



elmhurst
energy



SAP Report Submission for Building Regulations Compliance

Client: Vauss Ltd

Project: Plot 1, Station Road
Quinton, AYLESBURY, HP22

Contact: Gary White
Hibec Limited
gary_hibec@btconnect.com

Report Issue Date: 01/11/2022

EXCELLENCE
IN ENERGY
ASSESSMENT

PREDICTED ENERGY ASSESSMENT



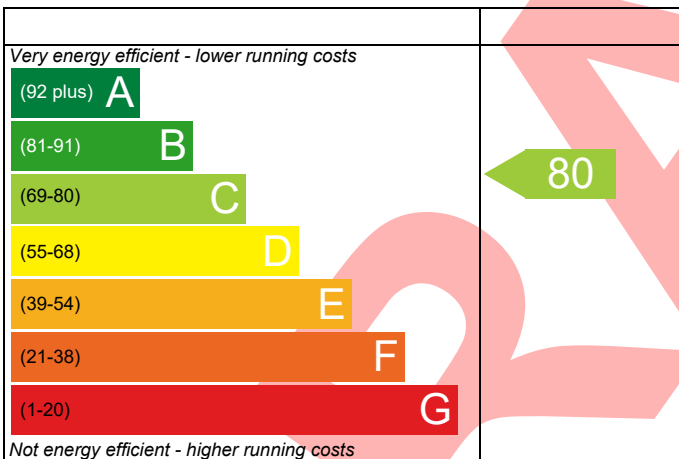
Plot 1, Station Road,
Quinton,
AYLESBURY,
HP22

Dwelling type: House, End-Terrace
Date of assessment: 01/11/2022
Produced by: Hibec Limited
Total floor area: 66.54 m²

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

The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

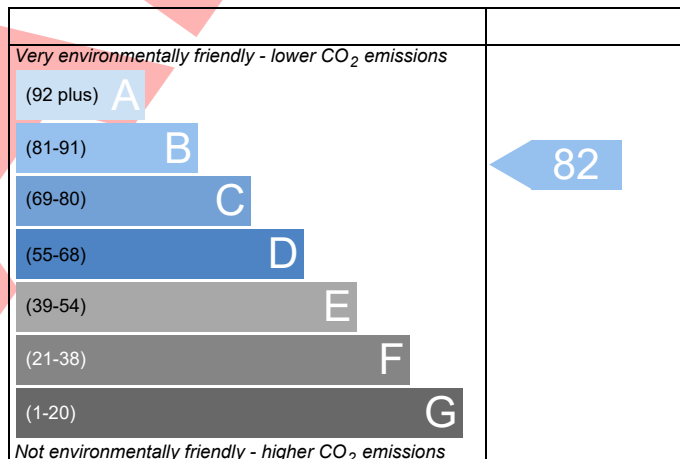
Energy Efficiency Rating



England EU Directive 2002/91/EC

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

Environmental Impact (CO₂) Rating



England EU Directive 2002/91/EC

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

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

THERMAL BRIDGING

Calculation Type: New Build (As Designed)



Property Reference	C2223084/1	Issued on Date	01/11/2022	
Assessment Reference	As Designed	Prop Type Ref		
Property	Plot 1, Station Road, Quainton, AYLESBURY, HP22			
SAP Rating	80 C	DER	24.99	
Environmental	82 B	TER	28.85	
CO ₂ Emissions (t/year)	1.40	% DER<TER	13.37	
General Requirements Compliance	Pass	DFEE	47.95	
		TFEE	55.69	
		% DFEE<TFEE	13.89	
Assessor Details	Mr. Gary White, Hibec Limited, Tel: 01564 795566, gary_hibec@btconnect.com		Assessor ID	4104-0001
Client	Vauss Ltd, 016			

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Table K1 - Approved	0.300	9.38	2.81	
External wall	E3 Sill	Table K1 - Approved	0.040	6.04	0.24	
External wall	E4 Jamb	Table K1 - Approved	0.050	19.50	0.98	
External wall	E5 Ground floor (normal)	Independently assessed	0.030	16.32	0.49	LABC
External wall	E6 Intermediate floor within a dwelling	Table K1 - Approved	0.070	16.32	1.14	
External wall	E10 Eaves (insulation at ceiling level)	Table K1 - Approved	0.060	8.36	0.50	
External wall	E12 Gable (insulation at ceiling level)	Table K1 - Approved	0.240	7.96	1.91	
External wall	E16 Corner (normal)	Table K1 - Approved	0.090	10.30	0.93	
External wall	E18 Party wall between dwellings	Table K1 - Approved	0.060	10.30	0.62	
Party wall	P1 Party wall - Ground floor	Table K1 - Default	0.160	7.96	1.27	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	7.96	0.00	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	0.240	7.96	1.91	

Total: **12.80** W/mK:
 Y-Value: **0.085** W/m²K:

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	C2223084/1			Issued on Date	01/11/2022
Assessment Reference	As Designed	Prop Type Ref			
Property	Plot 1, Station Road, Quainton, AYLESBURY, HP22				
SAP Rating	80 C	DER	24.99	TER	28.85
Environmental	82 B	% DER<TER	13.37		
CO ₂ Emissions (t/year)	1.40	DFEE	47.95	TFEE	55.69
General Requirements Compliance	Pass	% DFEE<TFEE	13.89		
Assessor Details	Mr. Gary White, Hibec Limited, Tel: 01564 795566, gary_hibec@btconnect.com			Assessor ID	4104-0001
Client	Vauss Ltd, 016				

