

ENERGY & SUSTAINABILITY ASSESSMENT

166 NORTHWOOD WAY

PROPERTY ADDRESS

166 NORTHWOOD WAY

NORTHWOOD

HA6 1RB

DATE

January 2026

PREPARED BY

EAL Consult

CONTENTS

1.	EXECUTIVE SUMMARY	3
2.	METHODOLOGY	5
3.	PLANNING POLICY CONTEXT	6
4.	ENERGY STRATEGY	9
a.	Baseline Model	10
b.	Be 'Lean' – Demand Reduction.....	10
c.	Be 'Clean' – Supply Energy Efficiently	12
d.	Be 'Green' – Renewable Energy.....	14
e.	Be 'Seen' – Monitoring Performance.....	15
5.	SUSTAINABILITY STRATEGY.....	16
a.	Sustainable Design.....	16
b.	Overheating Strategy.....	17
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 (New Build)	21
i.	Baseline	21
ii.	Be Lean	22
iii.	Be Green.....	23
B.	SAP Calculations (Existing).....	24
i.	Existing/Notional	24
ii.	Proposed.....	25
C.	SBEM Calculations	26
i.	Existing/Notional	26
ii.	Proposed	27
D.	GHA Overheating Tool	28

1. EXECUTIVE SUMMARY

Site description

This Energy and Sustainability Assessment has been prepared to support the planning application for the change of use from offices to 5 residential flats.

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 Hillingdon'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.

Energy Efficiency & Carbon Reduction

- **Be 'Lean':** Passive design principles including a high level of insulation and reduced air permeability to deliver Part L compliant Building in absence of renewable technologies. It will achieve **25%** reduction in carbon emissions over Part L 2021 baseline.
- **Be 'Clean':** district heating was deemed not viable for this project
- **Be 'Green':** Air Source Heat Pumps have been proposed for the specific scheme and will deliver a further **37%** reduction in regulated carbon emissions over Part L 2021 baseline

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
- 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.

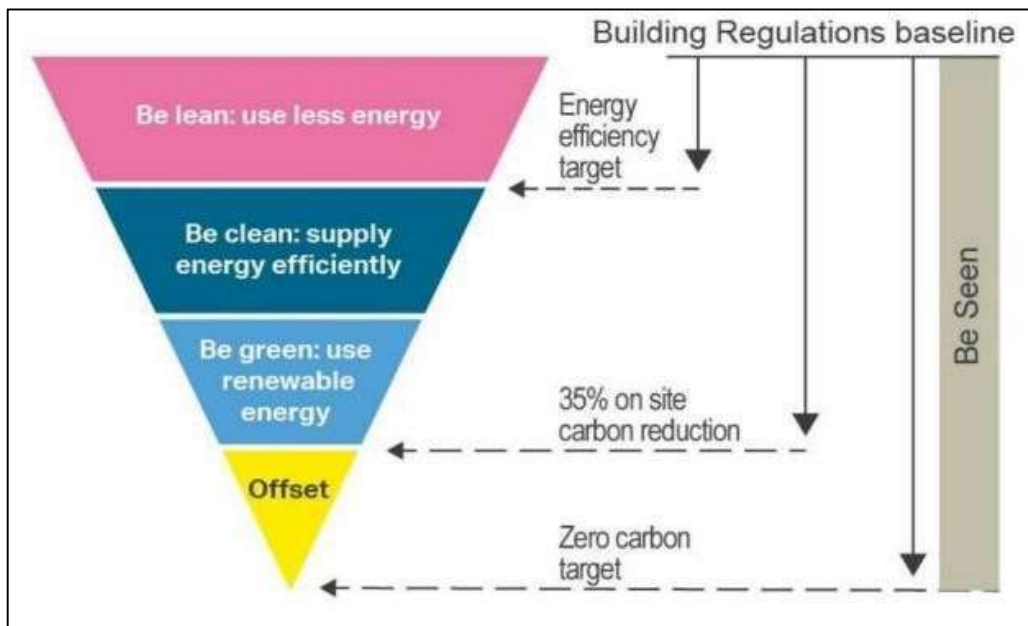
2. METHODOLOGY

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 (2021) and Simplified Building Energy Model (SBEM) software has been used to determine the CO₂ emissions and energy requirements. It compares CO₂ emissions from regulated energy use (DER and BER) with those of an equivalent dwelling/building built to Part L 2021 (TER), a notional dwelling/building 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 collocating 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, iv) 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 ii) 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:

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.

Local Plan Part 1 – Strategic Policies (2012)

Policy EM1: Climate Change Adaptation and Mitigation

The Council will ensure that climate change mitigation is addressed at every stage of the development process by:

1. Prioritising higher density development in urban and town centres that are well served by sustainable forms of transport.
2. Promoting a modal shift away from private car use and requiring new development to include innovative initiatives to reduce car dependency.
3. Ensuring development meets the highest possible design standards whilst still retaining competitiveness within the market.
4. Working with developers of major schemes to identify the opportunities to help provide efficiency initiatives that can benefit the existing building stock.
5. Promoting the use of decentralised energy within large scale development whilst improving local air quality levels.
6. Targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact on local air quality. Targeting areas of poor air quality for additional emissions reductions.
7. Encouraging sustainable techniques to land remediation to reduce the need to transport waste to landfill. In particular developers should consider remediation as part of their proposals.
8. Encouraging the installation of renewable energy for all new development in meeting the carbon reduction targets savings set out in the London Plan. Identify opportunities for new sources of electricity generation including anaerobic digestion, hydroelectricity and a greater use of waste as a resource.
9. Promoting new development to contribute to the upgrading of existing housing stock where appropriate.

The Borough will ensure that climate change adaptation is addressed at every stage of the development process by:

10. Locating and designing development to minimise the probability and impacts of flooding.
11. Requiring major development proposals to consider the whole water cycle impact which includes flood risk management, foul and surface water drainage and water consumption.
1. Giving preference to development of previously developed land to avoid the loss of further green areas.

Local Plan Part 2 – Development Management Policies (2020)

Policy DMEI 2: Reducing Carbon Emissions

A) All developments are required to make the fullest contribution to minimising carbon dioxide emissions in accordance with London Plan targets.

B) All major development proposals must be accompanied by an energy assessment showing how these reductions will be achieved.

C) Proposals that fail to take reasonable steps to achieve the required savings will be resisted. However, where it is clearly demonstrated that the targets for carbon emissions cannot be met onsite, the Council may approve the application and seek an off-site contribution to make up for the shortfall.

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)
	Residential
Baseline: Part L 2021 of the Building Regulations Compliant Development	7.3
After Energy Demand Reduction (Be Lean)	5.5
After Heat Network Connection (Be Clean)	5.5
After Renewables (Be Green)	2.8

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	1.8	24.7
Be Clean: Savings from Heat Network	1.8	0
Be Green: Savings from Renewable Energy	2.7	36.7
Cumulative on-site savings	4.5	61.5
Annual savings from off-set payment	2.8	
(Tonnes CO ₂)		
Cumulative savings for off-set payment	84	
Cash in-lieu contribution (£)	5,880	

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 and the National Calculation Methodology Modelling Guide. 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 for the new build areas would be provided by an ASHP and any active cooling would be provided by electrically powered equipment. 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 new units are estimated to achieve **25%** reduction in annual residential 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 5. Energy Efficient Design Specification

Element	Building Regulations 2021 Standard	Specification
New External Walls	0.18 W/m ² k	0.18 W/m ² k
Improved External Walls	0.26 W/m ² k	0.22 W/m ² k
Floor	0.25 W/m ² k	0.22 W/m ² k
Windows	1.2 W/m ² k	1.2 W/m ² k

Table 6. Development Part L Fabric Energy Efficiency Standard (FEES)

	Target Fabric Energy Efficiency (MWh/year)	Design Fabric Energy Efficiency (MWh/year)	Improvement %
Development Total	83.04	77.85	6.25

Air Permeability – designed to achieve an air permeability score of 5

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

Ventilation - The use of natural ventilation is proposed

Space Heating & Cooling - Space heating will be provided by radiators heating by the ASHP.

Hot Water system – hot water is supplied via built in cylinders.

c. Be 'Clean' - Supply Energy Efficiently

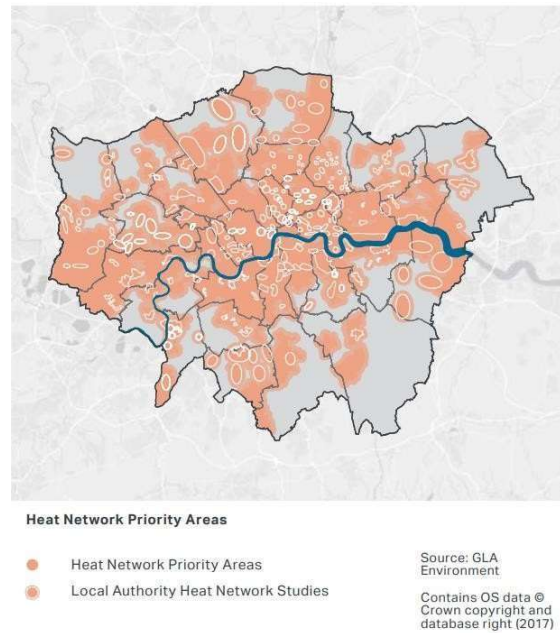
The Be Clean step of the energy hierarchy refers to the use of 'Clean energy supply'. This includes, but is not limited to, the use of Combined Heat and Power (CHP) and District Heat Networks. Policy SI 3 seeks for new development to promote the use of CHP and district heating.

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.

As the heating system proposed for this development is a heat pump, in accordance with the Air Quality Neutral LPG it is assumed that this project meets BEB and a full Air Quality Neutral (AQN) Assessment is not required.

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 8. Renewable Technologies Feasibility Table

Technology	Pros	Cons
Biomass Heating A biomass system designed for wood pellets, which have a high-energy content, would fuel this development. 	• Less volume of storage • Less maintenance and produce considerably less ash residue	• Nox Emissions which may impacts • High Costs • Not suitable for the project
Ground Source Heat Pump It circulates a mixture of water and antifreeze around a loop of pipe, called a ground loop, which is buried in the garden. Heat from the ground is absorbed into the fluid and passes through a heat exchanger into the heat pump 	• Use all through the year	• High Costs • Not suitable for this project
Air Source Heat Pump They are an efficient and environmentally-friendly way of heating using air drawn freely from the atmosphere. They operate rather like a refrigerator in reverse, absorbing heat from the air into a working fluid which is passed into a compressor where its temperature is increased before it is transferred into the heating and hot water circuits of the building	• Can generate less 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 air source heat pumps are to be incorporated in the design because it leads to a **37%** reduction in residential CO₂ 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.

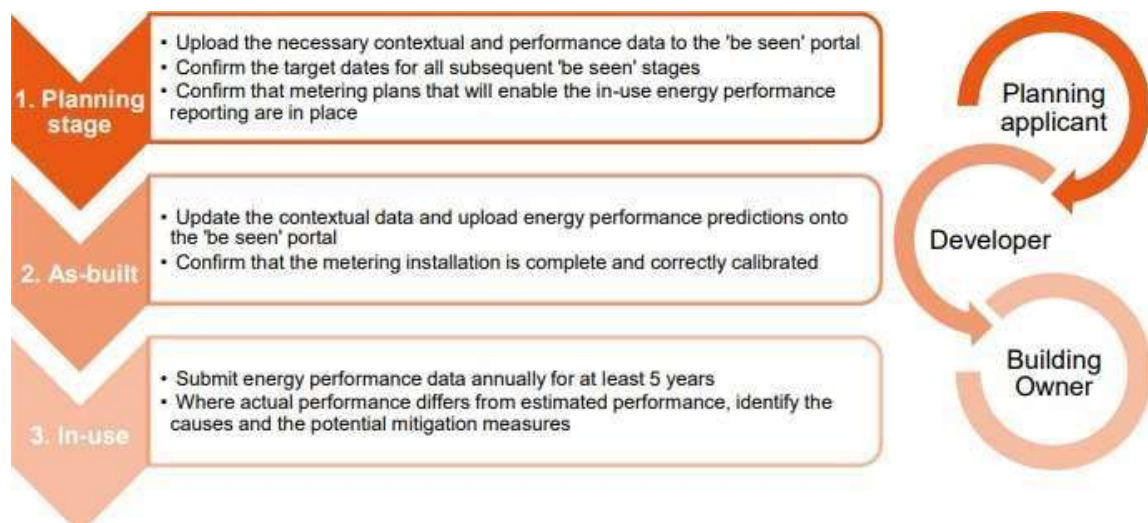
1.2.4 Ensuring that the actual energy and carbon performance of buildings is aligned with the estimated energy and carbon performance will also be a key factor in achieving a zero-carbon London.

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 units average an EPC rating of 82B, the operational running costs will be low due to the high performance. Smart metering equipment will be installed with display of energy usage and generation to raise awareness of users. This can help occupants to reduce demand and subsequent running costs. An on-site operational manual will be provided on completion of the build to assist users to 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:

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

- 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.

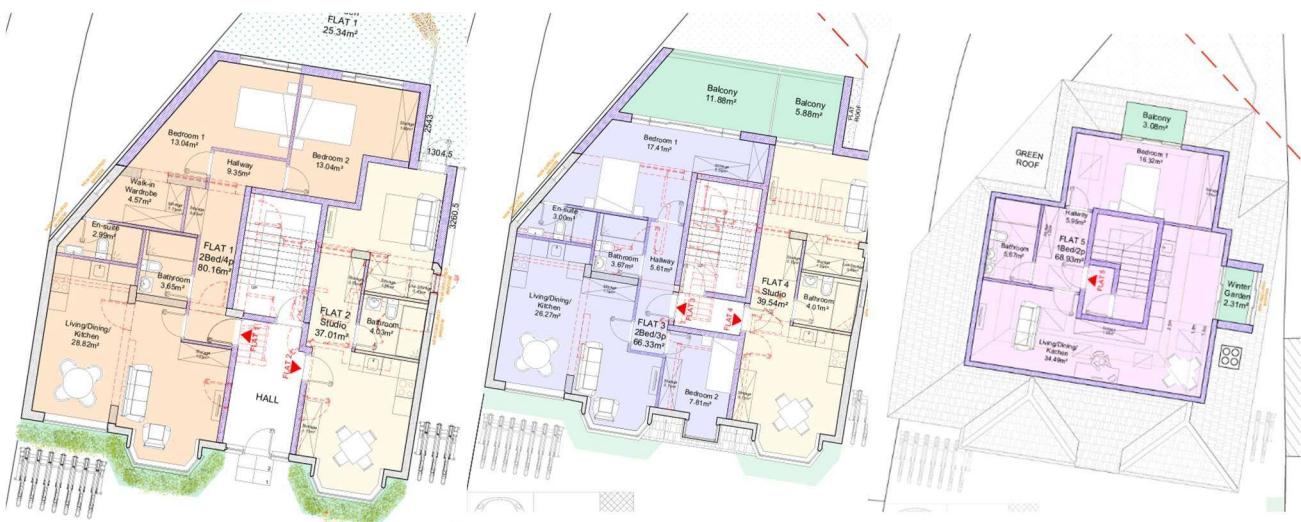
Minimise Heat Generation Through Energy Efficient Design

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, higher air tightness and reduced cold bridging. The GHA Overheating Tool has been completed and can be found in the Appendix. The tool showed a medium risk of overheating and that an overheating assessment is recommended.

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



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 9. 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

A space for reuse and recycling has been included.

f. Flood Risk

The development site is located in a 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 is limited in what biodiversity measures it can include as it relates to a roof extension on top of an existing building.

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 residential development will be reduced by **25%** from the notional emissions once energy efficiency measures and lean measures are taken into account.

The use of air source heat pumps are to be incorporated in the design because they achieve a CO₂ percentage reduction of **37%** contributing to the overall reduction of **62%** in carbon emissions. The development achieves a CO₂ percentage reduction of 62% from a fabric first approach with U-values outlined in the specification column of Table 4 on Page 11 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. Notional

Full SAP Calculation Printout



Plot Reference	Flat 1				Issued on Date	29/01/2026	
Assessment Reference	Notional			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	41 E		DER	17.65		TER	
Environmental	88 B		% DER < TER				N/A
CO ₂ Emissions (t/year)	0.8		DFEE	89.55		TFEE	
Compliance Check	N/A		% DFEE < TFEE				
% DPER < TPER			DPER	182.77		TPER	
Assessor Details	Miss Charlotte Russell				Assessor ID	DK97-0001	
Client	tbc, tbc						

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.8600 (1b)	x 2.6000 (2b)	= 132.2360 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 132.2360 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813 (22b)
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			10.7900	1.1450	12.3550		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			50.8600	0.2500	12.7150	75.0000	3814.5000 (28a)
Existing Wall	54.6300	10.7900	43.8400	0.3000	13.1520	9.0000	394.5600 (29a)
Wall to Corridor	15.7300	1.7600	13.9700	0.3000	4.1910	9.0000	125.7300 (29a)
Total net area of external elements Aum(A, m ²)			121.2200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.5250		(33)
Main dwelling							
Party Wall			12.5500	0.0000	0.0000	70.0000	878.5000 (32)
Party Ceiling			50.8600			30.0000	1525.8000 (32b)
Internal Wall			40.1700			9.0000	361.5300 (32c)
Internal Wall 2			17.4500			100.0000	1745.0001 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 8845.6201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							173.9210 (35)
Thermal bridges (Default value 0.200 * total exposed area)							24.2440 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 68.7690 (37)

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

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	41.7705	40.9957	40.2363	36.6695	36.0021	32.8955	32.8955	32.3202	34.0921	36.0021	37.3521	38.7636	(38)
Heat transfer coeff	110.5394	109.7647	109.0053	105.4384	104.7711	101.6644	101.6644	101.0891	102.8611	104.7711	106.1211	107.5325	(39)
Average = Sum(39)m / 12 =												105.4352	
HLP	2.1734	2.1582	2.1432	2.0731	2.0600	1.9989	1.9989	1.9876	2.0224	2.0600	2.0865	2.1143	(40)
HLP (average)												2.0730	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7154 (42)
Hot water usage for mixer showers	52.9818	52.1856	51.0254	48.8055	47.1672	45.3403	44.3018	45.4533	46.7155	48.6771	50.9447	52.7788 (42a)	
Hot water usage for baths	22.9071	22.5669	22.0879	21.2045	20.5431	19.8097	19.4135	19.8893	20.4072	21.1920	22.0935	22.8297 (42b)	
Hot water usage for other uses	32.1978	31.0270	29.8562	28.6854	27.5145	26.3437	26.3437	27.5145	28.6854	29.8562	31.0270	32.1978 (42c)	
Average daily hot water use (litres/day)												99.3568 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	108.0868	105.7796	102.9694	98.6953	95.2248	91.4937	90.0591	92.8571	95.8081	99.7253	104.0652	107.8064 (44)	
Distribution loss (46)m = 0.15 x (45)m	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (45)	
Water storage loss (or HIU loss):	25.6775	22.5943	23.7390	20.2663	19.2286	16.8753	16.3378	17.2465	17.7211	20.2989	22.2390	25.3198 (46)	
Store volume												150.0000 (47)	
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)	
Volume factor from Table 2a												0.9283 (52)	
Temperature factor from Table 2b												0.6000 (53)	
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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (64)	
Electric shower(s)												1650.2951 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month	56.9184	50.0840	52.6215	44.9237	42.6235	37.4070	36.2154	38.2297	39.2819	44.9960	49.2965	56.1256 (65)	

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

Metabolic gains (Table 5), Watts													
(66)m	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.3485	16.2970	13.2536	10.0338	7.5004	6.3322	6.8421	8.8936	11.9370	15.1568	17.6902	18.8585	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.0855	225.4005	219.5669	207.1480	191.4713	176.7374	166.8943	164.5794	170.4129	182.8319	198.5085	213.2424	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	(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)	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	(71)
Water heating gains (Table 5)	76.5032	74.5298	70.7278	62.3941	57.2896	51.9541	48.6767	51.3840	54.5582	60.4785	68.4673	75.4376	(72)
Total internal gains	402.2542	400.5442	387.8653	363.8928	340.5783	316.3406	303.7301	306.1739	318.2251	342.7841	368.9830	391.8554	(73)

6. Solar gains

[Jan]													
				Area	Solar flux			g	FF		Access	Gains	
				m2	Table 6a	Specific data		or Table 6b	Specific data		factor	W	
					W/m2				or Table 6c		Table 6d		
Southeast				8.2300	36.7938	0.6300			0.7000		0.7700	92.5437 (77)	
Northwest				2.5600	11.2829	0.6300			0.7000		0.7700	8.8274 (81)	
Solar gains	101.3711	175.6046	248.0581	320.4102	370.8015	373.3612	357.7789	319.3835	272.9884	196.1804	121.9532	86.4070 (83)	
Total gains	503.6253	576.1488	635.9234	684.3031	711.3798	689.7018	661.5089	625.5574	591.2135	538.9645	490.9362	478.2624 (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	22.2284	22.3853	22.5413	23.3038	23.4522	24.1689	24.1689	24.3064	23.8877	23.4522	23.1539	22.8500		
alpha	2.4819	2.4924	2.5028	2.5536	2.5635	2.6113	2.6113	2.6204	2.5925	2.5635	2.5436	2.5233		
util living area	0.9707	0.9579	0.9362	0.8939	0.8212	0.7017	0.5720	0.6101	0.7839	0.9095	0.9585	0.9741	(86)	

Full SAP Calculation Printout



MIT	17.9758	18.2838	18.7916	19.4910	20.1111	20.6156	20.8411	20.8074	20.4348	19.6344	18.7235	17.9780 (87)
Th 2	19.9133	19.9209	19.9284	19.9634	19.9700	20.0005	20.0005	20.0062	19.9888	19.9700	19.9567	19.9429 (88)
util rest of house												
	0.9662	0.9514	0.9258	0.8754	0.7861	0.6366	0.4719	0.5139	0.7303	0.8901	0.9511	0.9701 (89)
MIT 2	17.1517	17.4611	17.9671	18.6740	19.2701	19.7469	19.9232	19.9067	19.5896	18.8264	17.9229	17.1728 (90)
Living area fraction									fLA = Living area / (4) =			0.5374 (91)
MIT	17.5945	17.9032	18.4102	19.1130	19.7220	20.2137	20.4164	20.3907	20.0438	19.2606	18.3531	17.6055 (92)
Temperature adjustment												0.0000
adjusted MIT	17.5945	17.9032	18.4102	19.1130	19.7220	20.2137	20.4164	20.3907	20.0438	19.2606	18.3531	17.6055 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9528	0.9351	0.9069	0.8569	0.7764	0.6517	0.5161	0.5537	0.7336	0.8734	0.9359	0.9578 (94)
Useful gains	479.8490	538.7582	576.6893	586.3783	552.3318	449.4883	341.3760	346.3823	433.7354	470.7358	459.4488	458.1013 (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	1469.5705	1427.2923	1298.2704	1076.8433	840.4781	570.7170	387.9957	403.4166	611.3808	907.3763	1194.1898	1441.5256 (97)
Space heating kWh	736.3528	597.0949	536.8563	353.1348	214.3809	0.0000	0.0000	0.0000	0.0000	324.8605	529.0135	731.6677 (98a)
Space heating requirement - total per year (kWh/year)												4023.3614
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	736.3528	597.0949	536.8563	353.1348	214.3809	0.0000	0.0000	0.0000	0.0000	324.8605	529.0135	731.6677 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4023.3614
Space heating per m2										(98c) / (4) =		79.1066 (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	736.3528	597.0949	536.8563	353.1348	214.3809	0.0000	0.0000	0.0000	0.0000	324.8605	529.0135	731.6677 (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)	736.3528	597.0949	536.8563	353.1348	214.3809	0.0000	0.0000	0.0000	0.0000	324.8605	529.0135	731.6677 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	16.0603	12.8842	11.6008	8.4992	6.5651	5.3637	5.9889	7.7846	10.1114	13.2667	14.9847	16.5067 (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												4023.3614 (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												1650.2951 (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)												129.6162 (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												5844.2726 (238)

Full SAP Calculation Printout



10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4023.3614	16.4900	663.4523 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1650.2951	16.4900	272.1337 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	129.6162	16.4900	21.3737 (250)
Additional standing charges			0.0000 (251)
Total energy cost			963.7206 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	3.6192 (257)
SAP value		41.4867
SAP rating (Section 12)		41 (258)
SAP band		E

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	4023.3614	0.1541	619.8202 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1650.2951	0.1416	233.6456 (264)
Space and water heating			853.4658 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	129.6162	0.1443	18.7076 (268)
Total CO2, kg/year			877.8606 (272)
CO2 emissions per m2			17.2600 (273)
EI value			87.7286
EI rating			88 (274)
EI band			B

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.8600 (1b)	x 2.6000 (2b)	= 132.2360 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 132.2360 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							

Full SAP Calculation Printout



Upgraded Windows		10.7900	1.1450	12.3550		(27)
Solid Door		1.7600	1.2000	2.1120		(26)
Heatloss Floor		50.8600	0.2500	12.7150	75.0000	3814.5000 (28a)
Existing Wall	54.6300	10.7900	0.3000	13.1520	9.0000	394.5600 (29a)
Wall to Corridor	15.7300	1.7600	0.3000	4.1910	9.0000	125.7300 (29a)
Total net area of external elements Aum(A, m2)		121.2200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	44.5250		(33)
Main dwelling						
Party Wall		12.5500	0.0000	0.0000	70.0000	878.5000 (32)
Party Ceiling		50.8600			30.0000	1525.8000 (32b)
Internal Wall		40.1700			9.0000	361.5300 (32c)
Internal Wall 2		17.4500			100.0000	1745.0001 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 8845.6201 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 173.9210 (35)

Thermal bridges (Default value 0.200 * total exposed area) 24.2440 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 68.7690 (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	39.4923	37.3521	36.6695	33.4861	33.4861	31.7602	32.3202	31.2156	32.3202	34.0921	34.7134	36.6695 (38)
Average = Sum(39)m / 12 =	108.2612	106.1211	105.4384	102.2551	102.2551	100.5292	101.0891	99.9845	101.0891	102.8611	103.4824	105.4384 (39)
												103.2337
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.1286	2.0865	2.0731	2.0105	2.0105	1.9766	1.9876	1.9659	1.9876	2.0224	2.0347	2.0731 (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												1.7154 (42)
Hot water usage for mixer showers												
	52.9818	52.1856	51.0254	48.8055	47.1672	45.3403	44.3018	45.4533	46.7155	48.6771	50.9447	52.7788 (42a)
Hot water usage for baths												
	22.9071	22.5669	22.0879	21.2045	20.5431	19.8097	19.4135	19.8893	20.4072	21.1920	22.0935	22.8297 (42b)
Hot water usage for other uses												
	32.1978	31.0270	29.8562	28.6854	27.5145	26.3437	26.3437	27.5145	28.6854	29.8562	31.0270	32.1978 (42c)
Average daily hot water use (litres/day)												99.3568 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	108.0868	105.7796	102.9694	98.6953	95.2248	91.4937	90.0591	92.8571	95.8081	99.7253	104.0652	107.8064 (44)
Energy content (annual)	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (45)
Distribution loss (46)m = 0.15 x (45)m												
	25.6775	22.5943	23.7390	20.2663	19.2286	16.8753	16.3378	17.2465	17.7211	20.2989	22.2390	25.3198 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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												
	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (62)
WVHRS	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												
	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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												
	56.9184	50.0840	52.6215	44.9237	42.6235	37.4070	36.2154	38.2297	39.2819	44.9960	49.2965	56.1256 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	18.3485	16.2970	13.2536	10.0338	7.5004	6.3322	6.8421	8.8936	11.9370	15.1568	17.6902	18.8585 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	223.0855	225.4005	219.5669	207.1480	191.4713	176.7374	166.8943	164.5794	170.4129	182.8319	198.5085	213.2424 (68)
Pumps, fans	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081 (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)	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177 (71)
Total internal gains	76.5032	74.5298	70.7278	62.3941	57.2896	51.9541	48.6767	51.3840	54.5582	60.4785	68.4673	75.4376 (72)
	402.2542	400.5442	387.8653	363.8928	340.5783	316.3406	303.7301	306.1739	318.2251	342.7841	368.9830	391.8554 (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
-------	------------	--------------------------------	-----------------------------------	------------------------------------	------------------------------	------------

Full SAP Calculation Printout



Southeast				8.2300		42.6275		0.6300		0.7000		0.7700		107.2166 (77)	
Northwest				2.5600		13.7622		0.6300		0.7000		0.7700		10.7671 (81)	
Solar gains	117.9837	181.9426	257.0279	352.0526	393.7461	424.6598	401.8608	360.7002	303.5192	217.5992	143.3584	97.2447 (83)			
Total gains	520.2379	582.4868	644.8932	715.9454	734.3244	741.0004	705.5909	666.8742	621.7442	560.3833	512.3414	489.1002 (84)			
7. Mean internal temperature (heating season)															
Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)		
Utilisation factor for gains for living area, nil,m (see Table 9a)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
tau	22.6962	23.1539	23.3038	24.0293	24.0293	24.4418	24.3064	24.5750	24.3064	23.8877	23.7443	23.3038			
alpha	2.5131	2.5436	2.5536	2.6020	2.6020	2.6295	2.6204	2.6383	2.6204	2.5925	2.5830	2.5536			
util living area	0.9654	0.9534	0.9272	0.8708	0.7763	0.6193	0.4673	0.4744	0.7148	0.8787	0.9463	0.9687 (86)			
MIT	18.2354	18.5067	19.0285	19.7290	20.3355	20.7590	20.9210	20.9221	20.6253	19.9346	19.0537	18.2911 (87)			
Th 2	19.9357	19.9567	19.9634	19.9947	19.9947	20.0117	20.0062	20.0171	20.0062	19.9888	19.9827	19.9634 (88)			
util rest of house	0.9600	0.9462	0.9154	0.8487	0.7329	0.5422	0.3552	0.3589	0.6459	0.8517	0.9365	0.9637 (89)			
MIT 2	17.4237	17.7048	18.2229	18.9237	19.4932	19.8685	19.9765	19.9884	19.7647	19.1274	18.2658	17.4974 (90)			
Living area fraction									fLA = Living area / (4) =					0.5374 (91)	
MIT	17.8599	18.1357	18.6558	19.3564	19.9458	20.3470	20.4840	20.4901	20.2272	19.5611	18.6892	17.9239 (92)			
Temperature adjustment												0.0000			
adjusted MIT	17.8599	18.1357	18.6558	19.3564	19.9458	20.3470	20.4840	20.4901	20.2272	19.5611	18.6892	17.9239 (93)			
8. Space heating requirement															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Utilisation	0.9455	0.9295	0.8965	0.8320	0.7305	0.5700	0.4112	0.4168	0.6627	0.8380	0.9200	0.9503 (94)			
Useful gains	491.8890	541.4468	578.1392	595.6888	536.4266	422.3780	290.1727	277.9704	412.0294	469.5752	471.3682	464.7985 (95)			
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)			
Heat loss rate W	1392.2281	1351.5279	1218.4274	1007.8714	751.1472	497.3173	311.7603	298.9686	528.4083	808.6060	1095.7924	1341.5893 (97)			
Space heating kWh	669.8522	544.3745	476.3744	296.7715	159.7521	0.0000	0.0000	0.0000	0.0000	252.2390	449.5854	652.3324 (98a)			
Space heating requirement - total per year (kWh/year)													3501.2815		
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	669.8522	544.3745	476.3744	296.7715	159.7521	0.0000	0.0000	0.0000	0.0000	252.2390	449.5854	652.3324 (98c)			
Space heating requirement after solar contribution - total per year (kWh/year)													3501.2815		
Space heating per m2	(98c) / (4) =													68.8416 (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	669.8522	544.3745	476.3744	296.7715	159.7521	0.0000	0.0000	0.0000	0.0000	252.2390	449.5854	652.3324 (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)	669.8522	544.3745	476.3744	296.7715	159.7521	0.0000	0.0000	0.0000	0.0000	252.2390	449.5854	652.3324 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	16.0603	12.8842	11.6008	8.4992	6.5651	5.3637	5.9889	7.7846	10.1114	13.2667	14.9847	16.5067 (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													3501.2815 (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													1650.2951 (219)		

Full SAP Calculation Printout



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)	129.6162 (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	5322.1928 (238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3501.2815	28.4300	995.4143 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1650.2951	28.4300	469.1789 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	129.6162	28.4300	36.8499 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1513.0994 (255)

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	3501.2815	0.1546	541.2188 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1650.2951	0.1416	233.6456 (264)
Space and water heating			774.8644 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	129.6162	0.1443	18.7076 (268)
Total CO2, kg/year			799.2593 (272)

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	3501.2815	1.5723	5505.0213 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1650.2951	1.5235	2514.2873 (278)
Space and water heating			8019.3086 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	129.6162	1.5338	198.8096 (282)
Total Primary energy kWh/year			8280.1430 (286)

SAP 10 EPC IMPROVEMENTS

Notional

Current energy efficiency rating:	E 41
Current environmental impact rating:	B 88

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	E 41
Potential environmental impact rating:	B 88

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £1513	Potential £1513	Saving £0
Electricity			
Space heating	£1007	£1007	£0
Water heating	£469	£469	£0
Lighting	£37	£37	£0
Total cost of fuels	£1513	£1513	£0
Total cost of uses	£1513	£1513	£0
Delivered energy	105 kWh/m²	105 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.8 tonnes	0.8 tonnes	0.0 tonnes
CO2 emissions per m²	16 kg/m²	16 kg/m²	0 kg/m²
Primary energy	163 kWh/m²	163 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.8600 (1b)	2.6000 (2b)	132.2360 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8600		132.2360 (5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 90 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross 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													
Upgraded Windows			10.7900	1.1450	12.3550			(27)					
Solid Door			1.7600	1.2000	2.1120			(26)					
Heatloss Floor			50.8600	0.2500	12.7150	75.0000	3814.5000	(28a)					
Existing Wall	54.6300	10.7900	43.8400	0.3000	13.1520	9.0000	394.5600	(29a)					
Wall to Corridor	15.7300	1.7600	13.9700	0.3000	4.1910	9.0000	125.7300	(29a)					
Total net area of external elements Aum(A, m2)			121.2200					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	44.5250			(33)					
Main dwelling													
Party Wall			12.5500	0.0000	0.0000	70.0000	878.5000	(32)					
Party Ceiling			50.8600			30.0000	1525.8000	(32b)					
Internal Wall			40.1700			9.0000	361.5300	(32c)					
Internal Wall 2			17.4500			100.0000	1745.0001	(32c)					
Heat capacity Cm = Sum(A x k)					(28)... (30) + (32) + (32a)... (32e) =		8845.6201	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							173.9210	(35)					
Thermal bridges (Default value 0.200 * total exposed area)							24.2440	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss					(33) + (36) + (36a) =		68.7690	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 41.7705	Feb 40.9957	Mar 40.2363	Apr 36.6695	May 36.0021	Jun 32.8955	Jul 32.8955	Aug 32.3202	Sep 34.0921	Oct 36.0021	Nov 37.3521	Dec 38.7636	(38)
Heat transfer coeff	110.5394	109.7647	109.0053	105.4384	104.7711	101.6644	101.6644	101.0891	102.8611	104.7711	106.1211	107.5325	(39)
Average = Sum(39)m / 12 =												105.4352	
HLP	Jan 2.1734	Feb 2.1582	Mar 2.1432	Apr 2.0731	May 2.0600	Jun 1.9989	Jul 1.9989	Aug 1.9876	Sep 2.0224	Oct 2.0600	Nov 2.0865	Dec 2.1143	(40)
HLP (average)												2.0730	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7154 (42)
Hot water usage for mixer showers	52.9818	52.1856	51.0254	48.8055	47.1672	45.3403	44.3018	45.4533	46.7155	48.6771	50.9447	52.7788 (42a)
Hot water usage for baths	22.9071	22.5669	22.0879	21.2045	20.5431	19.8097	19.4135	19.8893	20.4072	21.1920	22.0935	22.8297 (42b)

Full SAP Calculation Printout



Hot water usage for other uses	32.1978	31.0270	29.8562	28.6854	27.5145	26.3437	26.3437	27.5145	28.6854	29.8562	31.0270	32.1978 (42c)
Average daily hot water use (litres/day)												99.3568 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content	108.0868	105.7796	102.9694	98.6953	95.2248	91.4937	90.0591	92.8571	95.8081	99.7253	104.0652	107.8064 (44)
Energy content (annual)	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum (45)m =		1650.2951
Water storage loss (or HIU loss):	25.6775	22.5943	23.7390	20.2663	19.2286	16.8753	16.3378	17.2465	17.7211	20.2989	22.2390	25.3198 (46)
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	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)
Total heat required for water heating calculated for each month												
WWHRS	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	56.9184	50.0840	52.6215	44.9237	42.6235	37.4070	36.2154	38.2297	39.2819	44.9960	49.2965	56.1256 (65)
Total per year (kWh/year) = Sum (64)m =												1650.2951 (64)
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												
(66)m	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.3485	16.2970	13.2536	10.0338	7.5004	6.3322	6.8421	8.8936	11.9370	15.1568	17.6902	18.8585 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.0855	225.4005	219.5669	207.1480	191.4713	176.7374	166.8943	164.5794	170.4129	182.8319	198.5085	213.2424 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081 (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)	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177 (71)
Water heating gains (Table 5)	76.5032	74.5298	70.7278	62.3941	57.2896	51.9541	48.6767	51.3840	54.5582	60.4785	68.4673	75.4376 (72)
Total internal gains	402.2542	400.5442	387.8653	363.8928	340.5783	316.3406	303.7301	306.1739	318.2251	342.7841	368.9830	391.8554 (73)
6. Solar gains												
[Jan]												
Area												
Solar flux												
Specific data												
Specific data												
Access factor												
Gains												
Southeast	8.2300				36.7938		0.6300		0.7000		0.7700	92.5437 (77)
Northwest	2.5600				11.2829		0.6300		0.7000		0.7700	8.8274 (81)
Solar gains	101.3711	175.6046	248.0581	320.4102	370.8015	373.3612	357.7789	319.3835	272.9884	196.1804	121.9532	86.4070 (83)
Total gains	503.6253	576.1488	635.9234	684.3031	711.3798	689.7018	661.5089	625.5574	591.2135	538.9645	490.9362	478.2624 (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	22.2284	22.3853	22.5413	23.3038	23.4522	24.1689	24.1689	24.3064	23.8877	23.4522	23.1539	22.8500
alpha	2.4819	2.4924	2.5028	2.5536	2.5635	2.6113	2.6113	2.6204	2.5925	2.5635	2.5436	2.5233
util living area	0.9707	0.9579	0.9362	0.8939	0.8212	0.7017	0.5720	0.6101	0.7839	0.9095	0.9585	0.9741 (86)
MIT	17.9758	18.2838	18.7916	19.4910	20.1111	20.6156	20.8411	20.8074	20.4348	19.6344	18.7235	17.9780 (87)
Th 2	19.9133	19.9209	19.9284	19.9634	19.9700	20.0005	20.0005	20.0062	19.9888	19.9700	19.9567	19.9429 (88)
util rest of house	0.9662	0.9514	0.9258	0.8754	0.7861	0.6366	0.4719	0.5139	0.7303	0.8901	0.9511	0.9701 (89)
MIT 2	17.1517	17.4611	17.9671	18.6740	19.2701	19.7469	19.9232	19.9067	19.5896	18.8264	17.9229	17.1728 (90)
Living area fraction												
MIT	17.5945	17.9032	18.4102	19.1130	19.7220	20.2137	20.4164	20.3907	20.0438	19.2606	18.3531	17.6055 (92)
Temperature adjustment												0.0000
adjusted MIT	17.5945	17.9032	18.4102	19.1130	19.7220	20.2137	20.4164	20.3907	20.0438	19.2606	18.3531	17.6055 (93)
8. Space heating requirement												
Utilisation	0.9528	0.9351	0.9069	0.8569	0.7764	0.6517	0.5161	0.5537	0.7336	0.8734	0.9359	0.9578 (94)
Useful gains	479.8490	538.7582	576.6893	586.3783	552.3318	449.4883	341.3760	346.3823	433.7354	470.7358	459.4488	458.1013 (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												

Full SAP Calculation Printout



	1469.5705	1427.2923	1298.2704	1076.8433	840.4781	570.7170	387.9957	403.4166	611.3808	907.3763	1194.1898	1441.5256 (97)
Space heating kWh	736.3528	597.0949	536.8563	353.1348	214.3809	0.0000	0.0000	0.0000	0.0000	324.8605	529.0135	731.6677 (98a)
Space heating requirement - total per year (kWh/year)												4023.3614
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	736.3528	597.0949	536.8563	353.1348	214.3809	0.0000	0.0000	0.0000	0.0000	324.8605	529.0135	731.6677 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4023.3614
Space heating per m2										(98c) / (4) =		79.1066 (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	736.3528	597.0949	536.8563	353.1348	214.3809	0.0000	0.0000	0.0000	0.0000	324.8605	529.0135	731.6677 (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)	736.3528	597.0949	536.8563	353.1348	214.3809	0.0000	0.0000	0.0000	0.0000	324.8605	529.0135	731.6677 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	16.0603	12.8842	11.6008	8.4992	6.5651	5.3637	5.9889	7.7846	10.1114	13.2667	14.9847	16.5067 (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												4023.3614 (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												1650.2951 (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)												129.6162 (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												5844.2726 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4023.3614	16.4900	663.4523 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1650.2951	16.4900	272.1337 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	129.6162	16.4900	21.3737 (250)
Additional standing charges			0.0000 (251)
Total energy cost			963.7206 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	3.6192 (257)
SAP value		41.4867

Full SAP Calculation Printout



SAP rating (Section 12)
SAP band

41 (258)
E

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	4023.3614	0.1541	619.8202 (261)	
Total CO ₂ associated with community systems			0.0000 (373)	
Water heating (other fuel)	1650.2951	0.1416	233.6456 (264)	
Space and water heating			853.4658 (265)	
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)	
Energy for lighting	129.6162	0.1443	18.7076 (268)	
Total CO ₂ , kg/year			877.8606 (272)	
CO ₂ emissions per m ²			17.2600 (273)	
EI value			87.7286	
EI rating			88 (274)	
EI band			B	

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling	50.8600 (1b)	x 2.6000 (2b)	= 132.2360 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8600		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 132.2360 (5)	

2. Ventilation rate

		m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)	
Number of blocked chimneys	0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)	
Number of passive vents	0 * 10 =	0.0000 (7b)	
Number of flueless gas fires	0 * 40 =	0.0000 (7c)	
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000 (17)	
Infiltration rate		0.7500 (18)	
Number of sides sheltered		0 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)	
Wind speed	Jan 4.8000 Feb 4.5000 Mar 4.4000 Apr 3.9000 May 3.9000 Jun 3.6000 Jul 3.7000 Aug 3.5000 Sep 3.7000 Oct 4.0000 Nov 4.1000 Dec 4.4000 (22)		
Wind factor	1.2000 1.1250 1.1000 0.9750 0.9750 0.9000 0.9250 0.8750 0.9250 1.0000 1.0250 1.1000 (22a)		
Adj infilt rate	0.9000 0.8438 0.8250 0.7312 0.7312 0.6750 0.6938 0.6562 0.6938 0.7500 0.7687 0.8250 (22b)		
Effective ac	0.9050 0.8560 0.8403 0.7674 0.7674 0.7278 0.7406 0.7153 0.7406 0.7812 0.7955 0.8403 (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								
Upgraded Windows			10.7900	1.1450	12.3550			(27)
Solid Door			1.7600	1.2000	2.1120			(26)
Heatloss Floor			50.8600	0.2500	12.7150	75.0000	3814.5000 (28a)	
Existing Wall	54.6300	10.7900	43.8400	0.3000	13.1520	9.0000	394.5600 (29a)	
Wall to Corridor	15.7300	1.7600	13.9700	0.3000	4.1910	9.0000	125.7300 (29a)	
Total net area of external elements Aum(A, m ²)			121.2200					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	44.5250				(33)
Main dwelling								
Party Wall			12.5500	0.0000	0.0000	70.0000	878.5000 (32)	
Party Ceiling			50.8600			30.0000	1525.8000 (32b)	
Internal Wall			40.1700			9.0000	361.5300 (32c)	
Internal Wall 2			17.4500			100.0000	1745.0001 (32c)	
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8845.6201 (34)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							173.9210 (35)	
Thermal bridges (Default value 0.200 * total exposed area)							24.2440 (36)	
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		68.7690 (37)	
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)								
(38)m	Jan 39.4923 Feb 37.3521 Mar 36.6695 Apr 33.4861 May 33.4861 Jun 31.7602 Jul 32.3202 Aug 31.2156 Sep 32.3202 Oct 34.0921 Nov 34.7134 Dec 36.6695 (38)							

Full SAP Calculation Printout



Heat transfer coeff	108.2612	106.1211	105.4384	102.2551	102.2551	100.5292	101.0891	99.9845	101.0891	102.8611	103.4824	105.4384 (39)
Average = Sum(39)m / 12 =												103.2337
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.1286	2.0865	2.0731	2.0105	2.0105	1.9766	1.9876	1.9659	1.9876	2.0224	2.0347	2.0731 (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												1.7154 (42)
Hot water usage for mixer showers												
52.9818	52.1856	51.0254	48.8055	47.1672	45.3403	44.3018	45.4533	46.7155	48.6771	50.9447	52.7788 (42a)	
Hot water usage for baths												
22.9071	22.5669	22.0879	21.2045	20.5431	19.8097	19.4135	19.8893	20.4072	21.1920	22.0935	22.8297 (42b)	
Hot water usage for other uses												
32.1978	31.0270	29.8562	28.6854	27.5145	26.3437	26.3437	27.5145	28.6854	29.8562	31.0270	32.1978 (42c)	
Average daily hot water use (litres/day)												99.3568 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	108.0868	105.7796	102.9694	98.6953	95.2248	91.4937	90.0591	92.8571	95.8081	99.7253	104.0652	107.8064 (44)
Energy conte	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												1650.2951
25.6775	22.5943	23.7390	20.2663	19.2286	16.8753	16.3378	17.2465	17.7211	20.2989	22.2390	25.3198 (46)	
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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	0.0000 (56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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												
171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (64)
												Total per year (kWh/year) = Sum(64)m = 1650.2951 (64)
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
Heat gains from water heating, kWh/month												
56.9184	50.0840	52.6215	44.9237	42.6235	37.4070	36.2154	38.2297	39.2819	44.9960	49.2965	56.1256 (65)	

