Westcott Court,

13 Holmdale Road, NW6

Energy Statement for Planning

Job No: 6210.1

Issued: February, 2025

Issue No: 1

Contents

Document Prepared By:	Document Authorised By:
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Dated:	**Dated:**
28.02.25	28.02.25
Signed:	**Signed:**
[redacted]	[redacted]

1.0 Introduction

1.1 T16 Design has been appointed to produce this Energy Statement for the proposed development at Westcott Court, 13 Holmdale Road, NW6.

1.2 The report assesses the predicted energy performance and carbon dioxide emissions of the proposed development in the context of local and London-wide policy requirements and best practice methods.

1.3 The methodology used to demonstrate the effects of the proposed energy efficiency measures is the 3-stage Energy Hierarchy expounded by the London Plan, Policy SI 2 and Camden Local Policy CC1.

1.4 Emissions reductions are shown for the proposed scheme at each of these stages and the strategy underpinning them is detailed in the relevant sections of the report.

1.5 The overarching position within these policies is that all developments should achieve net zero carbon through the following two stages.

- Residential development should achieve a 10% reduction in regulated emissions through energy efficiency measures.
- On site regulated emissions should be reduced by at least 35%

2.0 Project Summary

2.1 The proposal site is at Westcott Court, 13 Holmdale Road, NW6, It is currently occupied by three single storey garages.

2.2 The proposal is for the demolition of the existing garages to be replaced by a three storey dwelling.

2.3 The site location is shown below.

3.0 Policy Requirements and Drivers

3.1 The relevant planning policy documents for this site, relating to energy are:

3.1.1 The London Plan (2021)

- Policy SI 2 – Minimizing greenhouse gas emissions – developments should achieve a minimum of 35% reduction in on site CO2 emissions.
- Policy SI 4 – Managing Heat risk. .

3.1.2 Camden Local Plan Policy CC1 'Climate Change Mitigation.'

3.2 In light of these policy requirements and through the developer and design team's commitment to reducing the impact of the development on the environment, this report sets out some of the measures that will be adopted to meet the policy targets

3.3 It is our understanding that Camden Council is currently consulting on a new Local Plan, but this is not yet active.

4.0 Energy Strategy and Approach

4.1 The London Plan document titled "Energy Assessment Guidance", updated in June 2022 updated to take into account of the update to building regulations 2021. This provides the parameters by which Energy Statements should be formulated and the approach to be adopted

4.2 The four stages of the hierarchy are referred to as Be Lean (Use Less Energy), Be Clean (Supply Energy Efficiently), Be Green (Use Renewable Energy) and Be Seen (Monitor, verify and report on energy performance).

4.3 The Be Lean stage of the hierarchy requires development must initially reduce the energy demand of the building through architectural and building fabric measures (passive design) and energy efficient services (active design).

4.4 The second part of the Hierarchy (Be Clean), is interested in the how energy systems will exploit local energy resources and supply energy efficiently and cleanly to reduce CO_2.

4.5 The third stage is the addition, where feasible to introduce renewable technology, which may include Heat pumps (Air and Ground), PV panel, Solar Hot Water panels and Wind Power.

4.6 The Be Seen stage of the assessment will ensure that the whole life cycle of the building will maintain low Carbon Emissions.

4.7 The first stage of this process is to establish the baseline emissions on which the reductions will be based.

4.8 This is done using SAP (Standard Assessment Procedure) for residential buildings.

5.0 Baseline Emissions

5.1 The baseline emissions on which reduction figures are based are calculated using SAP for residential buildings.

5.2 SAP calculates a notional building using the baseline Building Regulations parameters and represents the minimum allowable standard for the energy performance of the building to meet Part L1.

5.3 The parameters used are defined by the methodology and represent a target upon which improvements can be measured.

5.4 The GLA emissions reporting tool provides the baseline emissions. The baseline emissions are shown below.

Westcott Court – Baseline Emissions	
	Baseline Emissions
Regulated Emissions	1.4 Tonnes CO_2/Year

Table 1 –Baseline Emissions

6.0 Be Lean Strategy

6.1 The next stage, once the baseline has been established, is to make improvements within the "Be Lean" category. This includes improving the U Values and the reduction of thermal bridging.

6.2 A gas combi boiler with an 89.5% efficiency has been assumed at this stage in accordance with the London Plan Energy statement guidance.

6.3 Electrical lighting also represents a significant energy use within a building. 100% low energy lighting is proposed to reduce emissions.

6.4 Improved thermal bridging details are also proposed for the new dwelling.

6.5 It is proposed that a Waste Water Heat Recovery System (WWHRS) will be installed. This is assumed to have an efficiency of 54.9%.

6.6 It is assumed that the proposed dwelling will be naturally ventilated, with extract fans in the wet rooms.

6.7 The proposed U-values, with the relevant Part L backstop are shown below

Be Lean Fabric Specification			
Element or system	Notional Value	Proposed Value	% Improvement
External walls	U = 0.18 W/(m²k)	U = 0.15 W/(m²k)	16.15%
Party walls	U = 0.00	N/A	N/A
Ground Floor	U = 0.13 W/(m²k)	U = 0.10 W/(m²k)	23.07%
Roofs	U = 0.11 W/(m²k)	U = 0.10 W/(m²k)	10.00%
Glazing	U = 1.2 W/(m²k)	U = 1.0 W/(m²k)	16.15%
Air Permeability	5 m³/(hm²) at 50 Pa	4 m³/(hm²) at 50 Pa	20.00%
Lighting	Efficacy of all fixed lighting = 80 lm/W	Efficacy of all fixed lighting = 120 lm/W	50.00%

Table 2 – Be Lean Residential Fabric Specification

6.0 Be Lean Strategy

6.8 Following the implementation of these passive design measures including the building services the reduction in emissions at the 'Be Lean' stage have been calculated these are shown below.

Westcott Court Be Lean Emissions			
	Baseline Emissions	Be Lean Emissions	% Reduction
Regulated Emissions	1.4 (Tonnes CO_2/Year)	1.2 (Tonnes CO_2/Year)	17%

Table 3– Be Lean Emissions

Fabric Energy Efficiency Rates			
Westcott Court	TFEE $kgCO_2/m^2$	DFEE $kgCO_2/m^2$	% Improvement
	42.38	33.85	20%

Table 4– Residential Fabric Energy Efficiency

7.0 Be Clean Strategy

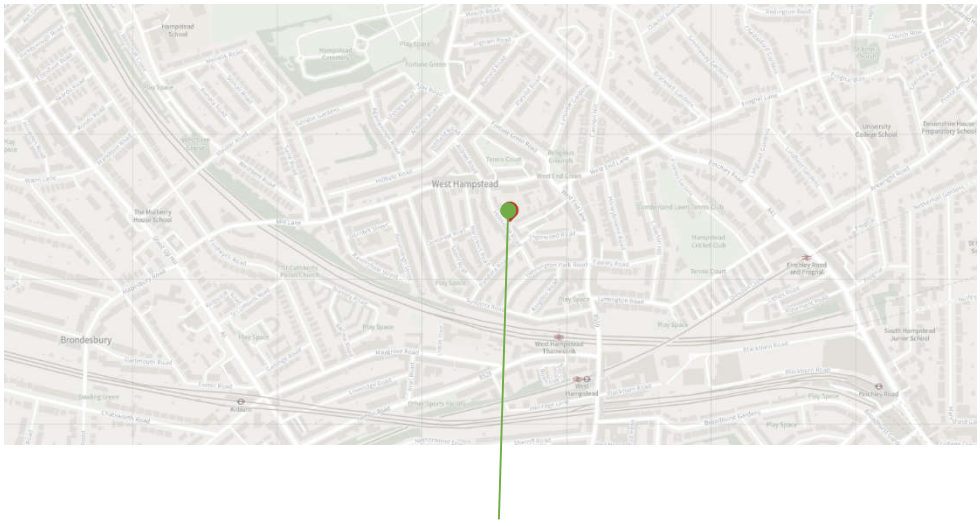
7.1 The Be Clean element of the hierarchy refers to supplying energy in a clean manner. This encompasses the use of energy efficient heating sources (such as heat pumps), decentralised energy and heat networks and the consideration of Combined Heat and Power.

7.2 The site does not sit within 800m of any existing decentralized energy or heating networks (as shown on the map below)

7.3 The site is also not located near any proposed heat networks

7.4 Due to the small scale of the proposal, CHP is also not a viable solution. London Plan guidance suggests that CHP is most suitable for developments of at least 500 units.

7.5 As there are currently no existing opportunities to connect to a heat network, and CHP is not suitable here, no changes have been made at the Be Clean stage.



Site Location

8.0 Be Green Strategy

8.1 The Be Green element of the hierarchy requires the consideration of renewable technologies to reduce emissions still further beyond the savings made at the Be Lean and Be Clean stages.

8.2 The technologies that are considered here are wind power and solar panels (photovoltaic (PV) or Solar Thermal and ground and air source heat pumps.

8.3 Wind power is not suitable in a location such as this. Wind turbines tend to perform poorly in built-up areas.

8.4 Any wind that is received on the site would be too intermittent and turbulent to provide any meaningful reduction in emissions.

8.5 Ground Source Heat pumps are also unlikely to be a viable proposition due to the ground disturbance required in their installation.

8.6 Air Source Heat Pumps (ASHP) however are a suitable solution in this instance and provide substantial improvements in CO2 emissions when combined with a high-performing fabric such as proposed here.

8.7 It is proposed that an ASHP with an efficiency of 270% will provide heating and hot water to the dwelling.

8.8 Photovoltaics panels are also considered feasible for this site, but are not required in order to achieve a significant reduction in emissions.

8.9 The reductions in emissions at the Be Green stage are shown below.

Westcott Court Be Green Emissions			
	Be Lean Emissions	Be Green Emissions	% Reduction
Regulated Emissions	1.2 (Tonnes CO_2/Year)	0.3 (Tonnes CO_2/Year)	65%

Table 5 –Be Green Emissions

9.0 Summary of Results

9.1 The tables below give the percentage improvement in emissions at each stage of the hierarchy and the overall savings made over Part L of the Building Regulations.

9.2 It is proposed that the building will be provided with increased U values (as shown above), an ASHP and PV Panels

9.3 The figures below have been calculated using the GLA carbon emission reporting tool and show the total CO2 emissions expected.

9.4 The EUI and Space heating demand calculations are also shown below.

Westcott Court	CO_2 Emissions (Tonnes)	% Reduction
Baseline (Part L 2022)	1.4	
After energy demand reduction	1.2	17%
After heat network / CHP	1.2	0%
After renewable energy	0.3	65%
Total Savings	1.1	82%

Table 6– Residential Carbon emissions savings at each stage of the Energy Hierarchy

EUI & Space Heating Demand				
Westcott Court	EUI (kWh/m²/year))	Space heating demand (kWh/m²/year)	EUI value requirement	Space heating demand requirement
	41.2	26.8	35	15

Table 7 EUI & Space Heating Demand

10.0 Conclusions

10.1 This Energy Statement has been produced to accompany an application |for the proposed dwelling at West Court, 13 Holmdale Road, NW6, to show how the site will meet the policy requirement of achieving a 35% reduction in emissions through the Be Lean, Be Clean, Be Green hierarchy.

10.2 In doing so, preliminary SAP calculations have been undertaken using the information available and sensible assumptions on construction and M&E parameters.

10.3 The baseline figures have been calculated and improvements made to the fabric and plant proposed for the scheme.

10.4 The measures proposed are detailed above summarise at Be Lean as

- Significant fabric improvements
- Waste Water Heat Recovery
- Good air tightness

10.5 The measures proposed at Be Green can be summarised as

- ASHP with an efficiency of at least 270%

10.6 The results in Section 10 show that an overall reduction of 82% in regulated CO2 emissions is achieved, using the GLA's carbon emission reporting spreadsheet.

10.7 The requirement for a 10% improvement at the Be Lean stage for residential has also been achieved.

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Appendix A – GHA Overheating calculation

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.

Good Homes Alliance

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	0

Site characteristics

#3 Does the site have barriers to windows opening?
- Noise/Acoustic risks
- Poor air quality/smells e.g. near factory or car park or very busy road
- Security risks/crime
- Adjacent to heat rejection plant

Day - reasons to keep all windows closed	8	0
Day - barriers some of the time, or for some windows e.g. on quiet side	4	
Night - reasons to keep all windows closed	8	0
Night - bedroom windows OK to open, but other windows are likely to stay closed	4	

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

1	0

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

1	0

Scheme characteristics and dwelling design

#4 Are the dwellings flats?
Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples

3	0

#5 Does the scheme have community heating?
i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures

3	0

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

1	0

#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future?
Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans

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

Solar heat gains and ventilation

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

>65%	12	4
>50%	7	
>35%	4	

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

Single-aspect	3	0
Dual aspect	0	

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

	Full	Part	
>65%	6	3	0
>50%	4	2	
>35%	2	1	

#14 Do windows & openings support effective ventilation?
Larger, effective and secure openings will help dissipate heat - see guidance

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

TOTAL SCORE 7 = Sum of contributing factors: 10 *minus* Sum of mitigating factors: 3

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)

Appendix B – SAP Calculations

Summary for Input Data

elmhurst energy

Property Reference	Westcott Court	**Issued on Date**	27/02/2025
Assessment Reference	Westcott Court - Be Lean	**Prop Type Ref**	
Property			

SAP Rating	88 B	**DER**	10.51	**TER**	10.09
Environmental	90 B	**% DER < TER**			-4.16
CO_2 Emissions (t/year)	1.33	**DFEE**	31.80	**TFEE**	38.37
Compliance Check	See BREL	**% DFEE < TFEE**			17.12
% DPER < TPER	-10.10	**DPER**	58.02	**TPER**	52.70

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southwest	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	89.78	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	
8.0 Living Area	29.60	m²

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	22.60 m	48.20 m²	2.50 m
1st Storey:	22.60 m	48.20 m²	2.60 m
2nd Storey:	21.00 m	44.80 m²	2.10 m

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	159.36	123.26	0.00	None	36.10	Calculate Wall Area

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	3.40	3.40	None	0.00	Enter Gross Area	0.00
Slope	External Slope Roof	Plasterboard, insulated slope	0.10	9.00	44.80	44.80	None	0.00	Enter Gross Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.10	None	0.00	75.00	48.20

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Triple Low-E Soft 0.05			0.57		0.70	1.00
RL	Manufacturer	Roof Light	Double Low-E Soft 0.05			0.63		0.70	1.00
Half-Glazed	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05			0.63		0.70	1.20

Summary for Input Data

elmhurst energy

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
SW	Windows	External Wall 1	South West	16.00	0
Front	Half-Glazed	External Wall 1	South West	3.10	0
NE	Windows	External Wall 1	North East	17.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)		19.90	0.00	0.00	Yes
E6 Intermediate floor within a dwelling		27.50	0.00	0.00	No
E16 Corner (normal)		24.60	0.00	0.00	No
E18 Party wall between dwellings		14.20	0.00	0.00	No
E1 Steel lintel with perforated steel base plate		19.00	0.00	0.00	No
E3 Sill		4.95	0.00	0.00	No
E4 Jamb		33.00	0.00	0.00	No
E11 Eaves (insulation at rafter level)		5.90	0.00	0.00	No
E13 Gable (insulation at rafter level)		3.30	0.00	0.00	No
E15 Flat roof with parapet		14.30	0.00	0.00	No
E14 Flat roof		8.20	0.00	0.00	No
P1 Party wall - Ground floor		6.40	0.00	0.00	No
P2 Party wall - Intermediate floor within a dwelling		6.40	0.00	0.00	No
P5 Party wall - Roof (insulation at rafter level)		5.40	0.00	0.00	No

Y-value	0.03	W/m²K
Description	RCD	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	4	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	120.00	5.00	600.00	35

24.0 Main Heating 1	Manufacturer	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Mains gas	
SAP Code	104	
In Winter	89.80	
In Summer	82.00	

Summary for Input Data

Model Name	GB
Manufacturer	GB
Controls SAP Code	2110
Delayed Start Stat	Yes
Burner Control	On/Off
HETAS approved System	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	Yes

25.0 Main Heating 2 — None

26.0 Heat Networks — None

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	Yes
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system	7.00		Yes	Instantaneous System 1
S2	Vented hot water system	7.00		Yes	Instantaneous System 1
S3	Vented hot water system	7.00		Yes	Instantaneous System 1

28.3 Waste Water Heat Recovery System
Instantaneous System 1

Database ID	80194
Brand Model	Zypho, Slim DW50
Details	Year: 2022 + current Efficiency: 54.9 Utilisation factor: 0.987

29.0 Hot Water Cylinder — None

Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

31.0 Thermal Store — None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact

Summary for Input Data

Solar water heating	£3,500 - £5,500	£223	B 88 A 92 0	B 91 B 90 0

Full SAP Calculation Printout

Property Reference	Westcott Court	**Issued on Date**	27/02/2025
Assessment Reference	Westcott Court - Be Lean	**Prop Type Ref**	
Property			

SAP Rating	88 B	**DER**	10.51	**TER**	10.09
Environmental	90 B	**% DER < TER**			-4.16
CO_2 Emissions (t/year)	1.33	**DFEE**	31.80	**TFEE**	38.37
Compliance Check	See BREL	**% DFEE < TFEE**			17.12
% DPER < TPER	-10.10	**DPER**	58.02	**TPER**	52.70