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

End-Terrace House, total floor area 67 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Electricity
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 28.85 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 24.99 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)55.7 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)48.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.09 (max. 0.20)	0.09 (max. 0.35)	OK
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 5.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Air-to-water heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water storage Measured cylinder loss: 1.89 kWh/day
Permitted by DBSCG 1.89 OK
Primary pipework insulated: Yes OK

6 Controls

Space heating controls: Programmer, TRVs and bypass OK

Hot water controls:

Cylinderstat OK
Independent timer for DHW OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley): Not significant OK

Based on:

Overshading: Average
Windows facing South East: 3.40 m², No overhang
Windows facing South West: 1.34 m², No overhang
Windows facing North West: 7.18 m², No overhang
Air change rate: 8.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.09 W/m²K
Floor U-value 0.12 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	33.2700 (1b)	2.5000 (2b)	83.1750 (1b) - (3b)
First floor	33.2700 (1c)	2.6500 (2c)	88.1655 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.5400		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 171.3405 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent 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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				40.0000 / (5) =	0.2335 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate					0.4835 (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) =		0.4109 (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	0.5239	0.5137	0.5034	0.4520	0.4418	0.3904	0.3904	0.3801	0.4109	0.4418	0.4623	0.4828 (22b)
Effective ac	0.6373	0.6319	0.6267	0.6022	0.5976	0.5762	0.5762	0.5722	0.5844	0.5976	0.6069	0.6166 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
door			1.9700	1.2000	2.3640		(26)
window (Uw = 1.40)			11.9200	1.3258	15.8030		(27)
Heat Loss Floor			33.2700	0.1200	3.9924		(28a)
External Wall	84.0500	13.8900	70.1600	0.1500	10.5240		(29a)
External Roof	33.2700		33.2700	0.0900	2.9943		(30)
Total net area of external elements Aum(A, m ²)			150.5900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.6777		(33)
Party Wall 1			40.9900	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.8036 (36)
Total fabric heat loss						(33) + (36) =	48.4813 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	36.0321	35.7307	35.4353	34.0478	33.7882	32.5798	32.5798	32.3560	33.0453	33.7882	34.3134	34.8624 (38)
Heat transfer coeff	84.5134	84.2120	83.9166	82.5292	82.2696	81.0611	81.0611	80.8373	81.5266	82.2696	82.7947	83.3437 (39)
Average = Sum(39)m / 12 =												82.5279 (39)
HLP	1.2701	1.2656	1.2611	1.2403	1.2364	1.2182	1.2182	1.2149	1.2252	1.2364	1.2443	1.2525 (40)
HLP (average)												1.2403 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.1593 (42)
Average daily hot water use (litres/day)												85.4831 (43)
Daily hot water use	94.0314	90.6121	87.1927	83.7734	80.3541	76.9348	76.9348	80.3541	83.7734	87.1927	90.6121	94.0314 (44)
Energy conte	139.4458	121.9602	125.8520	109.7208	105.2797	90.8484	84.1844	96.6028	97.7566	113.9259	124.3590	135.0458 (45)
Energy content (annual)												Total = Sum(45)m = 1344.9815 (45)
Distribution loss (46)m = 0.15 x (45)m	20.9169	18.2940	18.8778	16.4581	15.7920	13.6273	12.6277	14.4904	14.6635	17.0889	18.6538	20.2569 (46)
Water storage loss:												150.0000 (47)
Store volume												1.8900 (48)
a) If manufacturer declared loss factor is known (kWh/day):												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0206 (55)
Total storage loss	31.6386	28.5768	31.6386	30.6180	31.6386	30.6180	31.6386	31.6386	30.6180	31.6386	30.6180	31.6386 (56)
If cylinder contains dedicated solar storage	31.6386	28.5768	31.6386	30.6180	31.6386	30.6180	31.6386	31.6386	30.6180	31.6386	30.6180	31.6386 (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)
Total heat required for water heating calculated for each month	194.3468	171.5482	180.7530	162.8508	160.1807	143.9784	139.0854	151.5038	150.8866	168.8269	177.4890	189.9468 (62)
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 (63)
Output from w/h	194.3468	171.5482	180.7530	162.8508	160.1807	143.9784	139.0854	151.5038	150.8866	168.8269	177.4890	189.9468 (64)
Heat gains from water heating, kWh/month	90.2865	80.2222	85.7666	78.9862	78.9263	72.7111	71.9121	76.0412	75.0081	81.8012	83.8534	88.8235 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.2308	15.3043	12.4463	9.4226	7.0435	5.9464	6.4253	8.3519	11.2099	14.2336	16.6127	17.7097 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.0909	191.0531	186.1085	175.5820	162.2942	149.8055	141.4623	139.5001	144.4448	154.9712	168.2590	180.7477 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715 (71)
Water heating gains (Table 5)	121.3529	119.3782	115.2777	109.7030	106.0838	100.9876	96.6561	102.2060	104.1779	109.9478	116.4630	119.3865 (72)
Total internal gains	386.0639	384.1249	372.2217	353.0969	333.8108	315.1289	302.9330	308.4473	318.2218	337.5419	359.7240	376.2332 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
Southeast	3.4000	36.7938	0.4600	0.0000	0.7700	44.3101 (77)						
Southwest	1.3400	36.7938	0.4600	0.0000	0.7700	17.4634 (79)						
Northwest	7.1800	11.2829	0.4600	0.0000	0.7700	28.6943 (81)						
Solar gains	90.4677	163.6311	249.2035	351.2091	432.1152	446.0271	422.9278	359.9636	284.1176	187.6731	110.0952	76.2984 (83)
Total gains	476.5317	547.7560	621.4252	704.3060	765.9259	761.1560	725.8608	668.4110	602.3394	525.2150	469.8192	452.5316 (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	54.6757	54.8714	55.0646	55.9903	56.1670	57.0043	57.0043	57.1621	56.6788	56.1670	55.8107	55.4431
alpha	4.6450	4.6581	4.6710	4.7327	4.7445	4.8003	4.8003	4.8108	4.7786	4.7445	4.7207	4.6962
util living area	0.9957	0.9912	0.9783	0.9347	0.8255	0.6429	0.4830	0.5411	0.7975	0.9594	0.9913	0.9966 (86)
MIT	19.7060	19.8763	20.1577	20.5275	20.8154	20.9590	20.9915	20.9858	20.8856	20.5113	20.0494	19.6849 (87)
Th 2	19.8643	19.8679	19.8714	19.8879	19.8910	19.9054	19.9054	19.9081	19.8999	19.8910	19.8847	19.8782 (88)
util rest of house	0.9943	0.9882	0.9707	0.9117	0.7692	0.5486	0.3672	0.4203	0.7145	0.9403	0.9879	0.9955 (89)
MIT 2	18.7019	18.8738	19.1536	19.5204	19.7733	19.8880	19.9035	19.9044	19.8408	19.5151	19.0600	18.6919 (90)
Living area fraction	19.1413	19.3125	19.5930	19.9611	20.2293	20.3567	20.3796	20.3777	20.2980	19.9511	19.4930	19.1265 (91)
Temperature adjustment	19.1413	19.3125	19.5930	19.9611	20.2293	20.3567	20.3796	20.3777	20.2980	19.9511	19.4930	0.0000 (92)
adjusted MIT	19.1413	19.3125	19.5930	19.9611	20.2293	20.3567	20.3796	20.3777	20.2980	19.9511	19.4930	19.1265 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9931	0.9864	0.9684	0.9135	0.7879	0.5890	0.4182	0.4736	0.7473	0.9416	0.9863	0.9945 (94)
Ext temp.	473.2200	540.2870	601.8042	643.3851	603.4732	448.3282	303.5438	316.5363	450.1561	494.5434	463.3694	450.0304 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month fracti	1254.2904	1213.7088	1098.7245	912.8654	701.7054	466.6434	306.3810	321.5448	505.3033	769.3099	1026.0712	1244.0279 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating per m2	581.1163	452.5394	369.7087	194.0258	73.0847	0.0000	0.0000	0.0000	0.0000	204.4263	405.1453	590.7341 (98)
												2870.7807 (98)
												(98) / (4) = 43.1437 (99)