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
18.3485	16.2970	13.2536	10.0338	7.5004	6.3322	6.8421	8.8936	11.9370	15.1568	17.6902	18.8585 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
223.0855	225.4005	219.5669	207.1480	191.4713	176.7374	166.8943	164.5794	170.4129	182.8319	198.5085	213.2424 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081 (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)												
-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177 (71)
Water heating gains (Table 5)												
76.5032	74.5298	70.7278	62.3941	57.2896	51.9541	48.6767	51.3840	54.5582	60.4785	68.4673	75.4376 (72)	
Total internal gains												
402.2542	400.5442	387.8653	363.8928	340.5783	316.3406	303.7301	306.1739	318.2251	342.7841	368.9830	391.8554 (73)	

6. Solar gains

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Southeast	8.2300											107.2166 (77)
Northwest	2.5600											10.7671 (81)
Solar gains	117.9837	181.9426	257.0279	352.0526	393.7461	424.6598	401.8608	360.7002	303.5192	217.5992	143.3584	97.2447 (83)
Total gains	520.2379	582.4868	644.8932	715.9454	734.3244	741.0004	705.5909	666.8742	621.7442	560.3833	512.3414	489.1002 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	22.6962	23.1539	23.3038	24.0293	24.0293	24.4418	24.3064	24.5750	24.3064	23.8877	23.7443	23.3038
alpha	2.5131	2.5436	2.5536	2.6020	2.6020	2.6295	2.6204	2.6383	2.6204	2.5925	2.5830	2.5536
util living area												
	0.9654	0.9534	0.9272	0.8708	0.7763	0.6193	0.4673	0.4744	0.7148	0.8787	0.9463	0.9687 (86)
MIT	18.2354	18.5067	19.0285	19.7290	20.3355	20.7590	20.9210	20.9221	20.6253	19.9346	19.0537	18.2911 (87)

Full SAP Calculation Printout



Th 2	19.9357	19.9567	19.9634	19.9947	19.9947	20.0117	20.0062	20.0171	20.0062	19.9888	19.9827	19.9634 (88)
util rest of house	0.9600	0.9462	0.9154	0.8487	0.7329	0.5422	0.3552	0.3589	0.6459	0.8517	0.9365	0.9637 (89)
MIT 2	17.4237	17.7048	18.2229	18.9237	19.4932	19.8685	19.9765	19.9884	19.7647	19.1274	18.2658	17.4974 (90)
Living area fraction									FLA = Living area /	(4) =		0.5374 (91)
MIT	17.8599	18.1357	18.6558	19.3564	19.9458	20.3470	20.4840	20.4901	20.2272	19.5611	18.6892	17.9239 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8599	18.1357	18.6558	19.3564	19.9458	20.3470	20.4840	20.4901	20.2272	19.5611	18.6892	17.9239 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9455	0.9295	0.8965	0.8320	0.7305	0.5700	0.4112	0.4168	0.6627	0.8380	0.9200	0.9503 (94)
Useful gains	491.8890	541.4468	578.1392	595.6888	536.4266	422.3780	290.1727	277.9704	412.0294	469.5752	471.3682	464.7985 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	1392.2281	1351.5279	1218.4274	1007.8714	751.1472	497.3173	311.7603	298.9686	528.4083	808.6060	1095.7924	1341.5893 (97)
Space heating kWh	669.8522	544.3745	476.3744	296.7715	159.7521	0.0000	0.0000	0.0000	0.0000	252.2390	449.5854	652.3324 (98a)
Space heating requirement - total per year (kWh/year)												3501.2815
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	669.8522	544.3745	476.3744	296.7715	159.7521	0.0000	0.0000	0.0000	0.0000	252.2390	449.5854	652.3324 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3501.2815
Space heating per m2										(98c) / (4) =		68.8416 (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	669.8522	544.3745	476.3744	296.7715	159.7521	0.0000	0.0000	0.0000	0.0000	252.2390	449.5854	652.3324 (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)	669.8522	544.3745	476.3744	296.7715	159.7521	0.0000	0.0000	0.0000	0.0000	252.2390	449.5854	652.3324 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (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	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	16.0603	12.8842	11.6008	8.4992	6.5651	5.3637	5.9889	7.7846	10.1114	13.2667	14.9847	16.5067 (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												3501.2815 (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												1650.2951 (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)												129.6162 (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												5322.1928 (238)

10a. Fuel costs - using BEDF prices (589)

Full SAP Calculation Printout



	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3501.2815	28.4300	995.4143 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1650.2951	28.4300	469.1789 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	129.6162	28.4300	36.8499 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1513.0994 (255)

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	3501.2815	0.1546	541.2188 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1650.2951	0.1416	233.6456 (264)
Space and water heating			774.8644 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	129.6162	0.1443	18.7076 (268)
Total CO2, kg/year			799.2593 (272)

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	3501.2815	1.5723	5505.0213 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1650.2951	1.5235	2514.2873 (278)
Space and water heating			8019.3086 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	129.6162	1.5338	198.8096 (282)
Total Primary energy kWh/year			8280.1430 (286)

Full SAP Calculation Printout



Plot Reference	Flat 2				Issued on Date	29/01/2026	
Assessment Reference	Notional			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	41 E		DER	20.25		TER	
Environmental	88 B		% DER < TER				N/A
CO ₂ Emissions (t/year)	0.72		DFEE	103.77		TFEE	
Compliance Check	N/A		% DFEE < TFEE				
% DPER < TPER			DPER	209.61		TPER	
Assessor Details	Miss Charlotte Russell				Assessor ID	DK97-0001	
Client	tbc, tbc						

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	40.2800 (1b)	x 2.6000 (2b)	= 104.7280 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 104.7280 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813 (22b)
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			7.9500	1.1450	9.1031		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			40.2800	0.2500	10.0700	75.0000	3021.0000 (28a)
Existing Wall	31.1700		23.2200	0.3000	6.9660	9.0000	208.9800 (29a)
Wall to Corridor	20.1500	1.7600	18.3900	0.2600	4.7814	150.0000	2758.4999 (29a)
Proposed Wall	18.5600		18.5600	0.2600	4.8256	150.0000	2783.9999 (29a)
External Roof	9.2100		9.2100	0.1600	1.4736	9.0000	82.8900 (30)
Total net area of external elements Aum(A, m ²)			119.3700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		39.3317		(33)
Main dwelling							
Party Wall			8.3300	0.0000	0.0000	70.0000	583.1000 (32)
Party Ceiling			31.0700			30.0000	932.1000 (32b)
Internal Wall			20.9900			9.0000	188.9100 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10559.4799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							262.1519 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.8740 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	63.2057 (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	33.0813	32.4677	31.8663	29.0414	28.5129	26.0525	26.0525	25.5969	27.0002	28.5129	29.5821	30.6999 (38)
Heat transfer coeff	96.2870	95.6734	95.0719	92.2471	91.7185	89.2581	89.2581	88.8025	90.2058	91.7185	92.7877	93.9055 (39)
Average = Sum(39)m / 12 =												92.2445

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.3904	2.3752	2.3603	2.2901	2.2770	2.2159	2.2159	2.2046	2.2395	2.2770	2.3036	2.3313 (40)
HLP (average)												2.2901
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

												1.4138 (42)
Assumed occupancy												
Hot water usage for mixer showers												
	47.9241	47.2039	46.1545	44.1465	42.6646	41.0121	40.0728	41.1143	42.2560	44.0303	46.0815	47.7405 (42a)
Hot water usage for baths												
	20.7322	20.4243	19.9907	19.1912	18.5926	17.9288	17.5703	18.0008	18.4696	19.1799	19.9958	20.6621 (42b)
Hot water usage for other uses												
	29.1087	28.0502	26.9917	25.9332	24.8747	23.8162	23.8162	24.8747	25.9332	26.9917	28.0502	29.1087 (42c)
Average daily hot water use (litres/day)												
												89.8689 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	97.7650	95.6784	93.1368	89.2709	86.1319	82.7571	81.4592	83.9898	86.6588	92.2020	94.1275	97.5113 (44)
Energy content (annual)												
Energy conte	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (45)
Distribution loss (46)m = 0.15 x (45)m												
	23.2254	20.4367	21.4722	18.3311	17.3925	15.2639	14.7777	15.5995	16.0289	18.3605	20.1153	22.9019 (46)
Water storage loss (or HIU loss):												
Store volume												
150.0000 (47)												
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												
0.0000 (51)												
Volume factor from Table 2a												
0.9283 (52)												
Temperature factor from Table 2b												
0.6000 (53)												
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												
	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (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												
	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (64)
Total per year (kWh/year) = Sum(64)m =												
												1492.7037 (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												
	51.4829	45.3014	47.5967	40.6340	38.5534	33.8350	32.7572	34.5790	35.5306	40.6991	44.5889	50.7658 (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
	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.8049	14.0378	11.4163	8.6429	6.4606	5.4543	5.8936	7.6607	10.2822	13.0557	15.2379	16.2442 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.4452	184.3384	179.5676	169.4110	156.5902	144.5405	136.4905	134.5973	139.3681	149.5247	162.3455	174.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966 (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)	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519 (71)
Water heating gains (Table 5)	69.1975	67.4128	63.9740	56.4361	51.8191	46.9931	44.0285	46.4771	49.3481	54.7030	61.9290	68.2336 (72)
Total internal gains	343.6201	341.9615	331.1304	310.6625	291.0425	270.1605	259.5852	261.9077	272.1710	293.4559	315.6849	335.0455 (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	
Southeast	7.9500				36.7938		0.6300		0.7000		0.7700		89.3952 (77)	
Solar gains	89.3952	152.2730	208.3466	258.1515	289.1512	287.0602	276.7567	253.6295	225.5953	168.2941	107.0748	76.5036 (83)		
Total gains	433.0153	494.2345	539.4770	568.8140	580.1937	557.2207	536.3419	515.5373	497.7663	461.7500	422.7597	411.5492 (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	30.4630	30.6584	30.8523	31.7971	31.9803	32.8619	32.8619	33.0305	32.5166	31.9803	31.6118	31.2355
alpha	3.0309	3.0439	3.0568	3.1198	3.1320	3.1908	3.1908	3.2020	3.1678	3.1320	3.1075	3.0824
util living area												
	0.9862	0.9784	0.9646	0.9362	0.8799	0.7708	0.6328	0.6672	0.8372	0.9440	0.9788	0.9882 (86)

Full SAP Calculation Printout



MIT	18.5143	18.7708	19.1858	19.7534	20.2672	20.6939	20.8848	20.8605	20.5574	19.8916	19.1329	18.5142 (87)
Th 2	19.8048	19.8124	19.8199	19.8549	19.8615	19.8920	19.8920	19.8977	19.8803	19.8615	19.8482	19.8343 (88)
util rest of house												
	0.9832	0.9737	0.9564	0.9197	0.8445	0.6952	0.5084	0.5488	0.7774	0.9264	0.9733	0.9856 (89)
MIT 2	17.5586	17.8179	18.2335	18.8139	19.3081	19.7085	19.8463	19.8379	19.5910	18.9592	18.2040	17.5787 (90)
Living area fraction									fLA = Living area / (4) =			0.5300 (91)
MIT	18.0651	18.3230	18.7383	19.3119	19.8165	20.2308	20.3967	20.3799	20.1032	19.4534	18.6963	18.0746 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0651	18.3230	18.7383	19.3119	19.8165	20.2308	20.3967	20.3799	20.1032	19.4534	18.6963	18.0746 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9771	0.9657	0.9465	0.9101	0.8428	0.7207	0.5689	0.6046	0.7911	0.9185	0.9660	0.9802 (94)
Useful gains	423.0844	477.2589	510.5901	517.6562	488.9961	401.6126	305.1269	311.7093	393.7599	424.1031	408.3694	403.4055 (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												
	1325.4027	1284.2208	1163.5147	960.4672	744.4302	502.5964	338.8902	353.4227	541.5259	812.0233	1075.9967	1302.8979 (97)
Space heating kWh												
	671.3248	542.2784	485.7759	318.8239	190.0430	0.0000	0.0000	0.0000	0.0000	288.6126	480.6917	669.2223 (98a)
Space heating requirement - total per year (kWh/year)												3646.7726
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												
	671.3248	542.2784	485.7759	318.8239	190.0430	0.0000	0.0000	0.0000	0.0000	288.6126	480.6917	669.2223 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3646.7726
Space heating per m2										(98c) / (4) =		90.5356 (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												
	671.3248	542.2784	485.7759	318.8239	190.0430	0.0000	0.0000	0.0000	0.0000	288.6126	480.6917	669.2223 (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)												
	671.3248	542.2784	485.7759	318.8239	190.0430	0.0000	0.0000	0.0000	0.0000	288.6126	480.6917	669.2223 (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												
	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (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												
	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (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												
	13.8339	11.0981	9.9926	7.3210	5.6550	4.6202	5.1586	6.7054	8.7097	11.4275	12.9074	14.2184 (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												3646.7726 (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												1492.7037 (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)												111.6478 (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												5292.1240 (238)

Full SAP Calculation Printout



10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3646.7726	16.4900	601.3528 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1492.7037	16.4900	246.1468 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	111.6478	16.4900	18.4107 (250)
Additional standing charges			0.0000 (251)
Total energy cost			872.6713 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	3.6839 (257)
SAP value		40.5601
SAP rating (Section 12)		41 (258)
SAP band		E

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	3646.7726	0.1541	562.1107 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1492.7037	0.1416	211.3341 (264)
Space and water heating			773.4448 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	111.6478	0.1443	16.1142 (268)
Total CO2, kg/year			795.2462 (272)
CO2 emissions per m2			19.7400 (273)
EI value			87.5043
EI rating			88 (274)
EI band			B

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	40.2800 (1b)	x 2.6000 (2b)	= 104.7280 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	104.7280 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							

Full SAP Calculation Printout



Upgraded Windows		7.9500	1.1450	9.1031				(27)
Solid Door		1.7600	1.2000	2.1120				(26)
Heatloss Floor			40.2800	0.2500	10.0700	75.0000	3021.0000	(28a)
Existing Wall	31.1700	7.9500	23.2200	0.3000	6.9660	9.0000	208.9800	(29a)
Wall to Corridor	20.1500	1.7600	18.3900	0.2600	4.7814	150.0000	2758.4999	(29a)
Proposed Wall	18.5600		18.5600	0.2600	4.8256	150.0000	2783.9999	(29a)
External Roof	9.2100		9.2100	0.1600	1.4736	9.0000	82.8900	(30)
Total net area of external elements Aum(A, m2)			119.3700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		39.3317			(33)
Main dwelling								
Party Wall			8.3300	0.0000	0.0000	70.0000	583.1000	(32)
Party Ceiling			31.0700			30.0000	932.1000	(32b)
Internal Wall			20.9900			9.0000	188.9100	(32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
Thermal bridges (Default value 0.200 * total exposed area)
Point Thermal bridges
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) = 10559.4799 (34)
262.1519 (35)
23.8740 (36)
(36a) = 0.0000
(33) + (36) + (36a) = 63.2057 (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	31.2770	29.5821	29.0414	26.5203	26.5203	25.1534	25.5969	24.7220	25.5969	27.0002	27.4923	29.0414	(38)
Average = Sum(39)m / 12 =	94.4827	92.7877	92.2471	89.7259	89.7259	88.3590	88.8025	87.9277	88.8025	90.2058	90.6979	92.2471	(39)
												90.5010	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.3456	2.3036	2.2901	2.2276	2.2276	2.1936	2.2046	2.1829	2.2046	2.2395	2.2517	2.2901	(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													1.4138	(42)
Hot water usage for mixer showers														
Hot water usage for baths	47.9241	47.2039	46.1545	44.1465	42.6646	41.0121	40.0728	41.1143	42.2560	44.0303	46.0815	47.7405	(42a)	
Hot water usage for other uses	20.7322	20.4243	19.9907	19.1912	18.5926	17.9288	17.5703	18.0008	18.4696	19.1799	19.9958	20.6621	(42b)	
Average daily hot water use (litres/day)	29.1087	28.0502	26.9917	25.9332	24.8747	23.8162	23.8162	24.8747	25.9332	26.9917	28.0502	29.1087	(42c)	
												89.8689	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	97.7650	95.6784	93.1368	89.2709	86.1319	82.7571	81.4592	83.9898	86.6588	90.2020	94.1275	97.5113	(44)	
Energy content (annual)	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1492.7037		
Water storage loss (or HIU loss):	23.2254	20.4367	21.4722	18.3311	17.3925	15.2639	14.7777	15.5995	16.0289	18.3605	20.1153	22.9019	(46)	
Store volume												150.0000	(47)	
b) If manufacturer declared loss factor is not known :														
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000	(51)	
Volume factor from Table 2a												0.9283	(52)	
Temperature factor from Table 2b												0.6000	(53)	
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														
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Combi loss	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)	
Total heat required for water heating calculated for each month														
WWHRS	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792	(62)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792	(64)	
								Total per year (kWh/year) = Sum(64)m =				1492.7037	(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														
	51.4829	45.3014	47.5967	40.6340	38.5534	33.8350	32.7572	34.5790	35.5306	40.6991	44.5889	50.7658	(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	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	15.8049	14.0378	11.4163	8.6429	6.4606	5.4543	5.8936	7.6607	10.2822	13.0557	15.2379	16.2442	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	182.4452	184.3384	179.5676	169.4110	156.5902	144.5405	136.4905	134.5973	139.3681	149.5247	162.3455	174.3952	(68)	
Pumps, fans	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	(69)	
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)	
Water heating gains (Table 5)	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	(71)	
Total internal gains	69.1975	67.4128	63.9740	56.4361	51.8191	46.9931	44.0285	46.4771	49.3481	54.7030	61.9290	68.2336	(72)	
	343.6201	341.9615	331.1304	310.6625	291.0425	270.1605	259.5852	261.9077	272.1710	293.4559	315.6849	335.0455	(73)	

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
-------	------------	------------------------	--------------------	---------------------	------------------	------------

Full SAP Calculation Printout



					W/m2	or Table 6b		or Table 6c		Table 6d			
-----					-----	-----		-----		-----			
Southeast					7.9500	42.6275	0.6300		0.7000		0.7700		103.5689 (77)
-----					-----								
Solar gains	103.5689	156.8048	214.1318	281.1242	304.5788	324.1458	308.4937	283.9556	248.6554	185.3774	125.2380	85.7407 (83)	
Total gains	447.1890	498.7663	545.2622	591.7867	595.6213	594.3063	568.0788	545.8633	520.8264	478.8333	440.9229	420.7862 (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	31.0447	31.6118	31.7971	32.6905	32.6905	33.1963	33.0305	33.3591	33.0305	32.5166	32.3402	31.7971	
alpha	3.0696	3.1075	3.1198	3.1794	3.1794	3.2131	3.2020	3.2239	3.2020	3.1678	3.1560	3.1198	
util living area	0.9831	0.9758	0.9589	0.9193	0.8415	0.6887	0.5199	0.5212	0.7706	0.9196	0.9709	0.9852	(86)
MIT	18.7288	18.9520	19.3782	19.9485	20.4558	20.8148	20.9473	20.9496	20.7157	20.1424	19.4065	18.7725	(87)
Th 2	19.8272	19.8482	19.8549	19.8862	19.8862	19.9032	19.8977	19.9085	19.8977	19.8803	19.8742	19.8549	(88)
util rest of house	0.9794	0.9704	0.9492	0.8987	0.7949	0.5948	0.3785	0.3765	0.6895	0.8932	0.9631	0.9818	(89)
MIT 2	17.7871	18.0223	18.4474	19.0238	19.4976	19.8070	19.8830	19.8950	19.7337	19.2128	18.4926	17.8500	(90)
Living area fraction	FLA = Living area / (4) =												
MIT	18.2862	18.5151	18.9407	19.5140	20.0055	20.3412	20.4471	20.4540	20.2542	19.7055	18.9770	18.3390	(92)
Temperature adjustment	0.0000												
adjusted MIT	18.2862	18.5151	18.9407	19.5140	20.0055	20.3412	20.4471	20.4540	20.2542	19.7055	18.9770	18.3390	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9725	0.9621	0.9392	0.8904	0.8006	0.6351	0.4520	0.4520	0.7186	0.8881	0.9549	0.9756	(94)
Useful gains	434.8929	479.8684	512.1111	526.9054	476.8283	377.4527	256.7989	246.7539	374.2500	425.2683	421.0210	410.5285	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	1255.3194	1216.9206	1092.2719	898.5108	664.4624	436.5962	270.5937	259.7377	466.5841	722.1422	986.5203	1212.0333	(97)
Space heating kWh	610.3973	495.2991	431.6396	267.5559	139.5998	0.0000	0.0000	0.0000	0.0000	220.8742	407.1595	596.3196	(98a)
Space heating requirement - total per year (kWh/year)													3168.8449
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)													0.0000
Space heating kWh	610.3973	495.2991	431.6396	267.5559	139.5998	0.0000	0.0000	0.0000	0.0000	220.8742	407.1595	596.3196	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													3168.8449
Space heating per m2													(98c) / (4) = 78.6704 (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	610.3973	495.2991	431.6396	267.5559	139.5998	0.0000	0.0000	0.0000	0.0000	220.8742	407.1595	596.3196	(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)	610.3973	495.2991	431.6396	267.5559	139.5998	0.0000	0.0000	0.0000	0.0000	220.8742	407.1595	596.3196	(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	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792	(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	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792	(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	13.8339	11.0981	9.9926	7.3210	5.6550	4.6202	5.1586	6.7054	8.7097	11.4275	12.9074	14.2184	(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													3168.8449 (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													1492.7037 (219)

Full SAP Calculation Printout



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)	111.6478 (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	4814.1964 (238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3168.8449	28.4300	900.9026 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1492.7037	28.4300	424.3757 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	111.6478	28.4300	31.7415 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1368.6760 (255)

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	3168.8449	0.1547	490.1912 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1492.7037	0.1416	211.3341 (264)
Space and water heating			701.5253 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	111.6478	0.1443	16.1142 (268)
Total CO2, kg/year			723.3268 (272)

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	3168.8449	1.5727	4983.6701 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1492.7037	1.5235	2274.1906 (278)
Space and water heating			7257.8607 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	111.6478	1.5338	171.2492 (282)
Total Primary energy kWh/year			7491.1347 (286)

SAP 10 EPC IMPROVEMENTS

Notional

Current energy efficiency rating:	E 41
Current environmental impact rating:	B 88

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	E 41
Potential environmental impact rating:	B 88

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £1369	Potential £1369	Saving £0
Electricity			
Space heating	£913	£913	£0
Water heating	£424	£424	£0
Lighting	£32	£32	£0
Total cost of fuels	£1369	£1369	£0
Total cost of uses	£1369	£1369	£0
Delivered energy	120 kWh/m²	120 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.7 tonnes	0.7 tonnes	0.0 tonnes
CO2 emissions per m²	18 kg/m²	18 kg/m²	0 kg/m²
Primary energy	186 kWh/m²	186 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	40.2800 (1b)	x 2.6000 (2b)	= 104.7280 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.2800		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 104.7280 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 90 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross 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													
Upgraded Windows			7.9500	1.1450	9.1031			(27)					
Solid Door			1.7600	1.2000	2.1120			(26)					
Heatloss Floor			40.2800	0.2500	10.0700	75.0000	3021.0000	(28a)					
Existing Wall	31.1700	7.9500	23.2200	0.3000	6.9660	9.0000	208.9800	(29a)					
Wall to Corridor	20.1500	1.7600	18.3900	0.2600	4.7814	150.0000	2758.4999	(29a)					
Proposed Wall	18.5600		18.5600	0.2600	4.8256	150.0000	2783.9999	(29a)					
External Roof	9.2100		9.2100	0.1600	1.4736	9.0000	82.8900	(30)					
Total net area of external elements Aum(A, m2)			119.3700					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	39.3317			(33)					
Main dwelling													
Party Wall			8.3300	0.0000	0.0000	70.0000	583.1000	(32)					
Party Ceiling			31.0700			30.0000	932.1000	(32b)					
Internal Wall			20.9900			9.0000	188.9100	(32c)					
Heat capacity Cm = Sum(A x k)						(28)... (30) + (32) + (32a)... (32e) =	10559.4799	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							262.1519	(35)					
Thermal bridges (Default value 0.200 * total exposed area)							23.8740	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	63.2057	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 33.0813	Feb 32.4677	Mar 31.8663	Apr 29.0414	May 28.5129	Jun 26.0525	Jul 26.0525	Aug 25.5969	Sep 27.0002	Oct 28.5129	Nov 29.5821	Dec 30.6999	(38)
Heat transfer coeff	96.2870	95.6734	95.0719	92.2471	91.7185	89.2581	89.2581	88.8025	90.2058	91.7185	92.7877	93.9055	(39)
Average = Sum(39)m / 12 =												92.2445	
HLP	Jan 2.3904	Feb 2.3752	Mar 2.3603	Apr 2.2901	May 2.2770	Jun 2.2159	Jul 2.2159	Aug 2.2046	Sep 2.2395	Oct 2.2770	Nov 2.3036	Dec 2.3313	(40)
HLP (average)												2.2901	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4138 (42)
Hot water usage for mixer showers												47.7400 (42a)
Hot water usage for baths	47.9241	47.2039	46.1545	44.1465	42.6646	41.0121	40.0728	41.1143	42.2560	44.0303	46.0815	

Full SAP Calculation Printout



Hot water usage for other uses	20.7322	20.4243	19.9907	19.1912	18.5926	17.9288	17.5703	18.0008	18.4696	19.1799	19.9958	20.6621 (42b)
Average daily hot water use (litres/day)	29.1087	28.0502	26.9917	25.9332	24.8747	23.8162	23.8162	24.8747	25.9332	26.9917	28.0502	29.1087 (42c)
												89.8689 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	97.7650	95.6784	93.1368	89.2709	86.1319	82.7571	81.4592	83.9898	86.6588	90.2020	94.1275	97.5113 (44)
Distribution loss (46)m = 0.15 x (45)m	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (45)
	23.2254	20.4367	21.4722	18.3311	17.3925	15.2639	14.7777	15.5995	16.0289	18.3605	20.1153	22.9019 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (62)
WVHRS	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	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (64)
												1492.7037 (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	51.4829	45.3014	47.5967	40.6340	38.5534	33.8350	32.7572	34.5790	35.5306	40.6991	44.5889	50.7658 (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	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.8049	14.0378	11.4163	8.6429	6.4606	5.4543	5.8936	7.6607	10.2822	13.0557	15.2379	16.2442 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.4452	184.3384	179.5676	169.4110	156.5902	144.5405	136.4905	134.5973	139.3681	149.5247	162.3455	174.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519 (71)
Water heating gains (Table 5)	69.1975	67.4128	63.9740	56.4361	51.8191	46.9931	44.0285	46.4771	49.3481	54.7030	61.9290	68.2336 (72)
Total internal gains	343.6201	341.9615	331.1304	310.6625	291.0425	270.1605	259.5852	261.9077	272.1710	293.4559	315.6849	335.0455 (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
Southeast					7.9500	36.7938	0.6300	0.7000			0.7700	89.3952 (77)
Solar gains	89.3952	152.2730	208.3466	258.1515	289.1512	287.0602	276.7567	253.6295	225.5953	168.2941	107.0748	76.5036 (83)
Total gains	433.0153	494.2345	539.4770	568.8140	580.1937	557.2207	536.3419	515.5373	497.7663	461.7500	422.7597	411.5492 (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	30.4630	30.6584	30.8523	31.7971	31.9803	32.8619	32.8619	33.0305	32.5166	31.9803	31.6118	31.2355
alpha	3.0309	3.0439	3.0568	3.1198	3.1320	3.1908	3.1908	3.2020	3.1678	3.1320	3.1075	3.0824
util living area	0.9862	0.9784	0.9646	0.9362	0.8799	0.7708	0.6328	0.6672	0.8372	0.9440	0.9788	0.9882 (86)
MIT	18.5143	18.7708	19.1858	19.7534	20.2672	20.6939	20.8848	20.8605	20.5574	19.8916	19.1329	18.5142 (87)
Th 2	19.8048	19.8124	19.8199	19.8549	19.8615	19.8920	19.8920	19.8977	19.8803	19.8615	19.8482	19.8343 (88)
util rest of house	0.9832	0.9737	0.9564	0.9197	0.8445	0.6952	0.5084	0.5488	0.7774	0.9264	0.9733	0.9856 (89)
MIT 2	17.5586	17.8179	18.2335	18.8139	19.3081	19.7085	19.8463	19.8379	19.5910	18.9592	18.2040	17.5787 (90)
Living area fraction									fLA = Living area / (4) =			0.5300 (91)
MIT	18.0651	18.3230	18.7383	19.3119	19.8165	20.2308	20.3967	20.3799	20.1032	19.4534	18.6963	18.0746 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0651	18.3230	18.7383	19.3119	19.8165	20.2308	20.3967	20.3799	20.1032	19.4534	18.6963	18.0746 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9771	0.9657	0.9465	0.9101	0.8428	0.7207	0.5689	0.6046	0.7911	0.9185	0.9660	0.9802 (94)
Ext temp.	423.0844	477.2589	510.5901	517.6562	488.9961	401.6126	305.1269	311.7093	393.7599	424.1031	408.3694	403.4055 (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)

Full SAP Calculation Printout



Space heating kWh	1325.4027	1284.2208	1163.5147	960.4672	744.4302	502.5964	338.8902	353.4227	541.5259	812.0233	1075.9967	1302.8979 (97)
Space heating requirement - total per year (kWh/year)	671.3248	542.2784	485.7759	318.8239	190.0430	0.0000	0.0000	0.0000	0.0000	288.6126	480.6917	669.2223 (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)	671.3248	542.2784	485.7759	318.8239	190.0430	0.0000	0.0000	0.0000	0.0000	288.6126	480.6917	669.2223 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3646.7726
Space heating per m2											(98c) / (4) =	90.5356 (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	671.3248	542.2784	485.7759	318.8239	190.0430	0.0000	0.0000	0.0000	0.0000	288.6126	480.6917	669.2223 (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)	671.3248	542.2784	485.7759	318.8239	190.0430	0.0000	0.0000	0.0000	0.0000	288.6126	480.6917	669.2223 (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	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (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	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (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	13.8339	11.0981	9.9926	7.3210	5.6550	4.6202	5.1586	6.7054	8.7097	11.4275	12.9074	14.2184 (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												3646.7726 (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												1492.7037 (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)												111.6478 (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												5292.1240 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3646.7726	16.4900	601.3528 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1492.7037	16.4900	246.1468 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	111.6478	16.4900	18.4107 (250)
Additional standing charges			0.0000 (251)
Total energy cost			872.6713 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	3.6839 (257)
SAP value		40.5601

Full SAP Calculation Printout



SAP rating (Section 12)
SAP band

41 (258)
E

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	3646.7726	0.1541	562.1107 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1492.7037	0.1416	211.3341 (264)
Space and water heating			773.4448 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	111.6478	0.1443	16.1142 (268)
Total CO2, kg/year			795.2462 (272)
CO2 emissions per m2			19.7400 (273)
EI value			87.5043
EI rating			88 (274)
EI band			B

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	40.2800 (1b)	x 2.6000 (2b)	= 104.7280 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.2800		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 104.7280 (5)
Dwelling volume			

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)
Wind speed	Jan 4.8000 Feb 4.5000 Mar 4.4000 Apr 3.9000 May 3.9000 Jun 3.6000 Jul 3.7000 Aug 3.5000 Sep 3.7000 Oct 4.0000 Nov 4.1000 Dec 4.4000 (22)
Wind factor	1.2000 1.1250 1.1000 0.9750 0.9750 0.9000 0.9250 0.8750 0.9250 1.0000 1.0250 1.1000 (22a)
Adj infilt rate	0.9000 0.8438 0.8250 0.7312 0.7312 0.6750 0.6938 0.6562 0.6938 0.7500 0.7687 0.8250 (22b)
Effective ac	0.9050 0.8560 0.8403 0.7674 0.7674 0.7278 0.7406 0.7153 0.7406 0.7812 0.7955 0.8403 (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								
Upgraded Windows			7.9500	1.1450	9.1031			(27)
Solid Door			1.7600	1.2000	2.1120			(26)
Heatloss Floor			40.2800	0.2500	10.0700	75.0000	3021.0000	(28a)
Existing Wall	31.1700		23.2200	0.3000	6.9660	9.0000	208.9800	(29a)
Wall to Corridor	20.1500	1.7600	18.3900	0.2600	4.7814	150.0000	2758.4999	(29a)
Proposed Wall	18.5600		18.5600	0.2600	4.8256	150.0000	2783.9999	(29a)
External Roof	9.2100		9.2100	0.1600	1.4736	9.0000	82.8900	(30)
Total net area of external elements Aum(A, m2)			119.3700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.3317			(33)
Main dwelling								
Party Wall			8.3300	0.0000	0.0000	70.0000	583.1000	(32)
Party Ceiling			31.0700			30.0000	932.1000	(32b)
Internal Wall			20.9900			9.0000	188.9100	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10559.4799	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							262.1519	(35)
Thermal bridges (Default value 0.200 * total exposed area)							23.8740	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		63.2057	(37)

Full SAP Calculation Printout



(38)m	31.2770	29.5821	29.0414	26.5203	26.5203	25.1534	25.5969	24.7220	25.5969	27.0002	27.4923	29.0414 (38)
Heat transfer coeff	94.4827	92.7877	92.2471	89.7259	89.7259	88.3590	88.8025	87.9277	88.8025	90.2058	90.6979	92.2471 (39)
Average = Sum(39)m / 12 =												90.5010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.3456	2.3036	2.2901	2.2276	2.2276	2.1936	2.2046	2.1829	2.2046	2.2395	2.2517	2.2901 (40)
HLP (average)												2.2468
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4138 (42)
Hot water usage for mixer showers												
47.9241	47.2039	46.1545	44.1465	42.6646	41.0121	40.0728	41.1143	42.2560	44.0303	46.0815	47.7405 (42a)	
Hot water usage for baths												
20.7322	20.4243	19.9907	19.1912	18.5926	17.9288	17.5703	18.0008	18.4696	19.1799	19.9958	20.6621 (42b)	
Hot water usage for other uses												
29.1087	28.0502	26.9917	25.9332	24.8747	23.8162	23.8162	24.8747	25.9332	26.9917	28.0502	29.1087 (42c)	
Average daily hot water use (litres/day)												89.8689 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	97.7650	95.6784	93.1368	89.2709	86.1319	82.7571	81.4592	83.9898	86.6588	90.2020	94.1275	97.5113 (44)
Energy content (annual)	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (45)
										Total = Sum(45)m =		1492.7037
Distribution loss (46)m = 0.15 x (45)m												
23.2254	20.4367	21.4722	18.3311	17.3925	15.2639	14.7777	15.5995	16.0289	18.3605	20.1153	22.9019 (46)	
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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 (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												
154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (62)	
WVHRS	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												
154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (64)	
										Total per year (kWh/year) = Sum(64)m =		1492.7037 (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												
51.4829	45.3014	47.5967	40.6340	38.5534	33.8350	32.7572	34.5790	35.5306	40.6991	44.5889	50.7658 (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	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.8049	14.0378	11.4163	8.6429	6.4606	5.4543	5.8936	7.6607	10.2822	13.0557	15.2379	16.2442 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.4452	184.3384	179.5676	169.4110	156.5902	144.5405	136.4905	134.5973	139.3681	149.5247	162.3455	174.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966 (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)	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519 (71)
Water heating gains (Table 5)	69.1975	67.4128	63.9740	56.4361	51.8191	46.9931	44.0285	46.4771	49.3481	54.7030	61.9290	68.2336 (72)
Total internal gains	343.6201	341.9615	331.1304	310.6625	291.0425	270.1605	259.5852	261.9077	272.1710	293.4559	315.6849	335.0455 (73)

6. Solar gains

[Jan]											Access		Gains	
	Area				Solar flux		g		FF		factor		W	
	m2				Table 6a		Specific data		Specific data		Table 6d			
					W/m2		or Table 6b		or Table 6c					
Southeast	7.9500				42.6275		0.6300		0.7000		0.7700		103.5689 (77)	
Solar gains	103.5689	156.8048	214.1318	281.1242	304.5788	324.1458	308.4937	283.9556	248.6554	185.3774	125.2380	85.7407 (83)		
Total gains	447.1890	498.7663	545.2622	591.7867	595.6213	594.3063	568.0788	545.8633	520.8264	478.8333	440.9229	420.7862 (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	31.0447	31.6118	31.7971	32.6905	32.6905	33.1963	33.0305	33.3591	33.0305	32.5166	32.3402	31.7971
alpha	3.0696	3.1075	3.1198	3.1794	3.1794	3.2131	3.2020	3.2239	3.2020	3.1678	3.1560	3.1198
util living area												
	0.9831	0.9758	0.9589	0.9193	0.8415	0.6887	0.5199	0.5212	0.7706	0.9196	0.9709	0.9852 (86)
MIT	18.7288	18.9520	19.3782	19.9485	20.4558	20.8148	20.9473	20.9496	20.7157	20.1424	19.4065	18.7725 (87)

Full SAP Calculation Printout



Th 2	19.8272	19.8482	19.8549	19.8862	19.8862	19.9032	19.8977	19.9085	19.8977	19.8803	19.8742	19.8549 (88)
util rest of house	0.9794	0.9704	0.9492	0.8987	0.7949	0.5948	0.3785	0.3765	0.6895	0.8932	0.9631	0.9818 (89)
MIT 2	17.7871	18.0223	18.4474	19.0238	19.4976	19.8070	19.8830	19.8950	19.7337	19.2128	18.4926	17.8500 (90)
Living area fraction									FLA = Living area /	(4) =		0.5300 (91)
MIT	18.2862	18.5151	18.9407	19.5140	20.0055	20.3412	20.4471	20.4540	20.2542	19.7055	18.9770	18.3390 (92)
Temperature adjustment												0.0000
adjusted MIT	18.2862	18.5151	18.9407	19.5140	20.0055	20.3412	20.4471	20.4540	20.2542	19.7055	18.9770	18.3390 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9725	0.9621	0.9392	0.8904	0.8006	0.6351	0.4520	0.4520	0.7186	0.8881	0.9549	0.9756	(94)
Useful gains	434.8929	479.8684	512.1111	526.9054	476.8283	377.4527	256.7989	246.7539	374.2500	425.2683	421.0210	410.5285	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000		(96)
Heat loss rate W	1255.3194	1216.9206	1092.2719	898.5108	664.4624	436.5962	270.5937	259.7377	466.5841	722.1422	986.5203	1212.0333	(97)
Space heating kWh	610.3973	495.2991	431.6396	267.5559	139.5998	0.0000	0.0000	0.0000	0.0000	220.8742	407.1595	596.3196	(98a)
Space heating requirement - total per year (kWh/year)												3168.8449	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	610.3973	495.2991	431.6396	267.5559	139.5998	0.0000	0.0000	0.0000	0.0000	220.8742	407.1595	596.3196	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3168.8449	
Space heating per m2										(98c) / (4) =		78.6704	(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	610.3973	495.2991	431.6396	267.5559	139.5998	0.0000	0.0000	0.0000	0.0000	220.8742	407.1595	596.3196	(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)	610.3973	495.2991	431.6396	267.5559	139.5998	0.0000	0.0000	0.0000	0.0000	220.8742	407.1595	596.3196	(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	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792	(64)
Efficiency of water heater													100.0000 (216)
(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	(217)
Fuel for water heating, kWh/month	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792	(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	13.8339	11.0981	9.9926	7.3210	5.6550	4.6202	5.1586	6.7054	8.7097	11.4275	12.9074	14.2184	(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												3168.8449	(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												1492.7037	(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)												111.6478	(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												4814.1964	(238)

10a. Fuel costs - using BEDF prices (589)

Full SAP Calculation Printout



	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3168.8449	28.4300	900.9026 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1492.7037	28.4300	424.3757 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	111.6478	28.4300	31.7415 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1368.6760 (255)

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	3168.8449	0.1547	490.1912 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1492.7037	0.1416	211.3341 (264)
Space and water heating			701.5253 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	111.6478	0.1443	16.1142 (268)
Total CO2, kg/year			723.3268 (272)

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	3168.8449	1.5727	4983.6701 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1492.7037	1.5235	2274.1906 (278)
Space and water heating			7257.8607 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	111.6478	1.5338	171.2492 (282)
Total Primary energy kWh/year			7491.1347 (286)

Full SAP Calculation Printout



Plot Reference	Flat 3				Issued on Date	29/01/2026	
Assessment Reference	Notional			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	50 E	DER	14.90	TER			
Environmental	90 B	% DER < TER				N/A	
CO ₂ Emissions (t/year)	0.69	DFEE	72.01	TFEE			
Compliance Check	N/A	% DFEE < TFEE					
% DPER < TPER		DPER	154.78	TPER			
Assessor Details	Miss Charlotte Russell				Assessor ID	DK97-0001	
Client	tbc, tbc						

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.5700 (1b)	x 2.4700 (2b)	= 127.3779 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.3779 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813 (22b)
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			8.7700	1.1450	10.0420		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	55.9100	8.7700	47.1400	0.3000	14.1420	9.0000	424.2600 (29a)
Wall to Corridor	16.6600	1.7600	14.9000	0.3000	4.4700	9.0000	134.1000 (29a)
External Roof	22.8800		22.8800	0.1600	3.6608	9.0000	205.9200 (29a)
Total net area of external elements Aum(A, m ²)			95.4500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.4268		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			51.5700			40.0000	2062.8000 (32d)
Party Ceiling			28.6900			30.0000	860.7000 (32b)
Internal Wall			35.3200			9.0000	317.8800 (32c)
Internal Wall 2			13.6000			100.0000	1360.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5822.0600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							112.8963 (35)
Thermal bridges (Default value 0.200 * total exposed area)							19.0900 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	53.5168 (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	40.2359	39.4896	38.7581	35.3223	34.6795	31.6869	31.6869	31.1328	32.8396	34.6795	35.9799	37.3395	(38)
Heat transfer coeff	93.7527	93.0064	92.2749	88.8391	88.1962	85.2037	85.2037	84.6496	86.3564	88.1962	89.4967	90.8562	(39)
Average = Sum(39)m / 12 =												88.8360	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8180	1.8035	1.7893	1.7227	1.7102	1.6522	1.6522	1.6414	1.6745	1.7102	1.7354	1.7618	(40)
HLP (average)												1.7226	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7364 (42)
Hot water usage for mixer showers	53.3330	52.5315	51.3635	49.1289	47.4798	45.6408	44.5955	45.7545	47.0251	48.9997	51.2823	53.1286	(42a)
Hot water usage for baths	23.0581	22.7157	22.2335	21.3443	20.6785	19.9403	19.5415	20.0204	20.5418	21.3317	22.2392	22.9802	(42b)
Hot water usage for other uses	32.4123	31.2337	30.0551	28.8764	27.6978	26.5192	26.5192	27.6978	28.8764	30.0551	31.2337	32.4123	(42c)
Average daily hot water use (litres/day)												100.0155	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	108.8034	106.4809	103.6521	99.3497	95.8561	92.1002	90.6561	93.4727	96.4433	100.3865	104.7552	108.5211	(44)
Energy conte	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	25.8477	22.7441	23.8964	20.4007	19.3561	16.9872	16.4461	17.3608	17.8386	20.4335	22.3864	25.4877	(46)

Water storage loss (or HIU loss):													
Store volume												150.0000	(47)

b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000	(51)
Volume factor from Table 2a												0.9283	(52)
Temperature factor from Table 2b												0.6000	(53)
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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179	(62)
---	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	------

