

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	000011			Issued on Date	25/06/2023
Assessment Reference	2. Be Lean	Prop Type Ref			
Property	31A , Riverside Road, London, N15 6DA				
SAP Rating	83 B	DER	18.60	TER	19.91
Environmental	86 B	% DER<TER	6.58		
CO ₂ Emissions (t/year)	1.17	DFEE	50.68	TFEE	60.11
General Requirements Compliance	Pass	% DFEE<TFEE	15.70		
Assessor Details	Mr. Rickie Dickson, Rickie Dickson, Tel: 07515111966, rd@energysmartworld.co.uk			Assessor ID	H321-0001
Client					

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 76 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:Mains gas

Fuel factor:1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 19.91 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 18.60 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 60.1 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE) 50.7 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	1.04 (max. 2.00)	1.30 (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: Boiler system with radiators or underfloor - Mains gas

Data from manufacturer

TBC TBC

Combi boiler

Efficiency: 89.5% SEDBUK2009

Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls: No cylinder

Boiler interlock Yes 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): Slight OK

Based on:

Overshading:

Windows facing North: 3.73 m², No overhang

Windows facing East: 13.48 m², No overhang

Windows facing West: 13.16 m², No overhang

Air change rate: 8.00 ach

Blinds/curtains: None

10 Key features

Floor U-value 0.12 W/m²K

Window U-value 1.00 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	37.3000 (1b)	x 2.4200 (2b)	= 90.2660 (1b) - (3b)
First floor	38.3300 (1c)	x 2.8800 (2c)	= 110.3904 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.6564 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1495 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3995 (18)
Number of sides sheltered					4 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2797 (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	0.3566	0.3496	0.3426	0.3076	0.3006	0.2657	0.2657	0.2587	0.2797	0.3006	0.3146	0.3286 (22b)
Effective ac	0.5636	0.5611	0.5587	0.5473	0.5452	0.5353	0.5353	0.5335	0.5391	0.5452	0.5495	0.5540 (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
Triple Glazed Windows (Uw = 1.00)			30.3700	0.9615	29.2019		(27)
Roof window (Uw = 1.30)			4.8600	1.2357	6.0057		(27a)
Heat Loss Floor 1			37.3000	0.1200	4.4760		(28a)
External Wall 1	130.7400	30.3700	100.3700	0.1500	15.0555		(29a)
Flat Roof	36.6200	1.3900	35.2300	0.1500	5.2845		(30)
Pitched glazed roof	3.4700	3.4700	0.0000	0.1300	0.0000		(30)
Total net area of external elements Aum(A, m ²)			208.1300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		60.0236		(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)							14.5641 (36)
Total fabric heat loss						(33) + (36) =	74.5877 (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	37.3176	37.1541	36.9939	36.2414	36.1006	35.4452	35.4452	35.3238	35.6976	36.1006	36.3854	36.6832 (38)
Heat transfer coeff	111.9053	111.7419	111.5816	110.8291	110.6883	110.0329	110.0329	109.9115	110.2854	110.6883	110.9731	111.2709 (39)
Average = Sum(39)m / 12 =												110.8284 (39)
HLP	1.4796	1.4775	1.4754	1.4654	1.4636	1.4549	1.4549	1.4533	1.4582	1.4636	1.4673	1.4713 (40)
HLP (average)												1.4654 (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												2.3747 (42)
Average daily hot water use (litres/day)												90.5996 (43)
Daily hot water use	99.6596	96.0356	92.4116	88.7876	85.1636	81.5397	81.5397	85.1636	88.7876	92.4116	96.0356	99.6596 (44)
Energy conte	147.7923	129.2601	133.3848	116.2881	111.5812	96.2861	89.2232	102.3850	103.6078	120.7449	131.8025	143.1289 (45)
Energy content (annual)										Total = Sum(45)m =		1425.4849 (45)
Distribution loss (46)m = 0.15 x (45)m	22.1688	19.3890	20.0077	17.4432	16.7372	14.4429	13.3835	15.3577	15.5412	18.1117	19.7704	21.4693 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	50.7854	44.2027	47.0919	43.7857	43.3985	40.2113	41.5517	43.3985	43.7857	47.0919	47.3600	50.7854	(61)	
Total heat required for water heating calculated for each month	198.5777	173.4628	180.4768	160.0738	154.9797	136.4975	130.7750	145.7834	147.3934	167.8368	179.1625	193.9144	(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	198.5777	173.4628	180.4768	160.0738	154.9797	136.4975	130.7750	Solar input (sum of months) = Sum (63)m =				0.0000	(63)	
Heat gains from water heating, kWh/month	61.8373	54.0296	56.1234	49.6122	47.9504	42.0680	40.0547	44.8926	45.3960	51.9207	55.6643	60.2867	(65)	
								145.7834	147.3934	167.8368	179.1625	193.9144	(64)	
								Total per year (kWh/year) = Sum (64)m =				1968.9337	(64)	