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													170.0000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													1688.6945 (211)
Space heating requirement	581.1163	452.5394	369.7087	194.0258	73.0847	0.0000	0.0000	0.0000	0.0000	204.4263	405.1453	590.7341	(98)
Space heating efficiency (main heating system 1)	170.0000	170.0000	170.0000	170.0000	170.0000	0.0000	0.0000	0.0000	0.0000	170.0000	170.0000	170.0000	(210)
Space heating fuel (main heating system)	341.8331	266.1997	217.4757	114.1328	42.9910	0.0000	0.0000	0.0000	0.0000	120.2508	238.3207	347.4907	(211)
Water heating 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	(215)
Water heating requirement	194.3468	171.5482	180.7530	162.8508	160.1807	143.9784	139.0854	151.5038	150.8866	168.8269	177.4890	189.9468	(64)
Efficiency of water heater (217)m	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	(216)
Fuel for water heating, kWh/month	114.3217	100.9107	106.3253	95.7946	94.2240	84.6932	81.8149	89.1199	88.7568	99.3099	104.4053	111.7334	(219)
Water heating fuel used													1171.4097 (219)
Annual totals kWh/year													
Space heating fuel - main system													1688.6945 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													39.0000 (230c)
Total electricity for the above, kWh/year													39.0000 (231)
Electricity for lighting (calculated in Appendix L)													304.3021 (232)
Total delivered energy for all uses													3203.4064 (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	1688.6945	0.5190	876.4325	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1171.4097	0.5190	607.9616	(264)
Space and water heating			1484.3941	(265)
Pumps and fans	39.0000	0.5190	20.2410	(267)
Energy for lighting	304.3021	0.5190	157.9328	(268)
Total CO2, kg/year			1662.5679	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			24.9900	(273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER			24.9900	ZC1
Total Floor Area		TFA	66.5400	
Assumed number of occupants		N	2.1593	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			16.8397	ZC2
CO2 emissions from cooking, equation (L16)			2.5672	ZC3
Total CO2 emissions			44.3969	ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000	ZC5
Additional allowable electricity generation, kWh/m ² /year			0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	ZC7
Net CO2 emissions			44.3969	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	33.2700 (1b)	2.5000 (2b)	83.1750 (1b) - (3b)
First floor	33.2700 (1c)	2.6500 (2c)	88.1655 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.5400		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 171.3405 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				2 * 10 =	20.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.1167 (8)							
Pressure test				Yes								
Measured/design AP50				5.0000								
Infiltration rate				0.3667 (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) =		0.3117 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3974	0.3896	0.3819	0.3429	0.3351	0.2961	0.2961	0.2883	0.3117	0.3351	0.3507	0.3663 (22b)
Effective ac	0.5790	0.5759	0.5729	0.5588	0.5561	0.5438	0.5438	0.5416	0.5486	0.5561	0.5615	0.5671 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K					
TER Opaque door			1.9700	1.0000	1.9700		(26)					
TER Opening Type (Uw = 1.40)			11.9200	1.3258	15.8030		(27)					
Heat Loss Floor			33.2700	0.1300	4.3251		(28a)					
External Wall	84.0500	13.8900	70.1600	0.1800	12.6288		(29a)					
External Roof	33.2700		33.2700	0.1300	4.3251		(30)					
Total net area of external elements Aum(A, m ²)			150.5900				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 39.0520		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.4734 (36)					
Total fabric heat loss							(33) + (36) = 47.5254 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 32.7369	Feb 32.5634	Mar 32.3935	Apr 31.5951	May 31.4457	Jun 30.7504	Jul 30.7504	Aug 30.6216	Sep 31.0182	Oct 31.4457	Nov 31.7479	Dec 32.0638 (38)
Heat transfer coeff	80.2623	80.0889	79.9189	79.1205	78.9712	78.2758	78.2758	78.1471	78.5437	78.9712	79.2733	79.5893 (39)
Average = Sum(39)m / 12 =												79.1198 (39)
HLP	Jan 1.2062	Feb 1.2036	Mar 1.2011	Apr 1.1891	May 1.1868	Jun 1.1764	Jul 1.1764	Aug 1.1744	Sep 1.1804	Oct 1.1868	Nov 1.1914	Dec 1.1961 (40)
HLP (average)												1.1891 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.1593 (42)
Average daily hot water use (litres/day)												85.4831 (43)
Daily hot water use	94.0314	90.6121	87.1927	83.7734	80.3541	76.9348	76.9348	80.3541	83.7734	87.1927	90.6121	94.0314 (44)
Energy conte	139.4458	121.9602	125.8520	109.7208	105.2797	90.8484	84.1844	96.6028	97.7566	113.9259	124.3590	135.0458 (45)
Energy content (annual)												Total = Sum(45)m = 1344.9815 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	20.9169	18.2940	18.8778	16.4581	15.7920	13.6273	12.6277	14.4904	14.6635	17.0889	18.6538	20.2569 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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	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	23.3325 (57)
23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624 (59)
Total heat required for water heating calculated for each month												
186.0407	164.0459	172.4469	154.8127	151.8746	135.9403	130.7793	143.1977	142.8484	160.5208	169.4508	181.6407	181.6407 (62)
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 (63)
											Solar input (sum of months) = Sum(63)m =	0.0000 (63)
Output from w/h												
186.0407	164.0459	172.4469	154.8127	151.8746	135.9403	130.7793	143.1977	142.8484	160.5208	169.4508	181.6407	181.6407 (64)
											Total per year (kWh/year) = Sum(64)m =	1893.5989 (64)
Heat gains from water heating, kWh/month												
83.6417	74.2203	79.1217	72.5556	72.2814	66.2806	65.2672	69.3964	68.5775	75.1563	77.4228	82.1787	82.1787 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
17.2308	15.3043	12.4463	9.4226	7.0435	5.9464	6.4253	8.3519	11.2099	14.2336	16.6127	17.7097	17.7097 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
189.0909	191.0531	186.1085	175.5820	162.2942	149.8055	141.4623	139.5001	144.4448	154.9712	168.2590	180.7477	180.7477 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964 (69)
Pumps, fans												
3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715 (71)
Water heating gains (Table 5)												
112.4216	110.4469	106.3464	100.7717	97.1525	92.0563	87.7248	93.2747	95.2466	101.0165	107.5317	110.4552	110.4552 (72)
Total internal gains												
377.1326	375.1936	363.2904	344.1656	324.8795	306.1976	294.0017	299.5160	309.2905	328.6106	350.7927	367.3019	367.3019 (73)