WVHRS	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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179	(64)
Total per year (kWh/year) = Sum(64)m =												1661.2363	(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	57.2957	50.4161	52.9704	45.2216	42.9061	37.6549	36.4555	38.4831	39.5423	45.2943	49.6233	56.4977	(65)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	(66)
(66)m	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.1167	16.9792	13.8085	10.4539	7.8144	6.5972	7.1286	9.2660	12.4368	15.7913	18.4308	19.6480	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	225.8363	228.1798	222.2743	209.7022	193.8323	178.9167	168.9522	166.6088	172.5142	185.0863	200.9563	215.8718	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	(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)	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	(71)
Water heating gains (Table 5)	77.0104	75.0239	71.1967	62.8077	57.6694	52.2985	48.9994	51.7246	54.9199	60.8795	68.9212	75.9378	(72)
Total internal gains	406.8458	405.0654	392.1619	367.8463	344.1985	319.6949	306.9626	309.4818	321.7533	346.6395	373.1907	396.3399	(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	
Southeast				6.2100	36.7938	0.6300	0.7000		0.7700		69.8294 (77)	
Northwest				2.5600	11.2829	0.6300	0.7000		0.7700		8.8274 (81)	
Solar gains	78.6568	136.9138	195.1197	254.8170	297.3316	300.4226	287.4583	254.9392	215.6673	153.4189	94.7467	66.9684 (83)
Total gains	485.5026	541.9792	587.2816	622.6633	641.5301	620.1175	594.4209	564.4210	537.4206	500.0583	467.9375	463.3083 (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	17.2501	17.3885	17.5263	18.2041	18.3368	18.9808	18.9808	19.1051	18.7275	18.3368	18.0704	17.8000	
-----	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	--

alpha	2.1500	2.1592	2.1684	2.2136	2.2225	2.2654	2.2654	2.2737	2.2485	2.2225	2.2047	2.1867	
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--

util living area

Full SAP Calculation Printout



	0.9429	0.9259	0.8984	0.8481	0.7693	0.6481	0.5253	0.5591	0.7271	0.8624	0.9244	0.9475 (86)
MIT	17.6533	17.9810	18.5334	19.3053	19.9842	20.5469	20.8021	20.7661	20.3559	19.4888	18.4941	17.6656 (87)
Th 2	20.0910	20.0983	20.1053	20.1387	20.1449	20.1739	20.1739	20.1793	20.1627	20.1449	20.1323	20.1191 (88)
util rest of house												
	0.9370	0.9182	0.8874	0.8305	0.7394	0.5973	0.4504	0.4868	0.6831	0.8431	0.9155	0.9421 (89)
MIT 2	16.9930	17.3209	17.8703	18.6471	19.3039	19.8438	20.0577	20.0362	19.6714	18.8383	17.8533	17.0224 (90)
Living area fraction									FLA = Living area / (4) =			0.5300 (91)
MIT	17.3430	17.6707	18.2217	18.9959	19.6644	20.2164	20.4522	20.4230	20.0342	19.1830	18.1929	17.3633 (92)
Temperature adjustment												0.0000
adjusted MIT	17.3430	17.6707	18.2217	18.9959	19.6644	20.2164	20.4522	20.4230	20.0342	19.1830	18.1929	17.3633 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9125	0.8909	0.8579	0.8026	0.7203	0.6002	0.4770	0.5095	0.6755	0.8168	0.8894	0.9190 (94)
Useful gains	443.0111	482.8745	503.8340	499.7403	462.1113	372.1683	283.5127	287.5949	363.0528	408.4355	416.1748	425.7969 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
	1222.8132	1187.7617	1081.6168	896.9102	702.4299	478.5384	328.2228	340.5455	512.4546	756.9918	992.7807	1195.9642 (97)
Space heating kWh												
	580.1728	473.6842	429.8704	285.9623	178.7970	0.0000	0.0000	0.0000	0.0000	259.3259	415.1563	573.0045 (98a)
Space heating requirement - total per year (kWh/year)												3195.9734
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												
	580.1728	473.6842	429.8704	285.9623	178.7970	0.0000	0.0000	0.0000	0.0000	259.3259	415.1563	573.0045 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3195.9734
Space heating per m2										(98c) / (4) =		61.9735 (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												
	580.1728	473.6842	429.8704	285.9623	178.7970	0.0000	0.0000	0.0000	0.0000	259.3259	415.1563	573.0045 (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)												
	580.1728	473.6842	429.8704	285.9623	178.7970	0.0000	0.0000	0.0000	0.0000	259.3259	415.1563	573.0045 (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												
	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (64)
Efficiency of water heater (217)m												100.0000 (216)
	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (217)
Fuel for water heating, kWh/month												
	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (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												
	16.7327	13.4236	12.0865	8.8551	6.8399	5.5883	6.2396	8.1104	10.5347	13.8221	15.6120	17.1978 (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												3195.9734 (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												1661.2363 (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)												135.0425 (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												5033.2521 (238)

Full SAP Calculation Printout



10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3195.9734	16.4900	527.0160 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1661.2363	16.4900	273.9379 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	135.0425	16.4900	22.2685 (250)
Additional standing charges			0.0000 (251)
Total energy cost			829.9833 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	3.0941 (257)
SAP value		49.8452
SAP rating (Section 12)		50 (258)
SAP band		E

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	3195.9734	0.1539	491.9783 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1661.2363	0.1416	235.1947 (264)
Space and water heating			727.1730 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	135.0425	0.1443	19.4908 (268)
Total CO2, kg/year			752.3510 (272)
CO2 emissions per m2			14.5900 (273)
EI value			89.5604
EI rating			90 (274)
EI band			B

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	51.5700 (1b)	x 2.4700 (2b)	= 127.3779 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.3779 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
Upgraded Windows			8.7700	1.1450	10.0420			(27)					
Solid Door			1.7600	1.2000	2.1120			(26)					
Existing Wall	55.9100	8.7700	47.1400	0.3000	14.1420	9.0000	424.2600	(29a)					
Wall to Corridor	16.6600	1.7600	14.9000	0.3000	4.4700	9.0000	134.1000	(29a)					
External Roof	22.8800		22.8800	0.1600	3.6608	9.0000	205.9200	(30)					
Total net area of external elements Aum(A, m2)			95.4500					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.4268			(33)					
Main dwelling													
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000	(32)					
Party Floor			51.5700			40.0000	2062.8000	(32d)					
Party Ceiling			28.6900			30.0000	860.7000	(32b)					
Internal Wall			35.3200			9.0000	317.8800	(32c)					
Internal Wall 2			13.6000			100.0000	1360.0000	(32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		5822.0600	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							112.8963	(35)					
Thermal bridges (Default value 0.200 * total exposed area)							19.0900	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss					(33) + (36) + (36a) =		53.5168	(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	38.0414	35.9799	35.3223	32.2559	32.2559	30.5934	31.1328	30.0688	31.1328	32.8396	33.4381	35.3223	(38)
Average = Sum(39)m / 12 =	91.5582	89.4967	88.8391	85.7727	85.7727	84.1102	84.6496	83.5856	84.6496	86.3564	86.9549	88.8391	(39)
												86.7154	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.7754	1.7354	1.7227	1.6632	1.6632	1.6310	1.6414	1.6208	1.6414	1.6745	1.6862	1.7227	(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													1.7364	(42)
Hot water usage for mixer showers														
	53.3330	52.5315	51.3635	49.1289	47.4798	45.6408	44.5955	45.7545	47.0251	48.9997	51.2823	53.1286	(42a)	
Hot water usage for baths														
	23.0581	22.7157	22.2335	21.3443	20.6785	19.9403	19.5415	20.0204	20.5418	21.3317	22.2392	22.9802	(42b)	
Hot water usage for other uses														
	32.4123	31.2337	30.0551	28.8764	27.6978	26.5192	26.5192	27.6978	28.8764	30.0551	31.2337	32.4123	(42c)	
Average daily hot water use (litres/day)													100.0155	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	108.8034	106.4809	103.6521	99.3497	95.8561	92.1002	90.6561	93.4727	96.4433	100.3865	104.7552	108.5211	(44)	
Energy content (annual)	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179	(45)	
Distribution loss (46)m = 0.15 x (45)m														
	25.8477	22.7441	23.8964	20.4007	19.3561	16.9872	16.4461	17.3608	17.8386	20.4335	22.3864	25.4877	(46)	
Water storage loss (or HIU loss):														
Store volume													150.0000	(47)
b) If manufacturer declared loss factor is not known :														
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0000	(51)
Volume factor from Table 2a													0.9283	(52)
Temperature factor from Table 2b													0.6000	(53)
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														
	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179	(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														
	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179	(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														
	57.2957	50.4161	52.9704	45.2216	42.9061	37.6549	36.4555	38.4831	39.5423	45.2943	49.6233	56.4977	(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	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	19.1167	16.9792	13.8085	10.4539	7.8144	6.5972	7.1286	9.2660	12.4368	15.7913	18.4308	19.6480	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	225.8363	228.1798	222.2743	209.7022	193.8323	178.9167	168.9522	166.6088	172.5142	185.0863	200.9563	215.8718	(68)	
Pumps, fans	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	(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)	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	(71)	
Total internal gains	77.0104	75.0239	71.1967	62.8077	57.6694	52.2985	48.9994	51.7246	54.9199	60.8795	68.9212	75.9378	(72)	
	406.8458	405.0654	392.1619	367.8463	344.1985	319.6949	306.9626	309.4818	321.7533	346.6395	373.1907	396.3399	(73)	

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



				m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d		W		
Southeast				6.2100	42.6275	0.6300	0.7000	0.7700		80.9010 (77)		
Northwest				2.5600	13.7622	0.6300	0.7000	0.7700		10.7671 (81)		
Solar gains	91.6681	142.1004	202.6196	280.6222	316.3562	342.2982	323.4763	288.5505	240.3388	170.4970	111.5369	75.4591 (83)
Total gains	498.5139	547.1658	594.7814	648.4685	660.5547	661.9931	630.4388	598.0323	562.0921	517.1365	484.7277	471.7990 (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	17.6635	18.0704	18.2041	18.8549	18.8549	19.2276	19.1051	19.3483	19.1051	18.7275	18.5986	18.2041	
alpha	2.1776	2.2047	2.2136	2.2570	2.2570	2.2818	2.2737	2.2899	2.2737	2.2485	2.2399	2.2136	
util living area	0.9348	0.9189	0.8862	0.8215	0.7225	0.5712	0.4307	0.4355	0.6586	0.8260	0.9072	0.9387 (86)	
MIT	17.9481	18.2410	18.8068	19.5711	20.2338	20.7048	20.8947	20.8976	20.5637	19.8195	18.8654	18.0226 (87)	
Th 2	20.1123	20.1323	20.1387	20.1684	20.1684	20.1845	20.1793	20.1896	20.1627	20.1627	20.1569	20.1387 (88)	
util rest of house	0.9279	0.9105	0.8739	0.8014	0.6869	0.5128	0.3473	0.3499	0.6048	0.8009	0.8959	0.9323 (89)	
MIT 2	17.2982	17.5990	18.1599	18.9230	19.5529	19.9844	20.1275	20.1400	19.8672	19.1685	18.2347	17.3890 (90)	
Living area fraction									fLA = Living area / (4) =			0.5300 (91)	
MIT	17.6426	17.9392	18.5027	19.2665	19.9137	20.3661	20.5341	20.5415	20.2363	19.5135	18.5689	17.7248 (92)	
Temperature adjustment												0.0000	
adjusted MIT	17.6426	17.9392	18.5027	19.2665	19.9137	20.3661	20.5341	20.5415	20.2363	19.5135	18.5689	17.7248 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9024	0.8831	0.8450	0.7759	0.6749	0.5265	0.3846	0.3884	0.6088	0.7780	0.8690	0.9079 (94)	
Useful gains	449.8381	483.2273	502.5712	503.1709	445.8061	348.5449	242.4876	232.3010	342.2155	402.3532	421.2507	428.3665 (95)	
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)	
Heat loss rate W	1157.5351	1122.2213	1013.0044	837.6967	627.3180	417.7033	265.3009	254.2271	443.2513	674.7483	910.3257	1112.6904 (97)	
Space heating kWh	526.5265	429.4040	379.7623	240.8586	135.0448	0.0000	0.0000	0.0000	0.0000	202.6619	352.1340	509.1370 (98a)	
Space heating requirement - total per year (kWh/year)												2775.5292	
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	526.5265	429.4040	379.7623	240.8586	135.0448	0.0000	0.0000	0.0000	0.0000	202.6619	352.1340	509.1370 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2775.5292	
Space heating per m2										(98c) / (4) =		53.8206 (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	526.5265	429.4040	379.7623	240.8586	135.0448	0.0000	0.0000	0.0000	0.0000	202.6619	352.1340	509.1370 (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)	526.5265	429.4040	379.7623	240.8586	135.0448	0.0000	0.0000	0.0000	0.0000	202.6619	352.1340	509.1370 (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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (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	16.7327	13.4236	12.0865	8.8551	6.8399	5.5883	6.2396	8.1104	10.5347	13.8221	15.6120	17.1978 (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													2775.5292 (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	100.0000	
Water heating fuel used	1661.2363	(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)	135.0425	(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	4612.8079	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2775.5292	28.4300	789.0829 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1661.2363	28.4300	472.2895 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	135.0425	28.4300	38.3926 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1311.4213 (255)

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	2775.5292	0.1544	428.6244 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1661.2363	0.1416	235.1947 (264)
Space and water heating			663.8191 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	135.0425	0.1443	19.4908 (268)
Total CO2, kg/year			688.9971 (272)

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	2775.5292	1.5717	4362.4127 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1661.2363	1.5235	2530.9566 (278)
Space and water heating			6893.3693 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	135.0425	1.5338	207.1326 (282)
Total Primary energy kWh/year			7162.5267 (286)

SAP 10 EPC IMPROVEMENTS

Notional

Current energy efficiency rating:	E 50
Current environmental impact rating:	B 90

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	E 50
Potential environmental impact rating:	B 90

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):	Current	Potential	Saving
Electricity	£1311	£1311	£0
Space heating	£801	£801	£0
Water heating	£472	£472	£0
Lighting	£38	£38	£0
Total cost of fuels	£1311	£1311	£0
Total cost of uses	£1311	£1311	£0
Delivered energy	89 kWh/m²	89 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.7 tonnes	0.7 tonnes	0.0 tonnes

Full SAP Calculation Printout



CO2 emissions per m² 13 kg/m² 13 kg/m² 0 kg/m²
 Primary energy 139 kWh/m² 139 kWh/m² 0 kWh/m²

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
 CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.5700 (1b)	x 2.4700 (2b)	= 127.3779 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.3779 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			8.7700	1.1450	10.0420		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	55.9100	8.7700	47.1400	0.3000	14.1420	9.0000	424.2600 (29a)
Wall to Corridor	16.6600	1.7600	14.9000	0.3000	4.4700	9.0000	134.1000 (29a)
External Roof	22.8800		22.8800	0.1600	3.6608	9.0000	205.9200 (30)
Total net area of external elements Aum(A, m ²)			95.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.4268		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			51.5700			40.0000	2062.8000 (32d)
Party Ceiling			28.6900			30.0000	860.7000 (32b)
Internal Wall			35.3200			9.0000	317.8800 (32c)
Internal Wall 2			13.6000			100.0000	1360.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5822.0600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							112.8963 (35)
Thermal bridges (Default value 0.200 * total exposed area)							19.0900 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	53.5168 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	40.2359	39.4896	38.7581	35.3223	34.6795	31.6869	31.6869	31.1328	32.8396	34.6795	35.9799	37.3395 (38)
Heat transfer coeff	93.7527	93.0064	92.2749	88.8391	88.1962	85.2037	85.2037	84.6496	86.3564	88.1962	89.4967	90.8562 (39)
Average = Sum(39)m / 12 =												88.8360
HLP	1.8180	1.8035	1.7893	1.7227	1.7102	1.6522	1.6522	1.6414	1.6745	1.7102	1.7354	1.7618 (40)
HLP (average)												1.7226
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.7364 (42)
Hot water usage for mixer showers	

Full SAP Calculation Printout



Hot water usage for baths	53.3330	52.5315	51.3635	49.1289	47.4798	45.6408	44.5955	45.7545	47.0251	48.9997	51.2823	53.1286 (42a)
Hot water usage for other uses	23.0581	22.7157	22.2335	21.3443	20.6785	19.9403	19.5415	20.0204	20.5418	21.3317	22.2392	22.9802 (42b)
Average daily hot water use (litres/day)	32.4123	31.2337	30.0551	28.8764	27.6978	26.5192	26.5192	27.6978	28.8764	30.0551	31.2337	32.4123 (42c)
												100.0155 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	108.8034	106.4809	103.6521	99.3497	95.8561	92.1002	90.6561	93.4727	96.4433	100.3865	104.7552	108.5211 (44)
Distribution loss (46)m = 0.15 x (45)m	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (45)
Water storage loss (or HIU loss):	25.8477	22.7441	23.8964	20.4007	19.3561	16.9872	16.4461	17.3608	17.8386	20.4335	22.3864	25.4877 (46)
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (64)
												Total per year (kWh/year) = Sum (64)m = 1661.2363 (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	57.2957	50.4161	52.9704	45.2216	42.9061	37.6549	36.4555	38.4831	39.5423	45.2943	49.6233	56.4977 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.1167	16.9792	13.8085	10.4539	7.8144	6.5972	7.1286	9.2660	12.4368	15.7913	18.4308	19.6480 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	225.8363	228.1798	222.2743	209.7022	193.8323	178.9167	168.9522	166.6088	172.5142	185.0863	200.9563	215.8718 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547 (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)	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554 (71)
Water heating gains (Table 5)	77.0104	75.0239	71.1967	62.8077	57.6694	52.2985	48.9994	51.7246	54.9199	60.8795	68.9212	75.9378 (72)
Total internal gains	406.8458	405.0654	392.1619	367.8463	344.1985	319.6949	306.9626	309.4818	321.7533	346.6395	373.1907	396.3399 (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		

Southeast					6.2100	36.7938	0.6300	0.7000	0.7700	69.8294 (77)		
Northwest					2.5600	11.2829	0.6300	0.7000	0.7700	8.8274 (81)		

Solar gains	78.6568	136.9138	195.1197	254.8170	297.3316	300.4226	287.4583	254.9392	215.6673	153.4189	94.7467	66.9684 (83)
Total gains	485.5026	541.9792	587.2816	622.6633	641.5301	620.1175	594.4209	564.4210	537.4206	500.0583	467.9375	463.3083 (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	17.2501	17.3885	17.5263	18.2041	18.3368	18.9808	18.9808	19.1051	18.7275	18.3368	18.0704	17.8000
alpha	2.1500	2.1592	2.1684	2.2136	2.2225	2.2654	2.2654	2.2737	2.2485	2.2225	2.2047	2.1867
util living area	0.9429	0.9259	0.8984	0.8481	0.7693	0.6481	0.5253	0.5591	0.7271	0.8624	0.9244	0.9475 (86)
MIT	17.6533	17.9810	18.5334	19.3053	19.9842	20.5469	20.8021	20.7661	20.3559	19.4888	18.4941	17.6656 (87)
Th 2	20.0910	20.0983	20.1053	20.1387	20.1449	20.1739	20.1739	20.1793	20.1627	20.1449	20.1323	20.1191 (88)
util rest of house	0.9370	0.9182	0.8874	0.8305	0.7394	0.5973	0.4504	0.4868	0.6831	0.8431	0.9155	0.9421 (89)
MIT 2	16.9930	17.3209	17.8703	18.6471	19.3039	19.8438	20.0577	20.0362	19.6714	18.8383	17.8533	17.0224 (90)
Living area fraction									fLA = Living area / (4) =			0.5300 (91)
MIT	17.3430	17.6707	18.2217	18.9959	19.6644	20.2164	20.4522	20.4230	20.0342	19.1830	18.1929	17.3633 (92)
Temperature adjustment												0.0000
adjusted MIT	17.3430	17.6707	18.2217	18.9959	19.6644	20.2164	20.4522	20.4230	20.0342	19.1830	18.1929	17.3633 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9125	0.8909	0.8579	0.8026	0.7203	0.6002	0.4770	0.5095	0.6755	0.8168	0.8894	0.9190 (94)

Full SAP Calculation Printout



Useful gains	443.0111	482.8745	503.8340	499.7403	462.1113	372.1683	283.5127	287.5949	363.0528	408.4355	416.1748	425.7969 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1222.8132	1187.7617	1081.6168	896.9102	702.4299	478.5384	328.2228	340.5455	512.4546	756.9918	992.7807	1195.9642 (97)
Space heating kWh	580.1728	473.6842	429.8704	285.9623	178.7970	0.0000	0.0000	0.0000	0.0000	259.3259	415.1563	573.0045 (98a)
Space heating requirement - total per year (kWh/year)												3195.9734
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	580.1728	473.6842	429.8704	285.9623	178.7970	0.0000	0.0000	0.0000	0.0000	259.3259	415.1563	573.0045 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3195.9734
Space heating per m2										(98c) / (4) =		61.9735 (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	580.1728	473.6842	429.8704	285.9623	178.7970	0.0000	0.0000	0.0000	0.0000	259.3259	415.1563	573.0045 (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)	580.1728	473.6842	429.8704	285.9623	178.7970	0.0000	0.0000	0.0000	0.0000	259.3259	415.1563	573.0045 (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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (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	16.7327	13.4236	12.0865	8.8551	6.8399	5.5883	6.2396	8.1104	10.5347	13.8221	15.6120	17.1978 (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												3195.9734 (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												1661.2363 (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)												135.0425 (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												5033.2521 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3195.9734	16.4900	527.0160 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1661.2363	16.4900	273.9379 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	135.0425	16.4900	22.2685 (250)
Additional standing charges			0.0000 (251)
Total energy cost			829.9833 (255)

11a. SAP rating - Individual heating systems

Full SAP Calculation Printout



Energy cost deflator (Table 12):
Energy cost factor (ECF)
SAP value
SAP rating (Section 12)
SAP band

$[(255) \times (256)] / [(4) + 45.0] =$
0.3600 (256)
3.0941 (257)
49.8452
50 (258)
E

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	3195.9734	0.1539	491.9783 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1661.2363	0.1416	235.1947 (264)
Space and water heating			727.1730 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	135.0425	0.1443	19.4908 (268)
Total CO ₂ , kg/year			752.3510 (272)
CO ₂ emissions per m ²			14.5900 (273)
EI value			89.5604
EI rating			90 (274)
EI band			B

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	51.5700 (1b)	x 2.4700 (2b)	= 127.3779 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5700		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	127.3779 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							
Upgraded Windows			8.7700	1.1450	10.0420		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	55.9100	8.7700	47.1400	0.3000	14.1420	9.0000	424.2600 (29a)
Wall to Corridor	16.6600	1.7600	14.9000	0.3000	4.4700	9.0000	134.1000 (29a)
External Roof	22.8800		22.8800	0.1600	3.6608	9.0000	205.9200 (30)
Total net area of external elements Aum(A, m ²)			95.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.4268		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			51.5700			40.0000	2062.8000 (32d)
Party Ceiling			28.6900			30.0000	860.7000 (32b)
Internal Wall			35.3200			9.0000	317.8800 (32c)
Internal Wall 2			13.6000			100.0000	1360.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5822.0600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							112.8963 (35)
Thermal bridges (Default value 0.200 * total exposed area)							19.0900 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	53.5168 (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	38.0414	35.9799	35.3223	32.2559	32.2559	30.5934	31.1328	30.0688	31.1328	32.8396	33.4381	35.3223	(38)
Heat transfer coeff	91.5582	89.4967	88.8391	85.7727	85.7727	84.1102	84.6496	83.5856	84.6496	86.3564	86.9549	88.8391	(39)
Average = Sum(39)m / 12 =												86.7154	
HLP	1.7754	1.7354	1.7227	1.6632	1.6632	1.6310	1.6414	1.6208	1.6414	1.6745	1.6862	1.7227	(40)
HLP (average)												1.6815	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7364 (42)
Hot water usage for mixer showers	53.3330	52.5315	51.3635	49.1289	47.4798	45.6408	44.5955	45.7545	47.0251	48.9997	51.2823	53.1286 (42a)
Hot water usage for baths	23.0581	22.7157	22.2335	21.3443	20.6785	19.9403	19.5415	20.0204	20.5418	21.3317	22.2392	22.9802 (42b)
Hot water usage for other uses	32.4123	31.2337	30.0551	28.8764	27.6978	26.5192	26.5192	27.6978	28.8764	30.0551	31.2337	32.4123 (42c)
Average daily hot water use (litres/day)												100.0155 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	108.8034	106.4809	103.6521	99.3497	95.8561	92.1002	90.6561	93.4727	96.4433	100.3865	104.7552	108.5211 (44)
Energy content (annual)	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m =											1661.2363
	25.8477	22.7441	23.8964	20.4007	19.3561	16.9872	16.4461	17.3608	17.8386	20.4335	22.3864	25.4877 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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												
	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (62)
WVHRS	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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (64)
Total per year (kWh/year) = Sum(64)m =												1661.2363 (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												
	57.2957	50.4161	52.9704	45.2216	42.9061	37.6549	36.4555	38.4831	39.5423	45.2943	49.6233	56.4977 (65)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	19.1167	16.9792	13.8085	10.4539	7.8144	6.5972	7.1286	9.2660	12.4368	15.7913	18.4308	19.6480 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	225.8363	228.1798	222.2743	209.7022	193.8323	178.9167	168.9522	166.6088	172.5142	185.0863	200.9563	215.8718 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547 (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)												
	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554 (71)
Water heating gains (Table 5)												
	77.0104	75.0239	71.1967	62.8077	57.6694	52.2985	48.9994	51.7246	54.9199	60.8795	68.9212	75.9378 (72)
Total internal gains												
	406.8458	405.0654	392.1619	367.8463	344.1985	319.6949	306.9626	309.4818	321.7533	346.6395	373.1907	396.3399 (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				
Southeast			6.2100	42.6275	0.6300	0.7000	0.7700	80.9010 (77)				
Northwest			2.5600	13.7622	0.6300	0.7000	0.7700	10.7671 (81)				
Solar gains	91.6681	142.1004	202.6196	280.6222	316.3562	342.2982	323.4763	288.5505	240.3388	170.4970	111.5369	75.4591 (83)
Total gains	498.5139	547.1658	594.7814	648.4685	660.5547	661.9931	630.4388	598.0323	562.0921	517.1365	484.7277	471.7990 (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, n11,m (see Table 9a)														
tau	17.6635	18.0704	18.2041	18.8549	18.8549	19.2276	19.1051	19.3483	19.1051	18.7275	18.5986	18.2041		
alpha	2.1776	2.2047	2.2136	2.2570	2.2570	2.2818	2.2737	2.2899	2.2737	2.2485	2.2399	2.2136		

Full SAP Calculation Printout



util living area	0.9348	0.9189	0.8862	0.8215	0.7225	0.5712	0.4307	0.4355	0.6586	0.8260	0.9072	0.9387 (86)
MIT	17.9481	18.2410	18.8068	19.5711	20.2338	20.7048	20.8947	20.8976	20.5637	19.8195	18.8654	18.0226 (87)
Th 2	20.1123	20.1323	20.1387	20.1684	20.1684	20.1845	20.1793	20.1896	20.1793	20.1627	20.1569	20.1387 (88)
util rest of house	0.9279	0.9105	0.8739	0.8014	0.6869	0.5128	0.3473	0.3499	0.6048	0.8009	0.8959	0.9323 (89)
MIT 2	17.2982	17.5990	18.1599	18.9230	19.5529	19.9844	20.1275	20.1400	19.8672	19.1685	18.2347	17.3890 (90)
Living area fraction									FLA =	Living area / (4) =		0.5300 (91)
MIT	17.6426	17.9392	18.5027	19.2665	19.9137	20.3661	20.5341	20.5415	20.2363	19.5135	18.5689	17.7248 (92)
Temperature adjustment												0.0000
adjusted MIT	17.6426	17.9392	18.5027	19.2665	19.9137	20.3661	20.5341	20.5415	20.2363	19.5135	18.5689	17.7248 (93)
8. Space heating requirement												
Utilisation	Jan 0.9024	Feb 0.8831	Mar 0.8450	Apr 0.7759	May 0.6749	Jun 0.5265	Jul 0.3846	Aug 0.3884	Sep 0.6088	Oct 0.7780	Nov 0.8690	Dec 0.9079 (94)
Useful gains	449.8381	483.2273	502.5712	503.1709	445.8061	348.5449	242.4876	232.3010	342.2155	402.3532	421.2507	428.3665 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	1157.5351	1122.2213	1013.0044	837.6967	627.3180	417.7033	265.3009	254.2271	443.2513	674.7483	910.3257	1112.6904 (97)
Space heating kWh	526.5265	429.4040	379.7623	240.8586	135.0448	0.0000	0.0000	0.0000	0.0000	202.6619	352.1340	509.1370 (98a)
Space heating requirement - total per year (kWh/year)												2775.5292
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	526.5265	429.4040	379.7623	240.8586	135.0448	0.0000	0.0000	0.0000	0.0000	202.6619	352.1340	509.1370 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2775.5292
Space heating per m2										(98c) / (4) =		53.8206 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan 526.5265	Feb 429.4040	Mar 379.7623	Apr 240.8586	May 135.0448	Jun 0.0000	Jul 0.0000	Aug 0.0000	Sep 0.0000	Oct 202.6619	Nov 352.1340	Dec 509.1370 (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)	526.5265	429.4040	379.7623	240.8586	135.0448	0.0000	0.0000	0.0000	0.0000	202.6619	352.1340	509.1370 (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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (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	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	16.7327	13.4236	12.0865	8.8551	6.8399	5.5883	6.2396	8.1104	10.5347	13.8221	15.6120	17.1978 (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												2775.5292 (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												1661.2363 (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)												135.0425 (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												4612.8079 (238)

Full SAP Calculation Printout



10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2775.5292	28.4300	789.0829 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1661.2363	28.4300	472.2895 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	135.0425	28.4300	38.3926 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1311.4213 (255)

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	2775.5292	0.1544	428.6244 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1661.2363	0.1416	235.1947 (264)
Space and water heating			663.8191 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	135.0425	0.1443	19.4908 (268)
Total CO2, kg/year			688.9971 (272)

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	2775.5292	1.5717	4362.4127 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1661.2363	1.5235	2530.9566 (278)
Space and water heating			6893.3693 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	135.0425	1.5338	207.1326 (282)
Total Primary energy kWh/year			7162.5267 (286)

Full SAP Calculation Printout



Plot Reference	Flat 4				Issued on Date	29/01/2026	
Assessment Reference	Notional			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	51 E		DER	17.00		TER	
Environmental	90 B		% DER < TER				N/A
CO ₂ Emissions (t/year)	0.57		DFEE	78.44		TFEE	
Compliance Check	N/A		% DFEE < TFEE				
% DPER < TPER			DPER	176.92		TPER	
Assessor Details	Miss Charlotte Russell				Assessor ID	DK97-0001	
Client	tbc, tbc						

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.0200 (1b)	x 2.4700 (2b)	= 91.4394 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 91.4394 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813 (22b)
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			7.3900	1.1450	8.4618		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	48.9900	7.3900	41.6000	0.3000	12.4800	9.0000	374.4000 (29a)
Wall to Corridor	15.3600	1.7600	13.6000	0.3000	4.0800	9.0000	122.4000 (29a)
External Roof	25.0400		25.0400	0.1600	4.0064	9.0000	225.3600 (30)
Total net area of external elements Aum(A, m ²)			89.3900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.1402		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			37.0200			40.0000	1480.8000 (32d)
Party Ceiling			11.9800			30.0000	359.4000 (32b)
Internal Wall			14.3800			9.0000	129.4200 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 3148.1800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							85.0400 (35)
Thermal bridges (Default value 0.200 * total exposed area)							17.8780 (36)
Point Thermal bridges							0.0000 (36a)
Total fabric heat loss							(33) + (36) + (36a) = 49.0182 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							

elmhurst
energy

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nill,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	11.2256	11.3033	11.3806	11.7580	11.8314	12.1855	12.1855	12.2535	12.0466	11.8314	11.6838	11.5334
alpha	1.7484	1.7536	1.7587	1.7839	1.7888	1.8124	1.8124	1.8169	1.8031	1.7888	1.7789	1.7689
util living area	0.9172	0.9003	0.8708	0.8164	0.7351	0.6213	0.5121	0.5493	0.7082	0.8358	0.8971	0.9218 (86)

Full SAP Calculation Printout



MIT	16.7955	17.1350	17.7802	18.7023	19.5662	20.2939	20.6548	20.5945	20.0230	18.9372	17.7575	16.7866 (87)
Th 2	19.9478	19.9551	19.9622	19.9955	20.0017	20.0307	20.0307	20.0361	20.0196	20.0017	19.9891	19.9759 (88)
util rest of house	0.9092	0.8905	0.8575	0.7961	0.7020	0.5668	0.4312	0.4713	0.6610	0.8138	0.8857	0.9143 (89)
MIT 2	16.0894	16.4285	17.0689	17.9913	18.8268	19.5218	19.8308	19.7908	19.2811	18.2359	17.0687	16.0969 (90)
Living area fraction									fLA = Living area / (4) =			0.1961 (91)
MIT	16.2278	16.5670	17.2084	18.1308	18.9718	19.6732	19.9924	19.9484	19.4266	18.3735	17.2037	16.2322 (92)
Temperature adjustment												0.0000
adjusted MIT	16.2278	16.5670	17.2084	18.1308	18.9718	19.6732	19.9924	19.9484	19.4266	18.3735	17.2037	16.2322 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8682	0.8464	0.8101	0.7486	0.6613	0.5441	0.4277	0.4633	0.6271	0.7671	0.8419	0.8749 (94)
Useful gains	323.2928	345.6627	359.1474	358.6480	333.8869	268.3009	201.2577	203.0795	254.8747	287.8841	299.7856	312.4210 (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	929.2013	902.6342	822.8471	686.5347	537.4814	364.0812	243.4580	253.2407	386.6687	574.5606	756.2325	912.3136 (97)
Space heating kWh	450.7959	374.2848	344.9926	236.0784	151.4743	0.0000	0.0000	0.0000	0.0000	213.2873	328.6418	446.3201 (98a)
Space heating requirement - total per year (kWh/year)												2545.8752
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	450.7959	374.2848	344.9926	236.0784	151.4743	0.0000	0.0000	0.0000	0.0000	213.2873	328.6418	446.3201 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2545.8752
Space heating per m2										(98c) / (4) =		68.7703 (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	450.7959	374.2848	344.9926	236.0784	151.4743	0.0000	0.0000	0.0000	0.0000	213.2873	328.6418	446.3201 (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)	450.7959	374.2848	344.9926	236.0784	151.4743	0.0000	0.0000	0.0000	0.0000	213.2873	328.6418	446.3201 (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	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (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)
(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 (217)
Fuel for water heating, kWh/month	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (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 (231)
Lighting	13.3427	10.7040	9.6378	7.0610	5.4542	4.4561	4.9755	6.4673	8.4004	11.0217	12.4490	13.7135 (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)
(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)	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)
(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)	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)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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												2545.8752 (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												1448.7059 (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)												107.6832 (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												4143.2643 (238)

Full SAP Calculation Printout



10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2545.8752	16.4900	419.8148 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1448.7059	16.4900	238.8916 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	107.6832	16.4900	17.7570 (250)
Additional standing charges			0.0000 (251)
Total energy cost			683.2243 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.9988 (257)
SAP value		51.3896
SAP rating (Section 12)		51 (258)
SAP band		E

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	2545.8752	0.1537	391.2851 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1448.7059	0.1416	205.1050 (264)
Space and water heating			596.3901 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	107.6832	0.1443	15.5420 (268)
Total CO2, kg/year			617.6194 (272)
CO2 emissions per m2			16.6800 (273)
EI value			89.9097
EI rating			90 (274)
EI band			B

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	37.0200 (1b)	x 2.4700 (2b)	= 91.4394 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	91.4394 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							

Full SAP Calculation Printout



Upgraded Windows			7.3900	1.1450	8.4618		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	48.9900	7.3900	41.6000	0.3000	12.4800	9.0000	374.4000 (29a)
Wall to Corridor	15.3600	1.7600	13.6000	0.3000	4.0800	9.0000	122.4000 (29a)
External Roof	25.0400		25.0400	0.1600	4.0064	9.0000	225.3600 (30)
Total net area of external elements Aum(A, m2)			89.3900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.1402		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			37.0200			40.0000	1480.8000 (32d)
Party Ceiling			11.9800			30.0000	359.4000 (32b)
Internal Wall			14.3800			9.0000	129.4200 (32c)

Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				3148.1800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							85.0400 (35)
Thermal bridges (Default value 0.200 * total exposed area)							17.8780 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =				49.0182 (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	27.3084	25.8285	25.3564	23.1552	23.1552	21.9617	22.3490	21.5851	22.3490	23.5742	24.0039	25.3564	(38)
Average = Sum(39)m / 12 =	76.3266	74.8467	74.3747	72.1734	72.1734	70.9800	71.3672	70.6034	71.3672	72.5925	73.0221	74.3747	(39)
												72.8501	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.0618	2.0218	2.0090	1.9496	1.9496	1.9173	1.9278	1.9072	1.9278	1.9609	1.9725	2.0090	(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													1.3296 (42)
Hot water usage for mixer showers													
	46.5121	45.8131	44.7945	42.8457	41.4075	39.8037	38.8920	39.9029	41.0110	42.7330	44.7237	46.3339	(42a)
Hot water usage for baths													
	20.1250	19.8261	19.4052	18.6291	18.0480	17.4037	17.0557	17.4736	17.9287	18.6181	19.4102	20.0569	(42b)
Hot water usage for other uses													
	28.2462	27.2191	26.1920	25.1648	24.1377	23.1106	23.1106	24.1377	25.1648	26.1920	27.2191	28.2462	(42c)
Average daily hot water use (litres/day)													87.2200 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	94.8833	92.8583	90.3917	86.6397	83.5933	80.3179	79.0583	81.5142	84.1045	87.5431	91.3530	94.6371	(44)
Energy conte	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788	(45)
Energy content (annual)													Total = Sum(45)m = 1448.7059
Distribution loss (46)m = 0.15 x (45)m													
	22.5408	19.8343	20.8393	17.7908	16.8799	14.8140	14.3421	15.1397	15.5564	17.8193	19.5224	22.2268	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0000 (51)
Volume factor from Table 2a													0.9283 (52)
Temperature factor from Table 2b													0.6000 (53)
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													
	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788	(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													
	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788	(64)
													Total per year (kWh/year) = Sum(64)m = 1448.7059 (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													
	49.9654	43.9661	46.1938	39.4363	37.4171	32.8378	31.7917	33.5598	34.4833	39.4994	43.2746	49.2694	(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	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	15.2437	13.5393	11.0109	8.3360	6.2312	5.2607	5.6843	7.3887	9.9171	12.5920	14.6968	15.6673	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	170.3260	172.0934	167.6395	158.1576	146.1885	134.9392	127.4239	125.6565	130.1104	139.5923	151.5614	162.8107	(68)
Pumps, fans	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	(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)	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	(71)
Total internal gains	67.1578	65.4258	62.0884	54.7726	50.2918	45.6080	42.7308	45.1072	47.8935	53.0906	60.1036	66.2224	(72)
	326.6262	324.9572	314.6375	295.1649	276.6102	256.7066	246.7377	249.0511	258.8197	279.1736	300.2605	318.5991	(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	

Full SAP Calculation Printout



Southeast			2.6000		42.6275		0.6300		0.7000		0.7700		33.8716 (77)
Northwest			4.7900		13.7622		0.6300		0.7000		0.7700		20.1463 (81)
Solar gains	54.0179	87.9838	136.1818	206.1274	246.3792	272.7198	255.2599	217.7497	167.5900	108.7002	66.6101	43.9159 (83)	
Total gains	380.6440	412.9410	450.8193	501.2923	522.9894	529.4264	501.9976	466.8008	426.4097	387.8738	366.8706	362.5150 (84)	
7. Mean internal temperature (heating season)													
Temperature during heating periods in the living area from Table 9, Th1 (C)													
Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	11.4573	11.6838	11.7580	12.1166	12.1166	12.3203	12.2535	12.3860	12.2535	12.0466	11.9758	11.7580	
alpha	1.7638	1.7789	1.7839	1.8078	1.8078	1.8214	1.8169	1.8257	1.8169	1.8031	1.7984	1.7839	
util living area													
	0.9083	0.8923	0.8576	0.7898	0.6903	0.5506	0.4246	0.4359	0.6464	0.8013	0.8794	0.9118 (86)	
MIT	17.1117	17.4058	18.0774	19.0025	19.8715	20.5073	20.7971	20.7964	20.2929	19.3297	18.1706	17.1861 (87)	
Th 2	19.9691	19.9891	19.9955	20.0252	20.0252	20.0413	20.0361	20.0464	20.0361	20.0196	20.0137	19.9955 (88)	
util rest of house													
	0.8992	0.8818	0.8430	0.7671	0.6517	0.4880	0.3327	0.3407	0.5888	0.7735	0.8656	0.9031 (89)	
MIT 2	16.4149	16.7157	17.3805	18.2990	19.1275	19.7108	19.9383	19.9496	19.5341	18.6261	17.4902	16.5047 (90)	
Living area fraction													
MIT	16.5516	16.8511	17.5172	18.4370	19.2734	19.8670	20.1067	20.1156	19.6829	18.7641	17.6236	16.6383 (92)	
Temperature adjustment													
adjusted MIT	16.5516	16.8511	17.5172	18.4370	19.2734	19.8670	20.1067	20.1156	19.6829	18.7641	17.6236	16.6383 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8568	0.8372	0.7956	0.7215	0.6171	0.4754	0.3400	0.3482	0.5646	0.7287	0.8204	0.8618 (94)	
Useful gains	326.1316	345.7314	358.6645	361.6893	322.7186	251.6859	170.6866	162.5286	240.7309	282.6503	300.9909	312.4307 (95)	
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)	
Heat loss rate W													
	881.6932	857.0752	774.7764	645.0146	481.6417	317.0669	193.1725	184.6726	334.2085	512.7992	695.4363	850.7228 (97)	
Space heating kWh													
	413.3378	343.6231	309.5872	203.9942	118.2387	0.0000	0.0000	0.0000	0.0000	171.2308	284.0007	400.4893 (98a)	
Space heating requirement - total per year (kWh/year)													2244.5019
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													
	413.3378	343.6231	309.5872	203.9942	118.2387	0.0000	0.0000	0.0000	0.0000	171.2308	284.0007	400.4893 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													2244.5019
Space heating per m2													(98c) / (4) = 60.6294 (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													
	413.3378	343.6231	309.5872	203.9942	118.2387	0.0000	0.0000	0.0000	0.0000	171.2308	284.0007	400.4893 (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)													
	413.3378	343.6231	309.5872	203.9942	118.2387	0.0000	0.0000	0.0000	0.0000	171.2308	284.0007	400.4893 (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													
	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (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													
	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (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													
	13.3427	10.7040	9.6378	7.0610	5.4542	4.4561	4.9755	6.4673	8.4004	11.0217	12.4490	13.7135 (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													2244.5019 (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													1448.7059 (219)

Full SAP Calculation Printout



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)	107.6832 (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	3841.8910 (238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2244.5019	28.4300	638.1119 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1448.7059	28.4300	411.8671 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	107.6832	28.4300	30.6143 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1092.2496 (255)

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	2244.5019	0.1541	345.9505 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1448.7059	0.1416	205.1050 (264)
Space and water heating			551.0555 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	107.6832	0.1443	15.5420 (268)
Total CO2, kg/year			572.2847 (272)

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	2244.5019	1.5706	3525.3127 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1448.7059	1.5235	2207.1583 (278)
Space and water heating			5732.4710 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	107.6832	1.5338	165.1681 (282)
Total Primary energy kWh/year			5959.6639 (286)

SAP 10 EPC IMPROVEMENTS

Notional

Current energy efficiency rating:	E 51
Current environmental impact rating:	B 90

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	E 51
Potential environmental impact rating:	B 90

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £1092	Potential £1092	Saving £0
Electricity			
Space heating	£650	£650	£0
Water heating	£412	£412	£0
Lighting	£31	£31	£0
Total cost of fuels	£1092	£1092	£0
Total cost of uses	£1093	£1093	£0
Delivered energy	104 kWh/m²	104 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.6 tonnes	0.6 tonnes	0.0 tonnes
CO2 emissions per m²	15 kg/m²	15 kg/m²	0 kg/m²
Primary energy	161 kWh/m²	161 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.0200 (1b)	x 2.4700 (2b)	= 91.4394 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 91.4394 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 90 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross 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												
Upgraded Windows			7.3900	1.1450	8.4618		(27)					
Solid Door			1.7600	1.2000	2.1120		(26)					
Existing Wall	48.9900	7.3900	41.6000	0.3000	12.4800	9.0000	374.4000 (29a)					
Wall to Corridor	15.3600	1.7600	13.6000	0.3000	4.0800	9.0000	122.4000 (29a)					
External Roof	25.0400		25.0400	0.1600	4.0064	9.0000	225.3600 (30)					
Total net area of external elements Aum(A, m2)			89.3900				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	31.1402		(33)					
Main dwelling												
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)					
Party Floor			37.0200			40.0000	1480.8000 (32d)					
Party Ceiling			11.9800			30.0000	359.4000 (32b)					
Internal Wall			14.3800			9.0000	129.4200 (32c)					
Heat capacity Cm = Sum(A x k)						(28)... (30) + (32) + (32a)... (32e) =	3148.1800 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							85.0400 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							17.8780 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	49.0182 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 28.8837	Feb 28.3480	Mar 27.8229	Apr 25.3564	May 24.8950	Jun 22.7468	Jul 22.7468	Aug 22.3490	Sep 23.5742	Oct 24.8950	Nov 25.8285	Dec 26.8045 (38)
Heat transfer coeff	77.9020	77.3662	76.8411	74.3747	73.9132	71.7650	71.7650	71.3672	72.5925	73.9132	74.8467	75.8227 (39)
Average = Sum(39)m / 12 =												74.3725
HLP	Jan 2.1043	Feb 2.0898	Mar 2.0757	Apr 2.0090	May 1.9966	Jun 1.9385	Jul 1.9385	Aug 1.9278	Sep 1.9609	Oct 1.9966	Nov 2.0218	Dec 2.0482 (40)
HLP (average)												2.0090
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3296 (42)
Hot water usage for mixer showers	46.5121	45.8131	44.7945	42.8457	41.4075	39.8037	38.8920	39.9029	41.0110	42.7330	44.7237	46.3339 (42a)
Hot water usage for baths	20.1250	19.8261	19.4052	18.6291	18.0480	17.4037	17.0557	17.4736	17.9287	18.6181	19.4102	20.0569 (42b)