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	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.7275	16.6336	13.5274	10.2411	7.6553	6.4630	6.9835	9.0774	12.1836	15.4699	18.0556	19.2480	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.0659	212.2458	206.7527	195.0585	180.2968	166.4228	157.1541	154.9743	160.4674	172.1615	186.9233	200.7973	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	(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)	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	(71)
Water heating gains (Table 5)	83.1146	80.4013	75.4347	68.9059	64.4494	58.4277	53.8369	60.3395	63.0500	69.7858	77.3116	81.0306	(72)
Total internal gains	373.5289	370.9015	357.3356	335.8263	314.0223	292.9343	279.5953	286.0120	297.3218	319.0381	343.9113	362.6967	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
North					3.7300	10.6334	0.6800	0.7000	0.7700	13.0834 (74)				
East					13.4800	19.6403	0.6800	0.7000	0.7700	87.3328 (76)				
West					13.1600	19.6403	0.6800	0.7000	0.7700	85.2596 (80)				
South					3.4700	45.6416	0.7600	0.7000	1.0000	75.8305 (82)				
Horizontal					1.3900	26.0000	0.7600	0.7000	1.0000	17.3038 (82)				
Solar gains	278.8102	535.3561	865.7084	1251.2959	1532.3005	1570.1020	1494.0392	1282.6312	1001.9651	630.2393	345.6193	230.6942	(83)	
Total gains	652.3391	906.2576	1223.0440	1587.1222	1846.3229	1863.0363	1773.6345	1568.6432	1299.2869	949.2773	689.5306	593.3909	(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	46.9333	47.0019	47.0694	47.3890	47.4493	47.7319	47.7319	47.7846	47.6227	47.4493	47.3275	47.2009		
alpha	4.1289	4.1335	4.1380	4.1593	4.1633	4.1821	4.1821	4.1856	4.1748	4.1633	4.1552	4.1467		
util living area	0.9915	0.9699	0.8994	0.7330	0.5348	0.3739	0.2721	0.3204	0.5579	0.8754	0.9802	0.9941	(86)	
MIT	19.5685	19.9218	20.3929	20.7914	20.9506	20.9911	20.9982	20.9965	20.9576	20.6239	19.9826	19.4990	(87)	
Th 2	19.7028	19.7044	19.7060	19.7135	19.7149	19.7215	19.7215	19.7227	19.7190	19.7149	19.7121	19.7091	(88)	
util rest of house	0.9887	0.9606	0.8724	0.6800	0.4684	0.3011	0.1935	0.2324	0.4654	0.8301	0.9725	0.9921	(89)	
MIT 2	17.8520	18.3593	19.0079	19.5085	19.6766	19.7169	19.7210	19.7216	19.6930	19.3348	18.4586	17.7555	(90)	
Living area fraction	18.4875	18.9378	19.5206	19.9834	20.1482	20.1887	20.1938	20.1936	20.1612	19.8120	19.0228	18.4010	(92)	
Temperature adjustment													-0.1500	
adjusted MIT	18.3375	18.7878	19.3706	19.8334	19.9982	20.0387	20.0438	20.0436	20.0112	19.6620	18.8728	18.2510	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	642.0971	862.6908	1056.8744	1087.6114	892.5877	594.9068	378.4678	399.4905	633.1425	785.8843	665.7698	586.7181	(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	1570.8691	1551.8468	1436.1276	1211.7412	918.5185	598.4330	378.9366	400.4746	651.9205	1003.0625	1306.4679	1563.4676	(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	(97a)
Space heating kWh	691.0063	463.1128	282.1644	89.3735	19.2926	0.0000	0.0000	0.0000	0.0000	161.5806	461.3027	726.7016	(98)
Space heating												2894.5345	(98)
Space heating per m2												38.2723	(99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %)													90.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3201.9187 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	691.0063	463.1128	282.1644	89.3735	19.2926	0.0000	0.0000	0.0000	0.0000	161.5806	461.3027	726.7016	(98)
Space heating efficiency (main heating system 1)	90.4000	90.4000	90.4000	90.4000	90.4000	0.0000	0.0000	0.0000	0.0000	90.4000	90.4000	90.4000	(210)
Space heating fuel (main heating system)	764.3875	512.2929	312.1288	98.8645	21.3414	0.0000	0.0000	0.0000	0.0000	178.7396	510.2905	803.8735	(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	198.5777	173.4628	180.4768	160.0738	154.9797	136.4975	130.7750	145.7834	147.3934	167.8368	179.1625	193.9144	(64)
Efficiency of water heater (217)m	87.9312	87.4043	86.1719	83.6484	81.3056	80.3000	80.3000	80.3000	80.3000	84.9557	87.3274	88.0668	(216)
Fuel for water heating, kWh/month	225.8332	198.4602	209.4382	191.3650	190.6137	169.9844	162.8580	181.5485	183.5535	197.5580	205.1619	220.1901	(219)
Water heating fuel used												2336.5644	(219)
Annual totals kWh/year													
Space heating fuel - main system												3201.9187	(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)												330.7341	(232)
Total delivered energy for all uses												5944.2171	(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	3201.9187	0.2160	691.6144 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2336.5644	0.2160	504.6979 (264)
Space and water heating			1196.3123 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	330.7341	0.5190	171.6510 (268)
Total CO2, kg/year			1406.8883 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			18.6000 (273)