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000 (1b)	x	2.5000 (2b)	=	120.5000	(1b) - (3b)
First floor	48.2000 (1c)	x	2.6000 (2c)	=	125.3200	(1c) - (3c)
Second floor	44.8000 (1d)	x	2.1000 (2d)	=	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	339.9000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3682	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3130	(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	0.3990	0.3912	0.3834	0.3442	0.3364	0.2973	0.2973	0.2895	0.3130	0.3364	0.3521	0.3677	(22b)
Effective ac	0.5796	0.5765	0.5735	0.5593	0.5566	0.5442	0.5442	0.5419	0.5490	0.5566	0.5620	0.5676	(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								
Windows			33.0000	0.9615	31.7308			(27)
Half-Glazed			3.1000	1.2000	3.7200			(26a)
Heatloss Floor 1			48.2000	0.1000	4.8200	75.0000	3615.0000	(28a)
External Wall 1	159.3600	36.1000	123.2600	0.1500	18.4890	70.0000	8628.2000	(29a)
Flat Roof	3.4000		3.4000	0.1000	0.3400	9.0000	30.6000	(30)
Slope	44.8000		44.8000	0.1000	4.4800	9.0000	403.2000	(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		63.5798			(33)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12677.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							89.7805	(35)
Thermal bridges (User defined value 0.030 * total exposed area)							7.6728	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		71.2526	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	65.0128	64.6661	64.3262	62.7298	62.4312	61.0408	61.0408	60.7833	61.5763	62.4312	63.0354	63.6671	(38)

Heat transfer coeff

	136.2654	135.9186	135.5788	133.9824	133.6837	132.2934	132.2934	132.0359	132.8289	133.6837	134.2880	134.9196 (39)
Average = Sum(39)m / 12 =												133.9810

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9651	0.9626	0.9602	0.9489	0.9468	0.9369	0.9369	0.9351	0.9407	0.9468	0.9510	0.9555	(40)
HLP (average)												0.9489	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

Hot water usage for mixer showers

	73.1675	72.0679	70.4656	67.4000	65.1376	62.6146	61.1805	62.7706	64.5137	67.2227	70.3542	72.8871 (42a)

Hot water usage for baths

	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808 (42b)

Hot water usage for other uses

	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269 (42c)

Average daily hot water use (litres/day) 137.2237 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	149.2820	146.0942	142.2121	136.3092	131.5156	126.3621	124.3817	128.2470	132.3236	137.7338	143.7277	148.8949	(44)
Energy conte	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(45)
Energy content (annual)										Total = Sum(45)m =		2279.2566	
Distribution loss (46)m = 0.15 x (45)m													
	35.4639	31.2054	32.7862	27.9901	26.5568	23.3065	22.5643	23.8195	24.4752	28.0355	30.7150	34.9700	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	287.3851	254.0635	269.5336	235.9155	228.0041	204.6920	201.3878	209.7555	212.4832	237.8624	254.0815	284.0923	(62)
WWHRS	-51.3743	-45.4358	-47.5778	-39.3963	-36.7159	-31.4181	-29.4494	-31.3165	-32.5063	-38.3214	-43.4135	-50.4229	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	236.0108	208.6277	221.9558	196.5193	191.2882	173.2739	171.9384	178.4390	179.9769	199.5410	210.6680	233.6694	(64)
										Total per year (kWh/year) = Sum(64)m =		2401.9085	(64)
12Total per year (kWh/year)												2402	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	91.3514	80.6789	85.4158	74.3734	71.6073	63.9916	62.7573	65.5396	66.5822	74.8851	80.4136	90.2566	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	157.5130	174.3894	157.5130	162.7634	157.5130	162.7634	157.5130	157.5130	162.7634	157.5130	162.7634	157.5130	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)													
	122.7842	120.0578	114.8062	103.2964	96.2463	88.8772	84.3513	88.0909	92.4753	100.6521	111.6855	121.3126	(72)
Total internal gains													
	660.8595	678.2344	647.9798	624.4201	590.2810	564.6371	541.1486	541.6634	559.4247	582.6515	620.7740	645.6758	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	17.0000	11.2829	0.5700	0.7000	0.7700	53.0368	(75)
Southwest	16.0000	36.7938	0.5700	0.7000	0.7700	162.7800	(79)

Solar gains	215.8168	385.2326	573.8851	789.5038	955.8995	980.4767	932.1796	803.2267	647.7960	438.3807	261.7070	182.6183	(83)
Total gains	876.6763	1063.4670	1221.8650	1413.9240	1546.1805	1545.1138	1473.3282	1344.8901	1207.2207	1021.0322	882.4810	828.2941	(84)

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7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.8421	25.9081	25.9730	26.2825	26.3412	26.6180	26.6180	26.6699	26.5107	26.3412	26.2227	26.0999	
alpha	2.7228	2.7272	2.7315	2.7522	2.7561	2.7745	2.7745	2.7780	2.7674	2.7561	2.7482	2.7400	
util living area													
	0.9529	0.9229	0.8757	0.7814	0.6496	0.4959	0.3764	0.4230	0.6271	0.8347	0.9284	0.9588	(86)
MIT	18.6213	19.0050	19.5174	20.1418	20.6027	20.8657	20.9539	20.9356	20.7341	20.1049	19.2606	18.5589	(87)
Th 2	20.1126	20.1146	20.1166	20.1261	20.1279	20.1362	20.1362	20.1378	20.1330	20.1279	20.1243	20.1206	(88)
util rest of house													
	0.9469	0.9135	0.8606	0.7557	0.6099	0.4406	0.3084	0.3523	0.5725	0.8088	0.9181	0.9536	(89)
MIT 2	17.3054	17.7887	18.4294	19.1971	19.7357	20.0256	20.1075	20.0954	19.8972	19.1718	18.1236	17.2313	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)

MIT	17.5812	18.0437	18.6575	19.3952	19.9175	20.2017	20.2849	20.2716	20.0726	19.3674	18.3620	17.5096 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.4312	17.8937	18.5075	19.2452	19.7675	20.0517	20.1349	20.1216	19.9226	19.2174	18.2120	17.3596 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9214	0.8825	0.8267	0.7261	0.5921	0.4349	0.3083	0.3509	0.5581	0.7763	0.8879	0.9299	(94)
Useful gains	807.7460	938.5135	1010.0927	1026.7193	915.4826	672.0053	454.2477	471.9281	673.7320	792.6710	783.5350	770.2395	(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													
	1789.3303	1766.0855	1627.9615	1386.0712	1078.4881	721.2210	467.6459	491.3816	773.4107	1152.0117	1492.2046	1775.4894	(97)
Space heating kWh													
	730.2987	556.1284	459.6944	258.7334	121.2760	0.0000	0.0000	0.0000	0.0000	267.3495	510.2421	747.9060	(98a)
Space heating requirement - total per year (kWh/year)												3651.6285	
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													
	730.2987	556.1284	459.6944	258.7334	121.2760	0.0000	0.0000	0.0000	0.0000	267.3495	510.2421	747.9060	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3651.6285	
Space heating per m2											(98c) / (4) =	25.8614	(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 %)												89.8000	(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													
	730.2987	556.1284	459.6944	258.7334	121.2760	0.0000	0.0000	0.0000	0.0000	267.3495	510.2421	747.9060	(98)
Space heating efficiency (main heating system 1)													
	89.8000	89.8000	89.8000	89.8000	89.8000	0.0000	0.0000	0.0000	0.0000	89.8000	89.8000	89.8000	(210)
Space heating fuel (main heating system)													
	813.2502	619.2967	511.9091	288.1218	135.0513	0.0000	0.0000	0.0000	0.0000	297.7166	568.1983	832.8574	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	236.0108	208.6277	221.9558	196.5193	191.2882	173.2739	171.9384	178.4390	179.9769	199.5410	210.6680	233.6694	(64)
Efficiency of water heater												82.0000	(216)
(217)m	87.7611	87.5287	87.1022	86.2581	84.8599	82.0000	82.0000	82.0000	82.0000	86.2919	87.3713	87.8116	(217)
Fuel for water heating, kWh/month													
	268.9243	238.3536	254.8224	227.8270	225.4164	211.3096	209.6810	217.6085	219.4840	231.2395	241.1180	266.1032	(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	28.9374	23.2147	20.9022	15.3139	11.8289	9.6643	10.7907	14.0261	18.2186	23.9038	26.9992	29.7417	(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												4066.4014	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												82.0000	
Water heating fuel used												2811.8875	(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)												233.5413	(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												7152.8302	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4066.4014	0.2100	853.9443	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2811.8875	0.2100	590.4964	(264)

Space and water heating			1444.4407	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	233.5413	0.1443	33.7072	(268)
Total CO2, kg/year			1483.8351	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.5100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4066.4014	1.1300	4595.0336	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2811.8875	1.1300	3177.4328	(278)
Space and water heating			7772.4664	(279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248	(281)
Energy for lighting	233.5413	1.5338	358.2135	(282)
Total Primary energy kWh/year			8192.7047	(286)
Dwelling Primary energy Rate (DPER)			58.0200	(287)

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	48.2000	(1b) x	2.5000	(2b) =	120.5000	(1b) - (3b)
First floor	48.2000	(1c) x	2.6000	(2c) =	125.3200	(1c) - (3c)
Second floor	44.8000	(1d) x	2.1000	(2d) =	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000				(4)	
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		339.9000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1177 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3677 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3125 (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	0.3985	0.3907	0.3828	0.3438	0.3360	0.2969	0.2969	0.2891	0.3125	0.3360	0.3516	0.3672	(22b)
Effective ac	0.5794	0.5763	0.5733	0.5591	0.5564	0.5441	0.5441	0.5418	0.5488	0.5564	0.5618	0.5674	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Semi-glazed door			3.1000	1.0000	3.1000			(26a)
TER Opening Type			32.2000	1.1450	36.8702			(27)
Heatloss Floor 1			48.2000	0.1300	6.2660			(28a)
External Wall 1	159.3600	35.3000	124.0600	0.1800	22.3308			(29a)
Flat Roof	3.4000		3.4000	0.1100	0.3740			(30)
Slope	44.8000		44.8000	0.1100	4.9280			(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		73.8690			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 89.7805 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	19.9000	0.1600	3.1840
E6 Intermediate floor within a dwelling	27.5000	0.0000	0.0000
E16 Corner (normal)	24.6000	0.0900	2.2140
E18 Party wall between dwellings	14.2000	0.0600	0.8520
E1 Steel lintel with perforated steel base plate	19.0000	0.0500	0.9500
E3 Sill	4.9500	0.0500	0.2475
E4 Jamb	33.0000	0.0500	1.6500
E11 Eaves (insulation at rafter level)	5.9000	0.0400	0.2360

E13 Gable (insulation at rafter level)	3.3000	0.0800	0.2640	
E15 Flat roof with parapet	14.3000	0.5600	8.0080	
E14 Flat roof	8.2000	0.0800	0.6560	
P1 Party wall - Ground floor	6.4000	0.0800	0.5120	
P2 Party wall - Intermediate floor within a dwelling	6.4000	0.0000	0.0000	
P5 Party wall - Roof (insulation at rafter level)	5.4000	0.0800	0.4320	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 19.2055 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 93.0745 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	64.9886	64.6428	64.3038	62.7118	62.4139	61.0273	61.0273	60.7706	61.5614	62.4139	63.0165	63.6465	(38)
Heat transfer coeff	158.0631	157.7173	157.3784	155.7863	155.4885	154.1019	154.1019	153.8451	154.6360	155.4885	156.0910	156.7210	(39)

Average = Sum(39)m / 12 = 155.7849

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1194	1.1170	1.1146	1.1033	1.1012	1.0914	1.0914	1.0896	1.0952	1.1012	1.1055	1.1099	(40)
HLP (average)												1.1033	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

Hot water usage for mixer showers

	73.1675	72.0679	70.4656	67.4000	65.1376	62.6146	61.1805	62.7706	64.5137	67.2227	70.3542	72.8871 (42a)

Hot water usage for baths

	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808 (42b)

Hot water usage for other uses

	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269 (42c)

Average daily hot water use (litres/day) 137.2237 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	149.2820	146.0942	142.2121	136.3092	131.5156	126.3621	124.3817	128.2470	132.3236	137.7338	143.7277	148.8949	(44)
Energy conte	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(45)

Energy content (annual) Total = Sum(45)m = 2279.2566

Distribution loss (46)m = 0.15 x (45)m

	35.4639	31.2054	32.7862	27.9901	26.5568	23.3065	22.5643	23.8195	24.4752	28.0355	30.7150	34.9700 (46)

Water storage loss:

Total storage loss

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

If cylinder contains dedicated solar storage

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)

Total heat required for water heating calculated for each month

	287.3851	254.0635	269.5336	235.9155	228.0041	204.6920	201.3878	209.7555	212.4832	237.8624	254.0815	284.0923 (62)
WWHRS	-33.4491	-29.5827	-30.9773	-25.6504	-23.9053	-20.4559	-19.1741	-20.3898	-21.1645	-24.9506	-28.2660	-32.8297 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)

Output from w/h

	253.9360	224.4809	238.5563	210.2651	204.0989	184.2361	182.2137	189.3657	191.3188	212.9118	225.8155	251.2626 (64)

Total per year (kWh/year) = Sum(64)m = 2568.4614 (64)

12Total per year (kWh/year) 2568 (64)

Electric shower(s)

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)

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

Heat gains from water heating, kWh/month

	91.3514	80.6789	85.4158	74.3734	71.6073	63.9916	62.7573	65.5396	66.5822	74.8851	80.4136	90.2566 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.7170	173.5081	156.7170	161.9409	156.7170	161.9409	156.7170	156.7170	161.9409	156.7170	161.9409	156.7170	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)	122.7842	120.0578	114.8062	103.2964	96.2463	88.8772	84.3513	88.0909	92.4753	100.6521	111.6855	121.3126	(72)
Total internal gains	660.0635	677.3531	647.1839	623.5976	589.4850	563.8146	540.3527	540.8674	558.6022	581.8555	619.9515	644.8799	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	16.5900	11.2829	0.6300	0.7000	0.7700	57.2059	(75)
Southwest	15.6100	36.7938	0.6300	0.7000	0.7700	175.5294	(79)

Solar gains	232.7352	415.4356	618.8885	851.4305	1030.8899	1057.4002	1005.3119	866.2344	698.6003	472.7533	282.2235	196.9337 (83)
Total gains	892.7988	1092.7888	1266.0724	1475.0281	1620.3750	1621.2148	1545.6646	1407.1019	1257.2025	1054.6088	902.1750	841.8136 (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	22.2784	22.3272	22.3753	22.6040	22.6473	22.8510	22.8510	22.8892	22.7721	22.6473	22.5598	22.4692	
alpha	2.4852	2.4885	2.4917	2.5069	2.5098	2.5234	2.5234	2.5259	2.5181	2.5098	2.5040	2.4979	
util living area	0.9542	0.9262	0.8824	0.7961	0.6733	0.5261	0.4061	0.4546	0.6550	0.8469	0.9320	0.9598	(86)
MIT	18.2176	18.6211	19.1838	19.8872	20.4437	20.7903	20.9208	20.8930	20.6175	19.8655	18.9209	18.1497	(87)
Th 2	19.9850	19.9870	19.9889	19.9981	19.9999	20.0079	20.0079	20.0094	20.0048	19.9999	19.9964	19.9927	(88)
util rest of house	0.9480	0.9165	0.8667	0.7691	0.6300	0.4625	0.3247	0.3709	0.5947	0.8200	0.9213	0.9543	(89)
MIT 2	16.7240	17.2325	17.9371	18.8036	19.4575	19.8393	19.9609	19.9420	19.6715	18.7998	17.6238	16.6423	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)
MIT	17.0371	17.5236	18.1985	19.0308	19.6643	20.0386	20.1621	20.1413	19.8698	19.0232	17.8957	16.9583	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.0371	17.5236	18.1985	19.0308	19.6643	20.0386	20.1621	20.1413	19.8698	19.0232	17.8957	16.9583	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9216	0.8843	0.8316	0.7386	0.6140	0.4646	0.3379	0.3827	0.5857	0.7876	0.8905	0.9299	(94)
Useful gains	822.8292	966.4045	1052.8365	1089.4408	994.9457	753.1998	522.2689	538.4316	736.3555	830.6458	803.4217	782.7946	(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	2013.2621	1990.9636	1841.0890	1578.2342	1238.3521	838.1018	548.9337	575.5881	892.2150	1309.7126	1685.1098	1999.4924	(97)
Space heating kWh	885.6821	688.5037	586.4599	351.9312	181.0943	0.0000	0.0000	0.0000	0.0000	356.4257	634.8154	905.2232	(98a)
Space heating requirement - total per year (kWh/year)												4590.1355	
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	885.6821	688.5037	586.4599	351.9312	181.0943	0.0000	0.0000	0.0000	0.0000	356.4257	634.8154	905.2232	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4590.1355	
Space heating per m2											(98c) / (4) =	32.5080	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	885.6821	688.5037	586.4599	351.9312	181.0943	0.0000	0.0000	0.0000	0.0000	356.4257	634.8154	905.2232	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	958.5304	745.1339	634.6968	380.8779	195.9895	0.0000	0.0000	0.0000	0.0000	385.7421	687.0297	979.6788	(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	253.9360	224.4809	238.5563	210.2651	204.0989	184.2361	182.2137	189.3657	191.3188	212.9118	225.8155	251.2626	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.8279	86.6191	86.2297	85.4762	84.1261	80.3000	80.3000	80.3000	80.3000	85.4766	86.4701	86.8785	(217)
Fuel for water heating, kWh/month	292.4589	259.1587	276.6523	245.9926	242.6107	229.4347	226.9161	235.8228	238.2550	249.0879	261.1486	289.2116	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	32.5627	26.1230	23.5209	17.2324	13.3108	10.8750	12.1426	15.7834	20.5010	26.8984	30.3817	33.4677	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-46.3077	-65.9249	-95.6564	-108.5566	-117.8363	-110.1740	-108.7164	-102.1964	-90.9050	-75.7361	-51.0988	-39.9532	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-24.2666	-51.2514	-102.2717	-154.2312	-204.5901	-205.8895	-203.5660	-172.1474	-125.8304	-73.6201	-32.4972	-19.1825	(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	4967.6791	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	3046.7502	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	262.7997	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2382.4058	(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	5980.8232	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4967.6791	0.2100	1043.2126	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3046.7502	0.2100	639.8175	(264)
Space and water heating			1683.0302	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	262.7997	0.1443	37.9301	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1013.0617	0.1344	-136.1628	
PV Unit electricity exported	-1369.3440	0.1258	-172.2150	
Total			-308.3778	(269)
Total CO2, kg/year			1424.5118	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0900	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4967.6791	1.1300	5613.4774	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3046.7502	1.1300	3442.8277	(278)
Space and water heating			9056.3051	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	262.7997	1.5338	403.0909	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1013.0617	1.4967	-1516.2863	
PV Unit electricity exported	-1369.3440	0.4616	-632.1377	
Total			-2148.4240	(283)
Total Primary energy kWh/year			7441.0728	(286)
Target Primary Energy Rate (TPER)			52.7000	(287)