Full SAP Calculation Printout



Hot water usage for other uses	28.2462	27.2191	26.1920	25.1648	24.1377	23.1106	23.1106	24.1377	25.1648	26.1920	27.2191	28.2462 (42c)
Average daily hot water use (litres/day)												87.2200 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content	94.8833	92.8583	90.3917	86.6397	83.5933	80.3179	79.0583	81.5142	84.1045	87.5431	91.3530	94.6371 (44)
Energy content (annual)	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (45)
Distribution loss (46)m = 0.15 x (45)m												1448.7059
Water storage loss (or HIU loss):	22.5408	19.8343	20.8393	17.7908	16.8799	14.8140	14.3421	15.1397	15.5564	17.8193	19.5224	22.2268 (46)
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	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)
Total heat required for water heating calculated for each month	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (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	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (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	49.9654	43.9661	46.1938	39.4363	37.4171	32.8378	31.7917	33.5598	34.4833	39.4994	43.2746	49.2694 (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	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2437	13.5393	11.0109	8.3360	6.2312	5.2607	5.6843	7.3887	9.9171	12.5920	14.6968	15.6673 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	170.3260	172.0934	167.6395	158.1576	146.1885	134.9392	127.4239	125.6565	130.1104	139.5923	151.5614	162.8107 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071 (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)	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833 (71)
Water heating gains (Table 5)	67.1578	65.4258	62.0884	54.7726	50.2918	45.6080	42.7308	45.1072	47.8935	53.0906	60.1036	66.2224 (72)
Total internal gains	326.6262	324.9572	314.6375	295.1649	276.6102	256.7066	246.7377	249.0511	258.8197	279.1736	300.2605	318.5991 (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
Southeast				2.6000	36.7938		0.6300		0.7000		0.7700		29.2362 (77)
Northwest				4.7900	11.2829		0.6300		0.7000		0.7700		16.5169 (81)
Solar gains	45.7531	83.4207	128.7123	183.9066	228.2853	236.4412	223.8734	189.2656	147.5898	96.1268	55.8008		38.5086 (83)
Total gains	372.3793	408.3779	443.3499	479.0715	504.8955	493.1477	470.6112	438.3167	406.4095	375.3004	356.0612		357.1078 (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	11.2256	11.3033	11.3806	11.7580	11.8314	12.1855	12.1855	12.2535	12.0466	11.8314	11.6838	11.5334
alpha	1.7484	1.7536	1.7587	1.7839	1.7888	1.8124	1.8124	1.8169	1.8031	1.7888	1.7789	1.7689
util living area	0.9172	0.9003	0.8708	0.8164	0.7351	0.6213	0.5121	0.5493	0.7082	0.8358	0.8971	0.9218 (86)
MIT	16.7955	17.1350	17.7802	18.7023	19.5662	20.2939	20.6548	20.5945	20.0230	18.9372	17.7575	16.7866 (87)
Th 2	19.9478	19.9551	19.9622	19.9955	20.0017	20.0307	20.0307	20.0361	20.0196	20.0017	19.9891	19.9759 (88)
util rest of house	0.9092	0.8905	0.8575	0.7961	0.7020	0.5668	0.4312	0.4713	0.6610	0.8138	0.8857	0.9143 (89)
MIT 2	16.0894	16.4285	17.0689	17.9913	18.8268	19.5218	19.8308	19.7908	19.2811	18.2359	17.0687	16.0969 (90)
Living area fraction									fLA = Living area / (4) =			0.1961 (91)
MIT	16.2278	16.5670	17.2084	18.1308	18.9718	19.6732	19.9924	19.9484	19.4266	18.3735	17.2037	16.2322 (92)
Temperature adjustment												0.0000
adjusted MIT	16.2278	16.5670	17.2084	18.1308	18.9718	19.6732	19.9924	19.9484	19.4266	18.3735	17.2037	16.2322 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8682	0.8464	0.8101	0.7486	0.6613	0.5441	0.4277	0.4633	0.6271	0.7671	0.8419	0.8749 (94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	323.2928	345.6627	359.1474	358.6480	333.8869	268.3009	201.2577	203.0795	254.8747	287.8841	299.7856	312.4210 (95)

Full SAP Calculation Printout



	929.2013	902.6342	822.8471	686.5347	537.4814	364.0812	243.4580	253.2407	386.6687	574.5606	756.2325	912.3136 (97)
Space heating kWh	450.7959	374.2848	344.9926	236.0784	151.4743	0.0000	0.0000	0.0000	0.0000	213.2873	328.6418	446.3201 (98a)
Space heating requirement - total per year (kWh/year)												2545.8752
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	450.7959	374.2848	344.9926	236.0784	151.4743	0.0000	0.0000	0.0000	0.0000	213.2873	328.6418	446.3201 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2545.8752
Space heating per m2										(98c) / (4) =		68.7703 (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	450.7959	374.2848	344.9926	236.0784	151.4743	0.0000	0.0000	0.0000	0.0000	213.2873	328.6418	446.3201 (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)	450.7959	374.2848	344.9926	236.0784	151.4743	0.0000	0.0000	0.0000	0.0000	213.2873	328.6418	446.3201 (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	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (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	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (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	13.3427	10.7040	9.6378	7.0610	5.4542	4.4561	4.9755	6.4673	8.4004	11.0217	12.4490	13.7135 (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												2545.8752 (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												1448.7059 (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)												107.6832 (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												4143.2643 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2545.8752	16.4900	419.8148 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1448.7059	16.4900	238.8916 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	107.6832	16.4900	17.7570 (250)
Additional standing charges			0.0000 (251)
Total energy cost			683.2243 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	2.9988 (257)
SAP value		51.3896

Full SAP Calculation Printout



SAP rating (Section 12)
SAP band

51 (258)
E

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	2545.8752	0.1537	391.2851	(261)
Total CO ₂ associated with community systems			0.0000	(373)
Water heating (other fuel)	1448.7059	0.1416	205.1050	(264)
Space and water heating			596.3901	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	107.6832	0.1443	15.5420	(268)
Total CO ₂ , kg/year			617.6194	(272)
CO ₂ emissions per m ²			16.6800	(273)
EI value			89.9097	
EI rating			90	(274)
EI band			B	

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling	37.0200	2.4700	91.4394	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.0200			(5)
Dwelling volume			91.4394	(5)

2. Ventilation rate

		m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000	(8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7500	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500	(21)
Wind speed	Jan 4.8000 Feb 4.5000 Mar 4.4000 Apr 3.9000 May 3.9000 Jun 3.6000 Jul 3.7000 Aug 3.5000 Sep 3.7000 Oct 4.0000 Nov 4.1000 Dec 4.4000		(22)
Wind factor	1.2000 1.1250 1.1000 0.9750 0.9750 0.9000 0.9250 0.8750 0.9250 1.0000 1.0250 1.1000		(22a)
Adj infilt rate	0.9000 0.8438 0.8250 0.7312 0.7312 0.6750 0.6938 0.6562 0.6938 0.7500 0.7687 0.8250		(22b)
Effective ac	0.9050 0.8560 0.8403 0.7674 0.7674 0.7278 0.7406 0.7153 0.7406 0.7812 0.7955 0.8403		(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								
Upgraded Windows			7.3900	1.1450	8.4618			(27)
Solid Door			1.7600	1.2000	2.1120			(26)
Existing Wall	48.9900	7.3900	41.6000	0.3000	12.4800	9.0000	374.4000	(29a)
Wall to Corridor	15.3600	1.7600	13.6000	0.3000	4.0800	9.0000	122.4000	(29a)
External Roof	25.0400		25.0400	0.1600	4.0064	9.0000	225.3600	(30)
Total net area of external elements Aum(A, m ²)			89.3900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.1402			(33)
Main dwelling								
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000	(32)
Party Floor			37.0200			40.0000	1480.8000	(32d)
Party Ceiling			11.9800			30.0000	359.4000	(32b)
Internal Wall			14.3800			9.0000	129.4200	(32c)
Heat capacity Cm = Sum(A x k)								(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K								(35)
Thermal bridges (Default value 0.200 * total exposed area)								(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	49.0182	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)								
(38)m	Jan 27.3084 Feb 25.8285 Mar 25.3564 Apr 23.1552 May 23.1552 Jun 21.9617 Jul 22.3490 Aug 21.5851 Sep 22.3490 Oct 23.5742 Nov 24.0039 Dec 25.3564							(38)

Full SAP Calculation Printout



Heat transfer coeff	76.3266	74.8467	74.3747	72.1734	72.1734	70.9800	71.3672	70.6034	71.3672	72.5925	73.0221	74.3747 (39)
Average = Sum(39)m / 12 =												72.8501
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.0618	2.0218	2.0090	1.9496	1.9496	1.9173	1.9278	1.9072	1.9278	1.9609	1.9725	2.0090 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	1.9679

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.3296 (42)
Hot water usage for mixer showers													
46.5121	45.8131	44.7945	42.8457	41.4075	39.8037	38.8920	39.9029	41.0110	42.7330	44.7237	46.3339	(42a)	
Hot water usage for baths													
20.1250	19.8261	19.4052	18.6291	18.0480	17.4037	17.0557	17.4736	17.9287	18.6181	19.4102	20.0569	(42b)	
Hot water usage for other uses													
28.2462	27.2191	26.1920	25.1648	24.1377	23.1106	23.1106	24.1377	25.1648	26.1920	27.2191	28.2462	(42c)	
Average daily hot water use (litres/day)												87.2200 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
94.8833	92.8583	90.3917	86.6397	83.5933	80.3179	79.0583	81.5142	84.1045	87.5431	91.3530	94.6371	(44)	
Energy content	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (45)	
Energy content (annual)										Total = Sum(45)m =	1448.7059		
Distribution loss (46)m = 0.15 x (45)m													
22.5408	19.8343	20.8393	17.7908	16.8799	14.8140	14.3421	15.1397	15.5564	17.8193	19.5224	22.2268	(46)	
Water storage loss (or HIU loss):													
Store volume												150.0000 (47)	
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)	
Volume factor from Table 2a												0.9283 (52)	
Temperature factor from Table 2b												0.6000 (53)	
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	0.0000 (56)	
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	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													
150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788	(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	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (64)	
												Total per year (kWh/year) = Sum(64)m = 1448.7059 (64)	
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)	
Heat gains from water heating, kWh/month													
49.9654	43.9661	46.1938	39.4363	37.4171	32.8378	31.7917	33.5598	34.4833	39.4994	43.2746	49.2694	(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	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2437	13.5393	11.0109	8.3360	6.2312	5.2607	5.6843	7.3887	9.9171	12.5920	14.6968	15.6673 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	170.3260	172.0934	167.6395	158.1576	146.1885	134.9392	127.4239	125.6565	130.1104	139.5923	151.5614	162.8107 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071 (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)	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833 (71)
Water heating gains (Table 5)	67.1578	65.4258	62.0884	54.7726	50.2918	45.6080	42.7308	45.1072	47.8935	53.0906	60.1036	66.2224 (72)
Total internal gains	326.6262	324.9572	314.6375	295.1649	276.6102	256.7066	246.7377	249.0511	258.8197	279.1736	300.2605	318.5991 (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				
Southeast			2.6000	42.6275	0.6300	0.7000	0.7700	33.8716 (77)				
Northwest			4.7900	13.7622	0.6300	0.7000	0.7700	20.1463 (81)				
Solar gains	54.0179	87.9838	136.1818	206.1274	246.3792	272.7198	255.2599	217.7497	167.5900	108.7002	66.6101	43.9159 (83)
Total gains	380.6440	412.9410	450.8193	501.2923	522.9894	529.4264	501.9976	466.8008	426.4097	387.8738	366.8706	362.5150 (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	11.4573	11.6838	11.7580	12.1166	12.1166	12.3203	12.2535	12.3860	12.2535	12.0466	11.9758	11.7580
alpha	1.7638	1.7789	1.7839	1.8078	1.8078	1.8214	1.8169	1.8257	1.8169	1.8031	1.7984	1.7839
util living area												
	0.9083	0.8923	0.8576	0.7898	0.6903	0.5506	0.4246	0.4359	0.6464	0.8013	0.8794	0.9118 (86)
MIT	17.1117	17.4058	18.0774	19.0025	19.8715	20.5073	20.7971	20.7964	20.2929	19.3297	18.1706	17.1861 (87)

Full SAP Calculation Printout



Th 2	19.9691	19.9891	19.9955	20.0252	20.0252	20.0413	20.0361	20.0464	20.0361	20.0196	20.0137	19.9955 (88)
util rest of house	0.8992	0.8818	0.8430	0.7671	0.6517	0.4880	0.3327	0.3407	0.5888	0.7735	0.8656	0.9031 (89)
MIT 2	16.4149	16.7157	17.3805	18.2990	19.1275	19.7108	19.9383	19.9496	19.5341	18.6261	17.4902	16.5047 (90)
Living area fraction									FLA = Living area /	(4) =		0.1961 (91)
MIT	16.5516	16.8511	17.5172	18.4370	19.2734	19.8670	20.1067	20.1156	19.6829	18.7641	17.6236	16.6383 (92)
Temperature adjustment												0.0000
adjusted MIT	16.5516	16.8511	17.5172	18.4370	19.2734	19.8670	20.1067	20.1156	19.6829	18.7641	17.6236	16.6383 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8568	0.8372	0.7956	0.7215	0.6171	0.4754	0.3400	0.3482	0.5646	0.7287	0.8204	0.8618	(94)
Useful gains	326.1316	345.7314	358.6645	361.6893	322.7186	251.6859	170.6866	162.5286	240.7309	282.6503	300.9909	312.4307	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	881.6932	857.0752	774.7764	645.0146	481.6417	317.0669	193.1725	184.6726	334.2085	512.7992	695.4363	850.7228	(97)
Space heating kWh	413.3378	343.6231	309.5872	203.9942	118.2387	0.0000	0.0000	0.0000	0.0000	171.2308	284.0007	400.4893	(98a)
Space heating requirement - total per year (kWh/year)												2244.5019	
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	413.3378	343.6231	309.5872	203.9942	118.2387	0.0000	0.0000	0.0000	0.0000	171.2308	284.0007	400.4893	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2244.5019	
Space heating per m2										(98c) / (4) =		60.6294	(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	413.3378	343.6231	309.5872	203.9942	118.2387	0.0000	0.0000	0.0000	0.0000	171.2308	284.0007	400.4893	(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)	413.3378	343.6231	309.5872	203.9942	118.2387	0.0000	0.0000	0.0000	0.0000	171.2308	284.0007	400.4893	(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	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788	(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	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	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	13.3427	10.7040	9.6378	7.0610	5.4542	4.4561	4.9755	6.4673	8.4004	11.0217	12.4490	13.7135	(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												2244.5019	(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												1448.7059	(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)												107.6832	(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												3841.8910	(238)

10a. Fuel costs - using BEDF prices (589)

Full SAP Calculation Printout



	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2244.5019	28.4300	638.1119 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1448.7059	28.4300	411.8671 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	107.6832	28.4300	30.6143 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1092.2496 (255)

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	2244.5019	0.1541	345.9505 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1448.7059	0.1416	205.1050 (264)
Space and water heating			551.0555 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	107.6832	0.1443	15.5420 (268)
Total CO2, kg/year			572.2847 (272)

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	2244.5019	1.5706	3525.3127 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1448.7059	1.5235	2207.1583 (278)
Space and water heating			5732.4710 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	107.6832	1.5338	165.1681 (282)
Total Primary energy kWh/year			5959.6639 (286)

Full SAP Calculation Printout



Plot Reference	Flat 5			Issued on Date	29/01/2026	
Assessment Reference	Notional		Plot Type Ref			
Plot Address				SAP Version	10.2	
SAP Rating	55 D		DER	15.46	TER	
Environmental	91 B		% DER < TER			N/A
CO ₂ Emissions (t/year)	0.53		DFEE	71.43	TFEE	
Compliance Check	N/A		% DFEE < TFEE			
% DPER < TPER			DPER	160.90	TPER	
Assessor Details	Miss Charlotte Russell				Assessor ID	DK97-0001
Client	tbc, tbc					

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.5400 (1b)	x 2.4700 (2b)	= 92.7238 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 92.7238 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813 (22b)
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.7600	1.2000	2.1120		(26)
Roof lights			4.5000	1.1450	5.1527		(27a)
Wall to Corridor	21.2800	1.7600	19.5200	0.2600	5.0752	9.0000	175.6800 (29a)
Ashlar Walls	33.4900		33.4900	0.2600	8.7074	9.0000	301.4100 (29a)
External Roof	9.3000	2.4000	6.9000	0.1600	1.1040	9.0000	62.1000 (30)
Insulated at Rafters	28.2400	2.1000	26.1400	0.1600	4.1824	9.0000	235.2600 (30)
Total net area of external elements Aum(A, m ²)			92.3100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.3337		(33)
Main dwelling							
Party Floor			37.5400			40.0000	1501.6000 (32d)
Internal Wall			22.2300			9.0000	200.0700 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		2476.1200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							65.9595 (35)
Thermal bridges (Default value 0.200 * total exposed area)							18.4620 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		44.7957 (37)

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

Full SAP Calculation Printout



(38)m	29.2894	28.7462	28.2137	25.7126	25.2447	23.0663	23.0663	22.6629	23.9054	25.2447	26.1913	27.1810 (38)
Heat transfer coeff	74.0851	73.5419	73.0094	70.5083	70.0403	67.8620	67.8620	67.4585	68.7010	70.0403	70.9870	71.9767 (39)
Average = Sum(39)m / 12 =												70.5060

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.9735	1.9590	1.9448	1.8782	1.8658	1.8077	1.8077	1.7970	1.8301	1.8658	1.8910	1.9173 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

												1.3426 (42)	
Assumed occupancy													
Hot water usage for mixer showers													
	46.7304	46.0281	45.0047	43.0468	41.6018	39.9905	39.0745	40.0901	41.2034	42.9336	44.9336	46.5513 (42a)	
Hot water usage for baths													
	20.2188	19.9185	19.4957	18.7160	18.1322	17.4849	17.1352	17.5551	18.0123	18.7050	19.5007	20.1505 (42b)	
Hot water usage for other uses													
	28.3796	27.3476	26.3156	25.2836	24.2516	23.2196	23.2196	24.2516	25.2836	26.3156	27.3476	28.3796 (42c)	
Average daily hot water use (litres/day)												87.6294 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	95.3287	93.2942	90.8160	87.0464	83.9857	80.6950	79.4294	81.8969	84.4993	87.9541	91.7818	95.0813 (44)	
Energy conte	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (45)	
Energy content (annual)										Total = Sum(45)m =			1455.5066
Distribution loss (46)m = 0.15 x (45)m													
	22.6466	19.9275	20.9371	17.8743	16.9591	14.8836	14.4094	15.2108	15.6294	17.9029	19.6140	22.3312 (46)	
Water storage loss (or HIU loss):													
Store volume												150.0000 (47)	
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)	
Volume factor from Table 2a												0.9283 (52)	
Temperature factor from Table 2b												0.6000 (53)	
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 (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													
	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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													
	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (64)	
										Total per year (kWh/year) = Sum(64)m =			1455.5066 (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													
	50.2000	44.1725	46.4106	39.6214	37.5927	32.9919	31.9409	33.7173	34.6452	39.6848	43.4777	49.5007 (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	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2794	13.5710	11.0367	8.3555	6.2458	5.2730	5.6976	7.4060	9.9403	12.6215	14.7312	15.7040 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	172.2389	174.0262	169.5222	159.9339	147.8303	136.4546	128.8550	127.0677	131.5716	141.1600	153.2636	164.6392 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982 (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)	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040 (71)
Water heating gains (Table 5)	67.4731	65.7329	62.3799	55.0297	50.5279	45.8221	42.9314	45.3190	48.1183	53.3398	60.3857	66.5332 (72)
Total internal gains	329.2415	327.5802	317.1889	297.5693	278.8541	258.7999	248.7342	251.0428	260.8805	281.3715	302.6307	321.1267 (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				2.4000	26.0000	0.6300	1.0000				1.0000	35.3808 (82)
Northeast				0.5000	26.0000	0.6300	1.0000				1.0000	7.3710 (82)
Southeast				1.6000	26.0000	0.6300	1.0000				1.0000	23.5872 (82)
Solar gains	66.3390	137.7810	244.9440	382.7250	489.8880	510.3000	482.2335	400.5855	293.4225	168.3990	84.1995	53.5815 (83)
Total gains	395.5805	465.3612	562.1329	680.2943	768.7421	769.0999	730.9677	651.6283	554.3030	449.7705	386.8302	374.7082 (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, nll,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	9.2841	9.3526	9.4209	9.7550	9.8202	10.1354	10.1354	10.1961	10.0117	9.8202	9.6893	9.5560
alpha	1.6189	1.6235	1.6281	1.6503	1.6547	1.6757	1.6757	1.6797	1.6674	1.6547	1.6460	1.6371
util living area												
	0.8869	0.8541	0.7935	0.6910	0.5709	0.4442	0.3492	0.3931	0.5755	0.7614	0.8579	0.8938 (86)

Full SAP Calculation Printout



MIT	16.6734	17.1400	17.9779	19.0619	19.9199	20.5184	20.7747	20.7173	20.2011	19.0380	17.7029	16.6418 (87)
Th 2	20.0133	20.0205	20.0276	20.0609	20.0671	20.0961	20.0961	20.1015	20.0850	20.0671	20.0545	20.0413 (88)
util rest of house	0.8777	0.8426	0.7772	0.6672	0.5371	0.3982	0.2896	0.3321	0.5298	0.7369	0.8450	0.8853 (89)
MIT 2	16.0258	16.4877	17.3105	18.3759	19.1870	19.7491	19.9632	19.9277	19.4795	18.3812	17.0703	16.0112 (90)
Living area fraction									fLA = Living area / (4) =			0.2752 (91)
MIT	16.2040	16.6672	17.4941	18.5647	19.3887	19.9608	20.1865	20.1450	19.6781	18.5619	17.2444	16.1847 (92)
Temperature adjustment												0.0000
adjusted MIT	16.2040	16.6672	17.4941	18.5647	19.3887	19.9608	20.1865	20.1450	19.6781	18.5619	17.2444	16.1847 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8284	0.7899	0.7240	0.6232	0.5101	0.3908	0.2958	0.3352	0.5073	0.6883	0.7937	0.8375 (94)
Useful gains	327.6923	367.5853	406.9573	423.9678	392.1156	300.5854	216.2429	218.4385	281.1811	309.5912	307.0437	313.8313 (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	881.9092	865.3823	802.6738	681.4384	538.5191	363.7953	243.3857	252.6311	383.2216	557.6537	720.1201	862.6219 (97)
Space heating kWh	412.3374	334.5196	294.4131	185.3788	108.9242	0.0000	0.0000	0.0000	0.0000	184.5585	297.4150	408.3002 (98a)
Space heating requirement - total per year (kWh/year)												2225.8467
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	412.3374	334.5196	294.4131	185.3788	108.9242	0.0000	0.0000	0.0000	0.0000	184.5585	297.4150	408.3002 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2225.8467
Space heating per m2										(98c) / (4) =		59.2927 (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	412.3374	334.5196	294.4131	185.3788	108.9242	0.0000	0.0000	0.0000	0.0000	184.5585	297.4150	408.3002 (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)	412.3374	334.5196	294.4131	185.3788	108.9242	0.0000	0.0000	0.0000	0.0000	184.5585	297.4150	408.3002 (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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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)
(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 (217)
Fuel for water heating, kWh/month	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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 (231)
Lighting	13.3739	10.7291	9.6603	7.0776	5.4669	4.4665	4.9871	6.4824	8.4200	11.0476	12.4782	13.7456 (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)
(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)	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)
(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)	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)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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												2225.8467 (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												1455.5066 (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)												107.9353 (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												3830.2886 (238)

Full SAP Calculation Printout



10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2225.8467	16.4900	367.0421 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1455.5066	16.4900	240.0130 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	107.9353	16.4900	17.7985 (250)
Additional standing charges			0.0000 (251)
Total energy cost			631.6146 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.7548 (257)
SAP value		55.3447
SAP rating (Section 12)		55 (258)
SAP band		D

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	2225.8467	0.1542	343.2290 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1455.5066	0.1416	206.0678 (264)
Space and water heating			549.2969 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	107.9353	0.1443	15.5784 (268)
Total CO2, kg/year			570.5625 (272)
CO2 emissions per m2			15.2000 (273)
EI value			90.7372
EI rating			91 (274)
EI band			B

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	37.5400 (1b)	x 2.4700 (2b)	= 92.7238 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	92.7238 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							

Full SAP Calculation Printout



Solid Door					1.7600	1.2000	2.1120					(26)
Roof lights					4.5000	1.1450	5.1527					(27a)
Wall to Corridor	21.2800		1.7600		19.5200	0.2600	5.0752	9.0000		175.6800		(29a)
Ashlar Walls	33.4900				33.4900	0.2600	8.7074	9.0000		301.4100		(29a)
External Roof	9.3000		2.4000		6.9000	0.1600	1.1040	9.0000		62.1000		(30)
Insulated at Rafters	28.2400		2.1000		26.1400	0.1600	4.1824	9.0000		235.2600		(30)
Total net area of external elements Aum(A, m2)					92.3100							(31)
Fabric heat loss, W/K = Sum (A x U)						(26)... (30) + (32) =	26.3337					(33)
Main dwelling												
Party Floor					37.5400			40.0000		1501.6000		(32d)
Internal Wall					22.2300			9.0000		200.0700		(32c)
Heat capacity Cm = Sum(A x k)							(28)... (30) + (32) + (32a)... (32e) =			2476.1200		(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K										65.9595		(35)
Thermal bridges (Default value 0.200 * total exposed area)										18.4620		(36)
Point Thermal bridges										(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =	44.7957	(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	27.6920	26.1913	25.7126	23.4804	23.4804	22.2702	22.6629	21.8883	22.6629	23.9054	24.3410	25.7126 (38)
Average = Sum(39)m / 12 =	72.4876	70.9870	70.5083	68.2761	68.2761	67.0659	67.4585	66.6840	67.4585	68.7010	69.1367	70.5083 (39)
												68.9623
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.9309	1.8910	1.8782	1.8188	1.8188	1.7865	1.7970	1.7763	1.7970	1.8301	1.8417	1.8782 (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												1.3426 (42)
Hot water usage for mixer showers	46.7304	46.0281	45.0047	43.0468	41.6018	39.9905	39.0745	40.0901	41.2034	42.9336	44.9336	46.5513 (42a)
Hot water usage for baths	20.2188	19.9185	19.4957	18.7160	18.1322	17.4849	17.1352	17.5551	18.0123	18.7050	19.5007	20.1505 (42b)
Hot water usage for other uses	28.3796	27.3476	26.3156	25.2836	24.2516	23.2196	23.2196	24.2516	25.2836	26.3156	27.3476	28.3796 (42c)
Average daily hot water use (litres/day)												87.6294 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	95.3287	93.2942	90.8160	87.0464	83.9857	80.6950	79.4294	81.8969	84.4993	87.9541	91.7818	95.0813 (44)
Distribution loss (46)m = 0.15 x (45)m	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (45)
Total = Sum(45)m =												1455.5066
Water storage loss (or HIU loss):	22.6466	19.9275	20.9371	17.8743	16.9591	14.8836	14.4094	15.2108	15.6294	17.9029	19.6140	22.3312 (46)
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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												
	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (62)
WVHRS	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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (64)
Total per year (kWh/year) = Sum(64)m =												1455.5066 (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	50.2000	44.1725	46.4106	39.6214	37.5927	32.9919	31.9409	33.7173	34.6452	39.6848	43.4777	49.5007 (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	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2794	13.5710	11.0367	8.3555	6.2458	5.2730	5.6976	7.4060	9.9403	12.6215	14.7312	15.7040	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	172.2389	174.0262	169.5222	159.9339	147.8303	136.4546	128.8550	127.0677	131.5716	141.1600	153.2636	164.6392	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	(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)	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	(71)
Water heating gains (Table 5)	67.4731	65.7329	62.3799	55.0297	50.5279	45.8221	42.9314	45.3190	48.1183	53.3398	60.3857	66.5332	(72)
Total internal gains	329.2415	327.5802	317.1889	297.5693	278.8541	258.7999	248.7342	251.0428	260.8805	281.3715	302.6307	321.1267	(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
-------	------------	--------------------------------	-----------------------------------	------------------------------------	------------------------------	------------

Full SAP Calculation Printout



North				2.4000		32.0000		0.6300		1.0000		1.0000		43.5456 (82)	
Northeast				0.5000		32.0000		0.6300		1.0000		1.0000		9.0720 (82)	
Southeast				1.6000		32.0000		0.6300		1.0000		1.0000		29.0304 (82)	
Solar gains	81.6480	150.5385	265.3560	433.7550	530.7120	589.3965	551.1240	464.3730	339.3495	196.4655	104.6115		63.7875 (83)		
Total gains	410.8895	478.1187	582.5449	731.3243	809.5661	848.1964	799.8582	715.4158	600.2300	477.8370	407.2422		384.9142 (84)		
7. Mean internal temperature (heating season)															
Temperature during heating periods in the living area from Table 9, Th1 (C)														21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
tau	9.4887	9.6893	9.7550	10.0740	10.0740	10.2557	10.1961	10.3145	10.1961	10.0117	9.9486	9.7550			
alpha	1.6326	1.6460	1.6503	1.6716	1.6716	1.6837	1.6797	1.6876	1.6797	1.6674	1.6632	1.6503			
util living area															
	0.8731	0.8401	0.7702	0.6477	0.5155	0.3723	0.2738	0.2913	0.5006	0.7120	0.8316	0.8795 (86)			
MIT	17.0272	17.4467	18.3117	19.3878	20.1917	20.6865	20.8757	20.8686	20.4557	19.4606	18.1618	17.0766 (87)			
Th 2	20.0345	20.0545	20.0609	20.0906	20.0906	20.1067	20.1015	20.1118	20.1015	20.0850	20.0792	20.0609 (88)			
util rest of house															
	0.8627	0.8276	0.7525	0.6221	0.4790	0.3246	0.2129	0.2261	0.4493	0.6820	0.8162	0.8697 (89)			
MIT 2	16.3878	16.8093	17.6554	18.7030	19.4506	19.8952	20.0391	20.0465	19.7129	18.7958	17.5353	16.4533 (90)			
Living area fraction									fLA = Living area / (4) =						0.2752 (91)
MIT	16.5637	16.9847	17.8360	18.8914	19.6545	20.1129	20.2693	20.2727	19.9173	18.9788	17.7077	16.6248 (92)			
Temperature adjustment												0.0000			
adjusted MIT	16.5637	16.9847	17.8360	18.8914	19.6545	20.1129	20.2693	20.2727	19.9173	18.9788	17.7077	16.6248 (93)			
8. Space heating requirement															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Utilisation	0.8120	0.7750	0.7012	0.5840	0.4601	0.3249	0.2247	0.2384	0.4379	0.6392	0.7645	0.8203 (94)			
Useful gains	333.6616	370.5244	408.4767	427.1282	372.4958	275.5880	179.7157	170.5408	262.8601	305.4530	311.3536	315.7309 (95)			
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)			
Heat loss rate W	838.2284	822.3611	756.9744	641.2086	481.6565	316.0772	193.5590	184.8940	331.7143	500.0591	664.2474	805.5426 (97)			
Space heating kWh															
	375.3977	303.6342	259.2823	154.1379	81.2155	0.0000	0.0000	0.0000	0.0000	144.7869	254.0836	364.4200 (98a)			
Space heating requirement - total per year (kWh/year)													1936.9581		
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															
	375.3977	303.6342	259.2823	154.1379	81.2155	0.0000	0.0000	0.0000	0.0000	144.7869	254.0836	364.4200 (98c)			
Space heating requirement after solar contribution - total per year (kWh/year)													1936.9581		
Space heating per m2											(98c) / (4) =		51.5972 (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	375.3977	303.6342	259.2823	154.1379	81.2155	0.0000	0.0000	0.0000	0.0000	144.7869	254.0836	364.4200 (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)	375.3977	303.6342	259.2823	154.1379	81.2155	0.0000	0.0000	0.0000	0.0000	144.7869	254.0836	364.4200 (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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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	13.3739	10.7291	9.6603	7.0776	5.4669	4.4665	4.9871	6.4824	8.4200	11.0476	12.4782	13.7456 (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													1936.9581 (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													1455.5066 (219)		

Full SAP Calculation Printout



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)	107.9353 (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	3541.4000 (238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1936.9581	28.4300	550.6772 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1455.5066	28.4300	413.8005 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	107.9353	28.4300	30.6860 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1006.8200 (255)

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	1936.9581	0.1547	299.6618 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1455.5066	0.1416	206.0678 (264)
Space and water heating			505.7296 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	107.9353	0.1443	15.5784 (268)
Total CO2, kg/year			526.9952 (272)

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	1936.9581	1.5728	3046.3809 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1455.5066	1.5235	2217.5194 (278)
Space and water heating			5263.9003 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	107.9353	1.5338	165.5548 (282)
Total Primary energy kWh/year			5491.4799 (286)

SAP 10 EPC IMPROVEMENTS

Notional

Current energy efficiency rating:	D 55
Current environmental impact rating:	B 91

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	D 55
Potential environmental impact rating:	B 91

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £1007	Potential £1007	Saving £0
Electricity			
Space heating	£562	£562	£0
Water heating	£414	£414	£0
Lighting	£31	£31	£0
Total cost of fuels	£1007	£1007	£0
Total cost of uses	£1007	£1007	£0
Delivered energy	94 kWh/m²	94 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.5 tonnes	0.0 tonnes
CO2 emissions per m²	14 kg/m²	14 kg/m²	0 kg/m²
Primary energy	146 kWh/m²	146 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.5400 (1b)	x 2.4700 (2b)	= 92.7238 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 92.7238 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 90 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross 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												
Solid Door			1.7600	1.2000	2.1120		(26)					
Roof lights			4.5000	1.1450	5.1527		(27a)					
Wall to Corridor	21.2800	1.7600	19.5200	0.2600	5.0752	9.0000	175.6800 (29a)					
Ashlar Walls	33.4900		33.4900	0.2600	8.7074	9.0000	301.4100 (29a)					
External Roof	9.3000	2.4000	6.9000	0.1600	1.1040	9.0000	62.1000 (30)					
Insulated at Rafters	28.2400	2.1000	26.1400	0.1600	4.1824	9.0000	235.2600 (30)					
Total net area of external elements Aum(A, m2)			92.3100				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.3337		(33)					
Main dwelling												
Party Floor			37.5400			40.0000	1501.6000 (32d)					
Internal Wall			22.2300			9.0000	200.0700 (32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	2476.1200 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							65.9595 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							18.4620 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	44.7957 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	29.2894	28.7462	28.2137	25.7126	25.2447	23.0663	23.0663	22.6629	23.9054	25.2447	26.1913	27.1810 (38)
Heat transfer coeff	74.0851	73.5419	73.0094	70.5083	70.0403	67.8620	67.8620	67.4585	68.7010	70.0403	70.9870	71.9767 (39)
Average = Sum(39)m / 12 =												70.5060
HLP	1.9735	1.9590	1.9448	1.8782	1.8658	1.8077	1.8077	1.7970	1.8301	1.8658	1.8910	1.9173 (40)
HLP (average)												1.8782
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

												1.3426 (42)
Assumed occupancy												
Hot water usage for mixer showers												
46.7304	46.0281	45.0047	43.0468	41.6018	39.9905	39.0745	40.0901	41.2034	42.9336	44.9336	46.5513 (42a)	
Hot water usage for baths												
20.2188	19.9185	19.4957	18.7160	18.1322	17.4849	17.1352	17.5551	18.0123	18.7050	19.5007	20.1505 (42b)	
Hot water usage for other uses												

Full SAP Calculation Printout



Average daily hot water use (litres/day)	28.3796	27.3476	26.3156	25.2836	24.2516	23.2196	23.2196	24.2516	25.2836	26.3156	27.3476	28.3796 (42c) 87.6294 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	95.3287	93.2942	90.8160	87.0464	83.9857	80.6950	79.4294	81.8969	84.4993	87.9541	91.7818	95.0813 (44)
Distribution loss (46)m = 0.15 x (45)m	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (45)
Water storage loss (or HIU loss):	22.6466	19.9275	20.9371	17.8743	16.9591	14.8836	14.4094	15.2108	15.6294	17.9029	19.6140	22.3312 (46)
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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	50.2000	44.1725	46.4106	39.6214	37.5927	32.9919	31.9409	33.7173	34.6452	39.6848	43.4777	49.5007 (65)
Total per year (kWh/year) = Sum(64)m =												1455.5066 (64)
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	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2794	13.5710	11.0367	8.3555	6.2458	5.2730	5.6976	7.4060	9.9403	12.6215	14.7312	15.7040 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	172.2389	174.0262	169.5222	159.9339	147.8303	136.4546	128.8550	127.0677	131.5716	141.1600	153.2636	164.6392 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982 (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)	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040 (71)
Water heating gains (Table 5)	67.4731	65.7329	62.3799	55.0297	50.5279	45.8221	42.9314	45.3190	48.1183	53.3398	60.3857	66.5332 (72)
Total internal gains	329.2415	327.5802	317.1889	297.5693	278.8541	258.7999	248.7342	251.0428	260.8805	281.3715	302.6307	321.1267 (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					2.4000	26.0000	0.6300	1.0000			1.0000	35.3808 (82)
Northeast					0.5000	26.0000	0.6300	1.0000			1.0000	7.3710 (82)
Southeast					1.6000	26.0000	0.6300	1.0000			1.0000	23.5872 (82)
Solar gains	66.3390	137.7810	244.9440	382.7250	489.8880	510.3000	482.2335	400.5855	293.4225	168.3990	84.1995	53.5815 (83)
Total gains	395.5805	465.3612	562.1329	680.2943	768.7421	769.0999	730.9677	651.6283	554.3030	449.7705	386.8302	374.7082 (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	9.2841	9.3526	9.4209	9.7550	9.8202	10.1354	10.1354	10.1961	10.0117	9.8202	9.6893	9.5560
alpha	1.6189	1.6235	1.6281	1.6503	1.6547	1.6757	1.6757	1.6797	1.6674	1.6547	1.6460	1.6371
util living area	0.8869	0.8541	0.7935	0.6910	0.5709	0.4442	0.3492	0.3931	0.5755	0.7614	0.8579	0.8938 (86)
MIT	16.6734	17.1400	17.9779	19.0619	19.9199	20.5184	20.7747	20.7173	20.2011	19.0380	17.7029	16.6418 (87)
Th 2	20.0133	20.0205	20.0276	20.0609	20.0671	20.0961	20.0961	20.1015	20.0850	20.0671	20.0545	20.0413 (88)
util rest of house	0.8777	0.8426	0.7772	0.6672	0.5371	0.3982	0.2896	0.3321	0.5298	0.7369	0.8450	0.8853 (89)
MIT 2	16.0258	16.4877	17.3105	18.3759	19.1870	19.7491	19.9632	19.9277	19.4795	18.3812	17.0703	16.0112 (90)
Living area fraction									fLA = Living area / (4) =			0.2752 (91)
MIT	16.2040	16.6672	17.4941	18.5647	19.3887	19.9608	20.1865	20.1450	19.6781	18.5619	17.2444	16.1847 (92)
Temperature adjustment												0.0000
adjusted MIT	16.2040	16.6672	17.4941	18.5647	19.3887	19.9608	20.1865	20.1450	19.6781	18.5619	17.2444	16.1847 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8284	0.7899	0.7240	0.6232	0.5101	0.3908	0.2958	0.3352	0.5073	0.6883	0.7937	0.8375 (94)
Ext temp.	327.6923	367.5853	406.9573	423.9678	392.1156	300.5854	216.2429	218.4385	281.1811	309.5912	307.0437	313.8313 (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)

Full SAP Calculation Printout



	881.9092	865.3823	802.6738	681.4384	538.5191	363.7953	243.3857	252.6311	383.2216	557.6537	720.1201	862.6219 (97)
Space heating kWh	412.3374	334.5196	294.4131	185.3788	108.9242	0.0000	0.0000	0.0000	0.0000	184.5585	297.4150	408.3002 (98a)
Space heating requirement - total per year (kWh/year)												2225.8467
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	412.3374	334.5196	294.4131	185.3788	108.9242	0.0000	0.0000	0.0000	0.0000	184.5585	297.4150	408.3002 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2225.8467
Space heating per m2										(98c) / (4) =		59.2927 (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	412.3374	334.5196	294.4131	185.3788	108.9242	0.0000	0.0000	0.0000	0.0000	184.5585	297.4150	408.3002 (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)	412.3374	334.5196	294.4131	185.3788	108.9242	0.0000	0.0000	0.0000	0.0000	184.5585	297.4150	408.3002 (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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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	13.3739	10.7291	9.6603	7.0776	5.4669	4.4665	4.9871	6.4824	8.4200	11.0476	12.4782	13.7456 (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												2225.8467 (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												1455.5066 (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)												107.9353 (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												3830.2886 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2225.8467	16.4900	367.0421 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1455.5066	16.4900	240.0130 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	107.9353	16.4900	17.7985 (250)
Additional standing charges			0.0000 (251)
Total energy cost			631.6146 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	2.7548 (257)
SAP value		55.3447

Full SAP Calculation Printout



SAP rating (Section 12)
SAP band

55 (258)
D

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	2225.8467	0.1542	343.2290	(261)
Total CO ₂ associated with community systems			0.0000	(373)
Water heating (other fuel)	1455.5066	0.1416	206.0678	(264)
Space and water heating			549.2969	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	107.9353	0.1443	15.5784	(268)
Total CO ₂ , kg/year			570.5625	(272)
CO ₂ emissions per m ²			15.2000	(273)
EI value			90.7372	
EI rating			91	(274)
EI band			B	

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling	37.5400	2.4700	92.7238	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5400			(5)
Dwelling volume			92.7238	(5)

2. Ventilation rate

		m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000	(8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7500	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500	(21)
Wind speed	Jan 4.8000 Feb 4.5000 Mar 4.4000 Apr 3.9000 May 3.9000 Jun 3.6000 Jul 3.7000 Aug 3.5000 Sep 3.7000 Oct 4.0000 Nov 4.1000 Dec 4.4000		(22)
Wind factor	1.2000 1.1250 1.1000 0.9750 0.9750 0.9000 0.9250 0.8750 0.9250 1.0000 1.0250 1.1000		(22a)
Adj infilt rate	0.9000 0.8438 0.8250 0.7312 0.7312 0.6750 0.6938 0.6562 0.6938 0.7500 0.7687 0.8250		(22b)
Effective ac	0.9050 0.8560 0.8403 0.7674 0.7674 0.7278 0.7406 0.7153 0.7406 0.7812 0.7955 0.8403		(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								
Solid Door			1.7600	1.2000	2.1120			(26)
Roof lights			4.5000	1.1450	5.1527			(27a)
Wall to Corridor	21.2800	1.7600	19.5200	0.2600	5.0752	9.0000	175.6800	(29a)
Ashlar Walls	33.4900		33.4900	0.2600	8.7074	9.0000	301.4100	(29a)
External Roof	9.3000	2.4000	6.9000	0.1600	1.1040	9.0000	62.1000	(30)
Insulated at Rafters	28.2400	2.1000	26.1400	0.1600	4.1824	9.0000	235.2600	(30)
Total net area of external elements Aum(A, m ²)			92.3100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	26.3337		(33)
Main dwelling								
Party Floor			37.5400			40.0000	1501.6000	(32d)
Internal Wall			22.2300			9.0000	200.0700	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K								65.9595 (35)
Thermal bridges (Default value 0.200 * total exposed area)								18.4620 (36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	44.7957	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)								
(38)m	Jan 27.6920 Feb 26.1913 Mar 25.7126 Apr 23.4804 May 23.4804 Jun 22.2702 Jul 22.6629 Aug 21.8883 Sep 22.6629 Oct 23.9054 Nov 24.3410 Dec 25.7126							(38)
Heat transfer coeff								

Full SAP Calculation Printout



Average = Sum(39)m / 12 =	72.4876	70.9870	70.5083	68.2761	68.2761	67.0659	67.4585	66.6840	67.4585	68.7010	69.1367	70.5083 (39) 68.9623
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.9309	1.8910	1.8782	1.8188	1.8188	1.7865	1.7970	1.7763	1.7970	1.8301	1.8417	1.8782 (40) 1.8370
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3426 (42)
Hot water usage for mixer showers												
	46.7304	46.0281	45.0047	43.0468	41.6018	39.9905	39.0745	40.0901	41.2034	42.9336	44.9336	46.5513 (42a)
Hot water usage for baths												
	20.2188	19.9185	19.4957	18.7160	18.1322	17.4849	17.1352	17.5551	18.0123	18.7050	19.5007	20.1505 (42b)
Hot water usage for other uses												
	28.3796	27.3476	26.3156	25.2836	24.2516	23.2196	23.2196	24.2516	25.2836	26.3156	27.3476	28.3796 (42c)
Average daily hot water use (litres/day)												87.6294 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	95.3287	93.2942	90.8160	87.0464	83.9857	80.6950	79.4294	81.8969	84.4993	87.9541	91.7818	95.0813 (44)
Energy conte	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (45)
Energy content (annual)												Total = Sum(45)m = 1455.5066
Distribution loss (46)m = 0.15 x (45)m												
	22.6466	19.9275	20.9371	17.8743	16.9591	14.8836	14.4094	15.2108	15.6294	17.9029	19.6140	22.3312 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.9283 (52)
Temperature factor from Table 2b												0.6000 (53)
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												
	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (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												
	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (64)
Electric shower(s)												Total per year (kWh/year) = Sum(64)m = 1455.5066 (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												
	50.2000	44.1725	46.4106	39.6214	37.5927	32.9919	31.9409	33.7173	34.6452	39.6848	43.4777	49.5007 (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	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2794	13.5710	11.0367	8.3555	6.2458	5.2730	5.6976	7.4060	9.9403	12.6215	14.7312	15.7040 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	172.2389	174.0262	169.5222	159.9339	147.8303	136.4546	128.8550	127.0677	131.5716	141.1600	153.2636	164.6392 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982 (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)	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040 (71)
Water heating gains (Table 5)	67.4731	65.7329	62.3799	55.0297	50.5279	45.8221	42.9314	45.3190	48.1183	53.3398	60.3857	66.5332 (72)
Total internal gains	329.2415	327.5802	317.1889	297.5693	278.8541	258.7999	248.7342	251.0428	260.8805	281.3715	302.6307	321.1267 (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	2.4000				32.0000		0.6300		1.0000		1.0000		43.5456 (82)
Northeast	0.5000				32.0000		0.6300		1.0000		1.0000		9.0720 (82)
Southeast	1.6000				32.0000		0.6300		1.0000		1.0000		29.0304 (82)
Solar gains	81.6480	150.5385	265.3560	433.7550	530.7120	589.3965	551.1240	464.3730	339.3495	196.4655	104.6115	63.7875 (83)	
Total gains	410.8895	478.1187	582.5449	731.3243	809.5661	848.1964	799.8582	715.4158	600.2300	477.8370	407.2422	384.9142 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	9.4887	9.6893	9.7550	10.0740	10.0740	10.2557	10.1961	10.3145	10.1961	10.0117	9.9486	9.7550
alpha	1.6326	1.6460	1.6503	1.6716	1.6716	1.6837	1.6797	1.6876	1.6797	1.6674	1.6632	1.6503
util living area	0.8731	0.8401	0.7702	0.6477	0.5155	0.3723	0.2738	0.2913	0.5006	0.7120	0.8316	0.8795 (86)
MIT	17.0272	17.4467	18.3117	19.3878	20.1917	20.6865	20.8757	20.8686	20.4557	19.4606	18.1618	17.0766 (87)