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

DER		18.6000	ZC1
Total Floor Area	TFA	75.6300	
Assumed number of occupants	N	2.3747	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		16.4592	ZC2
CO2 emissions from cooking, equation (L16)		2.3270	ZC3
Total CO2 emissions		37.3862	ZC4
Residual CO2 emissions offset from biofuel CHP		0.0000	ZC5
Additional allowable electricity generation, kWh/m²/year		0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000	ZC7
Net CO2 emissions		37.3862	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	37.3000 (1b)	x 2.4200 (2b)	= 90.2660 (1b) - (3b)
First floor	38.3300 (1c)	x 2.8800 (2c)	= 110.3904 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.6564 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1495 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3995 (18)
Number of sides sheltered					4 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2797 (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	0.3566	0.3496	0.3426	0.3076	0.3006	0.2657	0.2657	0.2587	0.2797	0.3006	0.3146	0.3286 (22b)
Effective ac	0.5636	0.5611	0.5587	0.5473	0.5452	0.5353	0.5353	0.5335	0.5391	0.5452	0.5495	0.5540 (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 Opening Type (Uw = 1.40)			16.2900	1.3258	21.5966		(27)
TER Room Window (Uw = 1.70)			2.6100	1.5918	4.1545		(27a)
Heat Loss Floor 1			37.3000	0.1300	4.8490		(28a)
External Wall 1	130.7400	16.2900	114.4500	0.1800	20.6010		(29a)
Flat Roof	36.6200	0.7500	35.8700	0.1300	4.6631		(30)
Pitched glazed roof	3.4700	1.8600	1.6100	0.1300	0.2093		(30)
Total net area of external elements Aum(A, m ²)			208.1300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		56.0735		(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)							9.2776 (36)
Total fabric heat loss						(33) + (36) =	65.3511 (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	37.3176	37.1541	36.9939	36.2414	36.1006	35.4452	35.4452	35.3238	35.6976	36.1006	36.3854	36.6832 (38)
Heat transfer coeff	102.6687	102.5052	102.3450	101.5925	101.4517	100.7963	100.7963	100.6749	101.0487	101.4517	101.7365	102.0343 (39)
Average = Sum(39)m / 12 =												101.5918 (39)
HLP	1.3575	1.3554	1.3532	1.3433	1.3414	1.3328	1.3328	1.3312	1.3361	1.3414	1.3452	1.3491 (40)
HLP (average)												1.3433 (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												2.3747 (42)
Average daily hot water use (litres/day)												90.5996 (43)
Daily hot water use	99.6596	96.0356	92.4116	88.7876	85.1636	81.5397	81.5397	85.1636	88.7876	92.4116	96.0356	99.6596 (44)
Energy conte	147.7923	129.2601	133.3848	116.2881	111.5812	96.2861	89.2232	102.3850	103.6078	120.7449	131.8025	143.1289 (45)
Energy content (annual)										Total = Sum(45)m =		1425.4849 (45)
Distribution loss (46)m = 0.15 x (45)m	22.1688	19.3890	20.0077	17.4432	16.7372	14.4429	13.3835	15.3577	15.5412	18.1117	19.7704	21.4693 (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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.7854	44.2027	47.0919	43.7857	43.3985	40.2113	41.5517	43.3985	43.7857	47.0919	47.3600	50.7854	(61)
Total heat required for water heating calculated for each month	198.5777	173.4628	180.4768	160.0738	154.9797	136.4975	130.7750	145.7834	147.3934	167.8368	179.1625	193.9144	(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	198.5777	173.4628	180.4768	160.0738	154.9797	136.4975	130.7750	145.7834	147.3934	167.8368	179.1625	193.9144	(64)