6. Solar gains

[Jan]			Area	Solar flux	g		FF	Access		Gains		
			m ²	Table 6a	Specific data	or Table 6b	Specific data	or Table 6c	factor	Table 6d	W	
				W/m ²								
Southeast			3.4000	36.7938		0.6300		0.7700		0.7700	38.2319 (77)	
Southwest			1.3400	36.7938		0.6300		0.7700		0.7700	15.0679 (79)	
Northwest			7.1800	11.2829		0.6300		0.7700		0.7700	24.7582 (81)	
Solar gains												
78.0579	141.1852	215.0193	303.0324	372.8402	384.8438	364.9131	310.5860	245.1441	161.9293	94.9930	65.8323	65.8323 (83)
Total gains												
455.1906	516.3788	578.3097	647.1980	697.7197	691.0414	658.9149	610.1021	554.4346	490.5399	445.7857	433.1342	433.1342 (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	57.5717	57.6963	57.8190	58.4024	58.5129	59.0327	59.0327	59.1300	58.8314	58.5129	58.2899	58.0585
alpha	4.8381	4.8464	4.8546	4.8935	4.9009	4.9355	4.9355	4.9420	4.9221	4.9009	4.8860	4.8706
util living area												
0.9964	0.9929	0.9825	0.9470	0.8511	0.6771	0.5123	0.5707	0.8215	0.9662	0.9928	0.9972	0.9972 (86)
MIT												
19.7610	19.9143	20.1741	20.5173	20.8029	20.9535	20.9904	20.9841	20.8786	20.5130	20.0764	19.7331	19.7331 (87)
Th 2												
19.9150	19.9171	19.9191	19.9288	19.9306	19.9389	19.9389	19.9405	19.9357	19.9306	19.9269	19.9231	19.9231 (88)
util rest of house												
0.9952	0.9905	0.9764	0.9277	0.7998	0.5837	0.3941	0.4485	0.7437	0.9500	0.9899	0.9963	0.9963 (89)
MIT 2												
18.2774	18.5019	18.8791	19.3701	19.7418	19.9090	19.9356	19.9342	19.8410	19.3744	18.7460	18.2424	18.2424 (90)
Living area fraction												
											fLA = Living area / (4) =	0.4376 (91)
MIT												
18.9267	19.1200	19.4458	19.8721	20.2061	20.3662	20.3972	20.3937	20.2951	19.8727	19.3282	18.8947	18.8947 (92)
Temperature adjustment												
											0.0000	0.0000 (93)
adjusted MIT												
18.9267	19.1200	19.4458	19.8721	20.2061	20.3662	20.3972	20.3937	20.2951	19.8727	19.3282	18.8947	18.8947 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.9937	0.9881	0.9729	0.9265	0.8144	0.6231	0.4462	0.5023	0.7727	0.9489	0.9877	0.9950	0.9950 (94)	
Useful gains													
452.3320	510.2108	562.6446	599.6380	568.2204	430.5650	293.9917	306.4372	428.4150	465.4512	440.3184	430.9671	430.9671 (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	4.2000 (96)	
Heat loss rate W													
1173.9729	1138.8664	1034.6161	868.1212	671.7400	451.3503	297.2280	312.0941	486.5878	732.2735	969.3737	1169.5430	1169.5430 (97)	
Month fracti													
1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000 (97a)	
Space heating kWh													
536.9009	422.4566	351.1468	193.3079	77.0185	0.0000	0.0000	0.0000	0.0000	198.5158	380.9198	549.5004	549.5004 (98)	
Space heating													
											2709.7667	2709.7667 (98)	
											(98) / (4) =	40.7239	40.7239 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2898.1462 (211)
Space heating requirement	536.9009	422.4566	351.1468	193.3079	77.0185	0.0000	0.0000	0.0000	0.0000	198.5158	380.9198	549.5004	(98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)
Space heating fuel (main heating system)	574.2255	451.8252	375.5581	206.7464	82.3728	0.0000	0.0000	0.0000	0.0000	212.3164	407.4008	587.7010	(211)
Water heating 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	(215)
Water heating requirement	186.0407	164.0459	172.4469	154.8127	151.8746	135.9403	130.7793	143.1977	142.8484	160.5208	169.4508	181.6407	(64)
Efficiency of water heater (217)m	87.4814	87.2286	86.6724	85.4072	83.1062	79.8000	79.8000	79.8000	79.8000	85.3816	86.9120	79.8000	(216)
Fuel for water heating, kWh/month	212.6631	188.0644	198.9640	181.2641	182.7476	170.3512	163.8838	179.4458	179.0081	188.0040	194.9682	207.3938	(219)
Water heating fuel used													2246.7582 (219)
Annual totals kWh/year													
Space heating fuel - main system													2898.1462 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													304.3021 (232)
Total delivered energy for all uses													5524.2065 (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	2898.1462	0.2160	625.9996	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2246.7582	0.2160	485.2998	(264)
Space and water heating			1111.2993	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	304.3021	0.5190	157.9328	(268)
Total CO2, kg/m2/year			1308.1572	(272)
Emissions per m2 for space and water heating			16.7012	(272a)
Fuel factor (electricity)			1.5500	
Emissions per m2 for lighting			2.3735	(272b)
Emissions per m2 for pumps and fans			0.5850	(272c)
Target Carbon Dioxide Emission Rate (TER) = (16.7012 * 1.55) + 2.3735 + 0.5850, rounded to 2 d.p.			28.8500	(273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	C2223084/1	Issued on Date	01/11/2022
Assessment Reference	As Designed	Prop Type Ref	
Property	Plot 1, Station Road, Quainton, AYLESBURY, HP22		

SAP Rating	80 C	DER	24.99	TER	28.85
Environmental	82 B	% DER<TER	13.37		
CO ₂ Emissions (t/year)	1.40	DFEE	47.95	TREE	55.69
General Requirements Compliance	Pass	% DFEE<TFEE	13.89		

Assessor Details	Mr. Gary White, Hibec Limited, Tel: 01564 795566, gary_hibec@btconnect.com	Assessor ID	4104-0001
Client	Vauss Ltd, 016		