Full SAP Calculation Printout



Th 2	20.0345	20.0545	20.0609	20.0906	20.0906	20.1067	20.1015	20.1118	20.1015	20.0850	20.0792	20.0609 (88)
util rest of house	0.8627	0.8276	0.7525	0.6221	0.4790	0.3246	0.2129	0.2261	0.4493	0.6820	0.8162	0.8697 (89)
MIT 2	16.3878	16.8093	17.6554	18.7030	19.4506	19.8952	20.0391	20.0465	19.7129	18.7958	17.5353	16.4533 (90)
Living area fraction									fLA = Living area /	(4) =		0.2752 (91)
MIT	16.5637	16.9847	17.8360	18.8914	19.6545	20.1129	20.2693	20.2727	19.9173	18.9788	17.7077	16.6248 (92)
Temperature adjustment												0.0000
adjusted MIT	16.5637	16.9847	17.8360	18.8914	19.6545	20.1129	20.2693	20.2727	19.9173	18.9788	17.7077	16.6248 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8120	0.7750	0.7012	0.5840	0.4601	0.3249	0.2247	0.2384	0.4379	0.6392	0.7645	0.8203	(94)
Useful gains	333.6616	370.5244	408.4767	427.1282	372.4958	275.5880	179.7157	170.5408	262.8601	305.4530	311.3536	315.7309	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	838.2284	822.3611	756.9744	641.2086	481.6565	316.0772	193.5590	184.8940	331.7143	500.0591	664.2474	805.5426	(97)
Space heating kWh	375.3977	303.6342	259.2823	154.1379	81.2155	0.0000	0.0000	0.0000	0.0000	144.7869	254.0836	364.4200	(98a)
Space heating requirement - total per year (kWh/year)												1936.9581	
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	375.3977	303.6342	259.2823	154.1379	81.2155	0.0000	0.0000	0.0000	0.0000	144.7869	254.0836	364.4200	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1936.9581	
Space heating per m2										(98c) / (4) =		51.5972	(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	375.3977	303.6342	259.2823	154.1379	81.2155	0.0000	0.0000	0.0000	0.0000	144.7869	254.0836	364.4200	(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)	375.3977	303.6342	259.2823	154.1379	81.2155	0.0000	0.0000	0.0000	0.0000	144.7869	254.0836	364.4200	(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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744	(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	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	13.3739	10.7291	9.6603	7.0776	5.4669	4.4665	4.9871	6.4824	8.4200	11.0476	12.4782	13.7456	(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													1936.9581 (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													1455.5066 (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)													107.9353 (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													3541.4000 (238)

10a. Fuel costs - using BEDF prices (589)

Full SAP Calculation Printout



	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1936.9581	28.4300	550.6772 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1455.5066	28.4300	413.8005 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563 (249)
Energy for lighting	107.9353	28.4300	30.6860 (250)
Additional standing charges			0.0000 (251)
Total energy cost			1006.8200 (255)

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	1936.9581	0.1547	299.6618 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1455.5066	0.1416	206.0678 (264)
Space and water heating			505.7296 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	107.9353	0.1443	15.5784 (268)
Total CO2, kg/year			526.9952 (272)

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	1936.9581	1.5728	3046.3809 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1455.5066	1.5235	2217.5194 (278)
Space and water heating			5263.9003 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	107.9353	1.5338	165.5548 (282)
Total Primary energy kWh/year			5491.4799 (286)

B. SAP Calculations

i. Proposed

Full SAP Calculation Printout



Plot Reference	Flat 1			Issued on Date	29/01/2026
Assessment Reference	Proposed	Plot Type Ref			
Plot Address				SAP Version	10.2
SAP Rating	65 D	DER	10.47	TER	
Environmental	93 A	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.48	DFEE	84.07	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	108.95	TPER	
Assessor Details	Miss Charlotte Russell			Assessor ID	DK97-0001
Client	tbc, tbc				

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.8600 (1b)	x 2.6000 (2b)	= 132.2360 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8600		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n)	= 132.2360 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7500 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813 (22b)	
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883 (25)	

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			10.7900	1.1450	12.3550		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			50.8600	0.2200	11.1892	75.0000	3814.5000 (28a)
Existing Wall	54.6300	10.7900	43.8400	0.2200	9.6448	9.0000	394.5600 (29a)
Wall to Corridor	15.7300	1.7600	13.9700	0.2200	3.0734	9.0000	125.7300 (29a)
Total net area of external elements Aum(A, m ²)			121.2200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.3744		(33)
Main dwelling							
Party Wall			12.5500	0.0000	0.0000	70.0000	878.5000 (32)
Party Ceiling			50.8600			30.0000	1525.8000 (32b)
Internal Wall			40.1700			9.0000	361.5300 (32c)
Internal Wall 2			17.4500			100.0000	1745.0001 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	8845.6201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							173.9210 (35)
Thermal bridges (Default value 0.200 * total exposed area)							24.2440 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	62.6184 (37)

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

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	41.7705	40.9957	40.2363	36.6695	36.0021	32.8955	32.8955	32.3202	34.0921	36.0021	37.3521	38.7636	(38)
Heat transfer coeff	104.3888	103.6141	102.8547	99.2878	98.6205	95.5138	95.5138	94.9385	96.7105	98.6205	99.9705	101.3819	(39)
Average = Sum(39)m / 12 =												99.2846	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0525	2.0372	2.0223	1.9522	1.9391	1.8780	1.8780	1.8667	1.9015	1.9391	1.9656	Dec 1.9934	(40)
HLP (average)												1.9521	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7154	(42)
Hot water usage for mixer showers													
52.9818	52.1856	51.0254	48.8055	47.1672	45.3403	44.3018	45.4533	46.7155	48.6771	50.9447	52.7788	(42a)	
Hot water usage for baths													
22.9071	22.5669	22.0879	21.2045	20.5431	19.8097	19.4135	19.8893	20.4072	21.1920	22.0935	22.8297	(42b)	
Hot water usage for other uses													
32.1978	31.0270	29.8562	28.6854	27.5145	26.3437	26.3437	27.5145	28.6854	29.8562	31.0270	32.1978	(42c)	
Average daily hot water use (litres/day)												99.3568	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	108.0868	105.7796	102.9694	98.6953	95.2248	91.4937	90.0591	92.8571	95.8081	99.7253	104.0652	107.8064	(44)
Energy content	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
25.6775	22.5943	23.7390	20.2663	19.2286	16.8753	16.3378	17.2465	17.7211	20.2989	22.2390	25.3198	25.3198	(46)
Water storage loss (or HIU loss):													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6048	(55)
Total storage loss													
18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	(56)
If cylinder contains dedicated solar storage													
18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	(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													
213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099	210.8099	(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	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099	(64)
												2144.9431	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													
Heat gains from water heating, kWh/month													
90.5273	80.4405	86.2305	77.4485	76.2325	69.9318	69.8244	71.8386	71.8067	78.6050	81.8213	89.7345	89.7345	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
18.3485	16.2970	13.2536	10.0338	7.5004	6.3322	6.8421	8.8936	11.9370	15.1568	17.6902	18.8585	18.8585	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
223.0855	225.4005	219.5669	207.1480	191.4713	176.7374	166.8943	164.5794	170.4129	182.8319	198.5085	213.2424	213.2424	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	(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)													
-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	(71)
Water heating gains (Table 5)													
121.6765	119.7032	115.9012	107.5674	102.4630	97.1274	93.8500	96.5573	99.7315	105.6518	113.6406	120.6109	120.6109	(72)
Total internal gains													
447.4275	445.7175	433.0386	409.0662	385.7516	361.5140	348.9034	351.3473	363.3984	387.9574	414.1563	437.0288	437.0288	(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	
Southeast				8.2300	36.7938		0.6300		0.7000		0.7700	92.5437 (77)
Northwest				2.5600	11.2829		0.6300		0.7000		0.7700	8.8274 (81)
Solar gains	101.3711	175.6046	248.0581	320.4102	370.8015	373.3612	357.7789	319.3835	272.9884	196.1804	121.9532	86.4070 (83)
Total gains	548.7986	621.3221	681.0967	729.4764	756.5531	734.8752	706.6823	670.7308	636.3868	584.1378	536.1095	523.4358 (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	23.5381	23.7141	23.8892	24.7474	24.9149	25.7252	25.7252	25.8811	25.4069	24.9149	24.5784	24.2362
alpha	2.5692	2.5809	2.5926	2.6498	2.6610	2.7150	2.7150	2.7254	2.6938	2.6610	2.6386	2.6157
util living area												
	0.9643	0.9495	0.9243	0.8751	0.7926	0.6606	0.5259	0.5627	0.7463	0.8897	0.9486	0.9679 (86)
MIT	18.2300	18.5325	19.0218	19.6895	20.2589	20.7026	20.8852	20.8595	20.5477	19.8193	18.9549	18.2378 (87)

Full SAP Calculation Printout



Th 2	19.9738	19.9814	19.9888	20.0239	20.0305	20.0610	20.0610	20.0667	20.0492	20.0305	20.0172	20.0033 (88)
util rest of house	0.9590	0.9421	0.9127	0.8550	0.7561	0.5970	0.4341	0.4732	0.6916	0.8681	0.9401	0.9633 (89)
MIT 2	17.4416	17.7450	18.2314	18.9048	19.4481	19.8652	20.0048	19.9940	19.7312	19.0434	18.1895	17.4687 (90)
Living area fraction									FLA = Living area / (4) =			0.5374 (91)
MIT	17.8652	18.1682	18.6561	19.3265	19.8838	20.3152	20.4779	20.4591	20.1699	19.4603	18.6008	17.8820 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8652	18.1682	18.6561	19.3265	19.8838	20.3152	20.4779	20.4591	20.1699	19.4603	18.6008	17.8820 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9445	0.9251	0.8938	0.8380	0.7499	0.6154	0.4767	0.5127	0.6992	0.8528	0.9240	0.9499 (94)
Useful gains	518.3327	574.7658	608.7401	611.3374	567.3456	452.2083	336.8403	343.8968	444.9680	498.1385	495.3515	497.1939 (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	1416.0579	1374.7697	1250.3138	1035.2210	807.0910	545.8783	370.3928	385.3643	587.0267	873.8095	1149.7392	1387.1059 (97)
Space heating kWh	667.9076	537.6026	477.3308	305.1961	178.3705	0.0000	0.0000	0.0000	0.0000	279.4992	471.1592	662.0945 (98a)
Space heating requirement - total per year (kWh/year)												3579.1607
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	667.9076	537.6026	477.3308	305.1961	178.3705	0.0000	0.0000	0.0000	0.0000	279.4992	471.1592	662.0945 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3579.1607
Space heating per m2										(98c) / (4) =		70.3728 (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	667.9076	537.6026	477.3308	305.1961	178.3705	0.0000	0.0000	0.0000	0.0000	279.4992	471.1592	662.0945 (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)	392.8868	316.2368	280.7829	179.5271	104.9239	0.0000	0.0000	0.0000	0.0000	164.4113	277.1524	389.4674 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (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	125.4084	110.9261	117.8067	103.3912	100.1189	90.0930	88.7823	92.3457	93.4100	104.3162	111.1271	124.0058 (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	16.0603	12.8842	11.6008	8.4992	6.5651	5.3637	5.9889	7.7846	10.1114	13.2667	14.9847	16.5067 (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												2105.3886 (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												1261.7312 (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)												129.6162 (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												3496.7360 (238)

10a. Fuel costs - using Table 12 prices

	Fuel	Fuel price	Fuel cost
--	------	------------	-----------

Full SAP Calculation Printout



	kWh/year	p/kWh	£/year
Space heating - main system 1	2105.3886	16.4900	347.1786 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1261.7312	16.4900	208.0595 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	129.6162	16.4900	21.3737 (250)
Additional standing charges			0.0000 (251)
Total energy cost			576.6118 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.1655 (257)
SAP value		64.8980
SAP rating (Section 12)		65 (258)
SAP band		D

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	2105.3886	0.1543	324.8137 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1261.7312	0.1409	177.7997 (264)
Space and water heating			502.6134 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	129.6162	0.1443	18.7076 (268)
Total CO2, kg/year			521.3210 (272)
CO2 emissions per m2			10.2500 (273)
EI value			92.7126
EI rating			93 (274)
EI band			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.8600 (1b)	x 2.6000 (2b)	= 132.2360 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8600		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	132.2360 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7500 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							
Upgraded Windows			10.7900	1.1450	12.3550		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			50.8600	0.2200	11.1892	75.0000	3814.5000 (28a)

Full SAP Calculation Printout



Existing Wall	54.6300	10.7900	43.8400	0.2200	9.6448	9.0000	394.5600 (29a)
Wall to Corridor	15.7300	1.7600	13.9700	0.2200	3.0734	9.0000	125.7300 (29a)
Total net area of external elements Aum (A, m2)			121.2200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.3744		(33)
Main dwelling							
Party Wall			12.5500	0.0000	0.0000	70.0000	878.5000 (32)
Party Ceiling			50.8600			30.0000	1525.8000 (32b)
Internal Wall			40.1700			9.0000	361.5300 (32c)
Internal Wall 2			17.4500			100.0000	1745.0001 (32c)

Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				8845.6201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							173.9210 (35)
Thermal bridges (Default value 0.200 * total exposed area)							24.2440 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =				62.6184 (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	39.4923	37.3521	36.6695	33.4861	33.4861	31.7602	32.3202	31.2156	32.3202	34.0921	34.7134	36.6695 (38)	
Average = Sum(39)m / 12 =	102.1106	99.9705	99.2878	96.1045	96.1045	94.3786	94.9385	93.8339	94.9385	96.7105	97.3318	99.2878 (39)	
												97.0831	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.0077	1.9656	1.9522	1.8896	1.8896	1.8557	1.8667	1.8449	1.8667	1.9015	1.9137	1.9522 (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													1.7154 (42)
Hot water usage for mixer showers													
Hot water usage for baths	52.9818	52.1856	51.0254	48.8055	47.1672	45.3403	44.3018	45.4533	46.7155	48.6771	50.9447	52.7788 (42a)	
Hot water usage for other uses	22.9071	22.5669	22.0879	21.2045	20.5431	19.8097	19.4135	19.8893	20.4072	21.1920	22.0935	22.8297 (42b)	
Average daily hot water use (litres/day)	32.1978	31.0270	29.8562	28.6854	27.5145	26.3437	26.3437	27.5145	28.6854	29.8562	31.0270	32.1978 (42c)	
												99.3568 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	108.0868	105.7796	102.9694	98.6953	95.2248	91.4937	90.0591	92.8571	95.8081	99.7253	104.0652	107.8064 (44)	
Energy content (annual)	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (45)	
Distribution loss	25.6775	22.5943	23.7390	20.2663	19.2286	16.8753	16.3378	17.2465	17.7211	20.2989	22.2390	25.3198 (46)	
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.1200 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6048 (55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)	
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (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	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (64)	
												2144.9431 (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	90.5273	80.4405	86.2305	77.4485	76.2325	69.9318	69.8244	71.8386	71.8067	78.6050	81.8213	89.7345 (65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265 (66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	18.3485	16.2970	13.2536	10.0338	7.5004	6.3322	6.8421	8.8936	11.9370	15.1568	17.6902	18.8585 (67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	223.0855	225.4005	219.5669	207.1480	191.4713	176.7374	166.8943	164.5794	170.4129	182.8319	198.5085	213.2424 (68)	
Pumps, fans	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081 (69)	
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)	
	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177 (71)	
Water heating gains (Table 5)	121.6765	119.7032	115.9012	107.5674	102.4630	97.1274	93.8500	96.5573	99.7315	105.6518	113.6406	120.6109 (72)	
Total internal gains	447.4275	445.7175	433.0386	409.0662	385.7516	361.5140	348.9034	351.3473	363.3984	387.9574	414.1563	437.0288 (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
Southeast	8.2300	42.6275	0.6300	0.7000	0.7700	107.2166 (77)
Northwest	2.5600	13.7622	0.6300	0.7000	0.7700	10.7671 (81)

Full SAP Calculation Printout



Solar gains	117.9837	181.9426	257.0279	352.0526	393.7461	424.6598	401.8608	360.7002	303.5192	217.5992	143.3584	97.2447 (83)
Total gains	565.4112	627.6602	690.0665	761.1187	779.4977	786.1738	750.7642	712.0475	666.9176	605.5566	557.5148	534.2735 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	24.0633	24.5784	24.7474	25.5671	25.5671	26.0347	25.8811	26.1858	25.8811	25.4069	25.2448	24.7474
alpha	2.6042	2.6386	2.6498	2.7045	2.7045	2.7356	2.7254	2.7457	2.7254	2.6938	2.6830	2.6498
util living area	0.9578	0.9438	0.9134	0.8484	0.7427	0.5761	0.4246	0.4298	0.6716	0.8535	0.9337	0.9613 (86)
MIT	18.4859	18.7550	19.2549	19.9169	20.4618	20.8205	20.9455	20.9468	20.7118	20.1003	19.2758	18.5440 (87)
Th 2	19.9962	20.0172	20.0239	20.0552	20.0552	20.0722	20.0667	20.0775	20.0667	20.0492	20.0431	20.0239 (88)
util rest of house	0.9516	0.9357	0.9003	0.8247	0.6986	0.5036	0.3255	0.3279	0.6040	0.8240	0.9223	0.9554 (89)
MIT 2	17.7098	17.9884	18.4833	19.1437	19.6499	19.9654	20.0458	20.0576	19.8815	19.3239	18.5226	17.7863 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.1269	18.4003	18.8979	19.5592	20.0862	20.4249	20.5292	20.5354	20.3277	19.7411	18.9274	18.1935 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.1269	18.4003	18.8979	19.5592	20.0862	20.4249	20.5292	20.5354	20.3277	19.7411	18.9274	18.1935 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9361	0.9185	0.8818	0.8104	0.7002	0.5325	0.3760	0.3800	0.6243	0.8129	0.9056	0.9410 (94)
Useful gains	529.2718	576.4821	608.4682	616.8352	545.7846	418.6160	282.2664	270.5553	416.3667	492.2764	504.9000	502.7374 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	1340.3924	1299.6487	1171.3864	966.7312	719.4548	474.2430	297.0836	284.8238	505.8000	777.6588	1053.8462	1290.0919 (97)
Space heating kWh	603.4737	485.9680	418.8112	251.9251	129.2107	0.0000	0.0000	0.0000	0.0000	212.3245	395.2413	585.7917 (98a)
Space heating requirement - total per year (kWh/year)	3082.7462											
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000											
Space heating kWh	603.4737	485.9680	418.8112	251.9251	129.2107	0.0000	0.0000	0.0000	0.0000	212.3245	395.2413	585.7917 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3082.7462											
Space heating per m2	(98c) / (4) = 60.6124 (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	603.4737	485.9680	418.8112	251.9251	129.2107	0.0000	0.0000	0.0000	0.0000	212.3245	395.2413	585.7917 (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)	354.9845	285.8635	246.3595	148.1912	76.0063	0.0000	0.0000	0.0000	0.0000	124.8968	232.4949	344.5834 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (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	125.4084	110.9261	117.8067	103.3912	100.1189	90.0930	88.7823	92.3457	93.4100	104.3162	111.1271	124.0058 (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	16.0603	12.8842	11.6008	8.4992	6.5651	5.3637	5.9889	7.7846	10.1114	13.2667	14.9847	16.5067 (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	1813.3801 (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	1261.7312 (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)	129.6162 (232)											

Full SAP Calculation Printout



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	3204.7275	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1813.3801	28.4300	515.5440 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1261.7312	28.4300	358.7102 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	129.6162	28.4300	36.8499 (250)
Additional standing charges			0.0000 (251)
Total energy cost			911.1040 (255)

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	1813.3801	0.1548	280.7776 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1261.7312	0.1409	177.7997 (264)
Space and water heating			458.5773 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	129.6162	0.1443	18.7076 (268)
Total CO2, kg/year			477.2849 (272)

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	1813.3801	1.5732	2852.8949 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1261.7312	1.5211	1919.1711 (278)
Space and water heating			4772.0660 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	129.6162	1.5338	198.8096 (282)
Total Primary energy kWh/year			4970.8756 (286)

SAP 10 EPC IMPROVEMENTS

Proposed

Current energy efficiency rating:	D 65
Current environmental impact rating:	A 93

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	D 65
Potential environmental impact rating:	A 93

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £911	Potential £911	Saving £0
Electricity			
Space heating	£516	£516	£0
Water heating	£359	£359	£0
Lighting	£37	£37	£0
Total cost of fuels	£911	£911	£0
Total cost of uses	£912	£912	£0
Delivered energy	63 kWh/m²	63 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.5 tonnes	0.5 tonnes	0.0 tonnes
CO2 emissions per m²	9 kg/m²	9 kg/m²	0 kg/m²
Primary energy	98 kWh/m²	98 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.8600 (1b)	2.6000 (2b)	132.2360 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8600		132.2360 (5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			10.7900	1.1450	12.3550		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			50.8600	0.2200	11.1892	75.0000	3814.5000 (28a)
Existing Wall	54.6300	10.7900	43.8400	0.2200	9.6448	9.0000	394.5600 (29a)
Wall to Corridor	15.7300	1.7600	13.9700	0.2200	3.0734	9.0000	125.7300 (29a)
Total net area of external elements Aum(A, m ²)			121.2200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 38.3744		(33)
Main dwelling							
Party Wall			12.5500	0.0000	0.0000	70.0000	878.5000 (32)
Party Ceiling			50.8600			30.0000	1525.8000 (32b)
Internal Wall			40.1700			9.0000	361.5300 (32c)
Internal Wall 2			17.4500			100.0000	1745.0001 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	8845.6201 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							173.9210 (35)
Thermal bridges (Default value 0.200 * total exposed area)							24.2440 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	62.6184 (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	41.7705	40.9957	40.2363	36.6695	36.0021	32.8955	32.8955	32.3202	34.0921	36.0021	37.3521	38.7636 (38)
Average = Sum(39)m / 12 =	104.3888	103.6141	102.8547	99.2878	98.6205	95.5138	95.5138	94.9385	96.7105	98.6205	99.9705	101.3819 (39)
												99.2846
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.0525	2.0372	2.0223	1.9522	1.9391	1.8780	1.8780	1.8667	1.9015	1.9391	1.9656	1.9934 (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												1.7154 (42)
Hot water usage for mixer showers												
Hot water usage for baths	52.9818	52.1856	51.0254	48.8055	47.1672	45.3403	44.3018	45.4533	46.7155	48.6771	50.9447	52.7788 (42a)
Hot water usage for other uses	22.9071	22.5669	22.0879	21.2045	20.5431	19.8097	19.4135	19.8893	20.4072	21.1920	22.0935	22.8297 (42b)
Average daily hot water use (litres/day)	32.1978	31.0270	29.8562	28.6854	27.5145	26.3437	26.3437	27.5145	28.6854	29.8562	31.0270	32.1978 (42c)
												99.3568 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



Energy conte	108.0868	105.7796	102.9694	98.6953	95.2248	91.4937	90.0591	92.8571	95.8081	99.7253	104.0652	107.8064 (44)
Energy content (annual)	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (45)
Distribution loss (46)m = 0.15 x (45)m	25.6775	22.5943	23.7390	20.2663	19.2286	16.8753	16.3378	17.2465	17.7211	20.2989	22.2390	25.3198 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6048 (55)
Total storage loss												
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (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	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (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	90.5273	80.4405	86.2305	77.4485	76.2325	69.9318	69.8244	71.8386	71.8067	78.6050	81.8213	89.7345 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.3485	16.2970	13.2536	10.0338	7.5004	6.3322	6.8421	8.8936	11.9370	15.1568	17.6902	18.8585 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.0855	225.4005	219.5669	207.1480	191.4713	176.7374	166.8943	164.5794	170.4129	182.8319	198.5085	213.2424 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081 (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)	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177 (71)
Water heating gains (Table 5)	121.6765	119.7032	115.9012	107.5674	102.4630	97.1274	93.8500	96.5573	99.7315	105.6518	113.6406	120.6109 (72)
Total internal gains	447.4275	445.7175	433.0386	409.0662	385.7516	361.5140	348.9034	351.3473	363.3984	387.9574	414.1563	437.0288 (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	
Southeast				8.2300	36.7938	0.6300	0.7000		0.7700		92.5437 (77)	
Northwest				2.5600	11.2829	0.6300	0.7000		0.7700		8.8274 (81)	
Solar gains	101.3711	175.6046	248.0581	320.4102	370.8015	373.3612	357.7789	319.3835	272.9884	196.1804	121.9532	86.4070 (83)
Total gains	548.7986	621.3221	681.0967	729.4764	756.5531	734.8752	706.6823	670.7308	636.3868	584.1378	536.1095	523.4358 (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	23.5381	23.7141	23.8892	24.7474	24.9149	25.7252	25.7252	25.8811	25.4069	24.9149	24.5784	24.2362
alpha	2.5692	2.5809	2.5926	2.6498	2.6610	2.7150	2.7150	2.7254	2.6938	2.6610	2.6386	2.6157
util living area	0.9643	0.9495	0.9243	0.8751	0.7926	0.6606	0.5259	0.5627	0.7463	0.8897	0.9486	0.9679 (86)
MIT	18.2300	18.5325	19.0218	19.6895	20.2589	20.7026	20.8852	20.8595	20.5477	19.8193	18.9549	18.2378 (87)
Th 2	19.9738	19.9814	19.9888	20.0239	20.0305	20.0610	20.0610	20.0667	20.0492	20.0305	20.0172	20.0033 (88)
util rest of house	0.9590	0.9421	0.9127	0.8550	0.7561	0.5970	0.4341	0.4732	0.6916	0.8681	0.9401	0.9633 (89)
MIT 2	17.4416	17.7450	18.2314	18.9048	19.4481	19.8652	20.0048	19.9940	19.7312	19.0434	18.1895	17.4687 (90)
Living area fraction	17.8652	18.1682	18.6561	19.3265	19.8838	20.3152	20.4779	20.4591	20.1699	19.4603	18.6008	17.8820 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8652	18.1682	18.6561	19.3265	19.8838	20.3152	20.4779	20.4591	20.1699	19.4603	18.6008	17.8820 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9445	0.9251	0.8938	0.8380	0.7499	0.6154	0.4767	0.5127	0.6992	0.8528	0.9240	0.9499 (94)
Ext temp.	518.3327	574.7658	608.7401	611.3374	567.3456	452.2083	336.8403	343.8968	444.9680	498.1385	495.3515	497.1939 (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	1416.0579	1374.7697	1250.3138	1035.2210	807.0910	545.8783	370.3928	385.3643	587.0267	873.8095	1149.7392	1387.1059 (97)
Space heating requirement - total per year (kWh/year)	667.9076	537.6026	477.3308	305.1961	178.3705	0.0000	0.0000	0.0000	0.0000	279.4992	471.1592	662.0945 (98a)
Solar heating kWh												3579.1607
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh												0.0000

Full SAP Calculation Printout



667.9076	537.6026	477.3308	305.1961	178.3705	0.0000	0.0000	0.0000	0.0000	279.4992	471.1592	662.0945 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)											3579.1607
Space heating per m2											(98c) / (4) = 70.3728 (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	667.9076	537.6026	477.3308	305.1961	178.3705	0.0000	0.0000	0.0000	0.0000	279.4992	471.1592	662.0945 (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)	392.8868	316.2368	280.7829	179.5271	104.9239	0.0000	0.0000	0.0000	0.0000	164.4113	277.1524	389.4674 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (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	125.4084	110.9261	117.8067	103.3912	100.1189	90.0930	88.7823	92.3457	93.4100	104.3162	111.1271	124.0058 (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	16.0603	12.8842	11.6008	8.4992	6.5651	5.3637	5.9889	7.7846	10.1114	13.2667	14.9847	16.5067 (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												2105.3886 (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												1261.7312 (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)												129.6162 (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												3496.7360 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2105.3886	16.4900	347.1786 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1261.7312	16.4900	208.0595 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	129.6162	16.4900	21.3737 (250)
Additional standing charges			0.0000 (251)
Total energy cost			576.6118 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):			0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =		2.1655 (257)
SAP value			64.8980
SAP rating (Section 12)			65 (258)
SAP band			D

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

Energy	Emission factor	Emissions
--------	-----------------	-----------

Full SAP Calculation Printout



Space heating - main system 1	kWh/year	kg CO2/kWh	kg CO2/year
Total CO2 associated with community systems	2105.3886	0.1543	324.8137 (261)
Water heating (other fuel)			0.0000 (373)
Space and water heating	1261.7312	0.1409	177.7997 (264)
Pumps, fans and electric keep-hot			502.6134 (265)
Energy for lighting	0.0000	0.0000	0.0000 (267)
Total CO2, kg/year	129.6162	0.1443	18.7076 (268)
CO2 emissions per m2			521.3210 (272)
EI value			10.2500 (273)
EI rating			92.7126
EI band			93 (274)
			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	50.8600 (1b)	x 2.6000 (2b)	= 132.2360 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 132.2360 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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												
Upgraded Windows			10.7900	1.1450	12.3550		(27)					
Solid Door			1.7600	1.2000	2.1120		(26)					
Heatloss Floor			50.8600	0.2200	11.1892	75.0000	3814.5000 (28a)					
Existing Wall	54.6300	10.7900	43.8400	0.2200	9.6448	9.0000	394.5600 (29a)					
Wall to Corridor	15.7300	1.7600	13.9700	0.2200	3.0734	9.0000	125.7300 (29a)					
Total net area of external elements Aum(A, m2)			121.2200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.3744		(33)					
Main dwelling												
Party Wall			12.5500	0.0000	0.0000	70.0000	878.5000 (32)					
Party Ceiling			50.8600			30.0000	1525.8000 (32b)					
Internal Wall			40.1700			9.0000	361.5300 (32c)					
Internal Wall 2			17.4500			100.0000	1745.0001 (32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8845.6201 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							173.9210 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							24.2440 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	62.6184 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 39.4923	Feb 37.3521	Mar 36.6695	Apr 33.4861	May 33.4861	Jun 31.7602	Jul 32.3202	Aug 31.2156	Sep 32.3202	Oct 34.0921	Nov 34.7134	Dec 36.6695 (38)
Heat transfer coeff	102.1106	99.9705	99.2878	96.1045	96.1045	94.3786	94.9385	93.8339	94.9385	96.7105	97.3318	99.2878 (39)
Average = Sum(39)m / 12 =												97.0831
HLP	Jan 2.0077	Feb 1.9656	Mar 1.9522	Apr 1.8896	May 1.8896	Jun 1.8557	Jul 1.8667	Aug 1.8449	Sep 1.8667	Oct 1.9015	Nov 1.9137	Dec 1.9522 (40)
HLP (average)												1.9088
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)												
Assumed occupancy	1.7154 (42)											
Hot water usage for mixer showers	52.7788 (42a)											
Hot water usage for baths	22.8297 (42b)											
Hot water usage for other uses	32.1978 (42c)											
Average daily hot water use (litres/day)	99.3568 (43)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	108.0868	105.7796	102.9694	98.6953	95.2248	91.4937	90.0591	92.8571	95.8081	99.7253	104.0652	107.8064 (44)
Energy content (annual)	171.1831	150.6287	158.2602	135.1090	128.1910	112.5021	108.9186	114.9765	118.1410	135.3263	148.2600	168.7987 (45)
Distribution loss (46)m = 0.15 x (45)m	25.6775											1650.2951
Water storage loss (or HIU loss):	22.5943											25.3198 (46)
Store volume	150.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.1200 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.6048 (55)											
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (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	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099 (64)
Total per year (kWh/year) = Sum(64)m =	2144.9431 (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	90.5273	80.4405	86.2305	77.4485	76.2325	69.9318	69.8244	71.8386	71.8067	78.6050	81.8213	89.7345 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265	102.9265 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.3485	16.2970	13.2536	10.0338	7.5004	6.3322	6.8421	8.8936	11.9370	15.1568	17.6902	18.8585 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	223.0855	225.4005	219.5669	207.1480	191.4713	176.7374	166.8943	164.5794	170.4129	182.8319	198.5085	213.2424 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081	47.0081 (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)	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177	-68.6177 (71)
Water heating gains (Table 5)	121.6765	119.7032	115.9012	107.5674	102.4630	97.1274	93.8500	96.5573	99.7315	105.6518	113.6406	120.6109 (72)
Total internal gains	447.4275	445.7175	433.0386	409.0662	385.7516	361.5140	348.9034	351.3473	363.3984	387.9574	414.1563	437.0288 (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							
Southeast	8.2300	42.6275	0.6300	0.7000	0.7700	107.2166 (77)						
Northwest	2.5600	13.7622	0.6300	0.7000	0.7700	10.7671 (81)						
Solar gains	117.9837	181.9426	257.0279	352.0526	393.7461	424.6598	401.8608	360.7002	303.5192	217.5992	143.3584	97.2447 (83)
Total gains	565.4112	627.6602	690.0665	761.1187	779.4977	786.1738	750.7642	712.0475	666.9176	605.5566	557.5148	534.2735 (84)
7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	24.0633	24.5784	24.7474	25.5671	25.5671	26.0347	25.8811	26.1858	25.8811	25.4069	25.2448	24.7474
alpha	2.6042	2.6386	2.6498	2.7045	2.7045	2.7356	2.7254	2.7457	2.7254	2.6938	2.6830	2.6498
util living area	0.9578	0.9438	0.9134	0.8484	0.7427	0.5761	0.4246	0.4298	0.6716	0.8535	0.9337	0.9613 (86)
MIT	18.4859	18.7550	19.2549	19.9169	20.4618	20.8205	20.9455	20.9468	20.7118	20.1003	19.2758	18.5440 (87)
Th 2	19.9962	20.0172	20.0239	20.0552	20.0552	20.0722	20.0667	20.0775	20.0667	20.0492	20.0431	20.0239 (88)
util rest of house	0.9516	0.9357	0.9003	0.8247	0.6986	0.5036	0.3255	0.3279	0.6040	0.8240	0.9223	0.9554 (89)
MIT 2	17.7098	17.9884	18.4833	19.1437	19.6499	19.9654	20.0458	20.0576	19.8815	19.3239	18.5226	17.7863 (90)
Living area fraction	18.1269	18.4003	18.8979	19.5592	20.0862	20.4249	20.5292	20.5354	20.3277	19.7411	18.9274	18.1935 (91)
MIT	18.1269	18.4003	18.8979	19.5592	20.0862	20.4249	20.5292	20.5354	20.3277	19.7411	18.9274	18.1935 (92)
Temperature adjustment	18.1269	18.4003	18.8979	19.5592	20.0862	20.4249	20.5292	20.5354	20.3277	19.7411	18.9274	18.1935 (93)
adjusted MIT	18.1269	18.4003	18.8979	19.5592	20.0862	20.4249	20.5292	20.5354	20.3277	19.7411	18.9274	18.1935 (93)

Full SAP Calculation Printout



8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9361	0.9185	0.8818	0.8104	0.7002	0.5325	0.3760	0.3800	0.6243	0.8129	0.9056	0.9410	(94)
Useful gains	529.2718	576.4821	608.4682	616.8352	545.7846	418.6160	282.2664	270.5553	416.3667	492.2764	504.9000	502.7374	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	1340.3924	1299.6487	1171.3864	966.7312	719.4548	474.2430	297.0836	284.8238	505.8000	777.6588	1053.8462	1290.0919	(97)
Space heating kWh	603.4737	485.9680	418.8112	251.9251	129.2107	0.0000	0.0000	0.0000	0.0000	212.3245	395.2413	585.7917	(98a)
Space heating requirement - total per year (kWh/year)												3082.7462	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	603.4737	485.9680	418.8112	251.9251	129.2107	0.0000	0.0000	0.0000	0.0000	212.3245	395.2413	585.7917	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3082.7462	
Space heating per m2										(98c) / (4) =		60.6124	(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	603.4737	485.9680	418.8112	251.9251	129.2107	0.0000	0.0000	0.0000	0.0000	212.3245	395.2413	585.7917	(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)	354.9845	285.8635	246.3595	148.1912	76.0063	0.0000	0.0000	0.0000	0.0000	124.8968	232.4949	344.5834	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	213.1943	188.5743	200.2714	175.7650	170.2022	153.1581	150.9298	156.9877	158.7970	177.3375	188.9160	210.8099	(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	125.4084	110.9261	117.8067	103.3912	100.1189	90.0930	88.7823	92.3457	93.4100	104.3162	111.1271	124.0058	(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 (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	(231)	
Lighting (233a)m	16.0603	12.8842	11.6008	8.4992	6.5651	5.3637	5.9889	7.7846	10.1114	13.2667	14.9847	16.5067	(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													1813.3801	(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													1261.7312	(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)													129.6162	(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													3204.7275	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1813.3801	28.4300	515.5440	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1261.7312	28.4300	358.7102	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	129.6162	28.4300	36.8499	(250)
Additional standing charges			0.0000	(251)
Total energy cost			911.1040	(255)

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	1813.3801	0.1548	280.7776 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1261.7312	0.1409	177.7997 (264)
Space and water heating			458.5773 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	129.6162	0.1443	18.7076 (268)
Total CO2, kg/year			477.2849 (272)

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	1813.3801	1.5732	2852.8949 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1261.7312	1.5211	1919.1711 (278)
Space and water heating			4772.0660 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	129.6162	1.5338	198.8096 (282)
Total Primary energy kWh/year			4970.8756 (286)

Full SAP Calculation Printout



Plot Reference	Flat 2			Issued on Date	29/01/2026
Assessment Reference	Proposed	Plot Type Ref			
Plot Address				SAP Version	10.2
SAP Rating	65 D	DER	11.90	TER	
Environmental	93 A	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.43	DFEE	96.40	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	123.84	TPER	
Assessor Details	Miss Charlotte Russell			Assessor ID	DK97-0001
Client	tbc, tbc				

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	40.2800 (1b)	x 2.6000 (2b)	= 104.7280 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.2800		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e)... (3n) =	104.7280 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7500 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			7.9500	1.1450	9.1031		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			40.2800	0.2200	8.8616	75.0000	3021.0000 (28a)
Existing Wall	31.1700		23.2200	0.2200	5.1084	9.0000	208.9800 (29a)
Wall to Corridor	20.1500	1.7600	18.3900	0.1800	3.3102	150.0000	2758.4999 (29a)
Proposed Wall	18.5600		18.5600	0.1800	3.3408	150.0000	2783.9999 (29a)
External Roof	9.2100		9.2100	0.1500	1.3815	9.0000	82.8900 (30)
Total net area of external elements Aum (A, m ²)			119.3700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.2176		(33)
Main dwelling							
Party Wall			8.3300	0.0000	0.0000	70.0000	583.1000 (32)
Party Ceiling			31.0700			30.0000	932.1000 (32b)
Internal Wall			20.9900			9.0000	188.9100 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10559.4799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							262.1519 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.8740 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		57.0916 (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	33.0813	32.4677	31.8663	29.0414	28.5129	26.0525	26.0525	25.5969	27.0002	28.5129	29.5821	30.6999	(38)
Heat transfer coeff	90.1729	89.5593	88.9578	86.1330	85.6044	83.1440	83.1440	82.6884	84.0917	85.6044	86.6736	87.7914	(39)
Average = Sum(39)m / 12 =												86.1304	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2387	2.2234	2.2085	2.1384	2.1252	2.0642	2.0642	2.0528	2.0877	2.1252	2.1518	2.1795	(40)
HLP (average)												2.1383	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4138	(42)
Hot water usage for mixer showers	47.9241	47.2039	46.1545	44.1465	42.6646	41.0121	40.0728	41.1143	42.2560	44.0303	46.0815	47.7405	(42a)	
Hot water usage for baths	20.7322	20.4243	19.9907	19.1912	18.5926	17.9288	17.5703	18.0008	18.4696	19.1799	19.9958	20.6621	(42b)	
Hot water usage for other uses	29.1087	28.0502	26.9917	25.9332	24.8747	23.8162	23.8162	24.8747	25.9332	26.9917	28.0502	29.1087	(42c)	
Average daily hot water use (litres/day)												89.8689	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	97.7650	95.6784	93.1368	89.2709	86.1319	82.7571	81.4592	83.9898	86.6588	90.2020	94.1275	97.5113	(44)	
Energy conte	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792	(45)	
Energy content (annual)										Total = Sum(45)m =		1492.7037		
Distribution loss (46)m = 0.15 x (45)m	23.2254	20.4367	21.4722	18.3311	17.3925	15.2639	14.7777	15.5995	16.0289	18.3605	20.1153	22.9019	(46)	
Water storage loss (or HIU loss):														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.1200	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.6048	(55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	(56)	
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	(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	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904	(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	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904	(64)	
								Total per year (kWh/year) = Sum(64)m =				1987.3517	(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	85.0919	75.6579	81.2056	73.1588	72.1624	66.3598	66.3662	68.1879	68.0554	74.3080	77.1137	84.3748	(65)	

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

Metabolic gains (Table 5), Watts														
(66)m	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.8049	14.0378	11.4163	8.6429	6.4606	5.4543	5.8936	7.6607	10.2822	13.0557	15.2379	16.2442	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.4452	184.3384	179.5676	169.4110	156.5902	144.5405	136.4905	134.5973	139.3681	149.5247	162.3455	174.3952	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	(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)	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	(71)	
Water heating gains (Table 5)	114.3708	112.5861	109.1473	101.6094	96.9924	92.1664	89.2018	91.6505	94.5214	99.8764	107.1023	113.4070	(72)	
Total internal gains	388.7934	387.1348	376.3037	355.8358	336.2158	315.3338	304.7585	307.0811	317.3443	338.6292	360.8582	380.2189	(73)	

6. Solar gains

[Jan]											Access factor Table 6d		Gains W	
	Area m2				Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c					
Southeast	7.9500				36.7938		0.6300		0.7000		0.7700		89.3952 (77)	
Solar gains	89.3952	152.2730	208.3466	258.1515	289.1512	287.0602	276.7567	253.6295	225.5953	168.2941	107.0748	76.5036 (83)		
Total gains	478.1886	539.4078	584.6503	613.9873	625.3671	602.3940	581.5152	560.7106	542.9396	506.9234	467.9330	456.7225 (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	32.5285	32.7514	32.9728	34.0542	34.2645	35.2784	35.2784	35.4728	34.8808	34.2645	33.8418	33.4109		
alpha	3.1686	3.1834	3.1982	3.2703	3.2843	3.3519	3.3519	3.3649	3.3254	3.2843	3.2561	3.2274		
util living area	0.9818	0.9722	0.9548	0.9187	0.8494	0.7203	0.5722	0.6059	0.7937	0.9256	0.9714	0.9842	(86)	
MIT	18.7698	19.0212	19.4186	19.9557	20.4202	20.7831	20.9269	20.9101	20.6714	20.0785	19.3646	18.7741	(87)	

Full SAP Calculation Printout



Th 2	19.8807	19.8883	19.8958	19.9308	19.9374	19.9679	19.9679	19.9736	19.9562	19.9374	19.9241	19.9102 (88)
util rest of house	0.9781	0.9664	0.9450	0.8996	0.8103	0.6445	0.4590	0.4962	0.7300	0.9044	0.9645	0.9809 (89)
MIT 2	17.8638	18.1175	18.5142	19.0620	19.5032	19.8397	19.9390	19.9354	19.7446	19.1915	18.4850	17.8888 (90)
Living area fraction									FLA = Living area / (4) =			0.5300 (91)
MIT	18.3440	18.5965	18.9935	19.5357	19.9893	20.3397	20.4626	20.4521	20.2358	19.6616	18.9513	18.3580 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3440	18.5965	18.9935	19.5357	19.9893	20.3397	20.4626	20.4521	20.2358	19.6616	18.9513	18.3580 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9711	0.9577	0.9349	0.8912	0.8125	0.6739	0.5157	0.5500	0.7489	0.8978	0.9564	0.9746 (94)
Useful gains	464.3521	516.5703	546.5669	547.1764	508.1101	405.9310	299.8960	308.3974	406.5810	455.1154	447.5225	445.1394 (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	1266.3883	1226.6476	1111.3985	916.0823	709.5966	477.2256	321.1550	335.0587	515.9721	775.7154	1027.1913	1242.9510 (97)
Space heating kWh	596.7149	477.1719	420.2347	265.6122	149.9059	0.0000	0.0000	0.0000	0.0000	238.5264	417.3615	593.5718 (98a)
Space heating requirement - total per year (kWh/year)												3159.0994
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	596.7149	477.1719	420.2347	265.6122	149.9059	0.0000	0.0000	0.0000	0.0000	238.5264	417.3615	593.5718 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3159.0994
Space heating per m2										(98c) / (4) =		78.4285 (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	596.7149	477.1719	420.2347	265.6122	149.9059	0.0000	0.0000	0.0000	0.0000	238.5264	417.3615	593.5718 (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)	351.0088	280.6894	247.1969	156.2425	88.1800	0.0000	0.0000	0.0000	0.0000	140.3096	245.5068	349.1599 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (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	115.7924	102.4649	108.9171	95.8020	92.9184	83.7738	82.6642	85.8872	86.7735	96.7144	102.7988	114.5237 (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	13.8339	11.0981	9.9926	7.3210	5.6550	4.6202	5.1586	6.7054	8.7097	11.4275	12.9074	14.2184 (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												1858.2938 (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												1169.0304 (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)												111.6478 (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												3138.9720 (238)