Full SAP Calculation Printout

Property Reference	Westcott Court	**Issued on Date**	27/02/2025
Assessment Reference	Westcott Court - Be Lean	**Prop Type Ref**	
Property			

SAP Rating	88 B	**DER**	10.51	**TER**	10.09
Environmental	90 B	**% DER < TER**			-4.16
CO_2 Emissions (t/year)	1.33	**DFEE**	31.80	**TFEE**	38.37
Compliance Check	See BREL	**% DFEE < TFEE**			17.12
% DPER < TPER	-10.10	**DPER**	58.02	**TPER**	52.70

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000 (1b)	x	2.5000 (2b)	=	120.5000	(1b) - (3b)
First floor	48.2000 (1c)	x	2.6000 (2c)	=	125.3200	(1c) - (3c)
Second floor	44.8000 (1d)	x	2.1000 (2d)	=	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	339.9000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3682	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3130	(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	0.3990	0.3912	0.3834	0.3442	0.3364	0.2973	0.2973	0.2895	0.3130	0.3364	0.3521	0.3677	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5796	0.5765	0.5735	0.5593	0.5566	0.5442	0.5442	0.5419	0.5490	0.5566	0.5620	0.5676	(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								
Windows			33.0000	0.9615	31.7308			(27)
Half-Glazed			3.1000	1.2000	3.7200			(26a)
Heatloss Floor 1			48.2000	0.1000	4.8200	75.0000	3615.0000	(28a)
External Wall 1	159.3600	36.1000	123.2600	0.1500	18.4890	70.0000	8628.2000	(29a)
Flat Roof	3.4000		3.4000	0.1000	0.3400	9.0000	30.6000	(30)
Slope	44.8000		44.8000	0.1000	4.4800	9.0000	403.2000	(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		63.5798			(33)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12677.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							89.7805	(35)
Thermal bridges (User defined value 0.030 * total exposed area)							7.6728	(36)
Point Thermal bridges					(36a) =		0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		71.2526	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	65.0128	64.6661	64.3262	62.7298	62.4312	61.0408	61.0408	60.7833	61.5763	62.4312	63.0354	63.6671	(38)
Heat transfer coeff													
	136.2654	135.9186	135.5788	133.9824	133.6837	132.2934	132.2934	132.0359	132.8289	133.6837	134.2880	134.9196	(39)
Average = Sum(39)m / 12 =												133.9810	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9651	0.9626	0.9602	0.9489	0.9468	0.9369	0.9369	0.9351	0.9407	0.9468	0.9510	0.9555	(40)
HLP (average)												0.9489	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808	(42b)

Hot water usage for other uses

44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269	(42c)

Average daily hot water use (litres/day) 69.7657 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	76.1145	74.0262	71.7465	68.9092	66.3780	63.7475	63.2012	65.4764	67.8098	70.5111	73.3735	76.0077	(44)
Energy conte	120.5468	105.4124	110.2716	94.3333	89.3576	78.3850	76.4364	81.0734	83.6163	95.6830	104.5339	119.0098	(45)
Energy content (annual)										Total = Sum(45)m =		1158.6595	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
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													
	102.4648	89.6005	93.7309	80.1833	75.9539	66.6272	64.9709	68.9124	71.0738	81.3305	88.8538	101.1583	(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													
	102.4648	89.6005	93.7309	80.1833	75.9539	66.6272	64.9709	68.9124	71.0738	81.3305	88.8538	101.1583	(64)
										Total per year (kWh/year) = Sum(64)m =		984.8606	(64)
12Total per year (kWh/year)												985	(64)
Electric shower(s)													
	58.5950	52.2086	57.0098	54.4037	55.4246	52.8697	54.6320	55.4246	54.4037	57.0098	55.9378	58.5950	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					666.5142	(64a)
Heat gains from water heating, kWh/month													
	40.2649	35.4523	37.6852	33.6468	32.8446	29.8742	29.9007	31.0843	31.3694	34.5851	36.1979	39.9383	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	157.5130	174.3894	157.5130	162.7634	157.5130	162.7634	157.5130	157.5130	162.7634	157.5130	162.7634	157.5130	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)													
	54.1195	52.7564	50.6521	46.7316	44.1460	41.4920	40.1892	41.7799	43.5686	46.4853	50.2749	53.6805	(72)
Total internal gains													
	589.1948	607.9329	580.8258	564.8553	535.1807	517.2519	496.9865	495.3524	510.5181	525.4847	556.3633	575.0437	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	17.0000	11.2829	0.5700	0.7000	0.7700	53.0368	(75)
Southwest	16.0000	36.7938	0.5700	0.7000	0.7700	162.7800	(79)

Solar gains	215.8168	385.2326	573.8851	789.5038	955.8995	980.4767	932.1796	803.2267	647.7960	438.3807	261.7070	182.6183	(83)
Total gains	805.0117	993.1655	1154.7109	1354.3592	1491.0802	1497.7286	1429.1661	1298.5792	1158.3140	963.8654	818.0703	757.6621	(84)

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7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.8421	25.9081	25.9730	26.2825	26.3412	26.6180	26.6180	26.6699	26.5107	26.3412	26.2227	26.0999	
alpha	2.7228	2.7272	2.7315	2.7522	2.7561	2.7745	2.7745	2.7780	2.7674	2.7561	2.7482	2.7400	
util living area													
	0.9610	0.9331	0.8882	0.7955	0.6641	0.5082	0.3866	0.4358	0.6438	0.8505	0.9390	0.9664	(86)
MIT	18.5193	18.9145	19.4440	20.0962	20.5790	20.8571	20.9507	20.9306	20.7152	20.0508	19.1758	18.4561	(87)
Th 2	20.1126	20.1146	20.1166	20.1261	20.1279	20.1362	20.1362	20.1378	20.1330	20.1279	20.1243	20.1206	(88)
util rest of house													
	0.9560	0.9248	0.8742	0.7707	0.6246	0.4522	0.3173	0.3636	0.5893	0.8261	0.9300	0.9620	(89)

MIT 2	17.8249	18.2143	18.7322	19.3610	19.8029	20.0442	20.1122	20.1020	19.9350	19.3337	18.4831	17.7679	(90)
Living area fraction									fLA = Living area / (4) =			0.2096	(91)
MIT	17.9705	18.3611	18.8814	19.5151	19.9656	20.2146	20.2879	20.2757	20.0986	19.4840	18.6283	17.9121	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.9705	18.3611	18.8814	19.5151	19.9656	20.2146	20.2879	20.2757	20.0986	19.4840	18.6283	17.9121	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9395	0.9037	0.8507	0.7512	0.6167	0.4575	0.3298	0.3756	0.5870	0.8050	0.9101	0.9470	(94)
Useful gains	756.3170	897.5624	982.3337	1017.3349	919.5340	685.2011	471.3133	487.6904	679.9358	775.9113	744.4900	717.4787	(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	1862.8113	1829.6128	1678.6543	1422.2359	1104.9719	742.7713	487.8898	511.7374	796.7863	1187.6448	1548.1140	1850.0378	(97)
Space heating kWh	823.2318	626.3379	518.0625	291.5287	137.9658	0.0000	0.0000	0.0000	0.0000	306.3297	578.6093	842.6240	(98a)
Space heating requirement - total per year (kWh/year)												4124.6897	
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	823.2318	626.3379	518.0625	291.5287	137.9658	0.0000	0.0000	0.0000	0.0000	306.3297	578.6093	842.6240	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4124.6897	
Space heating per m2											(98c) / (4) =	29.2117	(99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1243.5576	978.9709	1003.4727	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8343	0.8830	0.8536	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1037.5060	864.4336	856.5797	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1682.5799	1605.4699	1455.9885	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	464.4532	551.3311	445.9601	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	116.1133	137.8328	111.4900	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												365.4361	(107)
Energy for space heating												29.2117	(99)
Energy for space cooling												2.5881	(108)
Total												31.7998	(109)
Fabric Energy Efficiency (DFEE)												31.8	(109)

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000	(1b)	x 2.5000	(2b) =	120.5000	(1b) - (3b)
First floor	48.2000	(1c)	x 2.6000	(2c) =	125.3200	(1c) - (3c)
Second floor	44.8000	(1d)	x 2.1000	(2d) =	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		339.9000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3677	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3125	(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	0.3985	0.3907	0.3828	0.3438	0.3360	0.2969	0.2969	0.2891	0.3125	0.3360	0.3516	0.3672 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5794	0.5763	0.5733	0.5591	0.5564	0.5441	0.5441	0.5418	0.5488	0.5564	0.5618	0.5674 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Semi-glazed door			3.1000	1.0000	3.1000			(26a)
TER Opening Type			32.2000	1.1450	36.8702			(27)
Heatloss Floor 1			48.2000	0.1300	6.2660			(28a)
External Wall 1	159.3600	35.3000	124.0600	0.1800	22.3308			(29a)
Flat Roof	3.4000		3.4000	0.1100	0.3740			(30)
Slope	44.8000		44.8000	0.1100	4.9280			(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	73.8690			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	89.7805	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E5 Ground floor (normal)	19.9000	0.1600	3.1840
E6 Intermediate floor within a dwelling	27.5000	0.0000	0.0000
E16 Corner (normal)	24.6000	0.0900	2.2140
E18 Party wall between dwellings	14.2000	0.0600	0.8520
E1 Steel lintel with perforated steel base plate	19.0000	0.0500	0.9500
E3 Sill	4.9500	0.0500	0.2475
E4 Jamb	33.0000	0.0500	1.6500
E11 Eaves (insulation at rafter level)	5.9000	0.0400	0.2360
E13 Gable (insulation at rafter level)	3.3000	0.0800	0.2640
E15 Flat roof with parapet	14.3000	0.5600	8.0080
E14 Flat roof	8.2000	0.0800	0.6560
P1 Party wall - Ground floor	6.4000	0.0800	0.5120
P2 Party wall - Intermediate floor within a dwelling	6.4000	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	5.4000	0.0800	0.4320

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	19.2055	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	93.0745	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	64.9886	64.6428	64.3038	62.7118	62.4139	61.0273	61.0273	60.7706	61.5614	62.4139	63.0165	63.6465	(38)
Heat transfer coeff	158.0631	157.7173	157.3784	155.7863	155.4885	154.1019	154.1019	153.8451	154.6360	155.4885	156.0910	156.7210	(39)
Average = Sum(39)m / 12 =												155.7849	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1194	1.1170	1.1146	1.1033	1.1012	1.0914	1.0914	1.0896	1.0952	1.1012	1.1055	1.1099	(40)
HLP (average)												1.1033	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.9193	(42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808	(42b)
Hot water usage for other uses	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269	(42c)
Average daily hot water use (litres/day)												69.7657	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.1145	74.0262	71.7465	68.9092	66.3780	63.7475	63.2012	65.4764	67.8098	70.5111	73.3735	76.0077	(44)
Energy conte	120.5468	105.4124	110.2716	94.3333	89.3576	78.3850	76.4364	81.0734	83.6163	95.6830	104.5339	119.0098	(45)
Energy content (annual)										Total = Sum(45)m =		1158.6595	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
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	102.4648	89.6005	93.7309	80.1833	75.9539	66.6272	64.9709	68.9124	71.0738	81.3305	88.8538	101.1583	(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	102.4648	89.6005	93.7309	80.1833	75.9539	66.6272	64.9709	68.9124	71.0738	81.3305	88.8538	101.1583	(64)
									Total per year (kWh/year) = Sum(64)m =			984.8606	(64)
12Total per year (kWh/year)												985	(64)
Electric shower(s)	58.5950	52.2086	57.0098	54.4037	55.4246	52.8697	54.6320	55.4246	54.4037	57.0098	55.9378	58.5950	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			666.5142	(64a)
Heat gains from water heating, kWh/month	40.2649	35.4523	37.6852	33.6468	32.8446	29.8742	29.9007	31.0843	31.3694	34.5851	36.1979	39.9383	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.7170	173.5081	156.7170	161.9409	156.7170	161.9409	156.7170	156.7170	161.9409	156.7170	161.9409	156.7170	(67)

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

	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602 (68)

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

	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)

Losses e.g. evaporation (negative values) (Table 5)

	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734 (71)

Water heating gains (Table 5)

	54.1195	52.7564	50.6521	46.7316	44.1460	41.4920	40.1892	41.7799	43.5686	46.4853	50.2749	53.6805 (72)

Total internal gains

	588.3989	607.0517	580.0298	564.0328	534.3847	516.4294	496.1906	494.5565	509.6956	524.6888	555.5408	574.2478 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	16.5900	11.2829	0.6300	0.7000	0.7700	57.2059	(75)
Southwest	15.6100	36.7938	0.6300	0.7000	0.7700	175.5294	(79)

Solar gains	232.7352	415.4356	618.8885	851.4305	1030.8899	1057.4002	1005.3119	866.2344	698.6003	472.7533	282.2235	196.9337 (83)
Total gains	821.1341	1022.4873	1198.9183	1415.4633	1565.2747	1573.8296	1501.5025	1360.7909	1208.2959	997.4420	837.7643	771.1815 (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	22.2784	22.3272	22.3753	22.6040	22.6473	22.8510	22.8510	22.8892	22.7721	22.6473	22.5598	22.4692	
alpha	2.4852	2.4885	2.4917	2.5069	2.5098	2.5234	2.5234	2.5259	2.5181	2.5098	2.5040	2.4979	
util living area	0.9615	0.9352	0.8933	0.8084	0.6862	0.5375	0.4161	0.4669	0.6700	0.8604	0.9412	0.9666	(86)
MIT	18.1205	18.5339	19.1117	19.8400	20.4172	20.7794	20.9162	20.8861	20.5957	19.8109	18.8392	18.0519	(87)
Th 2	19.9850	19.9870	19.9889	19.9981	19.9999	20.0079	20.0079	20.0094	20.0048	19.9999	19.9964	19.9927	(88)
util rest of house	0.9562	0.9264	0.8787	0.7822	0.6433	0.4735	0.3333	0.3818	0.6102	0.8352	0.9318	0.9620	(89)
MIT 2	17.3484	17.7559	18.3215	19.0246	19.5555	19.8692	19.9690	19.9532	19.7287	19.0149	18.0683	17.2856	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)
MIT	17.5102	17.9190	18.4872	19.1956	19.7361	20.0600	20.1676	20.1488	19.9104	19.1818	18.2299	17.4463	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.5102	17.9190	18.4872	19.1956	19.7361	20.0600	20.1676	20.1488	19.9104	19.1818	18.2299	17.4463	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9379	0.9029	0.8518	0.7580	0.6309	0.4770	0.3472	0.3945	0.6039	0.8099	0.9096	0.9453	(94)
Useful gains	770.1753	923.2193	1021.1851	1072.8973	987.5035	750.7759	521.3339	536.7948	729.7196	807.8532	762.0411	729.0105	(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	2088.0503	2053.3212	1886.5230	1603.9069	1249.5220	841.3921	549.7709	576.7337	898.5022	1334.3655	1737.2816	2075.9674	(97)
Space heating kWh	980.4990	759.4285	643.8114	382.3269	194.9417	0.0000	0.0000	0.0000	0.0000	391.7251	702.1731	1002.1360	(98a)
Space heating requirement - total per year (kWh/year)												5057.0417	
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	980.4990	759.4285	643.8114	382.3269	194.9417	0.0000	0.0000	0.0000	0.0000	391.7251	702.1731	1002.1360	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5057.0417	
Space heating per m2										(98c) / (4) =		35.8147	(99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1448.5575	1140.3538	1169.2227	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7842	0.8394	0.8048	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1135.9226	957.2377	940.9410	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1772.4208	1690.8740	1529.5361	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	458.2787	545.8254	437.9147	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	114.5697	136.4564	109.4787	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												360.5047	(107)
Energy for space heating												35.8147	(99)
Energy for space cooling												2.5531	(108)
Total												38.3679	(109)
Fabric Energy Efficiency (TFEE)												38.4	(109)

Full SAP Calculation Printout

Property Reference	Westcott Court	**Issued on Date**	27/02/2025
Assessment Reference	Westcott Court - Be Lean	**Prop Type Ref**	
Property			

SAP Rating	88 B	**DER**	10.51	**TER**	10.09
Environmental	90 B	**% DER < TER**			-4.16
CO_2 Emissions (t/year)	1.33	**DFEE**	31.80	**TFEE**	38.37
Compliance Check	See BREL	**% DFEE < TFEE**			17.12
% DPER < TPER	-10.10	**DPER**	58.02	**TPER**	52.70