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	33.2700 (1b)	x 2.5000 (2b)	= 83.1750 (1b) - (3b)
First floor	33.2700 (1c)	x 2.6500 (2c)	= 88.1655 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.5400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 171.3405 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				2 * 10 =	20.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)				20.0000 / (5) =	0.1167 (8)							
Pressure test				Yes								
Measured/design AP50				5.0000								
Infiltration rate				0.3667 (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) =		0.3117 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3974	0.3896	0.3819	0.3429	0.3351	0.2961	0.2961	0.2883	0.3117	0.3351	0.3507	0.3663 (22b)
Effective ac	0.5790	0.5759	0.5729	0.5588	0.5561	0.5438	0.5438	0.5416	0.5486	0.5561	0.5615	0.5671 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K					
door			1.9700	1.2000	2.3640		(26)					
window (Uw = 1.40)			11.9200	1.3258	15.8030		(27)					
Heat Loss Floor			33.2700	0.1200	3.9924		(28a)					
External Wall	84.0500	13.8900	70.1600	0.1500	10.5240		(29a)					
External Roof	33.2700		33.2700	0.0900	2.9943		(30)					
Total net area of external elements Aum(A, m ²)			150.5900				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.6777		(33)					
Party Wall 1			40.9900	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.8036 (36)					
Total fabric heat loss						(33) + (36) =	48.4813 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 32.7369	Feb 32.5634	Mar 32.3935	Apr 31.5951	May 31.4457	Jun 30.7504	Jul 30.7504	Aug 30.6216	Sep 31.0182	Oct 31.4457	Nov 31.7479	Dec 32.0638 (38)
Heat transfer coeff	81.2182	81.0448	80.8748	80.0764	79.9271	79.2317	79.2317	79.1030	79.4996	79.9271	80.2292	80.5452 (39)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Average = Sum(39)m / 12 = 80.0757 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2206	1.2180	1.2154	1.2034	1.2012	1.1907	1.1907	1.1888	1.1948	1.2012	1.2057	1.2105 (40)
HLP (average)												1.2034 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.1593 (42)
Average daily hot water use (litres/day) 85.4831 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	94.0314	90.6121	87.1927	83.7734	80.3541	76.9348	76.9348	80.3541	83.7734	87.1927	90.6121	94.0314 (44)
Energy content (annual)	139.4458	121.9602	125.8520	109.7208	105.2797	90.8484	84.1844	96.6028	97.7566	113.9259	124.3590	135.0458 (45)
Energy content (annual)												1344.9815 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
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)
Heat gains from water heating, kWh/month	29.6322	25.9165	26.7435	23.3157	22.3719	19.3053	17.8892	20.5281	20.7733	24.2092	26.4263	28.6972 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644	107.9644 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	17.2308	15.3043	12.4463	9.4226	7.0435	5.9464	6.4253	8.3519	11.2099	14.2336	16.6127	17.7097 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	189.0909	191.0531	186.1085	175.5820	162.2942	149.8055	141.4623	139.5001	144.4448	154.9712	168.2590	180.7477 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964	33.7964 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715	-86.3715 (71)
Water heating gains (Table 5)	39.8283	38.5663	35.9456	32.3829	30.0698	26.8129	24.0446	27.5915	28.8518	32.5393	36.7032	38.5716 (72)
Total internal gains	301.5393	300.3129	289.8897	272.7768	254.7968	237.9542	227.3216	230.8329	239.8957	257.1334	276.9642	292.4183 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
Southeast	3.4000	36.7938	0.4600	0.0000	0.7700	44.3101 (77)						
Southwest	1.3400	36.7938	0.4600	0.0000	0.7700	17.4634 (79)						
Northwest	7.1800	11.2829	0.4600	0.0000	0.7700	28.6943 (81)						
Solar gains	90.4677	163.6311	249.2035	351.2091	432.1152	446.0271	422.9278	359.9636	284.1176	187.6731	110.0952	76.2984 (83)
Total gains	392.0071	463.9440	539.0932	623.9859	686.9120	683.9813	650.2494	590.7965	524.0133	444.8066	387.0594	368.7167 (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	56.8941	57.0158	57.1356	57.7053	57.8131	58.3205	58.3205	58.4154	58.1240	57.8131	57.5954	57.3695
alpha	4.7929	4.8011	4.8090	4.8470	4.8542	4.8880	4.8880	4.8944	4.8749	4.8542	4.8397	4.8246
util living area	0.9981	0.9955	0.9870	0.9543	0.8602	0.6878	0.5240	0.5925	0.8482	0.9771	0.9961	0.9986 (86)
MIT	19.6552	19.8248	20.1065	20.4780	20.7868	20.9486	20.9890	20.9806	20.8543	20.4454	19.9805	19.6250 (87)
Th 2	19.9036	19.9056	19.9077	19.9173	19.9190	19.9274	19.9274	19.9290	19.9242	19.9190	19.9154	19.9116 (88)
util rest of house	0.9975	0.9939	0.9822	0.9371	0.8102	0.5934	0.4025	0.4661	0.7747	0.9653	0.9945	0.9982 (89)
MIT 2	18.6825	18.8530	19.1338	19.5014	19.7786	19.9047	19.9247	19.9236	19.8443	19.4779	19.0166	18.6587 (90)
Living area fraction												0.4376 (91)
MIT	19.1082	19.2783	19.5595	19.9288	20.2198	20.3616	20.3905	20.3862	20.2863	19.9013	19.4385	19.0816 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1082	19.2783	19.5595	19.9288	20.2198	20.3616	20.3905	20.3862	20.2863	19.9013	19.4385	19.0816 (93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Utilisation	0.9969	0.9927	0.9803	0.9373	0.8256	0.6335	0.4561	0.5219	0.8024	0.9651	0.9935	0.9977 (94)