10a. Fuel costs - using Table 12 prices

Fuel	Fuel price	Fuel cost
------	------------	-----------

Full SAP Calculation Printout



	kWh/year	p/kWh	£/year
Space heating - main system 1	1858.2938	16.4900	306.4326 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1169.0304	16.4900	192.7731 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	111.6478	16.4900	18.4107 (250)
Additional standing charges			0.0000 (251)
Total energy cost			517.6165 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	2.1851 (257)
SAP value		64.5802
SAP rating (Section 12)		65 (258)
SAP band		D

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	1858.2938	0.1544	286.9950 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1169.0304	0.1409	164.6752 (264)
Space and water heating			451.6702 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	111.6478	0.1443	16.1142 (268)
Total CO2, kg/year			467.7844 (272)
CO2 emissions per m2			11.6100 (273)
EI value			92.6497
EI rating			93 (274)
EI band			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	40.2800 (1b)	x 2.6000 (2b)	= 104.7280 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.2800		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	104.7280 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7500 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							
Upgraded Windows			7.9500	1.1450	9.1031		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			40.2800	0.2200	8.8616	75.0000	3021.0000 (28a)

Full SAP Calculation Printout



Existing Wall	31.1700	7.9500	23.2200	0.2200	5.1084	9.0000	208.9800 (29a)
Wall to Corridor	20.1500	1.7600	18.3900	0.1800	3.3102	150.0000	2758.4999 (29a)
Proposed Wall	18.5600		18.5600	0.1800	3.3408	150.0000	2783.9999 (29a)
External Roof	9.2100		9.2100	0.1500	1.3815	9.0000	82.8900 (29a)
Total net area of external elements Aum (A, m2)			119.3700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.2176		(33)
Main dwelling							
Party Wall			8.3300	0.0000	0.0000	70.0000	583.1000 (32)
Party Ceiling			31.0700			30.0000	932.1000 (32b)
Internal Wall			20.9900			9.0000	188.9100 (32c)

Heat capacity Cm = Sum(A x k)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
 Thermal bridges (Default value 0.200 * total exposed area)
 Point Thermal bridges
 Total fabric heat loss

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	31.2770	29.5821	29.0414	26.5203	26.5203	25.1534	25.5969	24.7220	25.5969	27.0002	27.4923	29.0414 (38)
Average = Sum(39)m / 12 =	88.3686	86.6736	86.1330	83.6118	83.6118	82.2449	82.6884	81.8136	82.6884	84.0917	84.5838	86.1330 (39)
												84.3869
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.1939	2.1518	2.1384	2.0758	2.0758	2.0418	2.0528	2.0311	2.0528	2.0877	2.0999	2.1384 (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													1.4138 (42)
Hot water usage for mixer showers	47.9241	47.2039	46.1545	44.1465	42.6646	41.0121	40.0728	41.1143	42.2560	44.0303	46.0815	47.7405 (42a)	
Hot water usage for baths	20.7322	20.4243	19.9907	19.1912	18.5926	17.9288	17.5703	18.0008	18.4696	19.1799	19.9958	20.6621 (42b)	
Hot water usage for other uses	29.1087	28.0502	26.9917	25.9332	24.8747	23.8162	23.8162	24.8747	25.9332	26.9917	28.0502	29.1087 (42c)	
Average daily hot water use (litres/day)												89.8689 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	97.7650	95.6784	93.1368	89.2709	86.1319	82.7571	81.4592	83.9898	86.6588	90.2020	94.1275	97.5113 (44)	
Distribution loss (46)m = 0.15 x (45)m	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (45)	
Total storage loss	23.2254	20.4367	21.4722	18.3311	17.3925	15.2639	14.7777	15.5995	16.0289	18.3605	20.1153	22.9019 (46)	
Water storage loss (or HIU loss):													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.6048 (55)	
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)	
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (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	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (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	85.0919	75.6579	81.2056	73.1588	72.1624	66.3598	66.3662	68.1879	68.0554	74.3080	77.1137	84.3748 (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	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.8049	14.0378	11.4163	8.6429	6.4606	5.4543	5.8936	7.6607	10.2822	13.0557	15.2379	16.2442 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.4452	184.3384	179.5676	169.4110	156.5902	144.5405	136.4905	134.5973	139.3681	149.5247	162.3455	174.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966 (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)	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519 (71)
Water heating gains (Table 5)	114.3708	112.5861	109.1473	101.6094	96.9924	92.1664	89.2018	91.6505	94.5214	99.8764	107.1023	113.4070 (72)
Total internal gains	388.7934	387.1348	376.3037	355.8358	336.2158	315.3338	304.7585	307.0811	317.3443	338.6292	360.8582	380.2189 (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
Southeast	7.9500	42.6275	0.6300	0.7000	0.7700	103.5689 (77)

Full SAP Calculation Printout



Solar gains	103.5689	156.8048	214.1318	281.1242	304.5788	324.1458	308.4937	283.9556	248.6554	185.3774	125.2380	85.7407 (83)
Total gains	492.3623	543.9396	590.4355	636.9601	640.7946	639.4796	613.2522	591.0366	565.9998	524.0066	486.0962	465.9595 (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	33.1927	33.8418	34.0542	35.0810	35.0810	35.6641	35.4728	35.8521	35.4728	34.8808	34.6779	34.0542	
alpha	3.2128	3.2561	3.2703	3.3387	3.3387	3.3776	3.3649	3.3901	3.3649	3.3254	3.3119	3.2703	
util living area	0.9778	0.9685	0.9472	0.8975	0.8035	0.6330	0.4625	0.4621	0.7177	0.8941	0.9607	0.9800 (86)	
MIT	18.9800	19.2010	19.6065	20.1404	20.5866	20.8764	20.9689	20.9707	20.8011	20.3100	19.6289	19.0250 (87)	
Th 2	19.9031	19.9241	19.9308	19.9621	19.9621	19.9791	19.9736	19.9844	19.9736	19.9562	19.9501	19.9308 (88)	
util rest of house	0.9730	0.9620	0.9356	0.8739	0.7538	0.5440	0.3405	0.3378	0.6364	0.8633	0.9510	0.9758 (89)	
MIT 2	18.0881	18.3206	18.7236	19.2607	19.6700	19.9154	19.9648	19.9764	19.8606	19.4238	18.7636	18.1526 (90)	
Living area fraction	fLA = Living area / (4) =												0.5300 (91)
MIT	18.5608	18.7873	19.1916	19.7270	20.1558	20.4248	20.4970	20.5034	20.3591	19.8935	19.2223	18.6150 (92)	
Temperature adjustment													0.0000
adjusted MIT	18.5608	18.7873	19.1916	19.7270	20.1558	20.4248	20.4970	20.5034	20.3591	19.8935	19.2223	18.6150 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9654	0.9531	0.9257	0.8677	0.7640	0.5848	0.4044	0.4031	0.6693	0.8611	0.9424	0.9687 (94)
Useful gains	475.3116	518.4071	546.5845	552.6953	489.5817	373.9931	248.0095	238.2374	378.8105	451.2429	458.0942	451.3924 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	1198.3524	1160.3250	1041.4823	855.0972	631.7567	413.2611	256.0854	245.7213	443.1379	689.0063	940.7625	1155.4725 (97)
Space heating kWh	537.9423	431.3688	368.2039	217.7293	105.7782	0.0000	0.0000	0.0000	0.0000	176.8960	347.5212	523.8356 (98a)
Space heating requirement - total per year (kWh/year)	2709.2754											
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	537.9423	431.3688	368.2039	217.7293	105.7782	0.0000	0.0000	0.0000	0.0000	176.8960	347.5212	523.8356 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2709.2754											
Space heating per m2	(98c) / (4) = 67.2611 (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	537.9423	431.3688	368.2039	217.7293	105.7782	0.0000	0.0000	0.0000	0.0000	176.8960	347.5212	523.8356 (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)	316.4367	253.7464	216.5905	128.0761	62.2225	0.0000	0.0000	0.0000	0.0000	104.0565	204.4242	308.1386 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (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	115.7924	102.4649	108.9171	95.8020	92.9184	83.7738	82.6642	85.8872	86.7735	96.7144	102.7988	114.5237 (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	13.8339	11.0981	9.9926	7.3210	5.6550	4.6202	5.1586	6.7054	8.7097	11.4275	12.9074	14.2184 (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	1593.6914 (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	1169.0304 (219)											
Space cooling fuel	0.0000 (221)											
Electricity for pumps and fans:												
Total electricity for the above, kWh/year	0.0000 (221)											
Electricity for lighting (calculated in Appendix L)	111.6478 (232)											

Full SAP Calculation Printout



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		2874.3696 (238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1593.6914	28.4300	453.0865 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1169.0304	28.4300	332.3553 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	111.6478	28.4300	31.7415 (250)
Additional standing charges			0.0000 (251)
Total energy cost			817.1833 (255)

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	1593.6914	0.1550	247.0915 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1169.0304	0.1409	164.6752 (264)
Space and water heating			411.7668 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	111.6478	0.1443	16.1142 (268)
Total CO2, kg/year			427.8810 (272)

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	1593.6914	1.5740	2508.4929 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1169.0304	1.5209	1777.9377 (278)
Space and water heating			4286.4306 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	111.6478	1.5338	171.2492 (282)
Total Primary energy kWh/year			4457.6798 (286)

SAP 10 EPC IMPROVEMENTS

Proposed

Current energy efficiency rating:	D 65
Current environmental impact rating:	A 93

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	D 65
Potential environmental impact rating:	A 93

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £817	Potential £817	Saving £0
Electricity			
Space heating	£453	£453	£0
Water heating	£332	£332	£0
Lighting	£32	£32	£0
Total cost of fuels	£817	£817	£0
Total cost of uses	£817	£817	£0
Delivered energy	71 kWh/m²	71 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.4 tonnes	0.4 tonnes	0.0 tonnes
CO2 emissions per m²	11 kg/m²	11 kg/m²	0 kg/m²
Primary energy	111 kWh/m²	111 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	40.2800 (1b)	x 2.6000 (2b)	= 104.7280 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	40.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 104.7280 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			7.9500	1.1450	9.1031		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			40.2800	0.2200	8.8616	75.0000	3021.0000 (28a)
Existing Wall	31.1700	7.9500	23.2200	0.2200	5.1084	9.0000	208.9800 (29a)
Wall to Corridor	20.1500	1.7600	18.3900	0.1800	3.3102	150.0000	2758.4999 (29a)
Proposed Wall	18.5600		18.5600	0.1800	3.3408	150.0000	2783.9999 (29a)
External Roof	9.2100		9.2100	0.1500	1.3815	9.0000	82.8900 (30)
Total net area of external elements Aum(A, m ²)			119.3700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)... (30) + (32) =	33.2176	(33)
Main dwelling							
Party Wall			8.3300	0.0000	0.0000	70.0000	583.1000 (32)
Party Ceiling			31.0700			30.0000	932.1000 (32b)
Internal Wall			20.9900			9.0000	188.9100 (32c)
Heat capacity Cm = Sum(A x k)							(28)... (30) + (32) + (32a)... (32e) = 10559.4799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							262.1519 (35)
Thermal bridges (Default value 0.200 * total exposed area)							23.8740 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 57.0916 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	33.0813	32.4677	31.8663	29.0414	28.5129	26.0525	26.0525	25.5969	27.0002	28.5129	29.5821	30.6999 (38)
Heat transfer coeff	90.1729	89.5593	88.9578	86.1330	85.6044	83.1440	83.1440	82.6884	84.0917	85.6044	86.6736	87.7914 (39)
Average = Sum(39)m / 12 =												86.1304
HLP	2.2387	2.2234	2.2085	2.1384	2.1252	2.0642	2.0642	2.0528	2.0877	2.1252	2.1518	2.1795 (40)
HLP (average)												2.1383
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4138 (42)
Hot water usage for mixer showers												47.7405 (42a)
Hot water usage for baths												20.6621 (42b)
Hot water usage for other uses												29.1087 (42c)
Average daily hot water use (litres/day)												89.8689 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



Daily hot water use											
Energy conte	97.7650	95.6784	93.1368	89.2709	86.1319	82.7571	81.4592	83.9898	86.6588	90.2020	94.1275
Energy content (annual)	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =	1492.7037
23.2254	20.4367	21.4722	18.3311	17.3925	15.2639	14.7777	15.5995	16.0289	18.3605	20.1153	22.9019 (46)
Water storage loss (or HIU loss):											
Store volume											150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):											1.1200 (48)
Temperature factor from Table 2b											0.5400 (49)
Enter (49) or (54) in (55)											0.6048 (55)
Total storage loss											
18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage											
18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month											
196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (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											
196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (64)
Total per year (kWh/year) = Sum(64)m =											1987.3517 (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											
85.0919	75.6579	81.2056	73.1588	72.1624	66.3598	66.3662	68.1879	68.0554	74.3080	77.1137	84.3748 (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
84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5											
15.8049	14.0378	11.4163	8.6429	6.4606	5.4543	5.8936	7.6607	10.2822	13.0557	15.2379	16.2442 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5											
182.4452	184.3384	179.5676	169.4110	156.5902	144.5405	136.4905	134.5973	139.3681	149.5247	162.3455	174.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5											
44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966 (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)											
-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519 (71)
Water heating gains (Table 5)											
114.3708	112.5861	109.1473	101.6094	96.9924	92.1664	89.2018	91.6505	94.5214	99.8764	107.1023	113.4070 (72)
Total internal gains											
388.7934	387.1348	376.3037	355.8358	336.2158	315.3338	304.7585	307.0811	317.3443	338.6292	360.8582	380.2189 (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		
Southeast	7.9500		36.7938		0.6300		0.7000		0.7700		89.3952 (77)
Solar gains	89.3952	152.2730	208.3466	258.1515	289.1512	287.0602	276.7567	253.6295	225.5953	168.2941	107.0748
Total gains	478.1886	539.4078	584.6503	613.9873	625.3671	602.3940	581.5152	560.7106	542.9396	506.9234	467.9330

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
32.5285	32.7514	32.9728	34.0542	34.2645	35.2784	35.2784	35.4728	34.8808	34.2645	33.8418	33.4109
3.1686	3.1834	3.1982	3.2703	3.2843	3.3519	3.3519	3.3649	3.3254	3.2843	3.2561	3.2274
util living area											
0.9818	0.9722	0.9548	0.9187	0.8494	0.7203	0.5722	0.6059	0.7937	0.9256	0.9714	0.9842 (86)
MIT	18.7698	19.0212	19.4186	19.9557	20.4202	20.7831	20.9269	20.9101	20.6714	20.0785	19.3646
Th 2	19.8807	19.8883	19.8958	19.9308	19.9374	19.9679	19.9679	19.9736	19.9562	19.9374	19.9241
util rest of house											
0.9781	0.9664	0.9450	0.8996	0.8103	0.6445	0.4590	0.4962	0.7300	0.9044	0.9645	0.9809 (89)
MIT 2	17.8638	18.1175	18.5142	19.0620	19.5032	19.8397	19.9390	19.9354	19.7446	19.1915	18.4850
Living area fraction											
18.3440	18.5965	18.9935	19.5357	19.9893	20.3397	20.4626	20.4521	20.2358	19.6616	18.9513	18.3580 (92)
Temperature adjustment											
adjusted MIT	18.3440	18.5965	18.9935	19.5357	19.9893	20.3397	20.4626	20.4521	20.2358	19.6616	18.9513

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.9711	0.9577	0.9349	0.8912	0.8125	0.6739	0.5157	0.5500	0.7489	0.8978	0.9564	0.9746 (94)
Useful gains	464.3521	516.5703	546.5669	547.1764	508.1101	405.9310	299.8960	308.3974	406.5810	455.1154	447.5225
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											
1266.3883	1226.6476	1111.3985	916.0823	709.5966	477.2256	321.1550	335.0587	515.9721	775.7154	1027.1913	1242.9510 (97)
Space heating kWh											
596.7149	477.1719	420.2347	265.6122	149.9059	0.0000	0.0000	0.0000	0.0000	238.5264	417.3615	593.5718 (98a)
Space heating requirement - total per year (kWh/year)											
Solar heating kWh											3159.0994
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)											
Space heating kWh											

Full SAP Calculation Printout



596.7149	477.1719	420.2347	265.6122	149.9059	0.0000	0.0000	0.0000	0.0000	238.5264	417.3615	593.5718 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)											3159.0994
Space heating per m2											(98c) / (4) = 78.4285 (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	596.7149	477.1719	420.2347	265.6122	149.9059	0.0000	0.0000	0.0000	0.0000	238.5264	417.3615	593.5718 (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)	351.0088	280.6894	247.1969	156.2425	88.1800	0.0000	0.0000	0.0000	0.0000	140.3096	245.5068	349.1599 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (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	115.7924	102.4649	108.9171	95.8020	92.9184	83.7738	82.6642	85.8872	86.7735	96.7144	102.7988	114.5237 (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	13.8339	11.0981	9.9926	7.3210	5.6550	4.6202	5.1586	6.7054	8.7097	11.4275	12.9074	14.2184 (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) (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) (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												1858.2938 (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												1169.0304 (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)												111.6478 (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												3138.9720 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1858.2938	16.4900	306.4326 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1169.0304	16.4900	192.7731 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	111.6478	16.4900	18.4107 (250)
Additional standing charges			0.0000 (251)
Total energy cost			517.6165 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):			0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =		2.1851 (257)
SAP value			64.5802
SAP rating (Section 12)			65 (258)
SAP band			D

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

Energy	Emission factor	Emissions
--------	-----------------	-----------

Full SAP Calculation Printout



Space heating - main system 1	kWh/year	kg CO ₂ /kWh	kg CO ₂ /year
Total CO ₂ associated with community systems	1858.2938	0.1544	286.9950 (261)
Water heating (other fuel)			0.0000 (373)
Space and water heating	1169.0304	0.1409	164.6752 (264)
Pumps, fans and electric keep-hot			451.6702 (265)
Energy for lighting	0.0000	0.0000	0.0000 (267)
Total CO ₂ , kg/year	111.6478	0.1443	16.1142 (268)
CO ₂ emissions per m ²			467.7844 (272)
EI value			11.6100 (273)
EI rating			92.6497
EI band			93 (274)
			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	40.2800 (1b)	x 2.6000 (2b)	= 104.7280 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 104.7280 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7500 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							
Upgraded Windows			7.9500	1.1450	9.1031		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Heatloss Floor			40.2800	0.2200	8.8616	75.0000	3021.0000 (28a)
Existing Wall	31.1700	7.9500	23.2200	0.2200	5.1084	9.0000	208.9800 (29a)
Wall to Corridor	20.1500	1.7600	18.3900	0.1800	3.3102	150.0000	2758.4999 (29a)
Proposed Wall	18.5600		18.5600	0.1800	3.3408	150.0000	2783.9999 (29a)
External Roof	9.2100		9.2100	0.1500	1.3815	9.0000	82.8900 (30)
Total net area of external elements Aum(A, m ²)			119.3700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.2176	(33)
Main dwelling							
Party Wall			8.3300	0.0000	0.0000	70.0000	583.1000 (32)
Party Ceiling			31.0700			30.0000	932.1000 (32b)
Internal Wall			20.9900			9.0000	188.9100 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	10559.4799 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		262.1519 (35)
Thermal bridges (Default value 0.200 * total exposed area)		23.8740 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	57.0916 (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	31.2770	29.5821	29.0414	26.5203	26.5203	25.1534	25.5969	24.7220	25.5969	27.0002	27.4923	29.0414 (38)
Average = Sum(39)m / 12 =	88.3686	86.6736	86.1330	83.6118	83.6118	82.2449	82.6884	81.8136	82.6884	84.0917	84.5838	86.1330 (39)
												84.3869

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.1939	2.1518	2.1384	2.0758	2.0758	2.0418	2.0528	2.0311	2.0528	2.0877	2.0999	2.1384 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)												
Assumed occupancy	1.4138 (42)											
Hot water usage for mixer showers	47.9241	47.2039	46.1545	44.1465	42.6646	41.0121	40.0728	41.1143	42.2560	44.0303	46.0815	47.7405 (42a)
Hot water usage for baths	20.7322	20.4243	19.9907	19.1912	18.5926	17.9288	17.5703	18.0008	18.4696	19.1799	19.9958	20.6621 (42b)
Hot water usage for other uses	29.1087	28.0502	26.9917	25.9332	24.8747	23.8162	23.8162	24.8747	25.9332	26.9917	28.0502	29.1087 (42c)
Average daily hot water use (litres/day)	89.8689 (43)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	97.7650	95.6784	93.1368	89.2709	86.1319	82.7571	81.4592	83.9898	86.6588	90.2020	94.1275	97.5113 (44)
Energy content (annual)	154.8359	136.2448	143.1479	122.2074	115.9501	101.7595	98.5179	103.9970	106.8590	122.4032	134.1019	152.6792 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2254	20.4367	21.4722	18.3311	17.3925	15.2639	14.7777	15.5995	16.0289	18.3605	20.1153	22.9019 (46)
Water storage loss (or HIU loss):												
Store volume	150.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.1200 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.6048 (55)											
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (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	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904 (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	85.0919	75.6579	81.2056	73.1588	72.1624	66.3598	66.3662	68.1879	68.0554	74.3080	77.1137	84.3748 (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	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279	84.8279 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.8049	14.0378	11.4163	8.6429	6.4606	5.4543	5.8936	7.6607	10.2822	13.0557	15.2379	16.2442 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	182.4452	184.3384	179.5676	169.4110	156.5902	144.5405	136.4905	134.5973	139.3681	149.5247	162.3455	174.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966	44.8966 (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)	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519	-56.5519 (71)
Water heating gains (Table 5)	114.3708	112.5861	109.1473	101.6094	96.9924	92.1664	89.2018	91.6505	94.5214	99.8764	107.1023	113.4070 (72)
Total internal gains	388.7934	387.1348	376.3037	355.8358	336.2158	315.3338	304.7585	307.0811	317.3443	338.6292	360.8582	380.2189 (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							
Southeast	7.9500	42.6275	0.6300	0.7000	0.7700	103.5689 (77)						
Solar gains	103.5689	156.8048	214.1318	281.1242	304.5798	324.1458	308.4937	283.9556	248.6554	185.3774	125.2380	85.7407 (83)
Total gains	492.3623	543.9396	590.4355	636.9601	640.7946	639.4796	613.2522	591.0366	565.9998	524.0066	486.0962	465.9595 (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	33.1927	33.8418	34.0542	35.0810	35.0810	35.6641	35.4728	35.8521	35.4728	34.8808	34.6779	34.0542
alpha	3.2128	3.2561	3.2703	3.3387	3.3387	3.3776	3.3649	3.3901	3.3649	3.3254	3.3119	3.2703
util living area	0.9778	0.9685	0.9472	0.8975	0.8035	0.6330	0.4625	0.4621	0.7177	0.8941	0.9607	0.9800 (86)
MIT	18.9800	19.2010	19.6065	20.1404	20.5866	20.8764	20.9689	20.9707	20.8011	20.3100	19.6289	19.0250 (87)
Th 2	19.9031	19.9241	19.9308	19.9621	19.9621	19.9791	19.9736	19.9844	19.9736	19.9562	19.9501	19.9308 (88)
util rest of house	0.9730	0.9620	0.9356	0.8739	0.7538	0.5440	0.3405	0.3378	0.6364	0.8633	0.9510	0.9758 (89)
MIT 2	18.0881	18.3206	18.7236	19.2607	19.6700	19.9154	19.9648	19.9764	19.8606	19.4238	18.7636	18.1526 (90)
Living area fraction	18.5608	18.7873	19.1916	19.7270	20.1558	20.4248	20.4970	20.5034	20.3591	19.8935	19.2223	18.6150 (91)
MIT	18.5608	18.7873	19.1916	19.7270	20.1558	20.4248	20.4970	20.5034	20.3591	19.8935	19.2223	18.6150 (92)
Temperature adjustment	18.5608	18.7873	19.1916	19.7270	20.1558	20.4248	20.4970	20.5034	20.3591	19.8935	19.2223	18.6150 (93)

Full SAP Calculation Printout



8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9654	0.9531	0.9257	0.8677	0.7640	0.5848	0.4044	0.4031	0.6693	0.8611	0.9424	0.9687	(94)
Useful gains	475.3116	518.4071	546.5845	552.6953	489.5817	373.9931	248.0095	238.2374	378.8105	451.2429	458.0942	451.3924	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	1198.3524	1160.3250	1041.4823	855.0972	631.7567	413.2611	256.0854	245.7213	443.1379	689.0063	940.7625	1155.4725	(97)
Space heating kWh	537.9423	431.3688	368.2039	217.7293	105.7782	0.0000	0.0000	0.0000	0.0000	176.8960	347.5212	523.8356	(98a)
Space heating requirement - total per year (kWh/year)												2709.2754	
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	537.9423	431.3688	368.2039	217.7293	105.7782	0.0000	0.0000	0.0000	0.0000	176.8960	347.5212	523.8356	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2709.2754	
Space heating per m2										(98c) / (4) =		67.2611	(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	537.9423	431.3688	368.2039	217.7293	105.7782	0.0000	0.0000	0.0000	0.0000	176.8960	347.5212	523.8356	(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)	316.4367	253.7464	216.5905	128.0761	62.2225	0.0000	0.0000	0.0000	0.0000	104.0565	204.4242	308.1386	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	196.8471	174.1904	185.1591	162.8634	157.9613	142.4155	140.5291	146.0082	147.5150	164.4144	174.7579	194.6904	(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	115.7924	102.4649	108.9171	95.8020	92.9184	83.7738	82.6642	85.8872	86.7735	96.7144	102.7988	114.5237	(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	13.8339	11.0981	9.9926	7.3210	5.6550	4.6202	5.1586	6.7054	8.7097	11.4275	12.9074	14.2184	(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												1593.6914	(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												1169.0304	(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)												111.6478	(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												2874.3696	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1593.6914	28.4300	453.0865	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1169.0304	28.4300	332.3553	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	111.6478	28.4300	31.7415	(250)
Additional standing charges			0.0000	(251)
Total energy cost			817.1833	(255)

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	1593.6914	0.1550	247.0915 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1169.0304	0.1409	164.6752 (264)
Space and water heating			411.7668 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	111.6478	0.1443	16.1142 (268)
Total CO2, kg/year			427.8810 (272)

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	1593.6914	1.5740	2508.4929 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1169.0304	1.5209	1777.9377 (278)
Space and water heating			4286.4306 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	111.6478	1.5338	171.2492 (282)
Total Primary energy kWh/year			4457.6798 (286)

Full SAP Calculation Printout



Plot Reference	Flat 3				Issued on Date	29/01/2026	
Assessment Reference	Proposed			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	69 C		DER	9.00		TER	
Environmental	94 A		% DER < TER				N/A
CO ₂ Emissions (t/year)	0.42		DFEE	67.70		TFEE	
Compliance Check	N/A		% DFEE < TFEE				
% DPER < TPER			DPER	94.02		TPER	
Assessor Details	Miss Charlotte Russell				Assessor ID	DK97-0001	
Client	tbc, tbc						

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.5700 (1b)	x 2.4700 (2b)	= 127.3779 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5700		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e)...(3n)	= 127.3779 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813 (22b)
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			8.7700	1.1450	10.0420		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	55.9100	8.7700	47.1400	0.2200	10.3708	9.0000	424.2600 (29a)
Wall to Corridor	16.6600	1.7600	14.9000	0.2200	3.2780	9.0000	134.1000 (29a)
External Roof	22.8800		22.8800	0.1500	3.4320	9.0000	205.9200 (30)
Total net area of external elements Aum(A, m ²)			95.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.2348		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			51.5700			40.0000	2062.8000 (32d)
Party Ceiling			28.6900			30.0000	860.7000 (32b)
Internal Wall			35.3200			9.0000	317.8800 (32c)
Internal Wall 2			13.6000			100.0000	1360.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		5822.0600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							112.8963 (35)
Thermal bridges (Default value 0.200 * total exposed area)							19.0900 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		48.3248 (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	40.2359	39.4896	38.7581	35.3223	34.6795	31.6869	31.6869	31.1328	32.8396	34.6795	35.9799	37.3395 (38)
Average = Sum(39)m / 12 =	88.5607	87.8144	87.0829	83.6471	83.0042	80.0117	80.0117	79.4576	81.1644	83.0042	84.3047	85.6642 (39)
												83.6440

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.7173	1.7028	1.6886	1.6220	1.6095	1.5515	1.5515	1.5408	1.5739	1.6095	1.6348	1.6611 (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												1.7364 (42)
Hot water usage for mixer showers	53.3330	52.5315	51.3635	49.1289	47.4798	45.6408	44.5955	45.7545	47.0251	48.9997	51.2823	53.1286 (42a)
Hot water usage for baths	23.0581	22.7157	22.2335	21.3443	20.6785	19.9403	19.5415	20.0204	20.5418	21.3317	22.2392	22.9802 (42b)
Hot water usage for other uses	32.4123	31.2337	30.0551	28.8764	27.6978	26.5192	26.5192	27.6978	28.8764	30.0551	31.2337	32.4123 (42c)
Average daily hot water use (litres/day)												100.0155 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	108.8034	106.4809	103.6521	99.3497	95.8561	92.1002	90.6561	93.4727	96.4433	100.3865	104.7552	108.5211 (44)
Energy content (annual)	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m =											1661.2363
	25.8477	22.7441	23.8964	20.4007	19.3561	16.9872	16.4461	17.3608	17.8386	20.4335	22.3864	25.4877 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6048 (55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291 (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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291 (64)
Electric shower(s)	Total per year (kWh/year) = Sum(64)m =											2155.8843 (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	90.9047	80.7726	86.5793	77.7464	76.5150	70.1797	70.0645	72.0921	72.0671	78.9033	82.1481	90.1067 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.1167	16.9792	13.8085	10.4539	7.8144	6.5972	7.1286	9.2660	12.4368	15.7913	18.4308	19.6480 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	225.8363	228.1798	222.2743	209.7022	193.8323	178.9167	168.9522	166.6088	172.5142	185.0863	200.9563	215.8718 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547 (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)	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554 (71)
Water heating gains (Table 5)	122.1837	120.1973	116.3701	107.9811	102.8428	97.4719	94.1727	96.8980	100.0932	106.0528	114.0946	121.1111 (72)
Total internal gains	452.0191	450.2387	437.3352	413.0196	389.3718	364.8682	352.1359	354.6551	366.9266	391.8128	418.3641	441.5133 (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	
Southeast				6.2100	36.7938	0.6300	0.7000		0.7700		69.8294 (77)	
Northwest				2.5600	11.2829	0.6300	0.7000		0.7700		8.8274 (81)	
Solar gains	78.6568	136.9138	195.1197	254.8170	297.3316	300.4226	287.4583	254.9392	215.6673	153.4189	94.7467	66.9684 (83)
Total gains	530.6760	587.1525	632.4549	667.8366	686.7034	665.2908	639.5942	609.5943	582.5939	545.2317	513.1108	508.4816 (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	18.2614	18.4166	18.5713	19.3341	19.4838	20.2125	20.2125	20.3535	19.9255	19.4838	19.1833	18.8788
alpha	2.2174	2.2278	2.2381	2.2889	2.2989	2.3475	2.3475	2.3569	2.3284	2.2989	2.2789	2.2586
util living area	0.9314	0.9123	0.8811	0.8238	0.7365	0.6054	0.4800	0.5119	0.6856	0.8358	0.9083	0.9362 (86)

Full SAP Calculation Printout



MIT	17.9440	18.2639	18.7935	19.5281	20.1490	20.6448	20.8535	20.8258	20.4814	19.6971	18.7593	17.9645 (87)
Th 2	20.1414	20.1486	20.1557	20.1890	20.1952	20.2242	20.2242	20.2296	20.2131	20.1952	20.1826	20.1694 (88)
util rest of house												
	0.9247	0.9038	0.8691	0.8051	0.7060	0.5566	0.4117	0.4453	0.6417	0.8150	0.8982	0.9300 (89)
MIT 2	17.3103	17.6299	18.1554	18.8936	19.4909	19.9653	20.1377	20.1226	19.8180	19.0696	18.1443	17.3484 (90)
Living area fraction									fLA = Living area / (4) =			0.5300 (91)
MIT	17.6461	17.9659	18.4936	19.2298	19.8397	20.3254	20.5170	20.4953	20.1696	19.4021	18.4702	17.6749 (92)
Temperature adjustment												0.0000
adjusted MIT	17.6461	17.9659	18.4936	19.2298	19.8397	20.3254	20.5170	20.4953	20.1696	19.4021	18.4702	17.6749 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8990	0.8760	0.8401	0.7796	0.6912	0.5634	0.4384	0.4693	0.6390	0.7909	0.8716	0.9056	(94)
Useful gains	477.0723	514.3232	531.3515	520.6509	474.6387	374.7927	280.4277	286.0697	372.3027	431.2296	447.2258	460.5060	(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													
	1181.9441	1147.3729	1044.4348	864.0614	675.6260	458.0969	313.4085	325.4016	492.6329	730.6155	958.5635	1154.3181	(97)
Space heating kWh													
	524.4247	425.4094	381.7339	247.2556	149.5346	0.0000	0.0000	0.0000	0.0000	222.7431	368.1631	516.1962	(98a)
Space heating requirement - total per year (kWh/year)												2835.4607	
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													
	524.4247	425.4094	381.7339	247.2556	149.5346	0.0000	0.0000	0.0000	0.0000	222.7431	368.1631	516.1962	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2835.4607	
Space heating per m2													
										(98c) / (4) =		54.9828	(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													
	524.4247	425.4094	381.7339	247.2556	149.5346	0.0000	0.0000	0.0000	0.0000	222.7431	368.1631	516.1962 (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)													
	308.4851	250.2408	224.5494	145.4445	87.9615	0.0000	0.0000	0.0000	0.0000	131.0254	216.5666	303.6449 (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													
	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291 (64)	
Efficiency of water heater (217)m													170.0000 (216)
	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000 (217)	
Fuel for water heating, kWh/month													
	126.0760	111.5135	118.4239	103.9181	100.6188	90.5317	89.2070	92.7941	93.8707	104.8439	111.7053	124.6642 (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	16.7327	13.4236	12.0865	8.8551	6.8399	5.5883	6.2396	8.1104	10.5347	13.8221	15.6120	17.1978 (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													1667.9181 (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													1268.1672 (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)													135.0425 (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													3071.1277 (238)

10a. Fuel costs - using Table 12 prices

Full SAP Calculation Printout



	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1667.9181	16.4900	275.0397 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1268.1672	16.4900	209.1208 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	135.0425	16.4900	22.2685 (250)
Additional standing charges			0.0000 (251)
Total energy cost			506.4290 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.8879 (257)
SAP value		69.3972
SAP rating (Section 12)		69 (258)
SAP band		C

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	1667.9181	0.1541	257.1022 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1268.1672	0.1409	178.7109 (264)
Space and water heating			435.8131 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	135.0425	0.1443	19.4908 (268)
Total CO2, kg/year			455.3039 (272)
CO2 emissions per m2			8.8300 (273)
EI value			93.6822
EI rating			94 (274)
EI band			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	51.5700 (1b)	x 2.4700 (2b)	= 127.3779 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5700		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	127.3779 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AF50		15.0000	(17)
Infiltration rate		0.7500	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							
Upgraded Windows			8.7700	1.1450	10.0420		(27)
Solid Door			1.7600	1.2000	2.1120		(26)

Full SAP Calculation Printout



Existing Wall	55.9100	8.7700	47.1400	0.2200	10.3708	9.0000	424.2600 (29a)
Wall to Corridor	16.6600	1.7600	14.9000	0.2200	3.2780	9.0000	134.1000 (29a)
External Roof	22.8800		22.8800	0.1500	3.4320	9.0000	205.9200 (30)
Total net area of external elements A _{um} (A, m ²)			95.4500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.2348		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			51.5700			40.0000	2062.8000 (32d)
Party Ceiling			28.6900			30.0000	860.7000 (32b)
Internal Wall			35.3200			9.0000	317.8800 (32c)
Internal Wall 2			13.6000			100.0000	1360.0000 (32c)

Heat capacity C _m = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				5822.0600 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							112.8963 (35)
Thermal bridges (Default value 0.200 * total exposed area)							19.0900 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =				48.3248 (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	38.0414	35.9799	35.3223	32.2559	32.2559	30.5934	31.1328	30.0688	31.1328	32.8396	33.4381	35.3223	(38)
Average = Sum(39)m / 12 =	86.3662	84.3047	83.6471	80.5807	80.5807	78.9182	79.4576	78.3936	79.4576	81.1644	81.7629	83.6471	(39)
												81.5234	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.6747	1.6348	1.6220	1.5625	1.5625	1.5303	1.5408	1.5201	1.5408	1.5739	1.5855	1.6220	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7364 (42)
Hot water usage for mixer showers												
Hot water usage for baths	53.3330	52.5315	51.3635	49.1289	47.4798	45.6408	44.5955	45.7545	47.0251	48.9997	51.2823	53.1286 (42a)
Hot water usage for other uses	23.0581	22.7157	22.2335	21.3443	20.6785	19.9403	19.5415	20.0204	20.5418	21.3317	22.2392	22.9802 (42b)
Average daily hot water use (litres/day)	32.4123	31.2337	30.0551	28.8764	27.6978	26.5192	26.5192	27.6978	28.8764	30.0551	31.2337	32.4123 (42c)
												100.0155 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	108.8034	106.4809	103.6521	99.3497	95.8561	92.1002	90.6561	93.4727	96.4433	100.3865	104.7552	108.5211 (44)
Distribution loss (46)m = 0.15 x (45)m	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (45)
Water storage loss (or HIU loss):	25.8477	22.7441	23.8964	20.4007	19.3561	16.9872	16.4461	17.3608	17.8386	20.4335	22.3864	25.4877 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6048 (55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291 (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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291 (64)
												2155.8843 (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	90.9047	80.7726	86.5793	77.7464	76.5150	70.1797	70.0645	72.0921	72.0671	78.9033	82.1481	90.1067 (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	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	19.1167	16.9792	13.8085	10.4539	7.8144	6.5972	7.1286	9.2660	12.4368	15.7913	18.4308	19.6480 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	225.8363	228.1798	222.2743	209.7022	193.8323	178.9167	168.9522	166.6088	172.5142	185.0863	200.9563	215.8718 (68)
Pumps, fans	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Water heating gains (Table 5)	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554 (71)
Total internal gains	122.1837	120.1973	116.3701	107.9811	102.8428	97.4719	94.1727	96.8980	100.0932	106.0528	114.0946	121.1111 (72)
	452.0191	450.2387	437.3352	413.0196	389.3718	364.8682	352.1359	354.6551	366.9266	391.8128	418.3641	441.5133 (73)

6. Solar gains							
[Jan]		Area	Solar flux	g	FF	Access	Gains
		m ²	Table 6a	Specific data	Specific data	factor	W
			W/m ²	or Table 6b	or Table 6c	Table 6d	
Southeast		6.2100	42.6275	0.6300	0.7000	0.7700	80.9010 (77)
Northwest		2.5600	13.7622	0.6300	0.7000	0.7700	10.7671 (81)

Full SAP Calculation Printout



Solar gains	91.6681	142.1004	202.6196	280.6222	316.3562	342.2982	323.4763	288.5505	240.3388	170.4970	111.5369	75.4591 (83)
Total gains	543.6872	592.3391	639.9548	693.6418	705.7281	707.1665	675.6122	643.2056	607.2654	562.3098	529.9010	516.9723 (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	18.7254	19.1833	19.3341	20.0698	20.0698	20.4926	20.3535	20.6297	20.3535	19.9255	19.7796	19.3341
alpha	2.2484	2.2789	2.2889	2.3380	2.3380	2.3662	2.3569	2.3753	2.3569	2.3284	2.3186	2.2889
util living area	0.9217	0.9037	0.8667	0.7938	0.6857	0.5279	0.3893	0.3923	0.6136	0.7943	0.8877	0.9256 (86)
MIT	18.2347	18.5242	19.0627	19.7817	20.3748	20.7757	20.9249	20.9277	20.6605	20.0047	19.1191	18.3138 (87)
Th 2	20.1626	20.1826	20.1890	20.2187	20.2187	20.2348	20.2296	20.2399	20.2296	20.2131	20.2073	20.1890 (88)
util rest of house	0.9140	0.8945	0.8534	0.7728	0.6503	0.4736	0.3158	0.3171	0.5616	0.7678	0.8752	0.9182 (89)
MIT 2	17.6112	17.9082	18.4407	19.1571	19.7166	20.0823	20.1921	20.2044	19.9868	19.3759	18.5136	17.7068 (90)
Living area fraction	fLA = Living area / (4) = 0.5300 (91)											
MIT	17.9416	18.2346	18.7703	19.4881	20.0654	20.4498	20.5804	20.5877	20.3438	19.7092	18.8345	18.0284 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.9416	18.2346	18.7703	19.4881	20.0654	20.4498	20.5804	20.5877	20.3438	19.7092	18.8345	18.0284 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8876	0.8669	0.8254	0.7506	0.6428	0.4895	0.3501	0.3524	0.5698	0.7484	0.8487	0.8929 (94)
Useful gains	482.5654	513.4924	528.2477	520.6171	453.6362	346.1464	236.5337	226.6745	346.0019	420.8603	449.7022	461.6049 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	1117.7190	1082.0183	976.1883	804.8503	601.5661	398.5201	252.7107	242.0583	424.6046	650.0586	877.6824	1073.0616 (97)
Space heating kWh	472.5543	382.0494	333.2678	204.6479	110.0598	0.0000	0.0000	0.0000	0.0000	170.5235	308.1457	454.9238 (98a)
Space heating requirement - total per year (kWh/year)	2436.1723											
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	472.5543	382.0494	333.2678	204.6479	110.0598	0.0000	0.0000	0.0000	0.0000	170.5235	308.1457	454.9238 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2436.1723											
Space heating per m2	(98c) / (4) = 47.2401 (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 %) 170.0000 (206)

Efficiency of secondary/supplementary heating system, % 0.0000 (207)

0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	472.5543	382.0494	333.2678	204.6479	110.0598	0.0000	0.0000	0.0000	0.0000	170.5235	308.1457	454.9238 (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)	277.9731	224.7349	196.0399	120.3811	64.7411	0.0000	0.0000	0.0000	0.0000	100.3080	181.2622	267.6022 (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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291 (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	126.0760	111.5135	118.4239	103.9181	100.6188	90.5317	89.2070	92.7941	93.8707	104.8439	111.7053	124.6642 (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	16.7327	13.4236	12.0865	8.8551	6.8399	5.5883	6.2396	8.1104	10.5347	13.8221	15.6120	17.1978 (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	1433.0425 (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	1268.1672 (219)											
Space cooling fuel	0.0000 (221)											

Electricity for pumps and fans:

Full SAP Calculation Printout



Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	135.0425 (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	2836.2522 (238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1433.0425	28.4300	407.4140 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1268.1672	28.4300	360.5399 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	135.0425	28.4300	38.3926 (250)
Additional standing charges			0.0000 (251)
Total energy cost			806.3465 (255)

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	1433.0425	0.1547	221.6533 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1268.1672	0.1409	178.7109 (264)
Space and water heating			400.3641 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	135.0425	0.1443	19.4908 (268)
Total CO2, kg/year			419.8549 (272)

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	1433.0425	1.5726	2253.6629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1268.1672	1.5211	1928.9765 (278)
Space and water heating			4182.6395 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	135.0425	1.5338	207.1326 (282)
Total Primary energy kWh/year			4389.7721 (286)

SAP 10 EPC IMPROVEMENTS

Proposed

Current energy efficiency rating:	C 69
Current environmental impact rating:	A 94

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures (none)	Typical annual savings		Energy Efficiency impact	Environmental impact
	Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating:	C 69
Potential environmental impact rating:	A 94

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £806	Potential £806	£0	Saving
Electricity				
Space heating	£407	£407	£0	
Water heating	£361	£361	£0	
Lighting	£38	£38	£0	
Total cost of fuels	£806	£806	£0	
Total cost of uses	£806	£806	£0	
Delivered energy	55 kWh/m²	55 kWh/m²	0 kWh/m²	
Carbon dioxide emissions	0.4 tonnes	0.4 tonnes	0.0 tonnes	
CO2 emissions per m²	8 kg/m²	8 kg/m²	0 kg/m²	
Primary energy	85 kWh/m²	85 kWh/m²	0 kWh/m²	