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000 (1b)	x	2.5000 (2b)	=	120.5000	(1b) - (3b)
First floor	48.2000 (1c)	x	2.6000 (2c)	=	125.3200	(1c) - (3c)
Second floor	44.8000 (1d)	x	2.1000 (2d)	=	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	339.9000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3682	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3130	(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	0.3990	0.3912	0.3834	0.3442	0.3364	0.2973	0.2973	0.2895	0.3130	0.3364	0.3521	0.3677	(22b)
Effective ac	0.5796	0.5765	0.5735	0.5593	0.5566	0.5442	0.5442	0.5419	0.5490	0.5566	0.5620	0.5676	(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								
Windows			33.0000	0.9615	31.7308			(27)
Half-Glazed			3.1000	1.2000	3.7200			(26a)
Heatloss Floor 1			48.2000	0.1000	4.8200	75.0000	3615.0000	(28a)
External Wall 1	159.3600	36.1000	123.2600	0.1500	18.4890	70.0000	8628.2000	(29a)
Flat Roof	3.4000		3.4000	0.1000	0.3400	9.0000	30.6000	(30)
Slope	44.8000		44.8000	0.1000	4.4800	9.0000	403.2000	(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		63.5798			(33)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12677.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							89.7805	(35)
Thermal bridges (User defined value 0.030 * total exposed area)							7.6728	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		71.2526	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	65.0128	64.6661	64.3262	62.7298	62.4312	61.0408	61.0408	60.7833	61.5763	62.4312	63.0354	63.6671	(38)

Heat transfer coeff

	136.2654	135.9186	135.5788	133.9824	133.6837	132.2934	132.2934	132.0359	132.8289	133.6837	134.2880	134.9196 (39)
Average = Sum(39)m / 12 =												133.9810

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9651	0.9626	0.9602	0.9489	0.9468	0.9369	0.9369	0.9351	0.9407	0.9468	0.9510	0.9555	(40)
HLP (average)												0.9489	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

Hot water usage for mixer showers

	73.1675	72.0679	70.4656	67.4000	65.1376	62.6146	61.1805	62.7706	64.5137	67.2227	70.3542	72.8871 (42a)

Hot water usage for baths

	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808 (42b)

Hot water usage for other uses

	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269 (42c)

Average daily hot water use (litres/day) 137.2237 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	149.2820	146.0942	142.2121	136.3092	131.5156	126.3621	124.3817	128.2470	132.3236	137.7338	143.7277	148.8949	(44)
Energy conte	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(45)
Energy content (annual)										Total = Sum(45)m =		2279.2566	
Distribution loss (46)m = 0.15 x (45)m													
	35.4639	31.2054	32.7862	27.9901	26.5568	23.3065	22.5643	23.8195	24.4752	28.0355	30.7150	34.9700	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	287.3851	254.0635	269.5336	235.9155	228.0041	204.6920	201.3878	209.7555	212.4832	237.8624	254.0815	284.0923	(62)
WWHRS	-51.3743	-45.4358	-47.5778	-39.3963	-36.7159	-31.4181	-29.4494	-31.3165	-32.5063	-38.3214	-43.4135	-50.4229	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	236.0108	208.6277	221.9558	196.5193	191.2882	173.2739	171.9384	178.4390	179.9769	199.5410	210.6680	233.6694	(64)
										Total per year (kWh/year) = Sum(64)m =		2401.9085	(64)
12Total per year (kWh/year)												2402	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	91.3514	80.6789	85.4158	74.3734	71.6073	63.9916	62.7573	65.5396	66.5822	74.8851	80.4136	90.2566	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	157.5130	174.3894	157.5130	162.7634	157.5130	162.7634	157.5130	157.5130	162.7634	157.5130	162.7634	157.5130	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)													
	122.7842	120.0578	114.8062	103.2964	96.2463	88.8772	84.3513	88.0909	92.4753	100.6521	111.6855	121.3126	(72)
Total internal gains													
	660.8595	678.2344	647.9798	624.4201	590.2810	564.6371	541.1486	541.6634	559.4247	582.6515	620.7740	645.6758	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	17.0000	11.2829	0.5700	0.7000	0.7700	53.0368	(75)
Southwest	16.0000	36.7938	0.5700	0.7000	0.7700	162.7800	(79)

Solar gains	215.8168	385.2326	573.8851	789.5038	955.8995	980.4767	932.1796	803.2267	647.7960	438.3807	261.7070	182.6183	(83)
Total gains	876.6763	1063.4670	1221.8650	1413.9240	1546.1805	1545.1138	1473.3282	1344.8901	1207.2207	1021.0322	882.4810	828.2941	(84)

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7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.8421	25.9081	25.9730	26.2825	26.3412	26.6180	26.6180	26.6699	26.5107	26.3412	26.2227	26.0999	
alpha	2.7228	2.7272	2.7315	2.7522	2.7561	2.7745	2.7745	2.7780	2.7674	2.7561	2.7482	2.7400	
util living area													
	0.9529	0.9229	0.8757	0.7814	0.6496	0.4959	0.3764	0.4230	0.6271	0.8347	0.9284	0.9588	(86)
MIT	18.6213	19.0050	19.5174	20.1418	20.6027	20.8657	20.9539	20.9356	20.7341	20.1049	19.2606	18.5589	(87)
Th 2	20.1126	20.1146	20.1166	20.1261	20.1279	20.1362	20.1362	20.1378	20.1330	20.1279	20.1243	20.1206	(88)
util rest of house													
	0.9469	0.9135	0.8606	0.7557	0.6099	0.4406	0.3084	0.3523	0.5725	0.8088	0.9181	0.9536	(89)
MIT 2	17.3054	17.7887	18.4294	19.1971	19.7357	20.0256	20.1075	20.0954	19.8972	19.1718	18.1236	17.2313	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)

MIT	17.5812	18.0437	18.6575	19.3952	19.9175	20.2017	20.2849	20.2716	20.0726	19.3674	18.3620	17.5096 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.4312	17.8937	18.5075	19.2452	19.7675	20.0517	20.1349	20.1216	19.9226	19.2174	18.2120	17.3596 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9214	0.8825	0.8267	0.7261	0.5921	0.4349	0.3083	0.3509	0.5581	0.7763	0.8879	0.9299	(94)
Useful gains	807.7460	938.5135	1010.0927	1026.7193	915.4826	672.0053	454.2477	471.9281	673.7320	792.6710	783.5350	770.2395	(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													
	1789.3303	1766.0855	1627.9615	1386.0712	1078.4881	721.2210	467.6459	491.3816	773.4107	1152.0117	1492.2046	1775.4894	(97)
Space heating kWh													
	730.2987	556.1284	459.6944	258.7334	121.2760	0.0000	0.0000	0.0000	0.0000	267.3495	510.2421	747.9060	(98a)
Space heating requirement - total per year (kWh/year)												3651.6285	
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													
	730.2987	556.1284	459.6944	258.7334	121.2760	0.0000	0.0000	0.0000	0.0000	267.3495	510.2421	747.9060	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3651.6285	
Space heating per m2											(98c) / (4) =	25.8614	(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 %)												89.8000	(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													
	730.2987	556.1284	459.6944	258.7334	121.2760	0.0000	0.0000	0.0000	0.0000	267.3495	510.2421	747.9060	(98)
Space heating efficiency (main heating system 1)													
	89.8000	89.8000	89.8000	89.8000	89.8000	0.0000	0.0000	0.0000	0.0000	89.8000	89.8000	89.8000	(210)
Space heating fuel (main heating system)													
	813.2502	619.2967	511.9091	288.1218	135.0513	0.0000	0.0000	0.0000	0.0000	297.7166	568.1983	832.8574	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	236.0108	208.6277	221.9558	196.5193	191.2882	173.2739	171.9384	178.4390	179.9769	199.5410	210.6680	233.6694	(64)
Efficiency of water heater												82.0000	(216)
(217)m	87.7611	87.5287	87.1022	86.2581	84.8599	82.0000	82.0000	82.0000	82.0000	86.2919	87.3713	87.8116	(217)
Fuel for water heating, kWh/month													
	268.9243	238.3536	254.8224	227.8270	225.4164	211.3096	209.6810	217.6085	219.4840	231.2395	241.1180	266.1032	(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	28.9374	23.2147	20.9022	15.3139	11.8289	9.6643	10.7907	14.0261	18.2186	23.9038	26.9992	29.7417	(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												4066.4014	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												82.0000	
Water heating fuel used												2811.8875	(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)												233.5413	(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												7152.8302	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4066.4014	0.2100	853.9443	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2811.8875	0.2100	590.4964	(264)

Space and water heating			1444.4407	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	233.5413	0.1443	33.7072	(268)
Total CO2, kg/year			1483.8351	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.5100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4066.4014	1.1300	4595.0336	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2811.8875	1.1300	3177.4328	(278)
Space and water heating			7772.4664	(279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248	(281)
Energy for lighting	233.5413	1.5338	358.2135	(282)
Total Primary energy kWh/year			8192.7047	(286)
Dwelling Primary energy Rate (DPER)			58.0200	(287)

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	48.2000	(1b) x	2.5000	(2b) =	120.5000	(1b) - (3b)
First floor	48.2000	(1c) x	2.6000	(2c) =	125.3200	(1c) - (3c)
Second floor	44.8000	(1d) x	2.1000	(2d) =	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000				(4)	
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		339.9000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1177 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3677 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3125 (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	0.3985	0.3907	0.3828	0.3438	0.3360	0.2969	0.2969	0.2891	0.3125	0.3360	0.3516	0.3672	(22b)
Effective ac	0.5794	0.5763	0.5733	0.5591	0.5564	0.5441	0.5441	0.5418	0.5488	0.5564	0.5618	0.5674	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Semi-glazed door			3.1000	1.0000	3.1000			(26a)
TER Opening Type			32.2000	1.1450	36.8702			(27)
Heatloss Floor 1			48.2000	0.1300	6.2660			(28a)
External Wall 1	159.3600	35.3000	124.0600	0.1800	22.3308			(29a)
Flat Roof	3.4000		3.4000	0.1100	0.3740			(30)
Slope	44.8000		44.8000	0.1100	4.9280			(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		73.8690			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 89.7805 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	19.9000	0.1600	3.1840
E6 Intermediate floor within a dwelling	27.5000	0.0000	0.0000
E16 Corner (normal)	24.6000	0.0900	2.2140
E18 Party wall between dwellings	14.2000	0.0600	0.8520
E1 Steel lintel with perforated steel base plate	19.0000	0.0500	0.9500
E3 Sill	4.9500	0.0500	0.2475
E4 Jamb	33.0000	0.0500	1.6500
E11 Eaves (insulation at rafter level)	5.9000	0.0400	0.2360

E13 Gable (insulation at rafter level)	3.3000	0.0800	0.2640	
E15 Flat roof with parapet	14.3000	0.5600	8.0080	
E14 Flat roof	8.2000	0.0800	0.6560	
P1 Party wall - Ground floor	6.4000	0.0800	0.5120	
P2 Party wall - Intermediate floor within a dwelling	6.4000	0.0000	0.0000	
P5 Party wall - Roof (insulation at rafter level)	5.4000	0.0800	0.4320	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 19.2055 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 93.0745 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	64.9886	64.6428	64.3038	62.7118	62.4139	61.0273	61.0273	60.7706	61.5614	62.4139	63.0165	63.6465	(38)
Heat transfer coeff	158.0631	157.7173	157.3784	155.7863	155.4885	154.1019	154.1019	153.8451	154.6360	155.4885	156.0910	156.7210	(39)

Average = Sum(39)m / 12 = 155.7849

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1194	1.1170	1.1146	1.1033	1.1012	1.0914	1.0914	1.0896	1.0952	1.1012	1.1055	1.1099	(40)
HLP (average)												1.1033	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

Hot water usage for mixer showers

	73.1675	72.0679	70.4656	67.4000	65.1376	62.6146	61.1805	62.7706	64.5137	67.2227	70.3542	72.8871 (42a)

Hot water usage for baths

	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808 (42b)

Hot water usage for other uses

	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269 (42c)

Average daily hot water use (litres/day) 137.2237 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	149.2820	146.0942	142.2121	136.3092	131.5156	126.3621	124.3817	128.2470	132.3236	137.7338	143.7277	148.8949	(44)
Energy conte	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(45)

Energy content (annual) Total = Sum(45)m = 2279.2566

Distribution loss (46)m = 0.15 x (45)m

	35.4639	31.2054	32.7862	27.9901	26.5568	23.3065	22.5643	23.8195	24.4752	28.0355	30.7150	34.9700 (46)

Water storage loss:

Total storage loss

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

If cylinder contains dedicated solar storage

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)

Total heat required for water heating calculated for each month

	287.3851	254.0635	269.5336	235.9155	228.0041	204.6920	201.3878	209.7555	212.4832	237.8624	254.0815	284.0923 (62)
WWHRS	-33.4491	-29.5827	-30.9773	-25.6504	-23.9053	-20.4559	-19.1741	-20.3898	-21.1645	-24.9506	-28.2660	-32.8297 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)

Output from w/h

	253.9360	224.4809	238.5563	210.2651	204.0989	184.2361	182.2137	189.3657	191.3188	212.9118	225.8155	251.2626 (64)

Total per year (kWh/year) = Sum(64)m = 2568.4614 (64)

12Total per year (kWh/year) 2568 (64)

Electric shower(s)

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)

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

Heat gains from water heating, kWh/month

	91.3514	80.6789	85.4158	74.3734	71.6073	63.9916	62.7573	65.5396	66.5822	74.8851	80.4136	90.2566 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.7170	173.5081	156.7170	161.9409	156.7170	161.9409	156.7170	156.7170	161.9409	156.7170	161.9409	156.7170	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)	122.7842	120.0578	114.8062	103.2964	96.2463	88.8772	84.3513	88.0909	92.4753	100.6521	111.6855	121.3126	(72)
Total internal gains	660.0635	677.3531	647.1839	623.5976	589.4850	563.8146	540.3527	540.8674	558.6022	581.8555	619.9515	644.8799	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	16.5900	11.2829	0.6300	0.7000	0.7700	57.2059	(75)
Southwest	15.6100	36.7938	0.6300	0.7000	0.7700	175.5294	(79)

Solar gains	232.7352	415.4356	618.8885	851.4305	1030.8899	1057.4002	1005.3119	866.2344	698.6003	472.7533	282.2235	196.9337 (83)
Total gains	892.7988	1092.7888	1266.0724	1475.0281	1620.3750	1621.2148	1545.6646	1407.1019	1257.2025	1054.6088	902.1750	841.8136 (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	22.2784	22.3272	22.3753	22.6040	22.6473	22.8510	22.8510	22.8892	22.7721	22.6473	22.5598	22.4692	
alpha	2.4852	2.4885	2.4917	2.5069	2.5098	2.5234	2.5234	2.5259	2.5181	2.5098	2.5040	2.4979	
util living area	0.9542	0.9262	0.8824	0.7961	0.6733	0.5261	0.4061	0.4546	0.6550	0.8469	0.9320	0.9598	(86)
MIT	18.2176	18.6211	19.1838	19.8872	20.4437	20.7903	20.9208	20.8930	20.6175	19.8655	18.9209	18.1497	(87)
Th 2	19.9850	19.9870	19.9889	19.9981	19.9999	20.0079	20.0079	20.0094	20.0048	19.9999	19.9964	19.9927	(88)
util rest of house	0.9480	0.9165	0.8667	0.7691	0.6300	0.4625	0.3247	0.3709	0.5947	0.8200	0.9213	0.9543	(89)
MIT 2	16.7240	17.2325	17.9371	18.8036	19.4575	19.8393	19.9609	19.9420	19.6715	18.7998	17.6238	16.6423	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)
MIT	17.0371	17.5236	18.1985	19.0308	19.6643	20.0386	20.1621	20.1413	19.8698	19.0232	17.8957	16.9583	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.0371	17.5236	18.1985	19.0308	19.6643	20.0386	20.1621	20.1413	19.8698	19.0232	17.8957	16.9583	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9216	0.8843	0.8316	0.7386	0.6140	0.4646	0.3379	0.3827	0.5857	0.7876	0.8905	0.9299	(94)
Useful gains	822.8292	966.4045	1052.8365	1089.4408	994.9457	753.1998	522.2689	538.4316	736.3555	830.6458	803.4217	782.7946	(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	2013.2621	1990.9636	1841.0890	1578.2342	1238.3521	838.1018	548.9337	575.5881	892.2150	1309.7126	1685.1098	1999.4924	(97)
Space heating kWh	885.6821	688.5037	586.4599	351.9312	181.0943	0.0000	0.0000	0.0000	0.0000	356.4257	634.8154	905.2232	(98a)
Space heating requirement - total per year (kWh/year)												4590.1355	
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	885.6821	688.5037	586.4599	351.9312	181.0943	0.0000	0.0000	0.0000	0.0000	356.4257	634.8154	905.2232	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4590.1355	
Space heating per m2											(98c) / (4) =	32.5080	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	885.6821	688.5037	586.4599	351.9312	181.0943	0.0000	0.0000	0.0000	0.0000	356.4257	634.8154	905.2232	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	958.5304	745.1339	634.6968	380.8779	195.9895	0.0000	0.0000	0.0000	0.0000	385.7421	687.0297	979.6788	(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	253.9360	224.4809	238.5563	210.2651	204.0989	184.2361	182.2137	189.3657	191.3188	212.9118	225.8155	251.2626	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.8279	86.6191	86.2297	85.4762	84.1261	80.3000	80.3000	80.3000	80.3000	85.4766	86.4701	86.8785	(217)
Fuel for water heating, kWh/month	292.4589	259.1587	276.6523	245.9926	242.6107	229.4347	226.9161	235.8228	238.2550	249.0879	261.1486	289.2116	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	32.5627	26.1230	23.5209	17.2324	13.3108	10.8750	12.1426	15.7834	20.5010	26.8984	30.3817	33.4677	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-46.3077	-65.9249	-95.6564	-108.5566	-117.8363	-110.1740	-108.7164	-102.1964	-90.9050	-75.7361	-51.0988	-39.9532	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-24.2666	-51.2514	-102.2717	-154.2312	-204.5901	-205.8895	-203.5660	-172.1474	-125.8304	-73.6201	-32.4972	-19.1825	(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	4967.6791	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	3046.7502	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	262.7997	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2382.4058	(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	5980.8232	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4967.6791	0.2100	1043.2126	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3046.7502	0.2100	639.8175	(264)
Space and water heating			1683.0302	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	262.7997	0.1443	37.9301	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1013.0617	0.1344	-136.1628	
PV Unit electricity exported	-1369.3440	0.1258	-172.2150	
Total			-308.3778	(269)
Total CO2, kg/year			1424.5118	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0900	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4967.6791	1.1300	5613.4774	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3046.7502	1.1300	3442.8277	(278)
Space and water heating			9056.3051	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	262.7997	1.5338	403.0909	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1013.0617	1.4967	-1516.2863	
PV Unit electricity exported	-1369.3440	0.4616	-632.1377	
Total			-2148.4240	(283)
Total Primary energy kWh/year			7441.0728	(286)
Target Primary Energy Rate (TPER)			52.7000	(287)