Useful gains	390.7792	460.5729	528.4833	584.8496	567.0858	433.3175	296.5828	308.3442	420.4882	429.2732	384.5446	367.8511 (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												
Month fracti	1202.6923	1165.2862	1056.1830	883.1462	680.9658	456.4980	300.3260	315.3207	491.8083	743.4251	989.9058	1198.6399 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating	604.0634	473.5674	392.6086	214.7736	84.7267	0.0000	0.0000	0.0000	0.0000	233.7290	435.8600	618.1068 (98)
Space heating per m2												3057.4355 (98)
												(98) / (4) = 45.9488 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	744.7782	586.3148	601.1825	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8913	0.9405	0.9152	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	663.8134	551.4360	550.1870	0.0000	0.0000	0.0000	0.0000 (102)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	879.9005	838.8777	770.7179	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	155.5827	213.8566	164.0750	0.0000	0.0000	0.0000	0.0000 (104)
Cooled Fraction												533.5144 (104)
Intermittency factor (Table 10b)												FC = cooled area / (4) = 1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	38.8957	53.4642	41.0188	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												133.3786 (107)
Energy for space heating												2.0045 (108)
Energy for space cooling												45.9488 (99)
Total												2.0045 (108)
Dwelling Fabric Energy Efficiency (DFEE)												47.9533 (109)
												48.0 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	33.2700 (1b)	2.5000 (2b)	83.1750 (1b) - (3b)
First floor	33.2700 (1c)	2.6500 (2c)	88.1655 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	66.5400		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 171.3405 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.1167 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3667 (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) =	0.3117 (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	0.3974	0.3896	0.3819	0.3429	0.3351	0.2961	0.2961	0.2883	0.3117	0.3351	0.3507	0.3663 (22b)
Effective ac	0.5790	0.5759	0.5729	0.5588	0.5561	0.5438	0.5438	0.5416	0.5486	0.5561	0.5615	0.5671 (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
TER Opaque door			1.9700	1.0000	1.9700		(26)
TER Opening Type (Uw = 1.40)			11.9200	1.3258	15.8030		(27)
Heat Loss Floor			33.2700	0.1300	4.3251		(28a)
External Wall	84.0500	13.8900	70.1600	0.1800	12.6288		(29a)
External Roof	33.2700		33.2700	0.1300	4.3251		(30)
Total net area of external elements Aum(A, m2)			150.5900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 39.0520		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.0000 (35)
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.4734 (36)
 Total fabric heat loss (33) + (36) = 47.5254 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	32.7369	32.5634	32.3935	31.5951	31.4457	30.7504	30.7504	30.6216	31.0182	31.4457	31.7479	32.0638 (38)
Heat transfer coeff	80.2623	80.0889	79.9189	79.1205	78.9712	78.2758	78.2758	78.1471	78.5437	78.9712	79.2733	79.5893 (39)
Average = Sum(39)m / 12 =												79.1198 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2062	1.2036	1.2011	1.1891	1.1868	1.1764	1.1764	1.1744	1.1804	1.1868	1.1914	1.1961 (40)
HLP (average)												1.1891 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.1593 (42)
 Average daily hot water use (litres/day) 85.4831 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	94.0314	90.6121	87.1927	83.7734	80.3541	76.9348	76.9348	80.3541	83.7734	87.1927	90.6121	94.0314 (44)
Energy conte	139.4458	121.9602	125.8520	109.7208	105.2797	90.8484	84.1844	96.6028	97.7566	113.9259	124.3590	135.0458 (45)
Energy content (annual)												Total = Sum(45)m = 1344.9815 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
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												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Cooled fraction											FC = cooled area / (4) =	1.0000 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	30.5356	43.6754	33.4393	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											107.6504 (107)	
Space cooling per m2											1.6178 (108)	
Energy for space heating											46.8080 (99)	
Energy for space cooling											1.6178 (108)	
Total											48.4259 (109)	
Target Fabric Energy Efficiency (TFEE)											55.7 (109)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	C2223084/1	Issued on Date	01/11/2022
Assessment Reference	As Designed	Prop Type Ref	
Property	Plot 1, Station Road, Quainton, AYLESBURY, HP22		
SAP Rating	80 C	DER	24.99
Environmental	82 B	TER	28.85
CO ₂ Emissions (t/year)	1.40	% DER<TER	13.37
General Requirements Compliance	Pass	DFEE	47.95
		TFEE	55.69
		% DFEE<TFEE	13.89
Assessor Details	Mr. Gary White, Hibec Limited, Tel: 01564 795566, gary_hibec@btconnect.com	Assessor ID	4104-0001
Client	Vauss Ltd, 016		