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.5700 (1b)	x 2.4700 (2b)	= 127.3779 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 127.3779 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7500 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			8.7700	1.1450	10.0420		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	55.9100	8.7700	47.1400	0.2200	10.3708	9.0000	424.2600 (29a)
Wall to Corridor	16.6600	1.7600	14.9000	0.2200	3.2780	9.0000	134.1000 (29a)
External Roof	22.8800		22.8800	0.1500	3.4320	9.0000	205.9200 (30)
Total net area of external elements Aum (A, m ²)			95.4500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.2348		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			51.5700			40.0000	2062.8000 (32d)
Party Ceiling			28.6900			30.0000	860.7000 (32b)
Internal Wall			35.3200			9.0000	317.8800 (32c)
Internal Wall 2			13.6000			100.0000	1360.0000 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			5822.0600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							112.8963 (35)
Thermal bridges (Default value 0.200 * total exposed area)							19.0900 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss				(33) + (36) + (36a) =			48.3248 (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	40.2359	39.4896	38.7581	35.3223	34.6795	31.6869	31.6869	31.1328	32.8396	34.6795	35.9799	37.3395 (38)
Average = Sum(39)m / 12 =	88.5607	87.8144	87.0829	83.6471	83.0042	80.0117	80.0117	79.4576	81.1644	83.0042	84.3047	85.6642 (39)
												83.6440
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.7173	1.7028	1.6886	1.6220	1.6095	1.5515	1.5515	1.5408	1.5739	1.6095	1.6348	1.6611 (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												1.7364 (42)
Hot water usage for mixer showers	53.3330	52.5315	51.3635	49.1289	47.4798	45.6408	44.5955	45.7545	47.0251	48.9997	51.2823	53.1286 (42a)
Hot water usage for baths	23.0581	22.7157	22.2335	21.3443	20.6785	19.9403	19.5415	20.0204	20.5418	21.3317	22.2392	22.9802 (42b)
Hot water usage for other uses	32.4123	31.2337	30.0551	28.8764	27.6978	26.5192	26.5192	27.6978	28.8764	30.0551	31.2337	32.4123 (42c)
Average daily hot water use (litres/day)												100.0155 (43)

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	108.8034	106.4809	103.6521	99.3497	95.8561	92.1002	90.6561	93.4727	96.4433	100.3865	104.7552	108.5211	(44)
Energy conte	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179	(45)
Energy content (annual)	Total = Sum(45)m = 1661.2363												
Distribution loss (46)m = 0.15 x (45)m	25.8477	22.7441	23.8964	20.4007	19.3561	16.9872	16.4461	17.3608	17.8386	20.4335	22.3864	25.4877	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.1200 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6048 (55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	(56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	(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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291	(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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291	(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	90.9047	80.7726	86.5793	77.7464	76.5150	70.1797	70.0645	72.0921	72.0671	78.9033	82.1481	90.1067	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.1167	16.9792	13.8085	10.4539	7.8144	6.5972	7.1286	9.2660	12.4368	15.7913	18.4308	19.6480	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	225.8363	228.1798	222.2743	209.7022	193.8323	178.9167	168.9522	166.6088	172.5142	185.0863	200.9563	215.8718	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	(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)	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	(71)
Water heating gains (Table 5)	122.1837	120.1973	116.3701	107.9811	102.8428	97.4719	94.1727	96.8980	100.0932	106.0528	114.0946	121.1111	(72)
Total internal gains	452.0191	450.2387	437.3352	413.0196	389.3718	364.8682	352.1359	354.6551	366.9266	391.8128	418.3641	441.5133	(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			
Southeast				6.2100	36.7938	0.6300	0.7000		0.7700	69.8294 (77)			
Northwest				2.5600	11.2829	0.6300	0.7000		0.7700	8.8274 (81)			
Solar gains	78.6568	136.9138	195.1197	254.8170	297.3316	300.4226	287.4583	254.9392	215.6673	153.4189	94.7467	66.9684	(83)
Total gains	530.6760	587.1525	632.4549	667.8366	686.7034	665.2908	639.5942	609.5943	582.5939	545.2317	513.1108	508.4816	(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	18.2614	18.4166	18.5713	19.3341	19.4838	20.2125	20.2125	20.3535	19.9255	19.4838	19.1833	18.8788	
alpha	2.2174	2.2278	2.2381	2.2889	2.2989	2.3475	2.3475	2.3569	2.3284	2.2989	2.2789	2.2586	
util living area	0.9314	0.9123	0.8811	0.8238	0.7365	0.6054	0.4800	0.5119	0.6856	0.8358	0.9083	0.9362	(86)
MIT	17.9440	18.2639	18.7935	19.5281	20.1490	20.6448	20.8535	20.8258	20.4814	19.6971	18.7593	17.9645	(87)
Th 2	20.1414	20.1486	20.1557	20.1890	20.1952	20.2242	20.2242	20.2296	20.2131	20.1952	20.1826	20.1694	(88)
util rest of house	0.9247	0.9038	0.8691	0.8051	0.7060	0.5566	0.4117	0.4453	0.6417	0.8150	0.8982	0.9300	(89)
MIT 2	17.3103	17.6299	18.1554	18.8936	19.4909	19.9653	20.1377	20.1226	19.8180	19.0696	18.1443	17.3484	(90)
Living area fraction	17.6461	17.9659	18.4936	19.2298	19.8397	20.3254	20.5170	20.4953	20.1696	19.4021	18.4702	17.6749	(92)
MIT	17.6461	17.9659	18.4936	19.2298	19.8397	20.3254	20.5170	20.4953	20.1696	19.4021	18.4702	17.6749	(93)
Temperature adjustment													0.0000
adjusted MIT	17.6461	17.9659	18.4936	19.2298	19.8397	20.3254	20.5170	20.4953	20.1696	19.4021	18.4702	17.6749	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8990	0.8760	0.8401	0.7796	0.6912	0.5634	0.4384	0.4693	0.6390	0.7909	0.8716	0.9056	(94)
Useful gains	477.0723	514.3232	531.3515	520.6509	474.6387	374.7927	280.4277	286.0697	372.3027	431.2296	447.2258	460.5060	(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	1181.9441	1147.3729	1044.4348	864.0614	675.6260	458.0969	313.4085	325.4016	492.6329	730.6155	958.5635	1154.3181	(97)
Space heating kWh	524.4247	425.4094	381.7339	247.2556	149.5346	0.0000	0.0000	0.0000	0.0000	222.7431	368.1631	516.1962	(98a)
Space heating requirement - total per year (kWh/year)													2835.4607
Solar heating kWh													

Full SAP Calculation Printout



Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	524.4247	425.4094	381.7339	247.2556	149.5346	0.0000	0.0000	0.0000	0.0000	222.7431	368.1631	516.1962 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2835.4607
Space heating per m2										(98c) / (4) =		54.9828 (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	524.4247	425.4094	381.7339	247.2556	149.5346	0.0000	0.0000	0.0000	0.0000	222.7431	368.1631	516.1962 (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)	308.4851	250.2408	224.5494	145.4445	87.9615	0.0000	0.0000	0.0000	0.0000	131.0254	216.5666	303.6449 (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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291 (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	126.0760	111.5135	118.4239	103.9181	100.6188	90.5317	89.2070	92.7941	93.8707	104.8439	111.7053	124.6642 (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	16.7327	13.4236	12.0865	8.8551	6.8399	5.5883	6.2396	8.1104	10.5347	13.8221	15.6120	17.1978 (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												1667.9181 (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												1268.1672 (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)												135.0425 (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												3071.1277 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1667.9181	16.4900	275.0397 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1268.1672	16.4900	209.1208 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	135.0425	16.4900	22.2685 (250)
Additional standing charges			0.0000 (251)
Total energy cost			506.4290 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.8879 (257)
SAP value		69.3972
SAP rating (Section 12)		69 (258)
SAP band		C

Full SAP Calculation Printout



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	1667.9181	0.1541	257.1022 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1268.1672	0.1409	178.7109 (264)
Space and water heating			435.8131 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	135.0425	0.1443	19.4908 (268)
Total CO ₂ , kg/year			455.3039 (272)
CO ₂ emissions per m ²			8.8300 (273)
EI value			93.6822
EI rating			94 (274)
EI band			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	51.5700 (1b)	x 2.4700 (2b)	= 127.3779 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5700		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 127.3779 (5)
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)
Wind speed	Jan 4.8000 Feb 4.5000 Mar 4.4000 Apr 3.9000 May 3.9000 Jun 3.6000 Jul 3.7000 Aug 3.5000 Sep 3.7000 Oct 4.0000 Nov 4.1000 Dec 4.4000 (22)
Wind factor	1.2000 1.1250 1.1000 0.9750 0.9750 0.9000 0.9250 0.8750 0.9250 1.0000 1.0250 1.1000 (22a)
Adj infilt rate	0.9000 0.8438 0.8250 0.7312 0.7312 0.6750 0.6938 0.6562 0.6938 0.7500 0.7687 0.8250 (22b)
Effective ac	0.9050 0.8560 0.8403 0.7674 0.7674 0.7278 0.7406 0.7153 0.7406 0.7812 0.7955 0.8403 (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												
Upgraded Windows			8.7700	1.1450	10.0420		(27)					
Solid Door			1.7600	1.2000	2.1120		(26)					
Existing Wall	55.9100	8.7700	47.1400	0.2200	10.3708	9.0000	424.2600 (29a)					
Wall to Corridor	16.6600	1.7600	14.9000	0.2200	3.2780	9.0000	134.1000 (29a)					
External Roof	22.8800		22.8800	0.1500	3.4320	9.0000	205.9200 (30)					
Total net area of external elements Aum(A, m2)			95.4500				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.2348		(33)					
Main dwelling												
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)					
Party Floor			51.5700			40.0000	2062.8000 (32d)					
Party Ceiling			28.6900			30.0000	860.7000 (32b)					
Internal Wall			35.3200			9.0000	317.8800 (32c)					
Internal Wall 2			13.6000			100.0000	1360.0000 (32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		5822.0600 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							112.8963 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							19.0900 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss					(33) + (36) + (36a) =		48.3248 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 38.0414	Feb 35.9799	Mar 35.3223	Apr 32.2559	May 32.2559	Jun 30.5934	Jul 31.1328	Aug 30.0688	Sep 31.1328	Oct 32.8396	Nov 33.4381	Dec 35.3223 (38)
Heat transfer coeff	86.3662	84.3047	83.6471	80.5807	80.5807	78.9182	79.4576	78.3936	79.4576	81.1644	81.7629	83.6471 (39)
Average = Sum(39)m / 12 =												81.5234
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



HLP	1.6747	1.6348	1.6220	1.5625	1.5625	1.5303	1.5408	1.5201	1.5408	1.5739	1.5855	1.6220 (40)
HLP (average)												1.5808
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7364 (42)
Hot water usage for mixer showers												
53.3330	52.5315	51.3635	49.1289	47.4798	45.6408	44.5955	45.7545	47.0251	48.9997	51.2823	53.1286	(42a)
Hot water usage for baths												
23.0581	22.7157	22.2335	21.3443	20.6785	19.9403	19.5415	20.0204	20.5418	21.3317	22.2392	22.9802	(42b)
Hot water usage for other uses												
32.4123	31.2337	30.0551	28.8764	27.6978	26.5192	26.5192	27.6978	28.8764	30.0551	31.2337	32.4123	(42c)
Average daily hot water use (litres/day)												100.0155 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
108.8034	106.4809	103.6521	99.3497	95.8561	92.1002	90.6561	93.4727	96.4433	100.3865	104.7552	108.5211	(44)
Energy conte	172.3180	151.6273	159.3094	136.0047	129.0408	113.2480	109.6407	115.7387	118.9242	136.2235	149.2430	169.9179 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												1661.2363
25.8477	22.7441	23.8964	20.4007	19.3561	16.9872	16.4461	17.3608	17.8386	20.4335	22.3864	25.4877	(46)
Water storage loss (or HIU loss):												150.0000 (47)
Store volume												1.1200 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.6048 (55)
Enter (49) or (54) in (55)												
Total storage loss												
18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	(56)
If cylinder contains dedicated solar storage												
18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	(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												
214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291	(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												
214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291	(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												
90.9047	80.7726	86.5793	77.7464	76.5150	70.1797	70.0645	72.0921	72.0671	78.9033	82.1481	90.1067	(65)

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

Metabolic gains (Table 5), Watts												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	104.1831	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
19.1167	16.9792	13.8085	10.4539	7.8144	6.5972	7.1286	9.2660	12.4368	15.7913	18.4308	19.6480	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
225.8363	228.1798	222.2743	209.7022	193.8323	178.9167	168.9522	166.6088	172.5142	185.0863	200.9563	215.8718	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	47.1547	(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)												
-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	-69.4554	(71)
Water heating gains (Table 5)												
122.1837	120.1973	116.3701	107.9811	102.8428	97.4719	94.1727	96.8980	100.0932	106.0528	114.0946	121.1111	(72)
Total internal gains												
452.0191	450.2387	437.3352	413.0196	389.3718	364.8682	352.1359	354.6551	366.9266	391.8128	418.3641	441.5133	(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
Southeast				6.2100	42.6275		0.6300		0.7000		0.7700		80.9010 (77)
Northwest				2.5600	13.7622		0.6300		0.7000		0.7700		10.7671 (81)
Solar gains	91.6681	142.1004	202.6196	280.6222	316.3562	342.2982	323.4763	288.5505	240.3388	170.4970	111.5369	75.4591	(83)
Total gains	543.6872	592.3391	639.9548	693.6418	705.7281	707.1665	675.6122	643.2056	607.2654	562.3098	529.9010	516.9723	(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	18.7254	19.1833	19.3341	20.0698	20.0698	20.4926	20.3535	20.6297	20.3535	19.9255	19.7796	19.3341
alpha	2.2484	2.2789	2.2889	2.3380	2.3380	2.3662	2.3569	2.3753	2.3569	2.3284	2.3186	2.2889
util living area												
0.9217	0.9037	0.8667	0.7938	0.6857	0.5279	0.3893	0.3923	0.6136	0.7943	0.8877	0.9256	(86)
MIT	18.2347	18.5242	19.0627	19.7817	20.3748	20.7757	20.9249	20.9277	20.6605	20.0047	19.1191	18.3138 (87)
Th 2	20.1626	20.1826	20.1890	20.2187	20.2187	20.2348	20.2296	20.2399	20.2296	20.2131	20.2073	20.1890 (88)
util rest of house												
0.9140	0.8945	0.8534	0.7728	0.6503	0.4736	0.3158	0.3171	0.5616	0.7678	0.8752	0.9182	(89)
MIT 2	17.6112	17.9082	18.4407	19.1571	19.7166	20.0823	20.1921	20.2044	19.9868	19.3759	18.5136	17.7068 (90)
Living area fraction												
MIT	17.9416	18.2346	18.7703	19.4881	20.0654	20.4498	20.5804	20.5877	20.3438	19.7092	18.8345	18.0284 (92)
Temperature adjustment												0.0000

Full SAP Calculation Printout



adjusted MIT 17.9416 18.2346 18.7703 19.4881 20.0654 20.4498 20.5804 20.5877 20.3438 19.7092 18.8345 18.0284 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8876	0.8669	0.8254	0.7506	0.6428	0.4895	0.3501	0.3524	0.5698	0.7484	0.8487	0.8929	(94)
Useful gains	482.5654	513.4924	528.2477	520.6171	453.6362	346.1464	236.5337	226.6745	346.0019	420.8603	449.7022	461.6049	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	1117.7190	1082.0183	976.1883	804.8503	601.5661	398.5201	252.7107	242.0583	424.6046	650.0586	877.6824	1073.0616	(97)
Space heating kWh	472.5543	382.0494	333.2678	204.6479	110.0598	0.0000	0.0000	0.0000	0.0000	170.5235	308.1457	454.9238	(98a)
Space heating requirement - total per year (kWh/year)												2436.1723	
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	472.5543	382.0494	333.2678	204.6479	110.0598	0.0000	0.0000	0.0000	0.0000	170.5235	308.1457	454.9238	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2436.1723	
Space heating per m2										(98c) / (4) =		47.2401	(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	472.5543	382.0494	333.2678	204.6479	110.0598	0.0000	0.0000	0.0000	0.0000	170.5235	308.1457	454.9238	(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)	277.9731	224.7349	196.0399	120.3811	64.7411	0.0000	0.0000	0.0000	0.0000	100.3080	181.2622	267.6022	(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	214.3292	189.5729	201.3206	176.6607	171.0520	153.9040	151.6519	157.7499	159.5802	178.2347	189.8990	211.9291	(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	126.0760	111.5135	118.4239	103.9181	100.6188	90.5317	89.2070	92.7941	93.8707	104.8439	111.7053	124.6642	(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	16.7327	13.4236	12.0865	8.8551	6.8399	5.5883	6.2396	8.1104	10.5347	13.8221	15.6120	17.1978	(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												1433.0425	(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												1268.1672	(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)												135.0425	(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												2836.2522	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1433.0425	28.4300	407.4140	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1268.1672	28.4300	360.5399	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	135.0425	28.4300	38.3926	(250)

Full SAP Calculation Printout



Additional standing charges
Total energy cost

0.0000 (251)
806.3465 (255)

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	1433.0425	0.1547	221.6533 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1268.1672	0.1409	178.7109 (264)
Space and water heating			400.3641 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	135.0425	0.1443	19.4908 (268)
Total CO2, kg/year			419.8549 (272)

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	1433.0425	1.5726	2253.6629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1268.1672	1.5211	1928.9765 (278)
Space and water heating			4182.6395 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	135.0425	1.5338	207.1326 (282)
Total Primary energy kWh/year			4389.7721 (286)

Full SAP Calculation Printout



Plot Reference	Flat 4			Issued on Date	29/01/2026		
Assessment Reference	Proposed		Plot Type Ref				
Plot Address				SAP Version	10.2		
SAP Rating	70 C		DER	10.48		TER	
Environmental	94 A		% DER < TER				N/A
CO ₂ Emissions (t/year)	0.36		DFEE	73.93		TFEE	
Compliance Check	N/A		% DFEE < TFEE				
% DPER < TPER			DPER	109.66		TPER	
Assessor Details	Miss Charlotte Russell				Assessor ID	DK97-0001	
Client	tbc, tbc						

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.0200 (1b)	x 2.4700 (2b)	= 91.4394 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.0200		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e)... (3n) =	91.4394 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7500 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813 (22b)	
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883 (25)	

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			7.3900	1.1450	8.4618		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	48.9900	7.3900	41.6000	0.2200	9.1520	9.0000	374.4000 (29a)
Wall to Corridor	15.3600	1.7600	13.6000	0.2200	2.9920	9.0000	122.4000 (29a)
External Roof	25.0400		25.0400	0.1500	3.7560	9.0000	225.3600 (30)
Total net area of external elements Aum(A, m ²)			89.3900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		26.4738		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			37.0200			40.0000	1480.8000 (32d)
Party Ceiling			11.9800			30.0000	359.4000 (32b)
Internal Wall			14.3800			9.0000	129.4200 (32c)
Heat capacity Cm = Sum(A x k)							(28)... (30) + (32) + (32a)... (32e) = 3148.1800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							85.0400 (35)
Thermal bridges (Default value 0.200 * total exposed area)							17.8780 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	44.3518 (37)

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

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.8837	28.3480	27.8229	25.3564	24.8950	22.7468	22.7468	22.3490	23.5742	24.8950	25.8285	26.8045	(38)
Heat transfer coeff	73.2356	72.6998	72.1747	69.7083	69.2468	67.0986	67.0986	66.7008	67.9261	69.2468	70.1803	71.1563	(39)
Average = Sum(39)m / 12 =												69.7061	
HLP	1.9783	1.9638	1.9496	1.8830	1.8705	1.8125	1.8125	1.8017	1.8348	1.8705	1.8957	1.9221	(40)
HLP (average)												1.8829	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3296 (42)
Hot water usage for mixer showers												
46.5121 45.8131 44.7945 42.8457 41.4075 39.8037 38.8920 39.9029 41.0110 42.7330 44.7237												46.3339 (42a)
Hot water usage for baths												
20.1250 19.8261 19.4052 18.6291 18.0480 17.4037 17.0557 17.4736 17.9287 18.6181 19.4102												20.0569 (42b)
Hot water usage for other uses												
28.2462 27.2191 26.1920 25.1648 24.1377 23.1106 23.1106 24.1377 25.1648 26.1920 27.2191												28.2462 (42c)
Average daily hot water use (litres/day)												87.2200 (43)
Daily hot water use												
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
94.8833 92.8583 90.3917 86.6397 83.5933 80.3179 79.0583 81.5142 84.1045 87.5431 91.3530 94.6371												(44)
Energy content (annual)												
150.2719 132.2290 138.9287 118.6054 112.5326 98.7603 95.6141 100.9316 103.7092 118.7952 130.1491 148.1788												(45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1448.7059
22.5408 19.8343 20.8393 17.7908 16.8799 14.8140 14.3421 15.1397 15.5564 17.8193 19.5224 22.2268												(46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6048 (55)
Total storage loss												
18.7488 16.9344 18.7488 18.1440 18.7488 18.1440 18.7488 18.7488 18.1440 18.7488 18.1440 18.7488												(56)
If cylinder contains dedicated solar storage												
18.7488 16.9344 18.7488 18.1440 18.7488 18.1440 18.7488 18.7488 18.1440 18.7488 18.1440 18.7488												(57)
Primary loss												23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624
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												
192.2831 170.1746 180.9399 159.2614 154.5438 139.4163 137.6253 142.9428 144.3652 160.8064 170.8051 190.1900												(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
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												
192.2831 170.1746 180.9399 159.2614 154.5438 139.4163 137.6253 142.9428 144.3652 160.8064 170.8051 190.1900												(64)
Electric shower(s)												Total per year (kWh/year) = Sum(64)m = 1943.3539 (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												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
83.5744 74.3226 79.8027 71.9611 71.0261 65.3626 65.4007 67.1687 67.0081 73.1084 75.7994 82.8784												(65)

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

Metabolic gains (Table 5), Watts													
(66)m	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
15.2437	13.5393	11.0109	8.3360	6.2312	5.2607	5.6843	7.3887	9.9171	12.5920	14.6968	15.6673	15.6673	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
170.3260	172.0934	167.6395	158.1576	146.1885	134.9392	127.4239	125.6565	130.1104	139.5923	151.5614	162.8107	162.8107	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	(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)													
-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	(71)
Water heating gains (Table 5)													
112.3312	110.5991	107.2618	99.9460	95.4651	90.7814	87.9041	90.2805	93.0668	98.2639	105.2769	111.3957	111.3957	(72)
Total internal gains													
371.7995	370.1305	359.8108	340.3383	321.7835	301.8799	291.9111	294.2244	303.9930	324.3470	345.4338	363.7725	363.7725	(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			
Southeast	2.6000				36.7938		0.6300		0.7000		0.7700		29.2362 (77)	
Northwest	4.7900				11.2829		0.6300		0.7000		0.7700		16.5169 (81)	
Solar gains	45.7531	83.4207	128.7123	183.9066	228.2853	236.4412	223.8734	189.2656	147.5898	96.1268	55.8008	38.5086	(83)	
Total gains	417.5526	453.5512	488.5232	524.2448	550.0689	538.3211	515.7845	483.4900	451.5828	420.4737	401.2346	402.2811	(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	11.9408	12.0288	12.1164	12.5451	12.6287	13.0330	13.0330	13.1107	12.8742	12.6287	12.4607	12.2898
alpha	1.7961	1.8019	1.8078	1.8363	1.8419	1.8689	1.8689	1.8740	1.8583	1.8419	1.8307	1.8193
util living area												
	0.8994	0.8807	0.8475	0.7866	0.6979	0.5760	0.4643	0.4990	0.6622	0.8028	0.8741	0.9041 (86)
MIT	17.1356	17.4679	18.0895	18.9733	19.7723	20.4259	20.7318	20.6836	20.1898	19.1940	18.0748	17.1388 (87)

Full SAP Calculation Printout



Th 2	20.0109	20.0181	20.0252	20.0585	20.0647	20.0938	20.0938	20.0991	20.0826	20.0647	20.0521	20.0389 (88)
util rest of house	0.8904	0.8699	0.8332	0.7654	0.6647	0.5242	0.3911	0.4275	0.6154	0.7792	0.8613	0.8956 (89)
MIT 2	16.4595	16.7907	17.4062	18.2882	19.0566	19.6780	19.9365	19.9058	19.4691	18.5176	17.4144	16.4794 (90)
Living area fraction									FLA = Living area /	(4) =		0.1961 (91)
MIT	16.5921	16.9235	17.5402	18.4225	19.1969	19.8247	20.0924	20.0584	19.6104	18.6503	17.5439	16.6087 (92)
Temperature adjustment												0.0000
adjusted MIT	16.5921	16.9235	17.5402	18.4225	19.1969	19.8247	20.0924	20.0584	19.6104	18.6503	17.5439	16.6087 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8473	0.8246	0.7861	0.7207	0.6292	0.5073	0.3910	0.4240	0.5878	0.7349	0.8165	0.8538	(94)
Useful gains	353.7735	373.9910	384.0102	377.8283	346.1187	273.0743	201.6683	204.9932	265.4539	308.9890	327.5967	343.4734	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	900.2201	874.1068	796.8232	663.7990	519.1397	350.5694	234.3378	244.0157	374.3012	557.4553	732.9554	882.9583	(97)
Space heating kWh	406.5563	336.0778	307.1328	205.8989	128.7277	0.0000	0.0000	0.0000	0.0000	184.8589	291.8582	401.3768	(98a)
Space heating requirement - total per year (kWh/year)												2262.4874	
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	406.5563	336.0778	307.1328	205.8989	128.7277	0.0000	0.0000	0.0000	0.0000	184.8589	291.8582	401.3768	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2262.4874	
Space heating per m2										(98c) / (4) =		61.1153	(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	406.5563	336.0778	307.1328	205.8989	128.7277	0.0000	0.0000	0.0000	0.0000	184.8589	291.8582	401.3768	(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)	239.1507	197.6928	180.6664	121.1170	75.7221	0.0000	0.0000	0.0000	0.0000	108.7405	171.6813	236.1040	(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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900	(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	113.1077	100.1027	106.4352	93.6832	90.9081	82.0096	80.9561	84.0840	84.9207	94.5920	100.4736	111.8764	(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	13.3427	10.7040	9.6378	7.0610	5.4542	4.4561	4.9755	6.4673	8.4004	11.0217	12.4490	13.7135	(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													1330.8749 (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													1143.1493 (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)													107.6832 (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													2581.7075 (238)

10a. Fuel costs - using Table 12 prices

	Fuel	Fuel price	Fuel cost
--	------	------------	-----------

Full SAP Calculation Printout



	kWh/year	p/kWh	£/year
Space heating - main system 1	1330.8749	16.4900	219.4613 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1143.1493	16.4900	188.5053 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	107.6832	16.4900	17.7570 (250)
Additional standing charges			0.0000 (251)
Total energy cost			425.7236 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.8686 (257)
SAP value		69.7104
SAP rating (Section 12)		70 (258)
SAP band		C

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	1330.8749	0.1539	204.7670 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1143.1493	0.1408	161.0110 (264)
Space and water heating			365.7780 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	107.6832	0.1443	15.5420 (268)
Total CO2, kg/year			381.3200 (272)
CO2 emissions per m2			10.3000 (273)
EI value			93.7702
EI rating			94 (274)
EI band			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	37.0200 (1b)	x 2.4700 (2b)	= 91.4394 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.0200		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e)... (3n) =	91.4394 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test			No
Pressure Test Method			Blower Door
Measured/design AP50			15.0000 (17)
Infiltration rate			0.7500 (18)
Number of sides sheltered			0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							
Upgraded Windows			7.3900	1.1450	8.4618		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	48.9900	7.3900	41.6000	0.2200	9.1520	9.0000	374.4000 (29a)

Full SAP Calculation Printout



Wall to Corridor	15.3600	1.7600	13.6000	0.2200	2.9920	9.0000	122.4000 (29a)
External Roof	25.0400		25.0400	0.1500	3.7560	9.0000	225.3600 (30)
Total net area of external elements Aum(A, m2)			89.3900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	26.4738			(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			37.0200			40.0000	1480.8000 (32d)
Party Ceiling			11.9800			30.0000	359.4000 (32b)
Internal Wall			14.3800			9.0000	129.4200 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
Thermal bridges (Default value 0.200 * total exposed area)
Point Thermal bridges
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) = 3148.1800 (34)
85.0400 (35)
17.8780 (36)
(36a) = 0.0000
(33) + (36) + (36a) = 44.3518 (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	27.3084	25.8285	25.3564	23.1552	23.1552	21.9617	22.3490	21.5851	22.3490	23.5742	24.0039	25.3564 (38)
Average = Sum(39)m / 12 =	71.6602	70.1803	69.7083	67.5070	67.5070	66.3136	66.7008	65.9370	66.7008	67.9261	68.3557	69.7083 (39)
												68.1837
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.9357	1.8957	1.8830	1.8235	1.8235	1.7913	1.8017	1.7811	1.8017	1.8348	1.8465	1.8830 (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												1.3296 (42)
Hot water usage for mixer showers												
Hot water usage for baths	46.5121	45.8131	44.7945	42.8457	41.4075	39.8037	38.8920	39.9029	41.0110	42.7330	44.7237	46.3339 (42a)
Hot water usage for other uses	20.1250	19.8261	19.4052	18.6291	18.0480	17.4037	17.0557	17.4736	17.9287	18.6181	19.4102	20.0569 (42b)
Average daily hot water use (litres/day)	28.2462	27.2191	26.1920	25.1648	24.1377	23.1106	23.1106	24.1377	25.1648	26.1920	27.2191	28.2462 (42c)
												87.2200 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	94.8833	92.8583	90.3917	86.6397	83.5933	80.3179	79.0583	81.5142	84.1045	87.5431	91.3530	94.6371 (44)
Energy content (annual)	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (45)
Distribution loss	(46)m = 0.15 x (45)m											
Water storage loss (or HIU loss):	22.5408	19.8343	20.8393	17.7908	16.8799	14.8140	14.3421	15.1397	15.5564	17.8193	19.5224	22.2268 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6048 (55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900 (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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900 (64)
												1943.3539 (64)
Electric shower s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	83.5744	74.3226	79.8027	71.9611	71.0261	65.3626	65.4007	67.1687	67.0081	73.1084	75.7994	82.8784 (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	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	15.2437	13.5393	11.0109	8.3360	6.2312	5.2607	5.6843	7.3887	9.9171	12.5920	14.6968	15.6673 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	170.3260	172.0934	167.6395	158.1576	146.1885	134.9392	127.4239	125.6565	130.1104	139.5923	151.5614	162.8107 (68)
Pumps, fans	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Water heating gains (Table 5)	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833 (71)
Total internal gains	112.3312	110.5991	107.2618	99.9460	95.4651	90.7814	87.9041	90.2805	93.0668	98.2639	105.2769	111.3957 (72)
	371.7995	370.1305	359.8108	340.3383	321.7835	301.8799	291.9111	294.2244	303.9930	324.3470	345.4338	363.7725 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W
Southeast	2.6000	42.6275	0.6300	0.7000	0.7700	33.8716 (77)
Northwest	4.7900	13.7622	0.6300	0.7000	0.7700	20.1463 (81)

Full SAP Calculation Printout



Solar gains	54.0179	87.9838	136.1818	206.1274	246.3792	272.7198	255.2599	217.7497	167.5900	108.7002	66.6101	43.9159 (83)
Total gains	425.8174	458.1144	495.9927	546.4656	568.1628	574.5997	547.1710	511.9741	471.5831	433.0471	412.0439	407.6883 (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	12.2033	12.4607	12.5451	12.9541	12.9541	13.1873	13.1107	13.2626	13.1107	12.8742	12.7933	12.5451
alpha	1.8136	1.8307	1.8363	1.8636	1.8636	1.8792	1.8740	1.8842	1.8740	1.8583	1.8529	1.8363
util living area	0.8889	0.8710	0.8322	0.7573	0.6502	0.5056	0.3808	0.3894	0.5975	0.7638	0.8531	0.8920 (86)
MIT	17.4499	17.7425	18.3852	19.2626	20.0526	20.6084	20.8467	20.8474	20.4283	19.5629	18.4775	17.5318 (87)
Th 2	20.0321	20.0521	20.0585	20.0882	20.0882	20.1044	20.0991	20.1094	20.0991	20.0826	20.0768	20.0585 (88)
util rest of house	0.8788	0.8596	0.8165	0.7339	0.6122	0.4478	0.3004	0.3062	0.5423	0.7347	0.8380	0.8822 (89)
MIT 2	16.7827	17.0814	17.7158	18.5845	19.3325	19.8395	20.0234	20.0351	19.6918	18.8828	17.8247	16.8801 (90)
Living area fraction	16.9135	17.2111	17.8471	18.7175	19.4737	19.9903	20.1849	20.1944	fLA = Living area / (4) =	19.0162	17.9527	0.1961 (91)
MIT	16.9135	17.2111	17.8471	18.7175	19.4737	19.9903	20.1849	20.1944	19.8362	19.0162	17.9527	17.0079 (92)
Temperature adjustment												0.0000
adjusted MIT	16.9135	17.2111	17.8471	18.7175	19.4737	19.9903	20.1849	20.1944	19.8362	19.0162	17.9527	17.0079 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8347	0.8143	0.7702	0.6921	0.5834	0.4398	0.3085	0.3146	0.5243	0.6939	0.7928	0.8392 (94)
Useful gains	355.4243	373.0299	382.0032	378.2355	331.4787	252.7270	168.7909	161.0858	247.2676	300.4833	326.6674	342.1211 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	853.7270	828.9051	749.1619	622.2431	464.0255	304.4007	185.7521	177.6601	322.5814	496.9601	673.4870	823.1062 (97)
Space heating kWh	370.7373	306.3481	273.1660	175.6854	98.6149	0.0000	0.0000	0.0000	0.0000	146.1787	249.7101	357.8529 (98a)
Space heating requirement - total per year (kWh/year)												1978.2935
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	370.7373	306.3481	273.1660	175.6854	98.6149	0.0000	0.0000	0.0000	0.0000	146.1787	249.7101	357.8529 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1978.2935
Space heating per m2										(98c) / (4) =		53.4385 (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	370.7373	306.3481	273.1660	175.6854	98.6149	0.0000	0.0000	0.0000	0.0000	146.1787	249.7101	357.8529 (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)	218.0807	180.2048	160.6859	103.3444	58.0087	0.0000	0.0000	0.0000	0.0000	85.9875	146.8883	210.5017 (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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900 (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	113.1077	100.1027	106.4352	93.6832	90.9081	82.0096	80.9561	84.0840	84.9207	94.5920	100.4736	111.8764 (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	13.3427	10.7040	9.6378	7.0610	5.4542	4.4561	4.9755	6.4673	8.4004	11.0217	12.4490	13.7135 (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												1163.7020 (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												1143.1493 (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)												107.6832 (232)

Full SAP Calculation Printout



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	2414.5346 (238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1163.7020	28.4300	330.8405 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1143.1493	28.4300	324.9974 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	107.6832	28.4300	30.6143 (250)
Additional standing charges			0.0000 (251)
Total energy cost			686.4522 (255)

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	1163.7020	0.1543	179.5865 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1143.1493	0.1408	161.0110 (264)
Space and water heating			340.5975 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	107.6832	0.1443	15.5420 (268)
Total CO2, kg/year			356.1395 (272)

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	1163.7020	1.5714	1828.5849 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1143.1493	1.5208	1738.5069 (278)
Space and water heating			3567.0918 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	107.6832	1.5338	165.1681 (282)
Total Primary energy kWh/year			3732.2599 (286)

SAP 10 EPC IMPROVEMENTS

Proposed

Current energy efficiency rating: C 70
Current environmental impact rating: A 94

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 70
Potential environmental impact rating: A 94

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £686	Potential £686	Saving £0
Electricity			
Space heating	£331	£331	£0
Water heating	£325	£325	£0
Lighting	£31	£31	£0
Total cost of fuels	£686	£686	£0
Total cost of uses	£687	£687	£0
Delivered energy	65 kWh/m²	65 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.4 tonnes	0.4 tonnes	0.0 tonnes
CO2 emissions per m²	10 kg/m²	10 kg/m²	0 kg/m²
Primary energy	101 kWh/m²	101 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	37.0200 (1b)	x 2.4700 (2b)	= 91.4394 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 91.4394 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			7.3900	1.1450	8.4618		(27)
Solid Door			1.7600	1.2000	2.1120		(26)
Existing Wall	48.9900	7.3900	41.6000	0.2200	9.1520	9.0000	374.4000 (29a)
Wall to Corridor	15.3600	1.7600	13.6000	0.2200	2.9920	9.0000	122.4000 (29a)
External Roof	25.0400		25.0400	0.1500	3.7560	9.0000	225.3600 (30)
Total net area of external elements A _{um} (A, m ²)			89.3900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.4738		(33)
Main dwelling							
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)
Party Floor			37.0200			40.0000	1480.8000 (32d)
Party Ceiling			11.9800			30.0000	359.4000 (32b)
Internal Wall			14.3800			9.0000	129.4200 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		3148.1800 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							85.0400 (35)
Thermal bridges (Default value 0.200 * total exposed area)							17.8780 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		44.3518 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	28.8837	28.3480	27.8229	25.3564	24.8950	22.7468	22.7468	22.3490	23.5742	24.8950	25.8285	26.8045 (38)
Heat transfer coeff	73.2356	72.6998	72.1747	69.7083	69.2468	67.0986	67.0986	66.7008	67.9261	69.2468	70.1803	71.1563 (39)
Average = Sum(39)m / 12 =												69.7061
HLP	1.9783	1.9638	1.9496	1.8830	1.8705	1.8125	1.8125	1.8017	1.8348	1.8705	1.8957	1.9221 (40)
HLP (average)												1.8829
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3296 (42)
Hot water usage for mixer showers	46.5121	45.8131	44.7945	42.8457	41.4075	39.8037	38.8920	39.9029	41.0110	42.7330	44.7237	46.3339 (42a)
Hot water usage for baths	20.1250	19.8261	19.4052	18.6291	18.0480	17.4037	17.0557	17.4736	17.9287	18.6181	19.4102	20.0569 (42b)
Hot water usage for other uses	28.2462	27.2191	26.1920	25.1648	24.1377	23.1106	23.1106	24.1377	25.1648	26.1920	27.2191	28.2462 (42c)
Average daily hot water use (litres/day)												87.2200 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Full SAP Calculation Printout



Energy content (annual)	94.8833	92.8583	90.3917	86.6397	83.5933	80.3179	79.0583	81.5142	84.1045	87.5431	91.3530	94.6371 (44)
Distribution loss (46)m = 0.15 x (45)m	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (45)
Total = Sum(45)m =	22.5408	19.8343	20.8393	17.7908	16.8799	14.8140	14.3421	15.1397	15.5564	17.8193	19.5224	22.2268 (46)
Water storage loss (or HIU loss):												150.0000 (47)
Store volume												1.1200 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.6048 (55)
Enter (49) or (54) in (55)												
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900 (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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900 (64)
Total per year (kWh/year) = Sum(64)m =												1943.3539 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	83.5744	74.3226	79.8027	71.9611	71.0261	65.3626	65.4007	67.1687	67.0081	73.1084	75.7994	82.8784 (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	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2437	13.5393	11.0109	8.3360	6.2312	5.2607	5.6843	7.3887	9.9171	12.5920	14.6968	15.6673 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	170.3260	172.0934	167.6395	158.1576	146.1885	134.9392	127.4239	125.6565	130.1104	139.5923	151.5614	162.8107 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071 (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)	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833 (71)
Water heating gains (Table 5)	112.3312	110.5991	107.2618	99.9460	95.4651	90.7814	87.9041	90.2805	93.0668	98.2639	105.2769	111.3957 (72)
Total internal gains	371.7995	370.1305	359.8108	340.3383	321.7835	301.8799	291.9111	294.2244	303.9930	324.3470	345.4338	363.7725 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
South-east					2.6000	36.7938	0.6300	0.7000	0.7700	29.2362 (77)			
North-west					4.7900	11.2829	0.6300	0.7000	0.7700	16.5169 (81)			
Solar gains	45.7531	83.4207	128.7123	183.9066		228.2853	236.4412	223.8734	189.2656	147.5898	96.1268	55.8008	38.5086 (83)
Total gains	417.5526	453.5512	488.5232	524.2448		550.0689	538.3211	515.7845	483.4900	451.5828	420.4737	401.2346	402.2811 (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	11.9408	12.0288	12.1164	12.5451	12.6287	13.0330	13.0330	13.1107	12.8742	12.6287	12.4607	12.2898
alpha	1.7961	1.8019	1.8078	1.8363	1.8419	1.8689	1.8689	1.8740	1.8583	1.8419	1.8307	1.8193
util living area	0.8994	0.8807	0.8475	0.7866	0.6979	0.5760	0.4643	0.4990	0.6622	0.8028	0.8741	0.9041 (86)
MIT	17.1356	17.4679	18.0895	18.9733	19.7723	20.4259	20.7318	20.6836	20.1898	19.1940	18.0748	17.1388 (87)
Th 2	20.0109	20.0181	20.0252	20.0585	20.0647	20.0938	20.0938	20.0991	20.0826	20.0647	20.0521	20.0389 (88)
util rest of house	0.8904	0.8699	0.8332	0.7654	0.6647	0.5242	0.3911	0.4275	0.6154	0.7792	0.8613	0.8956 (89)
MIT 2	16.4595	16.7907	17.4062	18.2882	19.0566	19.6780	19.9365	19.9058	19.4691	18.5176	17.4144	16.4794 (90)
Living area fraction	16.5921	16.9235	17.5402	18.4225	19.1969	19.8247	20.0924	20.0584	19.6104	18.6503	17.5439	16.6087 (91)
MIT	16.5921	16.9235	17.5402	18.4225	19.1969	19.8247	20.0924	20.0584	19.6104	18.6503	17.5439	16.6087 (92)
Temperature adjustment												0.0000
adjusted MIT	16.5921	16.9235	17.5402	18.4225	19.1969	19.8247	20.0924	20.0584	19.6104	18.6503	17.5439	16.6087 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8473	0.8246	0.7861	0.7207	0.6292	0.5073	0.3910	0.4240	0.5878	0.7349	0.8165	0.8538 (94)
Ext temp.	353.7735	373.9910	384.0102	377.8283	346.1187	273.0743	201.6683	204.9932	265.4539	308.9890	327.5967	343.4734 (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	900.2201	874.1068	796.8232	663.7990	519.1397	350.5694	234.3378	244.0157	374.3012	557.4553	732.9554	882.9583 (97)
Space heating requirement - total per year (kWh/year)	406.5563	336.0778	307.1328	205.8989	128.7277	0.0000	0.0000	0.0000	0.0000	184.8589	291.8582	401.3768 (98a)
Solar heating kWh												2262.4874
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh												0.0000

Full SAP Calculation Printout



406.5563 336.0778 307.1328 205.8989 128.7277 0.0000 0.0000 0.0000 0.0000 184.8589 291.8582 401.3768 (98c)
 Space heating requirement after solar contribution - total per year (kWh/year) 2262.4874
 Space heating per m2 (98c) / (4) = 61.1153 (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	406.5563	336.0778	307.1328	205.8989	128.7277	0.0000	0.0000	0.0000	0.0000	184.8589	291.8582	401.3768 (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)	239.1507	197.6928	180.6664	121.1170	75.7221	0.0000	0.0000	0.0000	0.0000	108.7405	171.6813	236.1040 (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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900 (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	113.1077	100.1027	106.4352	93.6832	90.9081	82.0096	80.9561	84.0840	84.9207	94.5920	100.4736	111.8764 (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	13.3427	10.7040	9.6378	7.0610	5.4542	4.4561	4.9755	6.4673	8.4004	11.0217	12.4490	13.7135 (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												1330.8749 (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												1143.1493 (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)												107.6832 (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												2581.7075 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1330.8749	16.4900	219.4613 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1143.1493	16.4900	188.5053 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	107.6832	16.4900	17.7570 (250)
Additional standing charges			0.0000 (251)
Total energy cost			425.7236 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.8686 (257)
SAP value		69.7104
SAP rating (Section 12)		70 (258)
SAP band		C