Heat gains from water heating, kWh/month	61.8373	54.0296	56.1234	49.6122	47.9504	42.0680	40.0547	44.8926	45.3960	51.9207	55.6643	60.2867	(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	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	118.7361	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.7275	16.6336	13.5274	10.2411	7.6553	6.4630	6.9835	9.0774	12.1836	15.4699	18.0556	19.2480	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.0659	212.2458	206.7527	195.0585	180.2968	166.4228	157.1541	154.9743	160.4674	172.1615	186.9233	200.7973	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	34.8736	(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)	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	-94.9888	(71)
Water heating gains (Table 5)	83.1146	80.4013	75.4347	68.9059	64.4494	58.4277	53.8369	60.3395	63.0500	69.7858	77.3116	81.0306	(72)
Total internal gains	373.5289	370.9015	357.3356	335.8263	314.0223	292.9343	279.5953	286.0120	297.3218	319.0381	343.9113	362.6967	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
North					2.0000	10.6334	0.6300	0.7000			0.7700			6.4994 (74)
East					7.2300	19.6403	0.6300	0.7000			0.7700			43.3968 (76)
West					7.0600	19.6403	0.6300	0.7000			0.7700			42.3764 (80)
South					1.8600	45.6416	0.6300	0.7000			1.0000			33.6942 (82)
Horizontal					0.7500	26.0000	0.6300	0.7000			1.0000			7.7396 (82)
Solar gains	133.7063	257.0648	416.3459	602.5488	738.3596	756.7503	720.0208	617.8379	482.1490	302.8135	165.8086	110.5889	(83)	
Total gains	507.2352	627.9663	773.6815	938.3751	1052.3820	1049.6846	999.6161	903.8500	779.4708	621.8516	509.7199	473.2856	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	51.1557	51.2372	51.3174	51.6976	51.7693	52.1059	52.1059	52.1688	51.9758	51.7693	51.6244	51.4737	
alpha	4.4104	4.4158	4.4212	4.4465	4.4513	4.4737	4.4737	4.4779	4.4651	4.4513	4.4416	4.4316	
util living area	0.9967	0.9913	0.9723	0.9075	0.7694	0.5857	0.4371	0.4995	0.7688	0.9587	0.9931	0.9976	(86)
MIT	19.5534	19.7696	20.1238	20.5470	20.8394	20.9636	20.9921	20.9861	20.8823	20.4493	19.9112	19.5116	(87)
Th 2	19.7961	19.7977	19.7994	19.8071	19.8085	19.8153	19.8153	19.8165	19.8127	19.8085	19.8056	19.8026	(88)
util rest of house	0.9956	0.9883	0.9627	0.8772	0.7045	0.4892	0.3228	0.3774	0.6782	0.9387	0.9902	0.9967	(89)
MIT 2	17.8929	18.2085	18.7185	19.3065	19.6658	19.7938	19.8128	19.8115	19.7272	19.1926	18.4218	17.8364	(90)
Living area fraction	18.5076	18.7865	19.2388	19.7658	20.1003	20.2269	20.2494	20.2464	20.1548	19.6578	18.9732	18.4566	(92)
Temperature adjustment	18.5076	18.7865	19.2388	19.7658	20.1003	20.2269	20.2494	20.2464	20.1548	19.6578	18.9732	18.4566	(92)
adjusted MIT	18.5076	18.7865	19.2388	19.7658	20.1003	20.2269	20.2494	20.2464	20.1548	19.6578	18.9732	18.4566	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	504.0889	618.3937	740.4029	822.0094	759.4840	549.9798	365.1775	382.2111	551.0104	581.7308	503.2793	471.0768	(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	1458.6782	1423.4337	1303.7507	1103.8785	852.2262	567.1726	367.8435	387.2324	611.8341	918.9315	1207.9420	1454.6623	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	710.2145	540.9869	419.1308	202.9457	69.0002	0.0000	0.0000	0.0000	0.0000	250.8773	507.3571	731.7876	(98)
Space heating												3432.3002	(98)
Space heating per m2												45.3828	(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