SAP 2012 OVERHEATING ASSESSMENT FOR New Build (As Designed) 9.92

SAP 2012 OVERHEATING ASSESSMENT FOR New Build (As Designed) 9.92

Overheating Calculation Input Data

Dwelling type	EndTerrace House
Number of storeys	2
Cross ventilation possible	Yes
SAP Region	Thames Valley
Front of dwelling faces	South East
Overshading	Average or unknown
Thermal mass parameter	250.0
Night ventilation	No
Ventilation rate during hot weather (ach)	8.00 (Windows fully open)

Overheating Calculation

Summer ventilation heat loss coefficient	452.34 (P1)
Transmission heat loss coefficient	48.48 (37)
Summer heat loss coefficient	500.82 (P2)

Overhangs Orientation	Ratio	Z_overhangs	Overhang type
South East	0.000	1.000	None
South West	0.000	1.000	None
North West	0.000	1.000	None

Solar shading Orientation	Z blinds	Solar access	Z overhangs	Z summer
South East	1.000	0.90	1.000	0.900 (P8)
South West	1.000	0.90	1.000	0.900 (P8)
North West	1.000	0.90	1.000	0.900 (P8)

[Jul]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Shading	Gains W
South East	3.4000	119.9223	0.4600	0.0000	0.9000	168.8027
South West	1.3400	119.9223	0.4600	0.0000	0.9000	66.5281
North West	7.1800	98.8453	0.4600	0.0000	0.9000	293.8195

total: 529.1504

Solar gains	564	529	460	(P4)
Internal gains	433	417	425	
Total summer gains	997	946	885	(P5)

Summer gain/loss ratio	1.99	1.89	1.77	(P6)
Summer external temperature	16.00	17.90	17.80	
Thermal mass temperature increment (TMP = 250.0)	0.25	0.25	0.25	
Threshold temperature	18.24	20.04	19.82	(P7)
Likelihood of high internal temperature	Not significant	Not significant	Not significant	