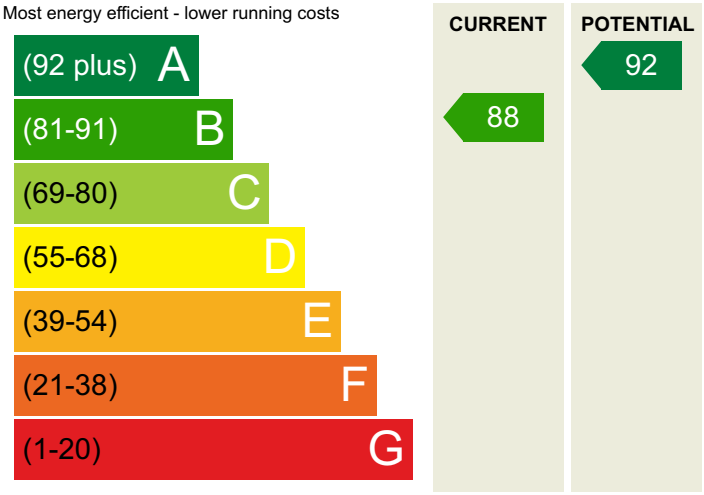
Energy Report

Dwelling Address	
Reference	Westcott Court-Westcott Court - Be Lean
Assessment Date	14/03/2024
Submission Date	
Property Type	House, Semi-Detached
Total Floor Area	141

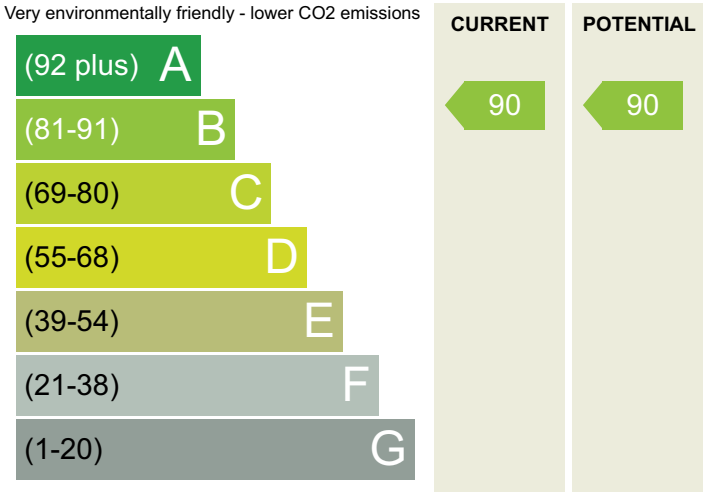
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

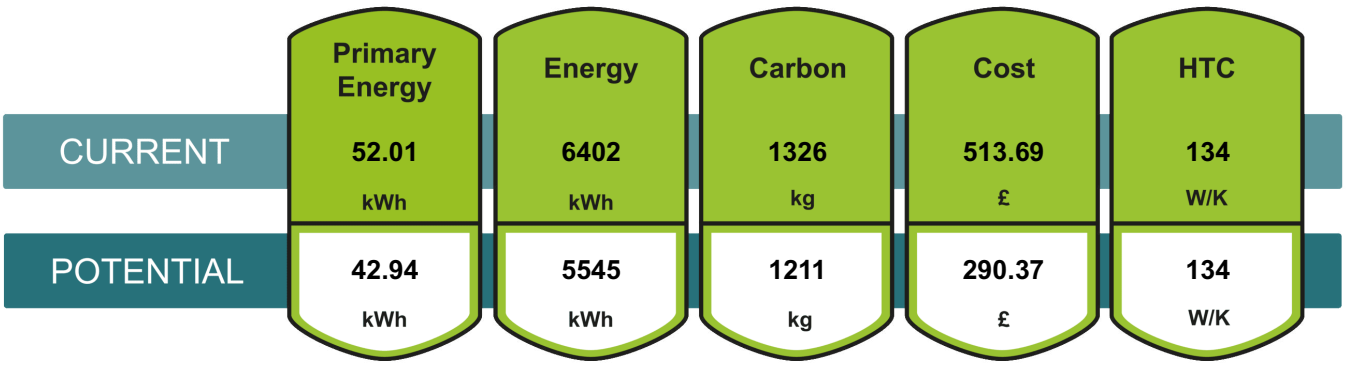
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.1 W/m²K	Very Good
Windows	High performance glazing	Very Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Very Good
Lighting	Excelent lighting efficiency	Very Good
Air tightness	Air permeability [AP50] = 5.0 m³/h.m² (assumed)	Good

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£24	B 88			B 91
Photovoltaic	£248	A 92	£3,500 - £5,500	£223	B 90

Energy Report

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

The table below shows the estimated running costs of the space and water heating and lighting within the dwelling. It does not include the energy used from household appliances. The estimated annual costs after potential improvements indicates the total energy cost if all recommended measures named above were installed.

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£61	£61	
Heating	£295	£295	
Hot Water	£158	£158	
New Technologies e.g. Impact of PV	£0	-(£223)	
TOTAL	£514	£290	

Estimated energy use and potential savings

Space Heating
3306
kWh per year

Water Heating
2822
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO2)	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.

Summary for Input Data

elmhurst energy

Property Reference	Westcott Court	**Issued on Date**	27/02/2025
Assessment Reference	Westcott Court - Be Green	**Prop Type Ref**	
Property			

SAP Rating	91 B	**DER**	1.81	**TER**	9.90
Environmental	98 A	**% DER < TER**			81.72
CO_2 Emissions (t/year)	0.2	**DFEE**	31.80	**TFEE**	38.37
Compliance Check	See BREL	**% DFEE < TFEE**			17.12
% DPER < TPER	58.88	**DPER**	21.24	**TPER**	51.66

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southwest	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
Which Floor	0	
2.0 Number of Storeys	3	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	89.78	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	22.60 m	48.20 m²	2.50 m
1st Storey:	22.60 m	48.20 m²	2.60 m
2nd Storey:	21.00 m	44.80 m²	2.10 m

8.0 Living Area	29.60	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	159.36	123.26	0.00	None	36.10	Calculate Wall Area

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	3.40	3.40	None	0.00	Enter Gross Area	0.00
Slope	External Slope Roof	Plasterboard, insulated slope	0.10	9.00	44.80	44.80	None	0.00	Enter Gross Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.10	None	0.00	75.00	48.20

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Triple Low-E Soft 0.05			0.57		0.70	1.00
RL	Manufacturer	Roof Light	Double Low-E Soft 0.05			0.63		0.70	1.00
Half-Glazed	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05			0.63		0.70	1.20

Summary for Input Data

elmhurst energy

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
SW	Windows	External Wall 1	South West	16.00	0
Front	Half-Glazed	External Wall 1	South West	3.10	0
NE	Windows	External Wall 1	North East	17.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	User Input	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)		19.90	0.00	0.00	Yes
E6 Intermediate floor within a dwelling		27.50	0.00	0.00	No
E16 Corner (normal)		24.60	0.00	0.00	No
E18 Party wall between dwellings		14.20	0.00	0.00	No
E1 Steel lintel with perforated steel base plate		19.00	0.00	0.00	No
E3 Sill		4.95	0.00	0.00	No
E4 Jamb		33.00	0.00	0.00	No
E11 Eaves (insulation at rafter level)		5.90	0.00	0.00	No
E13 Gable (insulation at rafter level)		3.30	0.00	0.00	No
E15 Flat roof with parapet		14.30	0.00	0.00	No
E14 Flat roof		8.20	0.00	0.00	No
P1 Party wall - Ground floor		6.40	0.00	0.00	No
P2 Party wall - Intermediate floor within a dwelling		6.40	0.00	0.00	No
P5 Party wall - Roof (insulation at rafter level)		5.40	0.00	0.00	No

Y-value	0.03	W/m²K
Description	RCD	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	4	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	5.01	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	120.00	5.00	600.00	35

24.0 Main Heating 1	SAP table	
Percentage of Heat	100.00	%
Database Ref. No.	0	
Fuel Type	Electricity	
SAP Code	214	
In Winter	249.90	
In Summer	175.10	

Summary for Input Data

Controls SAP Code	2207
Delayed Start Stat	Yes
Burner Control	On/Off
HETAS approved System	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Enter value
Flow Temperature Value	35.00
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	Yes
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
S1	Vented hot water system	7.00		Yes	Instantaneous System 1
S2	Vented hot water system	7.00		Yes	Instantaneous System 1
S3	Vented hot water system	7.00		Yes	Instantaneous System 1

28.3 Waste Water Heat Recovery System Instantaneous System 1

Database ID	80194
Brand Model	Zypho, Slim DW50
Details	Year: 2022 + current Efficiency: 54.9 Utilisation factor: 0.987

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None
32.0 Photovoltaic Unit	One Dwelling
Export Capable Meter?	Yes
Connected To Dwelling	Yes
Diverter	Yes
Battery Capacity [kWh]	0.00

Summary for Input Data

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
1.50	South West	30°	None Or Little	No	No	1.00		

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£66	A 92	A 98
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Westcott Court	**Issued on Date**	27/02/2025
Assessment Reference	Westcott Court - Be Green	**Prop Type Ref**	
Property			

SAP Rating	91 B	**DER**	1.81	**TER**	9.90
Environmental	98 A	**% DER < TER**			81.72
CO_2 Emissions (t/year)	0.2	**DFEE**	31.80	**TFEE**	38.37
Compliance Check	See BREL	**% DFEE < TFEE**			17.12
% DPER < TPER	58.88	**DPER**	21.24	**TPER**	51.66

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000 (1b)	x	2.5000 (2b)	=	120.5000	(1b) - (3b)
First floor	48.2000 (1c)	x	2.6000 (2c)	=	125.3200	(1c) - (3c)
Second floor	44.8000 (1d)	x	2.1000 (2d)	=	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	339.9000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3682	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3130	(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	0.3990	0.3912	0.3834	0.3442	0.3364	0.2973	0.2973	0.2895	0.3130	0.3364	0.3521	0.3677	(22b)
Effective ac	0.5796	0.5765	0.5735	0.5593	0.5566	0.5442	0.5442	0.5419	0.5490	0.5566	0.5620	0.5676	(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								
Windows			33.0000	0.9615	31.7308			(27)
Half-Glazed			3.1000	1.2000	3.7200			(26a)
Heatloss Floor 1			48.2000	0.1000	4.8200	75.0000	3615.0000	(28a)
External Wall 1	159.3600	36.1000	123.2600	0.1500	18.4890	70.0000	8628.2000	(29a)
Flat Roof	3.4000		3.4000	0.1000	0.3400	9.0000	30.6000	(30)
Slope	44.8000		44.8000	0.1000	4.4800	9.0000	403.2000	(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		63.5798			(33)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12677.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							89.7805	(35)
Thermal bridges (User defined value 0.030 * total exposed area)							7.6728	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		71.2526	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	65.0128	64.6661	64.3262	62.7298	62.4312	61.0408	61.0408	60.7833	61.5763	62.4312	63.0354	63.6671	(38)

Heat transfer coeff

	136.2654	135.9186	135.5788	133.9824	133.6837	132.2934	132.2934	132.0359	132.8289	133.6837	134.2880	134.9196 (39)
Average = Sum(39)m / 12 =												133.9810

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9651	0.9626	0.9602	0.9489	0.9468	0.9369	0.9369	0.9351	0.9407	0.9468	0.9510	0.9555	(40)
HLP (average)												0.9489	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

Hot water usage for mixer showers

	73.1675	72.0679	70.4656	67.4000	65.1376	62.6146	61.1805	62.7706	64.5137	67.2227	70.3542	72.8871 (42a)

Hot water usage for baths

	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808 (42b)

Hot water usage for other uses

	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269 (42c)

Average daily hot water use (litres/day) 137.2237 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	149.2820	146.0942	142.2121	136.3092	131.5156	126.3621	124.3817	128.2470	132.3236	137.7338	143.7277	148.8949	(44)
Energy conte	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(45)
Energy content (annual)										Total = Sum(45)m =		2279.2566	
Distribution loss (46)m = 0.15 x (45)m													
	35.4639	31.2054	32.7862	27.9901	26.5568	23.3065	22.5643	23.8195	24.4752	28.0355	30.7150	34.9700	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(62)
WWHRS	-51.3743	-45.4358	-47.5778	-39.3963	-36.7159	-31.4181	-29.4494	-31.3165	-32.5063	-38.3214	-43.4135	-50.4229	(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													
	185.0519	162.6003	170.9969	147.2042	140.3293	123.9588	120.9795	127.4801	130.6618	148.5821	161.3529	182.7105	(64)
										Total per year (kWh/year) = Sum(64)m =		1801.9085	(64)
12Total per year (kWh/year)												1802	(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													
	78.6117	69.1720	72.6761	62.0447	58.8675	51.6628	50.0176	52.7999	54.2534	62.1454	68.0848	77.5169	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	157.5130	174.3894	157.5130	162.7634	157.5130	162.7634	157.5130	157.5130	162.7634	157.5130	162.7634	157.5130	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)													
	105.6609	102.9345	97.6829	86.1731	79.1230	71.7539	67.2280	70.9676	75.3520	83.5288	94.5623	104.1893	(72)
Total internal gains													
	643.7362	661.1111	630.8566	607.2969	573.1577	547.5138	524.0253	524.5401	542.3014	565.5282	603.6507	628.5525	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	17.0000	11.2829	0.5700	0.7000	0.7700	53.0368	(75)
Southwest	16.0000	36.7938	0.5700	0.7000	0.7700	162.7800	(79)

Solar gains	215.8168	385.2326	573.8851	789.5038	955.8995	980.4767	932.1796	803.2267	647.7960	438.3807	261.7070	182.6183	(83)
Total gains	859.5531	1046.3437	1204.7417	1396.8007	1529.0572	1527.9905	1456.2049	1327.7668	1190.0974	1003.9089	865.3577	811.1708	(84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.8421	25.9081	25.9730	26.2825	26.3412	26.6180	26.6180	26.6699	26.5107	26.3412	26.2227	26.0999	
alpha	2.7228	2.7272	2.7315	2.7522	2.7561	2.7745	2.7745	2.7780	2.7674	2.7561	2.7482	2.7400	
util living area													
	0.9549	0.9255	0.8789	0.7855	0.6541	0.5003	0.3803	0.4276	0.6329	0.8395	0.9313	0.9607	(86)
MIT	18.5972	18.9832	19.4990	20.1290	20.5955	20.8627	20.9527	20.9338	20.7277	20.0891	19.2384	18.5342	(87)
Th 2	20.1126	20.1146	20.1166	20.1261	20.1279	20.1362	20.1362	20.1378	20.1330	20.1279	20.1243	20.1206	(88)
util rest of house													
	0.9491	0.9163	0.8641	0.7600	0.6144	0.4447	0.3118	0.3564	0.5783	0.8140	0.9213	0.9557	(89)
MIT 2	17.2751	17.7617	18.4071	19.1823	19.7282	20.0229	20.1067	20.0942	19.8910	19.1534	18.0961	17.2002	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)

MIT	17.5522	18.0178	18.6360	19.3807	19.9100	20.1990	20.2840	20.2702	20.0664	19.3495	18.3355	17.4799	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.5522	18.0178	18.6360	19.3807	19.9100	20.1990	20.2840	20.2702	20.0664	19.3495	18.3355	17.4799	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9259	0.8881	0.8337	0.7354	0.6037	0.4489	0.3238	0.3677	0.5738	0.7870	0.8943	0.9342	(94)
Useful gains	795.8644	929.2331	1004.4492	1027.2501	923.1537	685.9630	471.5593	488.2387	682.8691	790.1237	773.8845	757.7951	(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	1805.8197	1782.9527	1645.3806	1404.2340	1097.5429	740.7062	487.3721	511.0063	792.5075	1169.6690	1508.7967	1791.7144	(97)
Space heating kWh	751.4067	573.6996	476.8530	271.4284	129.7456	0.0000	0.0000	0.0000	0.0000	282.3817	529.1368	769.2360	(98a)
Space heating requirement - total per year (kWh/year)												3783.8877	
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	751.4067	573.6996	476.8530	271.4284	129.7456	0.0000	0.0000	0.0000	0.0000	282.3817	529.1368	769.2360	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3783.8877	
Space heating per m2											(98c) / (4) =	26.7981	(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 %)												249.9000	(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	751.4067	573.6996	476.8530	271.4284	129.7456	0.0000	0.0000	0.0000	0.0000	282.3817	529.1368	769.2360	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	300.6830	229.5717	190.8175	108.6148	51.9190	0.0000	0.0000	0.0000	0.0000	112.9979	211.7394	307.8175	(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	185.0519	162.6003	170.9969	147.2042	140.3293	123.9588	120.9795	127.4801	130.6618	148.5821	161.3529	182.7105	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	105.6836	92.8614	97.6567	84.0686	80.1424	70.7932	69.0917	72.8042	74.6213	84.8556	92.1490	104.3464	(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	28.9374	23.2147	20.9022	15.3139	11.8289	9.6643	10.7907	14.0261	18.2186	23.9038	26.9992	29.7417	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-27.0210	-42.4469	-67.6867	-82.4356	-92.5330	-84.8350	-83.4737	-76.1150	-63.5804	-50.3873	-30.8963	-22.8235	(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	-6.0401	-14.2298	-32.1915	-55.2213	-80.0448	-85.6713	-84.4411	-69.0681	-47.5855	-23.0410	-8.6318	-4.6234	(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	1514.1607	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1029.0740	(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)	233.5413	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1235.0241	(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	1541.7520	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1514.1607	0.1551	234.8377	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.0740	0.1414	145.5119	(264)
Space and water heating			380.3496	(265)

Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	233.5413	0.1443	33.7072	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-724.2343	0.1333	-96.5203	
PV Unit electricity exported	-510.7898	0.1221	-62.3524	
Total			-158.8727	(269)
Total CO2, kg/year			255.1841	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1.8100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1514.1607	1.5742	2383.5659	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.0740	1.5229	1567.1491	(278)
Space and water heating			3950.7150	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	233.5413	1.5338	358.2135	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-724.2343	1.4925	-1080.9126	
PV Unit electricity exported	-510.7898	0.4479	-228.7603	
Total			-1309.6729	(283)
Total Primary energy kWh/year			2999.2556	(286)
Dwelling Primary energy Rate (DPER)			21.2400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000 (1b)	x	2.5000 (2b)	=	120.5000	(1b) - (3b)
First floor	48.2000 (1c)	x	2.6000 (2c)	=	125.3200	(1c) - (3c)
Second floor	44.8000 (1d)	x	2.1000 (2d)	=	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		339.9000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3677	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3125	(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	0.3985	0.3907	0.3828	0.3438	0.3360	0.2969	0.2969	0.2891	0.3125	0.3360	0.3516	0.3672	(22b)
Effective ac	0.5794	0.5763	0.5733	0.5591	0.5564	0.5441	0.5441	0.5418	0.5488	0.5564	0.5618	0.5674	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Semi-glazed door			3.1000	1.0000	3.1000			(26a)
TER Opening Type			32.2000	1.1450	36.8702			(27)
Heatloss Floor 1			48.2000	0.1300	6.2660			(28a)
External Wall 1	159.3600	35.3000	124.0600	0.1800	22.3308			(29a)
Flat Roof	3.4000		3.4000	0.1100	0.3740			(30)
Slope	44.8000		44.8000	0.1100	4.9280			(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		73.8690			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 89.7805 (35)
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	19.9000	0.1600	3.1840
E6 Intermediate floor within a dwelling	27.5000	0.0000	0.0000
E16 Corner (normal)	24.6000	0.0900	2.2140
E18 Party wall between dwellings	14.2000	0.0600	0.8520
E1 Steel lintel with perforated steel base plate	19.0000	0.0500	0.9500
E3 Sill	4.9500	0.0500	0.2475
E4 Jamb	33.0000	0.0500	1.6500
E11 Eaves (insulation at rafter level)	5.9000	0.0400	0.2360
E13 Gable (insulation at rafter level)	3.3000	0.0800	0.2640
E15 Flat roof with parapet	14.3000	0.5600	8.0080
E14 Flat roof	8.2000	0.0800	0.6560
P1 Party wall - Ground floor	6.4000	0.0800	0.5120
P2 Party wall - Intermediate floor within a dwelling	6.4000	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	5.4000	0.0800	0.4320

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 19.2055 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 93.0745 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	64.9886	64.6428	64.3038	62.7118	62.4139	61.0273	61.0273	60.7706	61.5614	62.4139	63.0165	63.6465	(38)
Heat transfer coeff	158.0631	157.7173	157.3784	155.7863	155.4885	154.1019	154.1019	153.8451	154.6360	155.4885	156.0910	156.7210	(39)
Average = Sum(39)m / 12 =												155.7849	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1194	1.1170	1.1146	1.1033	1.1012	1.0914	1.0914	1.0896	1.0952	1.1012	1.1055	1.1099	(40)
HLP (average)												1.1033	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	73.1675	72.0679	70.4656	67.4000	65.1376	62.6146	61.1805	62.7706	64.5137	67.2227	70.3542	72.8871	(42a)
Hot water usage for baths	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808	(42b)
Hot water usage for other uses	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269	(42c)
Average daily hot water use (litres/day)												137.2237	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	149.2820	146.0942	142.2121	136.3092	131.5156	126.3621	124.3817	128.2470	132.3236	137.7338	143.7277	148.8949	(44)
Energy conte	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(45)
Energy content (annual)										Total = Sum(45)m =		2279.2566	
Distribution loss (46)m = 0.15 x (45)m	35.4639	31.2054	32.7862	27.9901	26.5568	23.3065	22.5643	23.8195	24.4752	28.0355	30.7150	34.9700	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	283.0211	250.1218	265.1696	231.6923	223.6401	200.4687	197.0238	205.3915	208.2600	233.4984	249.8582	279.7283	(62)
WWHRS	-33.4491	-29.5827	-30.9773	-25.6504	-23.9053	-20.4559	-19.1741	-20.3898	-21.1645	-24.9506	-28.2660	-32.8297	(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	249.5720	220.5392	234.1923	206.0419	199.7349	180.0128	177.8497	185.0017	187.0956	208.5478	221.5923	246.8986	(64)
										Total per year (kWh/year) = Sum(64)m =		2517.0788	(64)
12Total per year (kWh/year)												2517	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	115.8876	102.8406	109.9520	98.1181	96.1435	87.7363	87.2935	90.0758	90.3269	99.4213	104.1583	114.7928	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.7170	173.5081	156.7170	161.9409	156.7170	161.9409	156.7170	156.7170	161.9409	156.7170	161.9409	156.7170	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)	155.7629	153.0366	147.7850	136.2752	129.2251	121.8560	117.3300	121.0696	125.4540	133.6308	144.6643	154.2914	(72)
Total internal gains	693.0423	710.3319	680.1626	656.5764	622.4638	596.7934	573.3314	573.8462	591.5810	614.8343	652.9303	677.8586	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W

Northeast				16.5900		11.2829		0.6300		0.7000		0.7700	57.2059 (75)
Southwest				15.6100		36.7938		0.6300		0.7000		0.7700	175.5294 (79)
Solar gains	232.7352	415.4356	618.8885	851.4305	1030.8899	1057.4002	1005.3119	866.2344	698.6003	472.7533	282.2235	196.9337 (83)	
Total gains	925.7775	1125.7675	1299.0511	1508.0069	1653.3537	1654.1935	1578.6433	1440.0806	1290.1813	1087.5875	935.1537	874.7924 (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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	22.2784	22.3272	22.3753	22.6040	22.6473	22.8510	22.8510	22.8892	22.7721	22.6473	22.5598	22.4692	
alpha	2.4852	2.4885	2.4917	2.5069	2.5098	2.5234	2.5234	2.5259	2.5181	2.5098	2.5040	2.4979	
util living area	0.9507	0.9219	0.8770	0.7894	0.6658	0.5183	0.3989	0.4462	0.6451	0.8390	0.9270	0.9565	(86)
MIT	18.2615	18.6611	19.2183	19.9124	20.4589	20.7974	20.9240	20.8975	20.6313	19.8959	18.9618	18.1945	(87)
Th 2	19.9850	19.9870	19.9889	19.9981	19.9999	20.0079	20.0079	20.0094	20.0048	19.9999	19.9964	19.9927	(88)
util rest of house	0.9440	0.9117	0.8608	0.7619	0.6222	0.4551	0.3186	0.3635	0.5846	0.8112	0.9157	0.9506	(89)
MIT 2	16.7791	17.2822	17.9789	18.8327	19.4734	19.8454	19.9630	19.9451	19.6847	18.8350	17.6743	16.6988	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)
MIT	17.0899	17.5712	18.2387	19.0590	19.6800	20.0450	20.1644	20.1447	19.8832	19.0574	17.9442	17.0124	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.0899	17.5712	18.2387	19.0590	19.6800	20.0450	20.1644	20.1447	19.8832	19.0574	17.9442	17.0124	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9167	0.8790	0.8256	0.7319	0.6070	0.4576	0.3317	0.3754	0.5765	0.7793	0.8842	0.9251	(94)
Useful gains	848.6653	989.5055	1072.4459	1103.7073	1003.5256	756.9994	523.7108	540.5363	743.7981	847.5229	826.8960	809.2569	(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	2021.6050	1998.4724	1847.4229	1582.6388	1240.7995	839.0819	549.2844	576.1084	894.2844	1315.0313	1692.6824	2007.9646	(97)
Space heating kWh	872.6672	678.0258	576.5829	344.8307	176.5318	0.0000	0.0000	0.0000	0.0000	347.8263	623.3663	891.8386	(98a)
Space heating requirement - total per year (kWh/year)												4511.6694	
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	872.6672	678.0258	576.5829	344.8307	176.5318	0.0000	0.0000	0.0000	0.0000	347.8263	623.3663	891.8386	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4511.6694	
Space heating per m2											(98c) / (4) =	31.9523	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	872.6672	678.0258	576.5829	344.8307	176.5318	0.0000	0.0000	0.0000	0.0000	347.8263	623.3663	891.8386	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	945.4682	734.5891	624.6835	373.5977	191.2587	0.0000	0.0000	0.0000	0.0000	376.8432	675.3697	966.2390	(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	249.5720	220.5392	234.1923	206.0419	199.7349	180.0128	177.8497	185.0017	187.0956	208.5478	221.5923	246.8986	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.6273	86.4082	85.9984	85.2057	83.7840	79.8000	79.8000	79.8000	79.8000	85.1983	86.2490	86.6804	(217)
Fuel for water heating, kWh/month	288.0986	255.2296	272.3216	241.8170	238.3927	225.5800	222.8693	231.8318	234.4556	244.7794	256.9216	284.8379	(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													
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	32.5627	26.1230	23.5209	17.2324	13.3108	10.8750	12.1426	15.7834	20.5010	26.8984	30.3817	33.4677	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-46.3077	-65.9249	-95.6564	-108.5566	-117.8363	-110.1740	-108.7164	-102.1964	-90.9050	-75.7361	-51.0988	-39.9532	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-24.2666	-51.2514	-102.2717	-154.2312	-204.5901	-205.8895	-203.5660	-172.1474	-125.8304	-73.6201	-32.4972	-19.1825	(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												4888.0492	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2997.1350	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	262.7997	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2382.4058	(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	5851.5781	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4888.0492	0.2100	1026.4903	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2997.1350	0.2100	629.3984	(264)
Space and water heating			1655.8887	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	262.7997	0.1443	37.9301	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1013.0617	0.1344	-136.1628	
PV Unit electricity exported	-1369.3440	0.1258	-172.2150	
Total			-308.3778	(269)
Total CO2, kg/year			1397.3703	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9000	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4888.0492	1.1300	5523.4956	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2997.1350	1.1300	3386.7626	(278)
Space and water heating			8910.2582	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	262.7997	1.5338	403.0909	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1013.0617	1.4967	-1516.2863	
PV Unit electricity exported	-1369.3440	0.4616	-632.1377	
Total			-2148.4240	(283)
Total Primary energy kWh/year			7295.0258	(286)
Target Primary Energy Rate (TPER)			51.6600	(287)

Full SAP Calculation Printout

Property Reference	Westcott Court	**Issued on Date**	27/02/2025
Assessment Reference	Westcott Court - Be Green	**Prop Type Ref**	
Property			

SAP Rating	91 B	**DER**	1.81	**TER**	9.90
Environmental	98 A	**% DER < TER**			81.72
CO_2 Emissions (t/year)	0.2	**DFEE**	31.80	**TFEE**	38.37
Compliance Check	See BREL	**% DFEE < TFEE**			17.12
% DPER < TPER	58.88	**DPER**	21.24	**TPER**	51.66

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000 (1b)	x	2.5000 (2b)	=	120.5000	(1b) - (3b)
First floor	48.2000 (1c)	x	2.6000 (2c)	=	125.3200	(1c) - (3c)
Second floor	44.8000 (1d)	x	2.1000 (2d)	=	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	339.9000	(5)

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2. Ventilation rate

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			m3 per hour	
Number of open chimneys		0 * 80 =	0.0000	(6a)
Number of open flues		0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000	(6d)
Number of flues attached to other heater		0 * 35 =	0.0000	(6e)
Number of blocked chimneys		0 * 20 =	0.0000	(6f)
Number of intermittent extract fans		4 * 10 =	40.0000	(7a)
Number of passive vents		0 * 10 =	0.0000	(7b)
Number of flueless gas fires		0 * 40 =	0.0000	(7c)
		Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		40.0000 / (5) =	0.1177	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0100	(17)
Infiltration rate			0.3682	(18)
Number of sides sheltered			2	(19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.3130	(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	0.3990	0.3912	0.3834	0.3442	0.3364	0.2973	0.2973	0.2895	0.3130	0.3364	0.3521	0.3677	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5796	0.5765	0.5735	0.5593	0.5566	0.5442	0.5442	0.5419	0.5490	0.5566	0.5620	0.5676	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			33.0000	0.9615	31.7308			(27)
Half-Glazed			3.1000	1.2000	3.7200			(26a)
Heatloss Floor 1			48.2000	0.1000	4.8200	75.0000	3615.0000	(28a)
External Wall 1	159.3600	36.1000	123.2600	0.1500	18.4890	70.0000	8628.2000	(29a)
Flat Roof	3.4000		3.4000	0.1000	0.3400	9.0000	30.6000	(30)
Slope	44.8000		44.8000	0.1000	4.4800	9.0000	403.2000	(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	63.5798			(33)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12677.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							89.7805	(35)
Thermal bridges (User defined value 0.030 * total exposed area)							7.6728	(36)
Point Thermal bridges					(36a) =		0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		71.2526	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	65.0128	64.6661	64.3262	62.7298	62.4312	61.0408	61.0408	60.7833	61.5763	62.4312	63.0354	63.6671	(38)
Heat transfer coeff													
	136.2654	135.9186	135.5788	133.9824	133.6837	132.2934	132.2934	132.0359	132.8289	133.6837	134.2880	134.9196	(39)
Average = Sum(39)m / 12 =												133.9810	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9651	0.9626	0.9602	0.9489	0.9468	0.9369	0.9369	0.9351	0.9407	0.9468	0.9510	0.9555	(40)
HLP (average)												0.9489	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808	(42b)

Hot water usage for other uses

44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269	(42c)

Average daily hot water use (litres/day) 69.7657 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	76.1145	74.0262	71.7465	68.9092	66.3780	63.7475	63.2012	65.4764	67.8098	70.5111	73.3735	76.0077	(44)
Energy conte	120.5468	105.4124	110.2716	94.3333	89.3576	78.3850	76.4364	81.0734	83.6163	95.6830	104.5339	119.0098	(45)
Energy content (annual)										Total = Sum(45)m =		1158.6595	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
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													
	102.4648	89.6005	93.7309	80.1833	75.9539	66.6272	64.9709	68.9124	71.0738	81.3305	88.8538	101.1583	(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													
	102.4648	89.6005	93.7309	80.1833	75.9539	66.6272	64.9709	68.9124	71.0738	81.3305	88.8538	101.1583	(64)
										Total per year (kWh/year) = Sum(64)m =		984.8606	(64)
12Total per year (kWh/year)												985	(64)
Electric shower(s)													
	58.5950	52.2086	57.0098	54.4037	55.4246	52.8697	54.6320	55.4246	54.4037	57.0098	55.9378	58.5950	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					666.5142	(64a)
Heat gains from water heating, kWh/month													
	40.2649	35.4523	37.6852	33.6468	32.8446	29.8742	29.9007	31.0843	31.3694	34.5851	36.1979	39.9383	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	157.5130	174.3894	157.5130	162.7634	157.5130	162.7634	157.5130	157.5130	162.7634	157.5130	162.7634	157.5130	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)													
	54.1195	52.7564	50.6521	46.7316	44.1460	41.4920	40.1892	41.7799	43.5686	46.4853	50.2749	53.6805	(72)
Total internal gains													
	589.1948	607.9329	580.8258	564.8553	535.1807	517.2519	496.9865	495.3524	510.5181	525.4847	556.3633	575.0437	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	17.0000	11.2829	0.5700	0.7000	0.7700	53.0368	(75)
Southwest	16.0000	36.7938	0.5700	0.7000	0.7700	162.7800	(79)

Solar gains	215.8168	385.2326	573.8851	789.5038	955.8995	980.4767	932.1796	803.2267	647.7960	438.3807	261.7070	182.6183	(83)
Total gains	805.0117	993.1655	1154.7109	1354.3592	1491.0802	1497.7286	1429.1661	1298.5792	1158.3140	963.8654	818.0703	757.6621	(84)

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7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.8421	25.9081	25.9730	26.2825	26.3412	26.6180	26.6180	26.6699	26.5107	26.3412	26.2227	26.0999	
alpha	2.7228	2.7272	2.7315	2.7522	2.7561	2.7745	2.7745	2.7780	2.7674	2.7561	2.7482	2.7400	
util living area													
	0.9610	0.9331	0.8882	0.7955	0.6641	0.5082	0.3866	0.4358	0.6438	0.8505	0.9390	0.9664	(86)
MIT	18.5193	18.9145	19.4440	20.0962	20.5790	20.8571	20.9507	20.9306	20.7152	20.0508	19.1758	18.4561	(87)
Th 2	20.1126	20.1146	20.1166	20.1261	20.1279	20.1362	20.1362	20.1378	20.1330	20.1279	20.1243	20.1206	(88)
util rest of house													
	0.9560	0.9248	0.8742	0.7707	0.6246	0.4522	0.3173	0.3636	0.5893	0.8261	0.9300	0.9620	(89)

