0000	0.0000	0.0000	241.7165	429.5719	614.1967	(98c)
Space heating per m ²										(98c) / (4) =		52.2800	(99)

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

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

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency (main heating system 1)	599.7347	470.6413	409.4629	259.3255	141.9514	0.0000	0.0000	0.0000	0.0000	241.7165	429.5719	614.1967	(98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating efficiency (main heating system 2)	649.7668	509.9039	443.6218	280.9594	153.7935	0.0000	0.0000	0.0000	0.0000	261.8814	465.4083	665.4352	(211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)

Full SAP Calculation Printout



	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	206.6901	182.8392	194.5614	172.0404	167.3837	151.5107	150.1214	155.7619	157.0953	174.3329	184.3040	204.5813 (64)
Efficiency of water heater												79.8000 (216)
(217)m	86.3052	86.0836	85.6872	84.9777	83.6925	79.8000	79.8000	79.8000	79.8000	84.7929	85.8917	86.3662 (217)
Fuel for water heating, kWh/month	239.4874	212.3973	227.0602	202.4536	199.9984	189.8630	188.1220	195.1903	196.8612	205.5985	214.5773	236.8766 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	18.2755	14.6613	13.2008	9.6715	7.4705	6.1035	6.8149	8.8582	11.5060	15.0965	17.0514	18.7834 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-16.3112	-24.2113	-36.6245	-43.4160	-48.7975	-46.2879	-45.7349	-42.1943	-36.2920	-28.6673	-18.3626	-13.9646 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-5.8604	-12.6008	-25.5565	-39.1414	-52.4959	-53.0065	-52.3717	-43.9935	-31.7975	-18.2544	-7.8999	-4.6134 (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												3430.7702 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2508.4859 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												147.4935 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-748.4560 (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												5424.2936 (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	3430.7702	0.2100	720.4617 (261)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	2508.4859	0.2100	526.7820 (264)	
Space and water heating			1247.2438 (265)	
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)	
Energy for lighting	147.4935	0.1443	21.2879 (268)	
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-400.8642	0.1335	-53.5181	
PV Unit electricity exported	-347.5918	0.1253	-43.5648	
Total			-97.0829 (269)	
Total CO2, kg/year			1183.3780 (272)	
EPC Target Carbon Dioxide Emission Rate (TER)			19.5400 (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	3430.7702	1.1300	3876.7703 (275)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	2508.4859	1.1300	2834.5890 (278)	
Space and water heating			6711.3594 (279)	
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)	
Energy for lighting	147.4935	1.5338	226.2305 (282)	
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-400.8642	1.4934	-598.6333	
PV Unit electricity exported	-347.5918	0.4600	-159.9036	
Total			-758.5369 (283)	
Total Primary energy kWh/year			6309.1537 (286)	
Target Primary Energy Rate (TPER)			104.1600 (287)	