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

Energy	Emission factor	Emissions
--------	-----------------	-----------

Full SAP Calculation Printout



Space heating - main system 1	kWh/year	kg CO2/kWh	kg CO2/year
Total CO2 associated with community systems	1330.8749	0.1539	204.7670 (261)
Water heating (other fuel)			0.0000 (373)
Space and water heating	1143.1493	0.1408	161.0110 (264)
Pumps, fans and electric keep-hot			365.7780 (265)
Energy for lighting	0.0000	0.0000	0.0000 (267)
Total CO2, kg/year	107.6832	0.1443	15.5420 (268)
CO2 emissions per m2			381.3200 (272)
EI value			10.3000 (273)
EI rating			93.7702
EI band			94 (274)
			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	37.0200 (1b)	x 2.4700 (2b)	= 91.4394 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 91.4394 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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												
Upgraded Windows			7.3900	1.1450	8.4618		(27)					
Solid Door			1.7600	1.2000	2.1120		(26)					
Existing Wall	48.9900	7.3900	41.6000	0.2200	9.1520	9.0000	374.4000 (29a)					
Wall to Corridor	15.3600	1.7600	13.6000	0.2200	2.9920	9.0000	122.4000 (29a)					
External Roof	25.0400		25.0400	0.1500	3.7560	9.0000	225.3600 (30)					
Total net area of external elements Aum(A, m2)			89.3900				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	26.4738		(33)					
Main dwelling												
Party Wall			6.5200	0.0000	0.0000	70.0000	456.4000 (32)					
Party Floor			37.0200			40.0000	1480.8000 (32d)					
Party Ceiling			11.9800			30.0000	359.4000 (32b)					
Internal Wall			14.3800			9.0000	129.4200 (32c)					
Heat capacity Cm = Sum(A x k)						(28) ... (30) + (32) + (32a) ... (32e) =	3148.1800 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							85.0400 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							17.8780 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	44.3518 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.3084	Feb 25.8285	Mar 25.3564	Apr 23.1552	May 23.1552	Jun 21.9617	Jul 22.3490	Aug 21.5851	Sep 22.3490	Oct 23.5742	Nov 24.0039	Dec 25.3564 (38)
Heat transfer coeff	71.6602	70.1803	69.7083	67.5070	67.5070	66.3136	66.7008	65.9370	66.7008	67.9261	68.3557	69.7083 (39)
Average = Sum(39)m / 12 =												68.1837
HLP	Jan 1.9357	Feb 1.8957	Mar 1.8830	Apr 1.8235	May 1.8235	Jun 1.7913	Jul 1.8017	Aug 1.7811	Sep 1.8017	Oct 1.8348	Nov 1.8465	Dec 1.8830 (40)
HLP (average)												1.8418
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)												
Assumed occupancy	1.3296 (42)											
Hot water usage for mixer showers	46.5121	45.8131	44.7945	42.8457	41.4075	39.8037	38.8920	39.9029	41.0110	42.7330	44.7237	46.3339 (42a)
Hot water usage for baths	20.1250	19.8261	19.4052	18.6291	18.0480	17.4037	17.0557	17.4736	17.9287	18.6181	19.4102	20.0569 (42b)
Hot water usage for other uses	28.2462	27.2191	26.1920	25.1648	24.1377	23.1106	23.1106	24.1377	25.1648	26.1920	27.2191	28.2462 (42c)
Average daily hot water use (litres/day)	87.2200 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	94.8833	92.8583	90.3917	86.6397	83.5933	80.3179	79.0583	81.5142	84.1045	87.5431	91.3530	94.6371 (44)
Distribution loss (46)m = 0.15 x (45)m	150.2719	132.2290	138.9287	118.6054	112.5326	98.7603	95.6141	100.9316	103.7092	118.7952	130.1491	148.1788 (45)
Water storage loss (or HIU loss):	22.5408	19.8343	20.8393	17.7908	16.8799	14.8140	14.3421	15.1397	15.5564	17.8193	19.5224	22.2268 (46)
Store volume	150.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.1200 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.6048 (55)											
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900 (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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900 (64)
Total per year (kWh/year) = Sum(64)m =	1943.3539 (64)											
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000 (64a)											
Heat gains from water heating, kWh/month	83.5744	74.3226	79.8027	71.9611	71.0261	65.3626	65.4007	67.1687	67.0081	73.1084	75.7994	82.8784 (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	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749	79.7749 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2437	13.5393	11.0109	8.3360	6.2312	5.2607	5.6843	7.3887	9.9171	12.5920	14.6968	15.6673 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	170.3260	172.0934	167.6395	158.1576	146.1885	134.9392	127.4239	125.6565	130.1104	139.5923	151.5614	162.8107 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071	44.3071 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833	-53.1833 (71)
Water heating gains (Table 5)	112.3312	110.5991	107.2618	99.9460	95.4651	90.7814	87.9041	90.2805	93.0668	98.2639	105.2769	111.3957 (72)
Total internal gains	371.7995	370.1305	359.8108	340.3383	321.7835	301.8799	291.9111	294.2244	303.9930	324.3470	345.4338	363.7725 (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							
Southeast	2.6000	42.6275	0.6300	0.7000	0.7700	33.8716 (77)						
Northwest	4.7900	13.7622	0.6300	0.7000	0.7700	20.1463 (81)						
Solar gains	54.0179	87.9838	136.1818	206.1274	246.3792	272.7198	255.2599	217.7497	167.5900	108.7002	66.6101	43.9159 (83)
Total gains	425.8174	458.1144	495.9927	546.4656	568.1628	574.5997	547.1710	511.9741	471.5831	433.0471	412.0439	407.6883 (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	12.2033	12.4607	12.5451	12.9541	12.9541	13.1873	13.1107	13.2626	13.1107	12.8742	12.7933	12.5451
alpha	1.8136	1.8307	1.8363	1.8636	1.8636	1.8792	1.8740	1.8842	1.8740	1.8583	1.8529	1.8363
util living area	0.8889	0.8710	0.8322	0.7573	0.6502	0.5056	0.3808	0.3894	0.5975	0.7638	0.8531	0.8920 (86)
MIT	17.4499	17.7425	18.3852	19.2626	20.0526	20.6084	20.8467	20.8474	20.4283	19.5629	18.4775	17.5318 (87)
Th 2	20.0321	20.0521	20.0585	20.0882	20.0882	20.1044	20.0991	20.1094	20.0991	20.0826	20.0768	20.0585 (88)
util rest of house	0.8788	0.8596	0.8165	0.7339	0.6122	0.4478	0.3004	0.3062	0.5423	0.7347	0.8380	0.8822 (89)
MIT 2	16.7827	17.0814	17.7158	18.5845	19.3325	19.8395	20.0234	20.0351	19.6918	18.8828	17.8247	16.8801 (90)
Living area fraction	16.9135	17.2111	17.8471	18.7175	19.4737	19.9903	20.1849	20.1944	19.8362	19.0162	17.9527	17.0079 (91)
MIT	16.9135	17.2111	17.8471	18.7175	19.4737	19.9903	20.1849	20.1944	19.8362	19.0162	17.9527	17.0079 (92)
Temperature adjustment	16.9135	17.2111	17.8471	18.7175	19.4737	19.9903	20.1849	20.1944	19.8362	19.0162	17.9527	17.0079 (93)

Full SAP Calculation Printout



8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8347	0.8143	0.7702	0.6921	0.5834	0.4398	0.3085	0.3146	0.5243	0.6939	0.7928	0.8392	(94)
Useful gains	355.4243	373.0299	382.0032	378.2355	331.4787	252.7270	168.7909	161.0858	247.2676	300.4833	326.6674	342.1211	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	853.7270	828.9051	749.1619	622.2431	464.0255	304.4007	185.7521	177.6601	322.5814	496.9601	673.4870	823.1062	(97)
Space heating kWh	370.7373	306.3481	273.1660	175.6854	98.6149	0.0000	0.0000	0.0000	0.0000	146.1787	249.7101	357.8529	(98a)
Space heating requirement - total per year (kWh/year)												1978.2935	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	370.7373	306.3481	273.1660	175.6854	98.6149	0.0000	0.0000	0.0000	0.0000	146.1787	249.7101	357.8529	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1978.2935	
Space heating per m2										(98c) / (4) =		53.4385	(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	370.7373	306.3481	273.1660	175.6854	98.6149	0.0000	0.0000	0.0000	0.0000	146.1787	249.7101	357.8529	(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)	218.0807	180.2048	160.6859	103.3444	58.0087	0.0000	0.0000	0.0000	0.0000	85.9875	146.8883	210.5017	(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	192.2831	170.1746	180.9399	159.2614	154.5438	139.4163	137.6253	142.9428	144.3652	160.8064	170.8051	190.1900	(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	113.1077	100.1027	106.4352	93.6832	90.9081	82.0096	80.9561	84.0840	84.9207	94.5920	100.4736	111.8764	(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 (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	(231)
Lighting (234a)m	13.3427	10.7040	9.6378	7.0610	5.4542	4.4561	4.9755	6.4673	8.4004	11.0217	12.4490	13.7135	(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												1163.7020	(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												1143.1493	(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)												107.6832	(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												2414.5346	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1163.7020	28.4300	330.8405	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1143.1493	28.4300	324.9974	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	107.6832	28.4300	30.6143	(250)
Additional standing charges			0.0000	(251)
Total energy cost			686.4522	(255)

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	1163.7020	0.1543	179.5865 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1143.1493	0.1408	161.0110 (264)
Space and water heating			340.5975 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	107.6832	0.1443	15.5420 (268)
Total CO2, kg/year			356.1395 (272)

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	1163.7020	1.5714	1828.5849 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1143.1493	1.5208	1738.5069 (278)
Space and water heating			3567.0918 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	107.6832	1.5338	165.1681 (282)
Total Primary energy kWh/year			3732.2599 (286)

Full SAP Calculation Printout



Plot Reference	Flat 5			Issued on Date	29/01/2026		
Assessment Reference	Proposed		Plot Type Ref				
Plot Address				SAP Version	10.2		
SAP Rating	72 C		DER	9.62		TER	
Environmental	94 A		% DER < TER				N/A
CO ₂ Emissions (t/year)	0.33		DFEE	67.13		TFEE	
Compliance Check	N/A		% DFEE < TFEE				
% DPER < TPER			DPER	100.81		TPER	
Assessor Details	Miss Charlotte Russell				Assessor ID	DK97-0001	
Client	tbc, tbc						

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.5400 (1b)	x 2.4700 (2b)	= 92.7238 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5400		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	92.7238 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7500	(18)
Number of sides sheltered	0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)
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	0.9562 0.9375 0.9188 0.8250 0.8062 0.7125 0.7125 0.6938 0.7500 0.8062 0.8438 0.8813	(22b)
Effective ac	0.9572 0.9395 0.9221 0.8403 0.8250 0.7538 0.7538 0.7406 0.7812 0.8250 0.8560 0.8883	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Solid Door			1.7600	1.2000	2.1120		(26)
Roof lights			4.5000	1.1450	5.1527		(27a)
Wall to Corridor	21.2800	1.7600	19.5200	0.1800	3.5136	9.0000	175.6800 (29a)
Ashlar Walls	33.4900		33.4900	0.1800	6.0282	9.0000	301.4100 (29a)
External Roof	9.3000	2.4000	6.9000	0.1500	1.0350	9.0000	62.1000 (30)
Insulated at Rafters	28.2400	2.1000	26.1400	0.1500	3.9210	9.0000	235.2600 (30)
Total net area of external elements Aum(A, m ²)			92.3100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.7625		(33)
Main dwelling							
Party Floor			37.5400			40.0000	1501.6000 (32d)
Internal Wall			22.2300			9.0000	200.0700 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		2476.1200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							65.9595 (35)
Thermal bridges (Default value 0.200 * total exposed area)							18.4620 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		40.2245 (37)

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

Full SAP Calculation Printout



(38)m	29.2894	28.7462	28.2137	25.7126	25.2447	23.0663	23.0663	22.6629	23.9054	25.2447	26.1913	27.1810 (38)
Heat transfer coeff	69.5139	68.9707	68.4382	65.9371	65.4691	63.2908	63.2908	62.8873	64.1298	65.4691	66.4158	67.4055 (39)
Average = Sum(39)m / 12 =												65.9348

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.8517	1.8373	1.8231	1.7564	1.7440	1.6860	1.6860	1.6752	1.7083	1.7440	1.7692	1.7956	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.3426 (42)
Hot water usage for mixer showers													
	46.7304	46.0281	45.0047	43.0468	41.6018	39.9905	39.0745	40.0901	41.2034	42.9336	44.9336	46.5513	(42a)
Hot water usage for baths													
	20.2188	19.9185	19.4957	18.7160	18.1322	17.4849	17.1352	17.5551	18.0123	18.7050	19.5007	20.1505	(42b)
Hot water usage for other uses													
	28.3796	27.3476	26.3156	25.2836	24.2516	23.2196	23.2196	24.2516	25.2836	26.3156	27.3476	28.3796	(42c)
Average daily hot water use (litres/day)													87.6294 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	95.3287	93.2942	90.8160	87.0464	83.9857	80.6950	79.4294	81.8969	84.4993	87.9541	91.7818	95.0813	(44)
Energy conte	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													1455.5066
	22.6466	19.9275	20.9371	17.8743	16.9591	14.8836	14.4094	15.2108	15.6294	17.9029	19.6140	22.3312	(46)
Water storage loss (or HIU loss):													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.1200 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6048 (55)
Total storage loss													
	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	(56)
If cylinder contains dedicated solar storage													
	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488	(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													
	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856	(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													
	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
	83.8089	74.5290	80.0196	72.1462	71.2017	65.5167	65.5499	67.3263	67.1700	73.2938	76.0025	83.1097	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	15.2794	13.5710	11.0367	8.3555	6.2458	5.2730	5.6976	7.4060	9.9403	12.6215	14.7312	15.7040	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	172.2389	174.0262	169.5222	159.9339	147.8303	136.4546	128.8550	127.0677	131.5716	141.1600	153.2636	164.6392	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	(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)													
	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	(71)
Water heating gains (Table 5)													
	112.6464	110.9063	107.5532	100.2031	95.7012	90.9955	88.1047	90.4923	93.2917	98.5132	105.5591	111.7066	(72)
Total internal gains													
	374.4148	372.7536	362.3623	342.7426	324.0275	303.9732	293.9075	296.2162	306.0538	326.5449	347.8040	366.3000	(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			2.4000	26.0000	0.6300	1.0000	1.0000	35.3808 (82)				
Northeast			0.5000	26.0000	0.6300	1.0000	1.0000	7.3710 (82)				
Southeast			1.6000	26.0000	0.6300	1.0000	1.0000	23.5872 (82)				
Solar gains	66.3390	137.7810	244.9440	382.7250	489.8880	510.3000	482.2335	400.5855	293.4225	168.3990	84.1995	53.5815 (83)
Total gains	440.7538	510.5346	607.3063	725.4676	813.9155	814.2732	776.1410	696.8017	599.4763	494.9439	432.0035	419.8815 (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, n11,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	9.8946	9.9725	10.0501	10.4313	10.5059	10.8675	10.8675	10.9372	10.7253	10.5059	10.3561	10.2041	
alpha	1.6596	1.6648	1.6700	1.6954	1.7004	1.7245	1.7245	1.7291	1.7150	1.7004	1.6904	1.6803	
util living area													
	0.8654	0.8305	0.7661	0.6585	0.5363	0.4093	0.3170	0.3568	0.5336	0.7250	0.8307	0.8723 (86)	
MIT	17.0165	17.4722	18.2762	19.3025	20.0816	20.6087	20.8229	20.7771	20.3373	19.2838	18.0222	16.9985 (87)	

Full SAP Calculation Printout



Th 2	20.0741	20.0814	20.0885	20.1218	20.1280	20.1570	20.1570	20.1624	20.1458	20.1280	20.1154	20.1022 (88)
util rest of house	0.8554	0.8182	0.7494	0.6352	0.5045	0.3677	0.2648	0.3030	0.4908	0.7000	0.8168	0.8629 (89)
MIT 2	16.3970	16.8471	17.6346	18.6416	19.3756	19.8719	20.0502	20.0229	19.6405	18.6502	17.4160	16.3963 (90)
Living area fraction									fLA = Living area / (4) =			0.2752 (91)
MIT	16.5675	17.0191	17.8111	18.8234	19.5699	20.0746	20.2629	20.2304	19.8322	18.8245	17.5828	16.5620 (92)
Temperature adjustment												0.0000
adjusted MIT	16.5675	17.0191	17.8111	18.8234	19.5699	20.0746	20.2629	20.2304	19.8322	18.8245	17.5828	16.5620 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8047	0.7657	0.6987	0.5962	0.4825	0.3635	0.2716	0.3076	0.4737	0.6559	0.7657	0.8135 (94)
Useful gains	354.6577	390.9374	424.3350	432.5242	392.6932	295.9582	210.8092	214.3061	283.9772	324.6451	330.8054	341.5555 (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	852.7620	835.8606	774.1127	654.3231	515.2345	346.4945	231.8246	240.8852	367.6064	538.4523	696.2227	833.2695 (97)
Space heating kWh	370.5895	298.9884	260.2346	159.6952	91.1708	0.0000	0.0000	0.0000	0.0000	159.0725	263.1005	365.8352 (98a)
Space heating requirement - total per year (kWh/year)												1968.6867
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	370.5895	298.9884	260.2346	159.6952	91.1708	0.0000	0.0000	0.0000	0.0000	159.0725	263.1005	365.8352 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1968.6867
Space heating per m2										(98c) / (4) =		52.4424 (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	370.5895	298.9884	260.2346	159.6952	91.1708	0.0000	0.0000	0.0000	0.0000	159.0725	263.1005	365.8352 (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)	217.9938	175.8755	153.0792	93.9383	53.6299	0.0000	0.0000	0.0000	0.0000	93.5721	154.7650	215.1972 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (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	113.5227	100.4678	106.8188	94.0107	91.2189	82.2823	81.2201	84.3627	85.2071	94.9201	100.8330	112.2856 (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	13.3739	10.7291	9.6603	7.0776	5.4669	4.4665	4.9871	6.4824	8.4200	11.0476	12.4782	13.7456 (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												1158.0510 (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												1147.1497 (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)												107.9353 (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												2413.1360 (238)

10a. Fuel costs - using Table 12 prices

Fuel	Fuel price	Fuel cost
------	------------	-----------

Full SAP Calculation Printout



	kWh/year	p/kWh	£/year
Space heating - main system 1	1158.0510	16.4900	190.9626 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1147.1497	16.4900	189.1650 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	107.9353	16.4900	17.7985 (250)
Additional standing charges			0.0000 (251)
Total energy cost			397.9261 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.7356 (257)
SAP value		71.8665
SAP rating (Section 12)		72 (258)
SAP band		C

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	1158.0510	0.1544	178.7790 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1147.1497	0.1409	161.5774 (264)
Space and water heating			340.3564 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	107.9353	0.1443	15.5784 (268)
Total CO2, kg/year			355.9348 (272)
CO2 emissions per m2			9.4800 (273)
EI value			94.2216
EI rating			94 (274)
EI band			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	37.5400 (1b)	x 2.4700 (2b)	= 92.7238 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5400		
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	92.7238 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7500 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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							
Solid Door			1.7600	1.2000	2.1120		(26)
Roof lights			4.5000	1.1450	5.1527		(27a)
Wall to Corridor	21.2800	1.7600	19.5200	0.1800	3.5136	9.0000	175.6800 (29a)

Full SAP Calculation Printout



Ashlar Walls	33.4900		33.4900	0.1800	6.0282	9.0000	301.4100 (29a)
External Roof	9.3000	2.4000	6.9000	0.1500	1.0350	9.0000	62.1000 (30)
Insulated at Rafters	28.2400	2.1000	26.1400	0.1500	3.9210	9.0000	235.2600 (30)
Total net area of external elements Aum (A, m2)			92.3100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		21.7625		(33)
Main dwelling							
Party Floor			37.5400			40.0000	1501.6000 (32d)
Internal Wall			22.2300			9.0000	200.0700 (32c)

Heat capacity Cm = Sum(A x k)	(28)... (30) + (32) + (32a)... (32e) =	2476.1200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		65.9595 (35)
Thermal bridges (Default value 0.200 * total exposed area)		18.4620 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	40.2245 (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	27.6920	26.1913	25.7126	23.4804	23.4804	22.2702	22.6629	21.8883	22.6629	23.9054	24.3410	25.7126 (38)
Average = Sum(39)m / 12 =	67.9164	66.4158	65.9371	63.7049	63.7049	62.4947	62.8873	62.1128	62.8873	64.1298	64.5655	65.9371 (39)
												64.3911
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.8092	1.7692	1.7564	1.6970	1.6970	1.6647	1.6752	1.6546	1.6752	1.7083	1.7199	1.7564 (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												1.3426 (42)
Hot water usage for mixer showers	46.7304	46.0281	45.0047	43.0468	41.6018	39.9905	39.0745	40.0901	41.2034	42.9336	44.9336	46.5513 (42a)
Hot water usage for baths	20.2188	19.9185	19.4957	18.7160	18.1322	17.4849	17.1352	17.5551	18.0123	18.7050	19.5007	20.1505 (42b)
Hot water usage for other uses	28.3796	27.3476	26.3156	25.2836	24.2516	23.2196	23.2196	24.2516	25.2836	26.3156	27.3476	28.3796 (42c)
Average daily hot water use (litres/day)												87.6294 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	95.3287	93.2942	90.8160	87.0464	83.9857	80.6950	79.4294	81.8969	84.4993	87.9541	91.7818	95.0813 (44)
Energy content (annual)	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1455.5066
Water storage loss (or HIU loss):	22.6466	19.9275	20.9371	17.8743	16.9591	14.8836	14.4094	15.2108	15.6294	17.9029	19.6140	22.3312 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6048 (55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (64)
Electric shower s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	83.8089	74.5290	80.0196	72.1462	71.2017	65.5167	65.5499	67.3263	67.1700	73.2938	76.0025	83.1097 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2794	13.5710	11.0367	8.3555	6.2458	5.2730	5.6976	7.4060	9.9403	12.6215	14.7312	15.7040 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	172.2389	174.0262	169.5222	159.9339	147.8303	136.4546	128.8550	127.0677	131.5716	141.1600	153.2636	164.6392 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982 (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)	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040 (71)
Water heating gains (Table 5)	112.6464	110.9063	107.5532	100.2031	95.7012	90.9955	88.1047	90.4923	93.2917	98.5132	105.5591	111.7066 (72)
Total internal gains	374.4148	372.7536	362.3623	342.7426	324.0275	303.9732	293.9075	296.2162	306.0538	326.5449	347.8040	366.3000 (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	2.4000	32.0000	0.6300	1.0000	1.0000	43.5456 (82)
Northeast	0.5000	32.0000	0.6300	1.0000	1.0000	9.0720 (82)
Southeast	1.6000	32.0000	0.6300	1.0000	1.0000	29.0304 (82)

Full SAP Calculation Printout



Solar gains	81.6480	150.5385	265.3560	433.7550	530.7120	589.3965	551.1240	464.3730	339.3495	196.4655	104.6115	63.7875 (83)
Total gains	456.0628	523.2921	627.7183	776.4976	854.7395	893.3697	845.0315	760.5892	645.4033	523.0104	452.4155	430.0875 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	10.1273	10.3561	10.4313	10.7968	10.7968	11.0059	10.9372	11.0736	10.9372	10.7253	10.6529	10.4313	
alpha	1.6752	1.6904	1.6954	1.7198	1.7198	1.7337	1.7291	1.7382	1.7291	1.7150	1.7102	1.6954	
util living area	0.8498	0.8145	0.7406	0.6138	0.4808	0.3409	0.2472	0.2619	0.4598	0.6724	0.8011	0.8557 (86)	
MIT	17.3679	17.7819	18.6050	19.6102	20.3258	20.7501	20.9043	20.8995	20.5587	19.6773	18.4689	17.4268 (87)	
Th 2	20.0954	20.1154	20.1218	20.1515	20.1515	20.1676	20.1624	20.1727	20.1624	20.1458	20.1400	20.1218 (88)	
util rest of house	0.8386	0.8014	0.7227	0.5891	0.4470	0.2987	0.1948	0.2060	0.4130	0.6427	0.7847	0.8450 (89)	
MIT 2	16.7560	17.1712	17.9741	18.9511	19.6140	19.9964	20.1127	20.1211	19.8443	19.0351	17.8678	16.8312 (90)	
Living area fraction	16.9244	17.3392	18.1477	19.1325	19.8099	20.2038	20.3305	20.3353	fLA = Living area / (4) =				0.2752 (91)
MIT	16.9244	17.3392	18.1477	19.1325	19.8099	20.2038	20.3305	20.3353	20.0409	19.2118	18.0332	16.9951 (92)	
Temperature adjustment												0.0000	
adjusted MIT	16.9244	17.3392	18.1477	19.1325	19.8099	20.2038	20.3305	20.3353	20.0409	19.2118	18.0332	16.9951 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.7873	0.7498	0.6749	0.5564	0.4326	0.3006	0.2056	0.2173	0.4058	0.6055	0.7348	0.7947 (94)
Useful gains	359.0447	392.3469	423.6205	432.0508	369.7439	268.5105	173.7752	165.2691	261.9157	316.6743	332.4434	341.7850 (95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000 (96)
Heat loss rate W	809.8639	792.9536	728.4511	613.6353	459.3063	300.2120	184.2932	176.1070	317.0095	481.7326	641.3411	777.7345 (97)
Space heating kWh	335.4094	269.2078	226.7940	130.7408	66.6344	0.0000	0.0000	0.0000	0.0000	122.8034	222.4064	324.3464 (98a)
Space heating requirement - total per year (kWh/year)												1698.3425
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	335.4094	269.2078	226.7940	130.7408	66.6344	0.0000	0.0000	0.0000	0.0000	122.8034	222.4064	324.3464 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1698.3425
Space heating per m2										(98c) / (4) =		45.2409 (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	335.4094	269.2078	226.7940	130.7408	66.6344	0.0000	0.0000	0.0000	0.0000	122.8034	222.4064	324.3464 (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)	197.2997	158.3575	133.4082	76.9064	39.1967	0.0000	0.0000	0.0000	0.0000	72.2373	130.8273	190.7920 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (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	113.5227	100.4678	106.8188	94.0107	91.2189	82.2823	81.2201	84.3627	85.2071	94.9201	100.8330	112.2856 (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	13.3739	10.7291	9.6603	7.0776	5.4669	4.4665	4.9871	6.4824	8.4200	11.0476	12.4782	13.7456 (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												999.0250 (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												1147.1497 (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)												107.9353 (232)

Full SAP Calculation Printout



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	2254.1101	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	999.0250	28.4300	284.0228 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1147.1497	28.4300	326.1347 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	107.9353	28.4300	30.6860 (250)
Additional standing charges			0.0000 (251)
Total energy cost			640.8435 (255)

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	999.0250	0.1549	154.7584 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1147.1497	0.1409	161.5774 (264)
Space and water heating			316.3358 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	107.9353	0.1443	15.5784 (268)
Total CO2, kg/year			331.9142 (272)

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	999.0250	1.5735	1571.9780 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1147.1497	1.5208	1744.6017 (278)
Space and water heating			3316.5798 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	107.9353	1.5338	165.5548 (282)
Total Primary energy kWh/year			3482.1346 (286)

SAP 10 EPC IMPROVEMENTS

Proposed

Current energy efficiency rating:	C 72
Current environmental impact rating:	A 94

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
Total Savings	£0		0.00 kg/m²

Potential energy efficiency rating:	C 72
Potential environmental impact rating:	A 94

Fuel prices for cost data on this page from database revision number 589 TEST (12 Dec 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current £641	Potential £641	Saving £0
Electricity			
Space heating	£284	£284	£0
Water heating	£326	£326	£0
Lighting	£31	£31	£0
Total cost of fuels	£641	£641	£0
Total cost of uses	£641	£641	£0
Delivered energy	60 kWh/m²	60 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	9 kg/m²	9 kg/m²	0 kg/m²
Primary energy	93 kWh/m²	93 kWh/m²	0 kWh/m²

Full SAP Calculation Printout



SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	37.5400 (1b)	x 2.4700 (2b)	= 92.7238 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 92.7238 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (25)

3. Heat losses and heat loss parameter

Element	Gross 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													
Solid Door			1.7600	1.2000	2.1120			(26)					
Roof lights			4.5000	1.1450	5.1527			(27a)					
Wall to Corridor	21.2800	1.7600	19.5200	0.1800	3.5136	9.0000	175.6800	(29a)					
Ashlar Walls	33.4900		33.4900	0.1800	6.0282	9.0000	301.4100	(29a)					
External Roof	9.3000	2.4000	6.9000	0.1500	1.0350	9.0000	62.1000	(30)					
Insulated at Rafters	28.2400	2.1000	26.1400	0.1500	3.9210	9.0000	235.2600	(30)					
Total net area of external elements Aum(A, m2)			92.3100					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.7625			(33)					
Main dwelling													
Party Floor			37.5400			40.0000	1501.6000	(32d)					
Internal Wall			22.2300			9.0000	200.0700	(32c)					
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			2476.1200	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							65.9595	(35)					
Thermal bridges (Default value 0.200 * total exposed area)							18.4620	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss				(33) + (36) + (36a) =			40.2245	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 29.2894	Feb 28.7462	Mar 28.2137	Apr 25.7126	May 25.2447	Jun 23.0663	Jul 23.0663	Aug 22.6629	Sep 23.9054	Oct 25.2447	Nov 26.1913	Dec 27.1810	(38)
Heat transfer coeff	69.5139	68.9707	68.4382	65.9371	65.4691	63.2908	63.2908	62.8873	64.1298	65.4691	66.4158	67.4055	(39)
Average = Sum(39)m / 12 =												65.9348	
HLP	Jan 1.8517	Feb 1.8373	Mar 1.8231	Apr 1.7564	May 1.7440	Jun 1.6860	Jul 1.6860	Aug 1.6752	Sep 1.7083	Oct 1.7440	Nov 1.7692	Dec 1.7956	(40)
HLP (average)												1.7564	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3426 (42)	
Hot water usage for mixer showers													
46.7304 46.0281 45.0047 43.0468 41.6018 39.9905 39.0745 40.0901 41.2034 42.9336 44.9336												46.5513 (42a)	
Hot water usage for baths													
20.2188 19.9185 19.4957 18.7160 18.1322 17.4849 17.1352 17.5551 18.0123 18.7050 19.5007												20.1505 (42b)	
Hot water usage for other uses													
28.3796 27.3476 26.3156 25.2836 24.2516 23.2196 23.2196 24.2516 25.2836 26.3156 27.3476												28.3796 (42c)	
Average daily hot water use (litres/day)												87.6294 (43)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec													
Daily hot water use													
95.3287 93.2942 90.8160 87.0464 83.9857 80.6950 79.4294 81.8969 84.4993 87.9541 91.7818												95.0813 (44)	

Full SAP Calculation Printout



Energy content (annual)	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (45)
Distribution loss (46)m = 0.15 x (45)m	22.6466	19.9275	20.9371	17.8743	16.9591	14.8836	14.4094	15.2108	15.6294	17.9029	19.6140	22.3312 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6048 (55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	83.8089	74.5290	80.0196	72.1462	71.2017	65.5167	65.5499	67.3263	67.1700	73.2938	76.0025	83.1097 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2794	13.5710	11.0367	8.3555	6.2458	5.2730	5.6976	7.4060	9.9403	12.6215	14.7312	15.7040 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	172.2389	174.0262	169.5222	159.9339	147.8303	136.4546	128.8550	127.0677	131.5716	141.1600	153.2636	164.6392 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982 (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)	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040 (71)
Water heating gains (Table 5)	112.6464	110.9063	107.5532	100.2031	95.7012	90.9955	88.1047	90.4923	93.2917	98.5132	105.5591	111.7066 (72)
Total internal gains	374.4148	372.7536	362.3623	342.7426	324.0275	303.9732	293.9075	296.2162	306.0538	326.5449	347.8040	366.3000 (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				2.4000	26.0000		0.6300	1.0000		1.0000		35.3808 (82)
Northeast				0.5000	26.0000		0.6300	1.0000		1.0000		7.3710 (82)
Southeast				1.6000	26.0000		0.6300	1.0000		1.0000		23.5872 (82)
Solar gains	66.3390	137.7810	244.9440	382.7250	489.8880	510.3000	482.2335	400.5855	293.4225	168.3990	84.1995	53.5815 (83)
Total gains	440.7538	510.5346	607.3063	725.4676	813.9155	814.2732	776.1410	696.8017	599.4763	494.9439	432.0035	419.8815 (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	9.8946	9.9725	10.0501	10.4313	10.5059	10.8675	10.8675	10.9372	10.7253	10.5059	10.3561	10.2041
alpha	1.6596	1.6648	1.6700	1.6954	1.7004	1.7245	1.7245	1.7291	1.7150	1.7004	1.6904	1.6803
util living area	0.8654	0.8305	0.7661	0.6585	0.5363	0.4093	0.3170	0.3568	0.5336	0.7250	0.8307	0.8723 (86)
MIT	17.0165	17.4722	18.2762	19.3025	20.0816	20.6087	20.8229	20.7771	20.3373	19.2838	18.0222	16.9985 (87)
Th 2	20.0741	20.0814	20.0885	20.1218	20.1280	20.1570	20.1570	20.1624	20.1458	20.1280	20.1154	20.1022 (88)
util rest of house	0.8554	0.8182	0.7494	0.6352	0.5045	0.3677	0.2648	0.3030	0.4908	0.7000	0.8168	0.8629 (89)
MIT 2	16.3970	16.8471	17.6346	18.6416	19.3756	19.8719	20.0502	20.0229	19.6405	18.6502	17.4160	16.3963 (90)
Living area fraction									FLA = Living area / (4) =			0.2752 (91)
MIT	16.5675	17.0191	17.8111	18.8234	19.5699	20.0746	20.2629	20.2304	19.8322	18.8245	17.5828	16.5620 (92)
Temperature adjustment												0.0000
adjusted MIT	16.5675	17.0191	17.8111	18.8234	19.5699	20.0746	20.2629	20.2304	19.8322	18.8245	17.5828	16.5620 (93)

8. Space heating requirement

Utilisation	0.8047	0.7657	0.6987	0.5962	0.4825	0.3635	0.2716	0.3076	0.4737	0.6559	0.7657	0.8135 (94)
Useful gains	354.6577	390.9374	424.3350	432.5242	392.6932	295.9582	210.8092	214.3061	283.9772	324.6451	330.8054	341.5555 (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	852.7620	835.8606	774.1127	654.3231	515.2345	346.4945	231.8246	240.8852	367.6064	538.4523	696.2227	833.2695 (97)
Space heating kWh	370.5895	298.9884	260.2346	159.6952	91.1708	0.0000	0.0000	0.0000	0.0000	159.0725	263.1005	365.8352 (98a)
Space heating requirement - total per year (kWh/year)												1968.6867
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												

Full SAP Calculation Printout



370.5895	298.9884	260.2346	159.6952	91.1708	0.0000	0.0000	0.0000	0.0000	159.0725	263.1005	365.8352 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)											1968.6867
Space heating per m2											(98c) / (4) = 52.4424 (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	370.5895	298.9884	260.2346	159.6952	91.1708	0.0000	0.0000	0.0000	0.0000	159.0725	263.1005	365.8352 (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)	217.9938	175.8755	153.0792	93.9383	53.6299	0.0000	0.0000	0.0000	0.0000	93.5721	154.7650	215.1972 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (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	113.5227	100.4678	106.8188	94.0107	91.2189	82.2823	81.2201	84.3627	85.2071	94.9201	100.8330	112.2856 (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	13.3739	10.7291	9.6603	7.0776	5.4669	4.4665	4.9871	6.4824	8.4200	11.0476	12.4782	13.7456 (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												1158.0510 (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												1147.1497 (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)												107.9353 (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												2413.1360 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1158.0510	16.4900	190.9626 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1147.1497	16.4900	189.1650 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	107.9353	16.4900	17.7985 (250)
Additional standing charges			0.0000 (251)
Total energy cost			397.9261 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.7356 (257)
SAP value		71.8665
SAP rating (Section 12)		72 (258)
SAP band		C

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

Energy	Emission factor	Emissions
--------	-----------------	-----------

Full SAP Calculation Printout



Space heating - main system 1	kWh/year	kg CO2/kWh	kg CO2/year
Total CO2 associated with community systems	1158.0510	0.1544	178.7790 (261)
Water heating (other fuel)			0.0000 (373)
Space and water heating	1147.1497	0.1409	161.5774 (264)
Pumps, fans and electric keep-hot			340.3564 (265)
Energy for lighting	0.0000	0.0000	0.0000 (267)
Total CO2, kg/year	107.9353	0.1443	15.5784 (268)
CO2 emissions per m2			355.9348 (272)
EI value			9.4800 (273)
EI rating			94.2216
EI band			94 (274)
			A

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	37.5400 (1b)	x 2.4700 (2b)	= 92.7238 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	37.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 92.7238 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.7500 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.8000	4.5000	4.4000	3.9000	3.9000	3.6000	3.7000	3.5000	3.7000	4.0000	4.1000	4.4000 (22)
Wind factor	1.2000	1.1250	1.1000	0.9750	0.9750	0.9000	0.9250	0.8750	0.9250	1.0000	1.0250	1.1000 (22a)
Adj infilt rate	0.9000	0.8438	0.8250	0.7312	0.7312	0.6750	0.6938	0.6562	0.6938	0.7500	0.7687	0.8250 (22b)
Effective ac	0.9050	0.8560	0.8403	0.7674	0.7674	0.7278	0.7406	0.7153	0.7406	0.7812	0.7955	0.8403 (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													
Solid Door			1.7600	1.2000	2.1120			(26)					
Roof lights			4.5000	1.1450	5.1527			(27a)					
Wall to Corridor	21.2800	1.7600	19.5200	0.1800	3.5136	9.0000	175.6800	(29a)					
Ashlar Walls	33.4900		33.4900	0.1800	6.0282	9.0000	301.4100	(29a)					
External Roof	9.3000	2.4000	6.9000	0.1500	1.0350	9.0000	62.1000	(30)					
Insulated at Rafters	28.2400	2.1000	26.1400	0.1500	3.9210	9.0000	235.2600	(30)					
Total net area of external elements Aum(A, m2)			92.3100					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	21.7625			(33)					
Main dwelling													
Party Floor			37.5400			40.0000	1501.6000	(32d)					
Internal Wall			22.2300			9.0000	200.0700	(32c)					
Heat capacity Cm = Sum(A x k)					(28)... (30) + (32) + (32a)... (32e) =		2476.1200	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							65.9595	(35)					
Thermal bridges (Default value 0.200 * total exposed area)							18.4620	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	40.2245	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 27.6920	Feb 26.1913	Mar 25.7126	Apr 23.4804	May 23.4804	Jun 22.2702	Jul 22.6629	Aug 21.8883	Sep 22.6629	Oct 23.9054	Nov 24.3410	Dec 25.7126	(38)
Heat transfer coeff	67.9164	66.4158	65.9371	63.7049	63.7049	62.4947	62.8873	62.1128	62.8873	64.1298	64.5655	65.9371	(39)
Average = Sum(39)m / 12 =												64.3911	
HLP	Jan 1.8092	Feb 1.7692	Mar 1.7564	Apr 1.6970	May 1.6970	Jun 1.6647	Jul 1.6752	Aug 1.6546	Sep 1.6752	Oct 1.7083	Nov 1.7199	Dec 1.7564	(40)
HLP (average)												1.7153	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

Full SAP Calculation Printout



4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3426 (42)
Hot water usage for mixer showers	46.7304	46.0281	45.0047	43.0468	41.6018	39.9905	39.0745	40.0901	41.2034	42.9336	44.9336	46.5513 (42a)
Hot water usage for baths	20.2188	19.9185	19.4957	18.7160	18.1322	17.4849	17.1352	17.5551	18.0123	18.7050	19.5007	20.1505 (42b)
Hot water usage for other uses	28.3796	27.3476	26.3156	25.2836	24.2516	23.2196	23.2196	24.2516	25.2836	26.3156	27.3476	28.3796 (42c)
Average daily hot water use (litres/day)												87.6294 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	95.3287	93.2942	90.8160	87.0464	83.9857	80.6950	79.4294	81.8969	84.4993	87.9541	91.7818	95.0813 (44)
Distribution loss (46)m = 0.15 x (45)m	150.9774	132.8497	139.5808	119.1622	113.0608	99.2239	96.0629	101.4054	104.1961	119.3529	130.7601	148.8744 (45)
Water storage loss (or HIU loss):	22.6466	19.9275	20.9371	17.8743	16.9591	14.8836	14.4094	15.2108	15.6294	17.9029	19.6140	22.3312 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1200 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6048 (55)
Total storage loss	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (56)
If cylinder contains dedicated solar storage	18.7488	16.9344	18.7488	18.1440	18.7488	18.1440	18.7488	18.7488	18.1440	18.7488	18.1440	18.7488 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	83.8089	74.5290	80.0196	72.1462	71.2017	65.5167	65.5499	67.3263	67.1700	73.2938	76.0025	83.1097 (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	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559	80.5559 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.2794	13.5710	11.0367	8.3555	6.2458	5.2730	5.6976	7.4060	9.9403	12.6215	14.7312	15.7040 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	172.2389	174.0262	169.5222	159.9339	147.8303	136.4546	128.8550	127.0677	131.5716	141.1600	153.2636	164.6392 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982	44.3982 (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)	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040	-53.7040 (71)
Water heating gains (Table 5)	112.6464	110.9063	107.5532	100.2031	95.7012	90.9955	88.1047	90.4923	93.2917	98.5132	105.5591	111.7066 (72)
Total internal gains	374.4148	372.7536	362.3623	342.7426	324.0275	303.9732	293.9075	296.2162	306.0538	326.5449	347.8040	366.3000 (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						2.4000	32.0000	0.6300	1.0000	1.0000		43.5456 (82)
Northeast						0.5000	32.0000	0.6300	1.0000	1.0000		9.0720 (82)
Southeast						1.6000	32.0000	0.6300	1.0000	1.0000		29.0304 (82)
Solar gains	81.6480	150.5385	265.3560	433.7550	530.7120	589.3965	551.1240	464.3730	339.3495	196.4655	104.6115	63.7875 (83)
Total gains	456.0628	523.2921	627.7183	776.4976	854.7395	893.3697	845.0315	760.5892	645.4033	523.0104	452.4155	430.0875 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	10.1273	10.3561	10.4313	10.7968	10.7968	11.0059	10.9372	11.0736	10.9372	10.7253	10.6529	10.4313
alpha	1.6752	1.6904	1.6954	1.7198	1.7198	1.7337	1.7291	1.7382	1.7291	1.7150	1.7102	1.6954
util living area	0.8498	0.8145	0.7406	0.6138	0.4808	0.3409	0.2472	0.2619	0.4598	0.6724	0.8011	0.8557 (86)
MIT	17.3679	17.7819	18.6050	19.6102	20.3258	20.7501	20.9043	20.8995	20.5587	19.6773	18.4689	17.4268 (87)
Th 2	20.0954	20.1154	20.1218	20.1515	20.1515	20.1676	20.1624	20.1727	20.1624	20.1458	20.1400	20.1218 (88)
util rest of house	0.8386	0.8014	0.7227	0.5891	0.4470	0.2987	0.1948	0.2060	0.4130	0.6427	0.7847	0.8450 (89)
MIT 2	16.7560	17.1712	17.9741	18.9511	19.6140	19.9964	20.1127	20.1211	19.8443	19.0351	17.8678	16.8312 (90)
Living area fraction	16.9244	17.3392	18.1477	19.1325	19.8099	20.2038	20.3305	20.3353	fLA = Living area / (4) =	20.0409	19.2118	18.0332
Temperature adjustment												0.0000
adjusted MIT	16.9244	17.3392	18.1477	19.1325	19.8099	20.2038	20.3305	20.3353	20.0409	19.2118	18.0332	16.9951 (93)

Full SAP Calculation Printout



8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.7873	0.7498	0.6749	0.5564	0.4326	0.3006	0.2056	0.2173	0.4058	0.6055	0.7348	0.7947	(94)
Useful gains	359.0447	392.3469	423.6205	432.0508	369.7439	268.5105	173.7752	165.2691	261.9157	316.6743	332.4434	341.7850	(95)
Ext temp.	5.0000	5.4000	7.1000	9.5000	12.6000	15.4000	17.4000	17.5000	15.0000	11.7000	8.1000	5.2000	(96)
Heat loss rate W	809.8639	792.9536	728.4511	613.6353	459.3063	300.2120	184.2932	176.1070	317.0095	481.7326	641.3411	777.7345	(97)
Space heating kWh	335.4094	269.2078	226.7940	130.7408	66.6344	0.0000	0.0000	0.0000	0.0000	122.8034	222.4064	324.3464	(98a)
Space heating requirement - total per year (kWh/year)												1698.3425	
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	335.4094	269.2078	226.7940	130.7408	66.6344	0.0000	0.0000	0.0000	0.0000	122.8034	222.4064	324.3464	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1698.3425	
Space heating per m2										(98c) / (4) =		45.2409	(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	335.4094	269.2078	226.7940	130.7408	66.6344	0.0000	0.0000	0.0000	0.0000	122.8034	222.4064	324.3464	(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)	197.2997	158.3575	133.4082	76.9064	39.1967	0.0000	0.0000	0.0000	0.0000	72.2373	130.8273	190.7920	(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	192.9886	170.7953	181.5920	159.8182	155.0720	139.8799	138.0741	143.4166	144.8521	161.3641	171.4161	190.8856	(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	113.5227	100.4678	106.8188	94.0107	91.2189	82.2823	81.2201	84.3627	85.2071	94.9201	100.8330	112.2856	(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 (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 PVs (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 wind turbines (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 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) (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												999.0250	(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												1147.1497	(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)												107.9353	(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												2254.1101	(238)

10a. Fuel costs - using BEDF prices (589)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	999.0250	28.4300	284.0228	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1147.1497	28.4300	326.1347	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	107.9353	28.4300	30.6860	(250)
Additional standing charges			0.0000	(251)
Total energy cost			640.8435	(255)

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	999.0250	0.1549	154.7584 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1147.1497	0.1409	161.5774 (264)
Space and water heating			316.3358 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	107.9353	0.1443	15.5784 (268)
Total CO2, kg/year			331.9142 (272)

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	999.0250	1.5735	1571.9780 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1147.1497	1.5208	1744.6017 (278)
Space and water heating			3316.5798 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	107.9353	1.5338	165.5548 (282)
Total Primary energy kWh/year			3482.1346 (286)

C. GHA Overheating Tool

EARLY STAGE OVERHEATING RISK TOOL

Version 1.0, July 2019



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

The questions can be answered for an overall scheme or for individual units. Score zero wherever the question does not apply. Additional information is provided in the accompanying guidance, with examples of scoring and advice on next steps.

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

KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING

KEY FACTORS REDUCING THE LIKELIHOOD OF OVERHEATING

Geographical and local context

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

#8 Do the site surroundings feature significant blue/green infrastructure? Proximity to green spaces and large water bodies has beneficial effects on local temperatures; as guidance, this would require at least 50% of surroundings within a 100m radius to be blue/green, or a rural context	1	
---	---	--

Site characteristics

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

#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green? Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme	1	
---	---	--

#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas? Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels	1	1
---	---	---

Scheme characteristics and dwelling design

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

#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation? Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance	1	
---	---	--

#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future? Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans	>2.8m and fan installed	2	
	> 2.8m	1	

Solar heat gains and ventilation

#6 What is the estimated average glazing ratio for the dwellings? (as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space	>65%	12	4
	>50%	7	
	>35%	4	

#13 Is there useful external shading? Shading should apply to solar exposed (E/S/W/V) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per #6		Full	Part	1
	>65%	6	3	
	>50%	4	2	
	>35%	2	1	

#7 Are the dwellings single aspect? Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation	Single-aspect	3	0
	Dual aspect	0	

#14 Do windows & openings support effective ventilation? Larger, effective and secure openings will help dissipate heat - see guidance	Openings compared to Part F purge rates		
		= Part F	+50% +100%
	Single-aspect	minimum	3 4
	Dual aspect	required	2 3

TOTAL SCORE

11

= Sum of contributing factors:

13

minus

Sum of mitigating factors:

2

High

12

Medium

8

Low

score >12:

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

score between 8 and 12:

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

score <8:

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