MIT 2	17.8249	18.2143	18.7322	19.3610	19.8029	20.0442	20.1122	20.1020	19.9350	19.3337	18.4831	17.7679	(90)
Living area fraction									fLA = Living area / (4) =			0.2096	(91)
MIT	17.9705	18.3611	18.8814	19.5151	19.9656	20.2146	20.2879	20.2757	20.0986	19.4840	18.6283	17.9121	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.9705	18.3611	18.8814	19.5151	19.9656	20.2146	20.2879	20.2757	20.0986	19.4840	18.6283	17.9121	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9395	0.9037	0.8507	0.7512	0.6167	0.4575	0.3298	0.3756	0.5870	0.8050	0.9101	0.9470	(94)
Useful gains	756.3170	897.5624	982.3337	1017.3349	919.5340	685.2011	471.3133	487.6904	679.9358	775.9113	744.4900	717.4787	(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	1862.8113	1829.6128	1678.6543	1422.2359	1104.9719	742.7713	487.8898	511.7374	796.7863	1187.6448	1548.1140	1850.0378	(97)
Space heating kWh	823.2318	626.3379	518.0625	291.5287	137.9658	0.0000	0.0000	0.0000	0.0000	306.3297	578.6093	842.6240	(98a)
Space heating requirement - total per year (kWh/year)												4124.6897	
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	823.2318	626.3379	518.0625	291.5287	137.9658	0.0000	0.0000	0.0000	0.0000	306.3297	578.6093	842.6240	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4124.6897	
Space heating per m2											(98c) / (4) =	29.2117	(99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1243.5576	978.9709	1003.4727	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8343	0.8830	0.8536	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1037.5060	864.4336	856.5797	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1682.5799	1605.4699	1455.9885	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	464.4532	551.3311	445.9601	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	116.1133	137.8328	111.4900	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												365.4361	(107)
Energy for space heating												29.2117	(99)
Energy for space cooling												2.5881	(108)
Total												31.7998	(109)
Fabric Energy Efficiency (DFEE)												31.8	(109)

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000	(1b)	x 2.5000	(2b) =	120.5000	(1b) - (3b)
First floor	48.2000	(1c)	x 2.6000	(2c) =	125.3200	(1c) - (3c)
Second floor	44.8000	(1d)	x 2.1000	(2d) =	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		339.9000	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3677	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3125	(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	0.3985	0.3907	0.3828	0.3438	0.3360	0.2969	0.2969	0.2891	0.3125	0.3360	0.3516	0.3672 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5794	0.5763	0.5733	0.5591	0.5564	0.5441	0.5441	0.5418	0.5488	0.5564	0.5618	0.5674 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Semi-glazed door			3.1000	1.0000	3.1000			(26a)
TER Opening Type			32.2000	1.1450	36.8702			(27)
Heatloss Floor 1			48.2000	0.1300	6.2660			(28a)
External Wall 1	159.3600	35.3000	124.0600	0.1800	22.3308			(29a)
Flat Roof	3.4000		3.4000	0.1100	0.3740			(30)
Slope	44.8000		44.8000	0.1100	4.9280			(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	73.8690			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	89.7805	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E5 Ground floor (normal)	19.9000	0.1600	3.1840
E6 Intermediate floor within a dwelling	27.5000	0.0000	0.0000
E16 Corner (normal)	24.6000	0.0900	2.2140
E18 Party wall between dwellings	14.2000	0.0600	0.8520
E1 Steel lintel with perforated steel base plate	19.0000	0.0500	0.9500
E3 Sill	4.9500	0.0500	0.2475
E4 Jamb	33.0000	0.0500	1.6500
E11 Eaves (insulation at rafter level)	5.9000	0.0400	0.2360
E13 Gable (insulation at rafter level)	3.3000	0.0800	0.2640
E15 Flat roof with parapet	14.3000	0.5600	8.0080
E14 Flat roof	8.2000	0.0800	0.6560
P1 Party wall - Ground floor	6.4000	0.0800	0.5120
P2 Party wall - Intermediate floor within a dwelling	6.4000	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	5.4000	0.0800	0.4320

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	19.2055	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	93.0745	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	64.9886	64.6428	64.3038	62.7118	62.4139	61.0273	61.0273	60.7706	61.5614	62.4139	63.0165	63.6465	(38)
Heat transfer coeff	158.0631	157.7173	157.3784	155.7863	155.4885	154.1019	154.1019	153.8451	154.6360	155.4885	156.0910	156.7210	(39)
Average = Sum(39)m / 12 =												155.7849	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1194	1.1170	1.1146	1.1033	1.1012	1.0914	1.0914	1.0896	1.0952	1.1012	1.1055	1.1099	(40)
HLP (average)												1.1033	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.9193	(42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808	(42b)
Hot water usage for other uses	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269	(42c)
Average daily hot water use (litres/day)												69.7657	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.1145	74.0262	71.7465	68.9092	66.3780	63.7475	63.2012	65.4764	67.8098	70.5111	73.3735	76.0077	(44)
Energy conte	120.5468	105.4124	110.2716	94.3333	89.3576	78.3850	76.4364	81.0734	83.6163	95.6830	104.5339	119.0098	(45)
Energy content (annual)										Total = Sum(45)m =		1158.6595	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
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	102.4648	89.6005	93.7309	80.1833	75.9539	66.6272	64.9709	68.9124	71.0738	81.3305	88.8538	101.1583	(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	102.4648	89.6005	93.7309	80.1833	75.9539	66.6272	64.9709	68.9124	71.0738	81.3305	88.8538	101.1583	(64)
									Total per year (kWh/year) = Sum(64)m =			984.8606	(64)
12Total per year (kWh/year)												985	(64)
Electric shower(s)	58.5950	52.2086	57.0098	54.4037	55.4246	52.8697	54.6320	55.4246	54.4037	57.0098	55.9378	58.5950	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			666.5142	(64a)
Heat gains from water heating, kWh/month	40.2649	35.4523	37.6852	33.6468	32.8446	29.8742	29.9007	31.0843	31.3694	34.5851	36.1979	39.9383	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.7170	173.5081	156.7170	161.9409	156.7170	161.9409	156.7170	156.7170	161.9409	156.7170	161.9409	156.7170	(67)

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

	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602 (68)

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

	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)

Losses e.g. evaporation (negative values) (Table 5)

	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734 (71)

Water heating gains (Table 5)

	54.1195	52.7564	50.6521	46.7316	44.1460	41.4920	40.1892	41.7799	43.5686	46.4853	50.2749	53.6805 (72)

Total internal gains

	588.3989	607.0517	580.0298	564.0328	534.3847	516.4294	496.1906	494.5565	509.6956	524.6888	555.5408	574.2478 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	16.5900	11.2829	0.6300	0.7000	0.7700	57.2059	(75)
Southwest	15.6100	36.7938	0.6300	0.7000	0.7700	175.5294	(79)

Solar gains	232.7352	415.4356	618.8885	851.4305	1030.8899	1057.4002	1005.3119	866.2344	698.6003	472.7533	282.2235	196.9337 (83)
Total gains	821.1341	1022.4873	1198.9183	1415.4633	1565.2747	1573.8296	1501.5025	1360.7909	1208.2959	997.4420	837.7643	771.1815 (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	22.2784	22.3272	22.3753	22.6040	22.6473	22.8510	22.8510	22.8892	22.7721	22.6473	22.5598	22.4692	
alpha	2.4852	2.4885	2.4917	2.5069	2.5098	2.5234	2.5234	2.5259	2.5181	2.5098	2.5040	2.4979	
util living area	0.9615	0.9352	0.8933	0.8084	0.6862	0.5375	0.4161	0.4669	0.6700	0.8604	0.9412	0.9666	(86)
MIT	18.1205	18.5339	19.1117	19.8400	20.4172	20.7794	20.9162	20.8861	20.5957	19.8109	18.8392	18.0519	(87)
Th 2	19.9850	19.9870	19.9889	19.9981	19.9999	20.0079	20.0079	20.0094	20.0048	19.9999	19.9964	19.9927	(88)
util rest of house	0.9562	0.9264	0.8787	0.7822	0.6433	0.4735	0.3333	0.3818	0.6102	0.8352	0.9318	0.9620	(89)
MIT 2	17.3484	17.7559	18.3215	19.0246	19.5555	19.8692	19.9690	19.9532	19.7287	19.0149	18.0683	17.2856	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)
MIT	17.5102	17.9190	18.4872	19.1956	19.7361	20.0600	20.1676	20.1488	19.9104	19.1818	18.2299	17.4463	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.5102	17.9190	18.4872	19.1956	19.7361	20.0600	20.1676	20.1488	19.9104	19.1818	18.2299	17.4463	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9379	0.9029	0.8518	0.7580	0.6309	0.4770	0.3472	0.3945	0.6039	0.8099	0.9096	0.9453	(94)
Useful gains	770.1753	923.2193	1021.1851	1072.8973	987.5035	750.7759	521.3339	536.7948	729.7196	807.8532	762.0411	729.0105	(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	2088.0503	2053.3212	1886.5230	1603.9069	1249.5220	841.3921	549.7709	576.7337	898.5022	1334.3655	1737.2816	2075.9674	(97)
Space heating kWh	980.4990	759.4285	643.8114	382.3269	194.9417	0.0000	0.0000	0.0000	0.0000	391.7251	702.1731	1002.1360	(98a)
Space heating requirement - total per year (kWh/year)												5057.0417	
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	980.4990	759.4285	643.8114	382.3269	194.9417	0.0000	0.0000	0.0000	0.0000	391.7251	702.1731	1002.1360	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5057.0417	
Space heating per m2										(98c) / (4) =		35.8147	(99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1448.5575	1140.3538	1169.2227	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7842	0.8394	0.8048	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1135.9226	957.2377	940.9410	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1772.4208	1690.8740	1529.5361	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	458.2787	545.8254	437.9147	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	114.5697	136.4564	109.4787	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												360.5047	(107)
Energy for space heating												35.8147	(99)
Energy for space cooling												2.5531	(108)
Total												38.3679	(109)
Fabric Energy Efficiency (TFEE)												38.4	(109)

Full SAP Calculation Printout

Property Reference	Westcott Court	**Issued on Date**	27/02/2025
Assessment Reference	Westcott Court - Be Green	**Prop Type Ref**	
Property			

SAP Rating	91 B	**DER**	1.81	**TER**	9.90
Environmental	98 A	**% DER < TER**			81.72
CO_2 Emissions (t/year)	0.2	**DFEE**	31.80	**TFEE**	38.37
Compliance Check	See BREL	**% DFEE < TFEE**			17.12
% DPER < TPER	58.88	**DPER**	21.24	**TPER**	51.66

Assessor Details	Mr. Samuel Westover	**Assessor ID**	AX13-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000 (1b)	x	2.5000 (2b)	=	120.5000	(1b) - (3b)
First floor	48.2000 (1c)	x	2.6000 (2c)	=	125.3200	(1c) - (3c)
Second floor	44.8000 (1d)	x	2.1000 (2d)	=	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	339.9000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0100	(17)
Infiltration rate		0.3682	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3130	(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	0.3990	0.3912	0.3834	0.3442	0.3364	0.2973	0.2973	0.2895	0.3130	0.3364	0.3521	0.3677	(22b)
Effective ac	0.5796	0.5765	0.5735	0.5593	0.5566	0.5442	0.5442	0.5419	0.5490	0.5566	0.5620	0.5676	(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								
Windows			33.0000	0.9615	31.7308			(27)
Half-Glazed			3.1000	1.2000	3.7200			(26a)
Heatloss Floor 1			48.2000	0.1000	4.8200	75.0000	3615.0000	(28a)
External Wall 1	159.3600	36.1000	123.2600	0.1500	18.4890	70.0000	8628.2000	(29a)
Flat Roof	3.4000		3.4000	0.1000	0.3400	9.0000	30.6000	(30)
Slope	44.8000		44.8000	0.1000	4.4800	9.0000	403.2000	(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		63.5798			(33)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12677.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							89.7805	(35)
Thermal bridges (User defined value 0.030 * total exposed area)							7.6728	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		71.2526	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	65.0128	64.6661	64.3262	62.7298	62.4312	61.0408	61.0408	60.7833	61.5763	62.4312	63.0354	63.6671	(38)

Heat transfer coeff

	136.2654	135.9186	135.5788	133.9824	133.6837	132.2934	132.2934	132.0359	132.8289	133.6837	134.2880	134.9196 (39)
Average = Sum(39)m / 12 =												133.9810

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9651	0.9626	0.9602	0.9489	0.9468	0.9369	0.9369	0.9351	0.9407	0.9468	0.9510	0.9555	(40)
HLP (average)												0.9489	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

Hot water usage for mixer showers

	73.1675	72.0679	70.4656	67.4000	65.1376	62.6146	61.1805	62.7706	64.5137	67.2227	70.3542	72.8871 (42a)

Hot water usage for baths

	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808 (42b)

Hot water usage for other uses

	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269 (42c)

Average daily hot water use (litres/day) 137.2237 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	149.2820	146.0942	142.2121	136.3092	131.5156	126.3621	124.3817	128.2470	132.3236	137.7338	143.7277	148.8949	(44)
Energy conte	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(45)
Energy content (annual)										Total = Sum(45)m =		2279.2566	
Distribution loss (46)m = 0.15 x (45)m													
	35.4639	31.2054	32.7862	27.9901	26.5568	23.3065	22.5643	23.8195	24.4752	28.0355	30.7150	34.9700	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(62)
WWHRS	-51.3743	-45.4358	-47.5778	-39.3963	-36.7159	-31.4181	-29.4494	-31.3165	-32.5063	-38.3214	-43.4135	-50.4229	(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													
	185.0519	162.6003	170.9969	147.2042	140.3293	123.9588	120.9795	127.4801	130.6618	148.5821	161.3529	182.7105	(64)
										Total per year (kWh/year) = Sum(64)m =		1801.9085	(64)
12Total per year (kWh/year)												1802	(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													
	78.6117	69.1720	72.6761	62.0447	58.8675	51.6628	50.0176	52.7999	54.2534	62.1454	68.0848	77.5169	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	157.5130	174.3894	157.5130	162.7634	157.5130	162.7634	157.5130	157.5130	162.7634	157.5130	162.7634	157.5130	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)													
	105.6609	102.9345	97.6829	86.1731	79.1230	71.7539	67.2280	70.9676	75.3520	83.5288	94.5623	104.1893	(72)
Total internal gains													
	643.7362	661.1111	630.8566	607.2969	573.1577	547.5138	524.0253	524.5401	542.3014	565.5282	603.6507	628.5525	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	17.0000	11.2829	0.5700	0.7000	0.7700	53.0368	(75)
Southwest	16.0000	36.7938	0.5700	0.7000	0.7700	162.7800	(79)

Solar gains	215.8168	385.2326	573.8851	789.5038	955.8995	980.4767	932.1796	803.2267	647.7960	438.3807	261.7070	182.6183	(83)
Total gains	859.5531	1046.3437	1204.7417	1396.8007	1529.0572	1527.9905	1456.2049	1327.7668	1190.0974	1003.9089	865.3577	811.1708	(84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.8421	25.9081	25.9730	26.2825	26.3412	26.6180	26.6180	26.6699	26.5107	26.3412	26.2227	26.0999	
alpha	2.7228	2.7272	2.7315	2.7522	2.7561	2.7745	2.7745	2.7780	2.7674	2.7561	2.7482	2.7400	
util living area													
	0.9549	0.9255	0.8789	0.7855	0.6541	0.5003	0.3803	0.4276	0.6329	0.8395	0.9313	0.9607	(86)
MIT	18.5972	18.9832	19.4990	20.1290	20.5955	20.8627	20.9527	20.9338	20.7277	20.0891	19.2384	18.5342	(87)
Th 2	20.1126	20.1146	20.1166	20.1261	20.1279	20.1362	20.1362	20.1378	20.1330	20.1279	20.1243	20.1206	(88)
util rest of house													
	0.9491	0.9163	0.8641	0.7600	0.6144	0.4447	0.3118	0.3564	0.5783	0.8140	0.9213	0.9557	(89)
MIT 2	17.2751	17.7617	18.4071	19.1823	19.7282	20.0229	20.1067	20.0942	19.8910	19.1534	18.0961	17.2002	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)

MIT	17.5522	18.0178	18.6360	19.3807	19.9100	20.1990	20.2840	20.2702	20.0664	19.3495	18.3355	17.4799	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.5522	18.0178	18.6360	19.3807	19.9100	20.1990	20.2840	20.2702	20.0664	19.3495	18.3355	17.4799	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9259	0.8881	0.8337	0.7354	0.6037	0.4489	0.3238	0.3677	0.5738	0.7870	0.8943	0.9342	(94)
Useful gains	795.8644	929.2331	1004.4492	1027.2501	923.1537	685.9630	471.5593	488.2387	682.8691	790.1237	773.8845	757.7951	(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	1805.8197	1782.9527	1645.3806	1404.2340	1097.5429	740.7062	487.3721	511.0063	792.5075	1169.6690	1508.7967	1791.7144	(97)
Space heating kWh	751.4067	573.6996	476.8530	271.4284	129.7456	0.0000	0.0000	0.0000	0.0000	282.3817	529.1368	769.2360	(98a)
Space heating requirement - total per year (kWh/year)												3783.8877	
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	751.4067	573.6996	476.8530	271.4284	129.7456	0.0000	0.0000	0.0000	0.0000	282.3817	529.1368	769.2360	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3783.8877	
Space heating per m2											(98c) / (4) =	26.7981	(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 %)												249.9000	(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	751.4067	573.6996	476.8530	271.4284	129.7456	0.0000	0.0000	0.0000	0.0000	282.3817	529.1368	769.2360	(98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000	(210)
Space heating fuel (main heating system)	300.6830	229.5717	190.8175	108.6148	51.9190	0.0000	0.0000	0.0000	0.0000	112.9979	211.7394	307.8175	(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	185.0519	162.6003	170.9969	147.2042	140.3293	123.9588	120.9795	127.4801	130.6618	148.5821	161.3529	182.7105	(64)
Efficiency of water heater												175.1000	(216)
(217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(217)
Fuel for water heating, kWh/month	105.6836	92.8614	97.6567	84.0686	80.1424	70.7932	69.0917	72.8042	74.6213	84.8556	92.1490	104.3464	(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	28.9374	23.2147	20.9022	15.3139	11.8289	9.6643	10.7907	14.0261	18.2186	23.9038	26.9992	29.7417	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-27.0210	-42.4469	-67.6867	-82.4356	-92.5330	-84.8350	-83.4737	-76.1150	-63.5804	-50.3873	-30.8963	-22.8235	(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	-6.0401	-14.2298	-32.1915	-55.2213	-80.0448	-85.6713	-84.4411	-69.0681	-47.5855	-23.0410	-8.6318	-4.6234	(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	1514.1607	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.1000	
Water heating fuel used	1029.0740	(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)	233.5413	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1235.0241	(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	1541.7520	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1514.1607	0.1551	234.8377	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1029.0740	0.1414	145.5119	(264)
Space and water heating			380.3496	(265)

Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	233.5413	0.1443	33.7072	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-724.2343	0.1333	-96.5203	
PV Unit electricity exported	-510.7898	0.1221	-62.3524	
Total			-158.8727	(269)
Total CO2, kg/year			255.1841	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1.8100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1514.1607	1.5742	2383.5659	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1029.0740	1.5229	1567.1491	(278)
Space and water heating			3950.7150	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	233.5413	1.5338	358.2135	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-724.2343	1.4925	-1080.9126	
PV Unit electricity exported	-510.7898	0.4479	-228.7603	
Total			-1309.6729	(283)
Total Primary energy kWh/year			2999.2556	(286)
Dwelling Primary energy Rate (DPER)			21.2400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	48.2000 (1b)	x	2.5000 (2b)	=	120.5000	(1b) - (3b)
First floor	48.2000 (1c)	x	2.6000 (2c)	=	125.3200	(1c) - (3c)
Second floor	44.8000 (1d)	x	2.1000 (2d)	=	94.0800	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	141.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		339.9000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1177	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3677	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3125	(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	0.3985	0.3907	0.3828	0.3438	0.3360	0.2969	0.2969	0.2891	0.3125	0.3360	0.3516	0.3672	(22b)
Effective ac	0.5794	0.5763	0.5733	0.5591	0.5564	0.5441	0.5441	0.5418	0.5488	0.5564	0.5618	0.5674	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Semi-glazed door			3.1000	1.0000	3.1000			(26a)
TER Opening Type			32.2000	1.1450	36.8702			(27)
Heatloss Floor 1			48.2000	0.1300	6.2660			(28a)
External Wall 1	159.3600	35.3000	124.0600	0.1800	22.3308			(29a)
Flat Roof	3.4000		3.4000	0.1100	0.3740			(30)
Slope	44.8000		44.8000	0.1100	4.9280			(30)
Total net area of external elements Aum(A, m2)			255.7600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		73.8690			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 89.7805 (35)
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	19.9000	0.1600	3.1840
E6 Intermediate floor within a dwelling	27.5000	0.0000	0.0000
E16 Corner (normal)	24.6000	0.0900	2.2140
E18 Party wall between dwellings	14.2000	0.0600	0.8520
E1 Steel lintel with perforated steel base plate	19.0000	0.0500	0.9500
E3 Sill	4.9500	0.0500	0.2475
E4 Jamb	33.0000	0.0500	1.6500
E11 Eaves (insulation at rafter level)	5.9000	0.0400	0.2360
E13 Gable (insulation at rafter level)	3.3000	0.0800	0.2640
E15 Flat roof with parapet	14.3000	0.5600	8.0080
E14 Flat roof	8.2000	0.0800	0.6560
P1 Party wall - Ground floor	6.4000	0.0800	0.5120
P2 Party wall - Intermediate floor within a dwelling	6.4000	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	5.4000	0.0800	0.4320

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 19.2055 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 93.0745 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	64.9886	64.6428	64.3038	62.7118	62.4139	61.0273	61.0273	60.7706	61.5614	62.4139	63.0165	63.6465	(38)
Heat transfer coeff	158.0631	157.7173	157.3784	155.7863	155.4885	154.1019	154.1019	153.8451	154.6360	155.4885	156.0910	156.7210	(39)
Average = Sum(39)m / 12 =												155.7849	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1194	1.1170	1.1146	1.1033	1.1012	1.0914	1.0914	1.0896	1.0952	1.1012	1.1055	1.1099	(40)
HLP (average)												1.1033	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9193 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	73.1675	72.0679	70.4656	67.4000	65.1376	62.6146	61.1805	62.7706	64.5137	67.2227	70.3542	72.8871	(42a)
Hot water usage for baths	31.5876	31.1185	30.4579	29.2398	28.3278	27.3164	26.7701	27.4261	28.1404	29.2226	30.4657	31.4808	(42b)
Hot water usage for other uses	44.5269	42.9077	41.2886	39.6694	38.0503	36.4311	36.4311	38.0503	39.6694	41.2886	42.9077	44.5269	(42c)
Average daily hot water use (litres/day)												137.2237	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	149.2820	146.0942	142.2121	136.3092	131.5156	126.3621	124.3817	128.2470	132.3236	137.7338	143.7277	148.8949	(44)
Energy conte	236.4262	208.0361	218.5747	186.6005	177.0452	155.3769	150.4289	158.7966	163.1682	186.9035	204.7664	233.1334	(45)
Energy content (annual)										Total = Sum(45)m =		2279.2566	
Distribution loss (46)m = 0.15 x (45)m	35.4639	31.2054	32.7862	27.9901	26.5568	23.3065	22.5643	23.8195	24.4752	28.0355	30.7150	34.9700	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	283.0211	250.1218	265.1696	231.6923	223.6401	200.4687	197.0238	205.3915	208.2600	233.4984	249.8582	279.7283	(62)
WWHRS	-33.4491	-29.5827	-30.9773	-25.6504	-23.9053	-20.4559	-19.1741	-20.3898	-21.1645	-24.9506	-28.2660	-32.8297	(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	249.5720	220.5392	234.1923	206.0419	199.7349	180.0128	177.8497	185.0017	187.0956	208.5478	221.5923	246.8986	(64)
										Total per year (kWh/year) = Sum(64)m =		2517.0788	(64)
12Total per year (kWh/year)												2517	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	115.8876	102.8406	109.9520	98.1181	96.1435	87.7363	87.2935	90.0758	90.3269	99.4213	104.1583	114.7928	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	145.9667	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.7170	173.5081	156.7170	161.9409	156.7170	161.9409	156.7170	156.7170	161.9409	156.7170	161.9409	156.7170	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	310.7723	313.9972	305.8707	288.5703	266.7317	246.2065	232.4944	229.2695	237.3960	254.6964	276.5350	297.0602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	37.5967	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	-116.7734	(71)
Water heating gains (Table 5)	155.7629	153.0366	147.7850	136.2752	129.2251	121.8560	117.3300	121.0696	125.4540	133.6308	144.6643	154.2914	(72)
Total internal gains	693.0423	710.3319	680.1626	656.5764	622.4638	596.7934	573.3314	573.8462	591.5810	614.8343	652.9303	677.8586	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W

Northeast				16.5900		11.2829		0.6300		0.7000		0.7700	57.2059 (75)
Southwest				15.6100		36.7938		0.6300		0.7000		0.7700	175.5294 (79)
Solar gains	232.7352	415.4356	618.8885	851.4305	1030.8899	1057.4002	1005.3119	866.2344	698.6003	472.7533	282.2235	196.9337 (83)	
Total gains	925.7775	1125.7675	1299.0511	1508.0069	1653.3537	1654.1935	1578.6433	1440.0806	1290.1813	1087.5875	935.1537	874.7924 (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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	22.2784	22.3272	22.3753	22.6040	22.6473	22.8510	22.8510	22.8892	22.7721	22.6473	22.5598	22.4692	
alpha	2.4852	2.4885	2.4917	2.5069	2.5098	2.5234	2.5234	2.5259	2.5181	2.5098	2.5040	2.4979	
util living area	0.9507	0.9219	0.8770	0.7894	0.6658	0.5183	0.3989	0.4462	0.6451	0.8390	0.9270	0.9565	(86)
MIT	18.2615	18.6611	19.2183	19.9124	20.4589	20.7974	20.9240	20.8975	20.6313	19.8959	18.9618	18.1945	(87)
Th 2	19.9850	19.9870	19.9889	19.9981	19.9999	20.0079	20.0079	20.0094	20.0048	19.9999	19.9964	19.9927	(88)
util rest of house	0.9440	0.9117	0.8608	0.7619	0.6222	0.4551	0.3186	0.3635	0.5846	0.8112	0.9157	0.9506	(89)
MIT 2	16.7791	17.2822	17.9789	18.8327	19.4734	19.8454	19.9630	19.9451	19.6847	18.8350	17.6743	16.6988	(90)
Living area fraction										fLA = Living area / (4) =		0.2096	(91)
MIT	17.0899	17.5712	18.2387	19.0590	19.6800	20.0450	20.1644	20.1447	19.8832	19.0574	17.9442	17.0124	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.0899	17.5712	18.2387	19.0590	19.6800	20.0450	20.1644	20.1447	19.8832	19.0574	17.9442	17.0124	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9167	0.8790	0.8256	0.7319	0.6070	0.4576	0.3317	0.3754	0.5765	0.7793	0.8842	0.9251	(94)
Useful gains	848.6653	989.5055	1072.4459	1103.7073	1003.5256	756.9994	523.7108	540.5363	743.7981	847.5229	826.8960	809.2569	(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	2021.6050	1998.4724	1847.4229	1582.6388	1240.7995	839.0819	549.2844	576.1084	894.2844	1315.0313	1692.6824	2007.9646	(97)
Space heating kWh	872.6672	678.0258	576.5829	344.8307	176.5318	0.0000	0.0000	0.0000	0.0000	347.8263	623.3663	891.8386	(98a)
Space heating requirement - total per year (kWh/year)												4511.6694	
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	872.6672	678.0258	576.5829	344.8307	176.5318	0.0000	0.0000	0.0000	0.0000	347.8263	623.3663	891.8386	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4511.6694	
Space heating per m2											(98c) / (4) =	31.9523	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	872.6672	678.0258	576.5829	344.8307	176.5318	0.0000	0.0000	0.0000	0.0000	347.8263	623.3663	891.8386	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	945.4682	734.5891	624.6835	373.5977	191.2587	0.0000	0.0000	0.0000	0.0000	376.8432	675.3697	966.2390	(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	249.5720	220.5392	234.1923	206.0419	199.7349	180.0128	177.8497	185.0017	187.0956	208.5478	221.5923	246.8986	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.6273	86.4082	85.9984	85.2057	83.7840	79.8000	79.8000	79.8000	79.8000	85.1983	86.2490	86.6804	(217)
Fuel for water heating, kWh/month	288.0986	255.2296	272.3216	241.8170	238.3927	225.5800	222.8693	231.8318	234.4556	244.7794	256.9216	284.8379	(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													
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	32.5627	26.1230	23.5209	17.2324	13.3108	10.8750	12.1426	15.7834	20.5010	26.8984	30.3817	33.4677	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-46.3077	-65.9249	-95.6564	-108.5566	-117.8363	-110.1740	-108.7164	-102.1964	-90.9050	-75.7361	-51.0988	-39.9532	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-24.2666	-51.2514	-102.2717	-154.2312	-204.5901	-205.8895	-203.5660	-172.1474	-125.8304	-73.6201	-32.4972	-19.1825	(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												4888.0492	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2997.1350	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	262.7997	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2382.4058	(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	5851.5781	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4888.0492	0.2100	1026.4903	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2997.1350	0.2100	629.3984	(264)
Space and water heating			1655.8887	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	262.7997	0.1443	37.9301	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1013.0617	0.1344	-136.1628	
PV Unit electricity exported	-1369.3440	0.1258	-172.2150	
Total			-308.3778	(269)
Total CO2, kg/year			1397.3703	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9000	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4888.0492	1.1300	5523.4956	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2997.1350	1.1300	3386.7626	(278)
Space and water heating			8910.2582	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	262.7997	1.5338	403.0909	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1013.0617	1.4967	-1516.2863	
PV Unit electricity exported	-1369.3440	0.4616	-632.1377	
Total			-2148.4240	(283)
Total Primary energy kWh/year			7295.0258	(286)
Target Primary Energy Rate (TPER)			51.6600	(287)

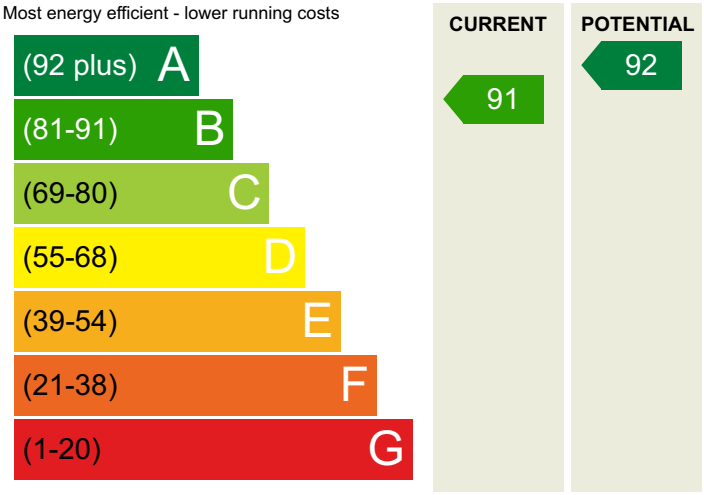
Energy Report

Dwelling Address	
Reference	Westcott Court-Westcott Court - Be Green
Assessment Date	27/02/2025
Submission Date	
Property Type	House, Semi-Detached
Total Floor Area	141

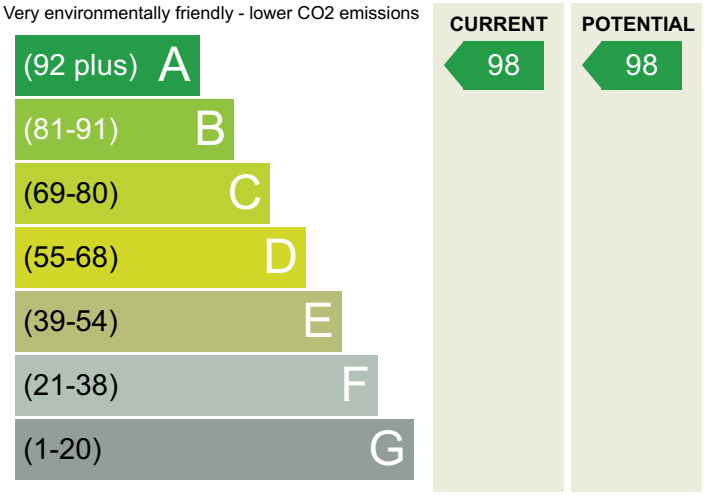
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

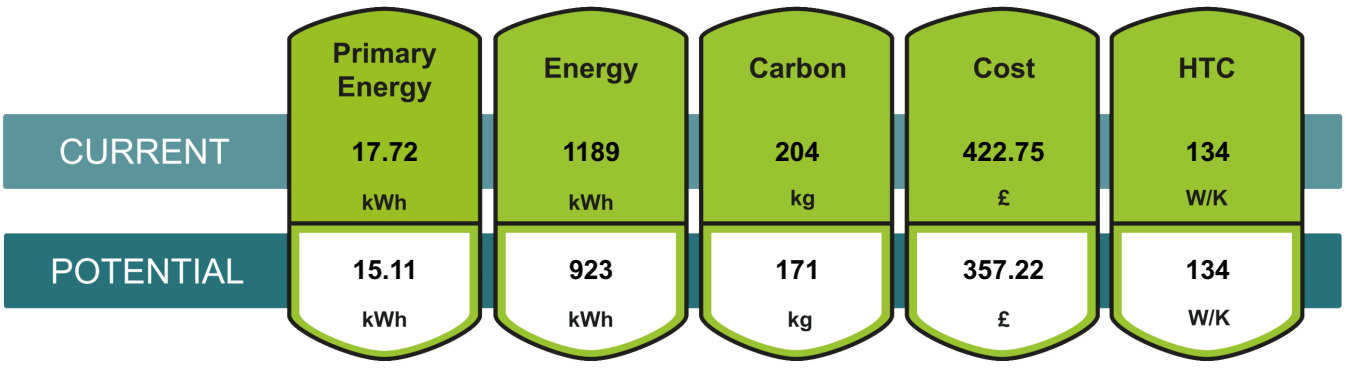
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.1 W/m²K	Very Good
Windows	High performance glazing	Very Good
Main heating	Air source heat pump, radiators, electric	Good
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Good
Lighting	Excelent lighting efficiency	Very Good
Air tightness	Air permeability [AP50] = 5.0 m³/h.m² (assumed)	Good

Recommendations

The recommended measures provided below will help to improve the energy efficiency of the dwelling.
To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed.
Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£66	A 92	£4,000 - £6,000	£66	A 98

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

The table below shows the estimated running costs of the space and water heating and lighting within the dwelling. It does not include the energy used from household appliances. The estimated annual costs after potential improvements indicates the total energy cost if all recommended measures named above were installed.

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£61	£61	
Heating	£322	£343	
Hot Water	£268	£178	
New Technologies e.g. Impact of PV	-(£228)	-(£224)	
TOTAL	£423	£357	

Estimated energy use and potential savings

Space Heating
1235
kWh per year

Water Heating
1029
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO2)	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.