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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3674.8396 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	710.2145	540.9869	419.1308	202.9457	69.0002	0.0000	0.0000	0.0000	0.0000	250.8773	507.3571	731.7876	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	760.4009	579.2151	448.7482	217.2866	73.8760	0.0000	0.0000	0.0000	0.0000	268.6053	543.2089	783.4985	(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	198.5777	173.4628	180.4768	160.0738	154.9797	136.4975	130.7750	145.7834	147.3934	167.8368	179.1625	193.9144	(64)
Efficiency of water heater (217)m	87.9819	87.7212	87.1025	85.6497	83.1623	80.3000	80.3000	80.3000	80.3000	86.0611	87.5270	88.0793	(216)
Fuel for water heating, kWh/month	225.7028	197.7433	207.2006	186.8936	186.3580	169.9844	162.8580	181.5485	183.5535	195.0206	204.6941	220.1588	(219)
Water heating fuel used												2321.7161	(219)
Annual totals kWh/year													
Space heating fuel - main system												3674.8396	(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)												330.7341	(232)
Total delivered energy for all uses												6402.2897	(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	3674.8396	0.2160	793.7653 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2321.7161	0.2160	501.4907 (264)
Space and water heating			1295.2560 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	330.7341	0.5190	171.6510 (268)
Total CO2, kg/m2/year			1505.8320 (272)
Emissions per m2 for space and water heating			17.1262 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2696 (272b)
Emissions per m2 for pumps and fans			0.5147 (272c)
Target Carbon Dioxide Emission Rate (TER) = (17.1262 * 1.00) + 2.2696 + 0.5147, rounded to 2 d.p.			19.9100 (273)

Project Information

Client : Rickie Dickson, Energy Smart

Date : 3 November 2021

Address : 9 Wedgwood Road, Bedford, MK41 7NW

Project : 31A Riverside London N15 - Mr Gluck, 31A Riverside London N15 6DA

Construction Type : Ground Floors > Solid - Insulation over slab

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Inside surface resistance	0.0	0.0000	0.1700	–
P/A Ratio (Exposed internal perimeter divided by area) <i>P/A Ratio : 0.59</i>	–	–	–	–
Floor Screed	65.0	1.1500	0.0565	–
Polythene, 500 gauge separating layer	–	–	–	–
Insulation <i>Celotex XR4000 150.0mm</i>	150.0	0.0220	6.8182	–
DPM - Polythene 1200 gauge	–	–	–	–
Concrete oversite	–	–	–	–
Sand Blinded Hardcore	–	–	–	–
Ground	–	–	0.0400	–

U-value = 0.12 W/m².K (combined method : 0.120 W/m².K, upper limit : 7.085m²K/W, lower limit : 7.085m²K/W)

Correction Factors

Mechanical Fasteners : N/A

Air Gap Corrections : N/A

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Project Information

Client : Rickie Dickson, Energy Smart

Date : 3 November 2021

Address : 9 Wedgwood Road, Bedford, MK41 7NW

Project : 31A Riverside London N15 - Mr Gluck, 31A Riverside London N15 6DA

Construction Type : Walls > Cavity Wall - Full Fill Insulation

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Outside surface resistance	0.0	0.0000	0.0400	–
External Finish <i>None</i>	–	–	–	–
Outer Leaf <i>Brickwork</i>	105.0	0.7700	0.1364	0.7600
Mortar	105.0	0.9400	0.1117	0.2400
10mm low emissivity cavity	10.0	–	0.3630	–
Insulation <i>Celotex Thermaclass Cavity Wall 21 115mm</i>	115.0	0.0210	5.4762	–
Inner Leaf <i>Celcon Standard (lambda = 0.15)</i>	100.0	0.1500	0.6667	0.9342
Mortar	100.0	0.8800	0.1136	0.0658
Internal Finish <i>Wet Plaster</i>	13.0	0.2200	0.0591	–
Inside surface resistance	0.0	0.0000	0.1300	–

U-value = 0.15 W/m².K (combined method : 0.148 W/m².K, upper limit : 6.826m²K/W, lower limit : 6.703m²K/W, dUf : 0.0017)

Correction Factors

Mechanical Fasteners : (nf = fasteners per m², Af = fasteners cross-sectional area)

1. Delta Uf for Celotex Thermaclass Cavity Wall 21 115mm Insulation : 0.0017

Alpha : 0.8 per m, lambda f : 17.0000 W/mK, nf : 0.00002500 per m², Af : 8.6000mm²

Air Gap Corrections : N/A

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Celotex products should not be used in the external walls of buildings over 18 metres in height (England and Wales) or 11 metres in height (Scotland). Recent changes to Building Regulations mean that only non-combustible insulation or insulation of limited combustibility can be used in buildings of that height.