Assessment of likelihood of high internal temperature: Not significant

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Property Reference	C2223084/1	Issued on Date	01/11/2022
Assessment Reference	As Designed	Prop Type Ref	
Property	Plot 1, Station Road, Quainton, AYLESBURY, HP22		
SAP Rating	80 C	DER	24.99
Environmental	82 B	TER	28.85
CO ₂ Emissions (t/year)	1.40	% DER<TER	13.37
General Requirements Compliance	Pass	DfEE	47.95
		TfEE	55.69
		% DfEE<TfEE	13.89
Assessor Details	Mr. Gary White, Hibec Limited, Tel: 01564 795566, gary_hibec@btconnect.com	Assessor ID	4104-0001
Client	Vauss Ltd, 016		

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

Orientation	South East
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, End-Terrace
2.0 Number of Storeys	2
3.0 Date Built	2022
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	16.32 m	33.27 m ²	2.50 m
1st Storey:	16.32 m	33.27 m ²	2.65 m

7.0 Living Area m²

8.0 Thermal Mass Parameter
 Thermal Mass kJ/m²K

9.0 External Walls

Description	Type	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
External Wall	Cavity Wall	0.15	84.05	70.16

9.1 Party Walls

Description	Type	Construction	U-Value (W/m ² K)	Area (m ²)
Party Wall 1	Filled Cavity with Edge Sealing		0.00	40.99

10.0 External Roofs

Description	Type	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
External Roof	External Plane Roof	0.09	33.27	33.27

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m ² K)	Area (m ²)
Heat Loss Floor	Ground Floor - Solid		0.12	33.27

12.0 Opening Types

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
door	Manufacturer	Solid Door							1.20
window	BFRC data	Window	Double Low-E Soft	0.05		0.46			1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
door	Solid Door	[1] External Wall	South East							1.97	
windows	Window	[1] External Wall	South East	None	0.00					3.40	
windows	Window	[1] External Wall	South West	None	0.00					1.34	
Bi fold door	Window	[1] External Wall	North West	None	0.00					5.04	
window	Window	[1] External Wall	North West	None	0.00					2.14	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	9.38	0.300	Yes
Table K1 - Approved	E3 Sill	6.04	0.040	No
Table K1 - Approved	E4 Jamb	19.50	0.050	Yes
Independently assessed	E5 Ground floor (normal)	16.32	0.030	Yes LABC
Table K1 - Approved	E6 Intermediate floor within a dwelling	16.32	0.070	Yes
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	8.36	0.060	No
Table K1 - Approved	E12 Gable (insulation at ceiling level)	7.96	0.240	No
Table K1 - Approved	E16 Corner (normal)	10.30	0.090	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.30	0.060	Yes
Table K1 - Default	P1 Party wall - Ground floor	7.96	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	7.96	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	7.96	0.240	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Property Tested ?

As Built AP₅₀ m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather

Cross ventilation possible

Night Ventilation

Air change rate

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				4
Number of passive vents				0
Number of flueless gas fires				0

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



21.0 Fixed Cooling System	<input type="text" value="No"/>	
22.0 Lighting		
Internal		
Total number of light fittings	<input type="text" value="20"/>	
Total number of L.E.L. fittings	<input type="text" value="20"/>	
Percentage of L.E.L. fittings	<input type="text" value="100.00"/>	%
External		
External lights fitted	<input type="text" value="Yes"/>	
Light and motion sensor	<input type="text" value="Yes"/>	
23.0 Electricity Tariff	<input type="text" value="Standard"/>	
24.0 Main Heating 1	<input type="text" value="SAP table"/>	
Description	<input type="text" value="ASHP"/>	
Percentage of Heat	<input type="text" value="100"/>	%
Main Heating	<input type="text" value="PET"/>	
SAP Code	<input type="text" value="224"/>	
Efficiency (SAP Table)	<input type="text" value="170.0"/>	%
Controls	<input type="text" value="CHG Programmer, TRVs and bypass"/>	
PCDF Controls	<input type="text" value="0"/>	
Sap Code	<input type="text" value="2206"/>	
Is MHS Pumped	<input type="text" value="Pump in heated space"/>	
Heat Emitter	<input type="text" value="Radiators"/>	
Flow Temperature	<input type="text" value="Unknown"/>	
25.0 Main Heating 2	<input type="text" value="None"/>	
Community Heating	<input type="text" value="None"/>	
28.0 Water Heating	<input type="text" value="HWP From main heating 1"/>	
Water Heating	<input type="text" value="Main Heating 1"/>	
Flue Gas Heat Recovery System	<input type="text" value="No"/>	
Waste Water Heat Recovery Instantaneous System 1	<input type="text" value="No"/>	
Waste Water Heat Recovery Instantaneous System 2	<input type="text" value="No"/>	
Waste Water Heat Recovery Storage System	<input type="text" value="No"/>	
Solar Panel	<input type="text" value="No"/>	
Water use <= 125 litres/person/day	<input type="text" value="Yes"/>	
SAP Code	<input type="text" value="901"/>	
Immersion Heater	<input type="text" value="Single"/>	
Supplementary Immersion	<input type="text" value="Yes"/>	
Immersion Only Heating Hot Water	<input type="text" value="Yes"/>	
29.0 Hot Water Cylinder	<input type="text" value="Hot Water Cylinder"/>	
Cylinder Stat	<input type="text" value="Yes"/>	
Cylinder In Heated Space	<input type="text" value="Yes"/>	
Independent Time Control	<input type="text" value="Yes"/>	
Insulation Type	<input type="text" value="Measured Loss"/>	

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Cylinder Volume	<input type="text" value="150.00"/>	L
Loss	<input type="text" value="1.89"/>	kWh/day
Pipes insulation	<input type="text" value="Fully insulated primary pipework"/>	

31.0 Thermal Store

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	£97	B 83	
	Typical Cost	Typical savings per year	Ratings after improvement	
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£375	A 95	