

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	P3 Riley	Issued on Date	01/08/2022
Assessment Reference	P3 Riley	Prop Type Ref	
Property	Plot 3, Riley Road, Reading		
SAP Rating	88 B	DER	13.47
Environmental	89 B	TER	16.93
CO ₂ Emissions (t/year)	0.94	% DER<TER	20.43
General Requirements Compliance	Pass	DfEE	44.48
		TfEE	49.08
		% DfEE<TfEE	9.38
Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com		Assessor ID
			L609-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TfEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	16.93	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.47	kgCO ₂ /m ²	Pass
	-3.46 (-20.4%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	49.08	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	44.48	kWh/m ² /yr	
	-4.6 (-9.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.27 (max. 2.00)	1.30 (max. 3.30)	Pass

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	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
X X

Efficiency: 90%
Minimum: 88%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.26 kWh/day
Permitted by DBSCG 2.56

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

5.35 m², Overhang width less than twice window, ratio 0.05

Windows facing East

2.08 m², Overhang width less than twice window, ratio 0.05

Windows facing South

8.82 m², Overhang width less than twice window, ratio 0.05

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.11	W/m ² K
Door U-value	1.00	W/m ² K
Photovoltaic array	1.00	kW

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

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	P4 Riley	Issued on Date	01/08/2022
Assessment Reference	P4 Riley	Prop Type Ref	
Property	Plot 4, Riley Road, Reading		
SAP Rating	88 B	DER	13.56
Environmental	89 B	TER	17.07
CO ₂ Emissions (t/year)	0.94	% DER<TER	20.54
General Requirements Compliance	Pass	DfEE	45.10
		TfEE	49.81
		% DfEE<TfEE	9.45
Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com		Assessor ID
			L609-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TfEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.07	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.56	kgCO ₂ /m ²	Pass
	-3.51 (-20.6%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	49.81	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	45.10	kWh/m ² /yr	
	-4.7 (-9.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.27 (max. 2.00)	1.30 (max. 3.30)	Pass

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	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
X X

Efficiency: 90%
Minimum: 88%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.01 kWh/day
Permitted by DBSCG 2.56

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

5.35 m², Overhang width less than twice window, ratio 0.05

Windows facing South

8.82 m², Overhang width less than twice window, ratio 0.05

Windows facing West

2.08 m², Overhang width less than twice window, ratio 0.05

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.11	W/m ² K
Door U-value	1.00	W/m ² K
Photovoltaic array	1.00	kW

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	P3 Riley			Issued on Date	01/08/2022
Assessment Reference	P3 Riley	Prop Type Ref			
Property	Plot 3, Riley Road, Reading				
SAP Rating	88 B	DER	13.47	TER	16.93
Environmental	89 B	% DER<TER	20.43		
CO ₂ Emissions (t/year)	0.94	DFEE	44.48	TFEE	49.08
General Requirements Compliance	Pass	% DFEE<TFEE	9.38		
Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com			Assessor ID	L609-0001
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

Semi-Detached House, total floor area 93 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) 16.93 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 13.47 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)49.1 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)44.5 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.27 (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

X X

Efficiency: 90%

Minimum: 88% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 2.26 kWh/day	
Permitted by DBSCG 2.56	OK	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls: Cylinderstat OK
Independent timer for DHW OK

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:	Average
Windows facing North:	5.35 m ² , Overhang width less than twice window, ratio 0.05
Windows facing East:	2.08 m ² , Overhang width less than twice window, ratio 0.05
Windows facing South:	8.82 m ² , Overhang width less than twice window, ratio 0.05
Air change rate:	4.00 ach
Blinds/curtains:	None

10 Key features

Party wall U-value	0.00 W/m ² K
Roof U-value	0.10 W/m ² K
Floor U-value	0.11 W/m ² K
Door U-value	1.00 W/m ² K
Photovoltaic array	1.00 kW

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	46.3300 (1b)	x 2.3800 (2b)	= 110.2654 (1b) - (3b)
First floor	46.3300 (1c)	x 2.5900 (2c)	= 119.9947 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	92.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 230.2601 (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					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) = 0.1737 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4237 (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) =	0.3602 (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	0.4592	0.4502	0.4412	0.3962	0.3872	0.3422	0.3422	0.3331	0.3602	0.3872	0.4052	0.4232 (22b)
Effective ac	0.6054	0.6013	0.5973	0.5785	0.5750	0.5585	0.5585	0.5555	0.5649	0.5750	0.5821	0.5895 (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
windows (Uw = 1.30)			12.4700	1.2357	15.4097		(27)
patio doors (Uw = 1.30)			3.7800	1.2357	4.6711		(27)
pers door			2.0000	1.0000	2.0000		(26a)
Heat Loss Floor 1			46.3300	0.1100	5.0963	75.0000	3474.7500 (28a)
brick	95.9100	18.2500	77.6600	0.2000	15.5320	70.0000	5436.2000 (29a)
External Roof 1	46.3300		46.3300	0.1000	4.6330	9.0000	416.9700 (30)
Total net area of external elements Aum(A, m ²)			188.5700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		47.3421		(33)
Party Wall 1			46.6100	0.0000	0.0000	180.0000	8389.8000 (32)
Internal Wall 1			35.0000			9.0000	315.0000 (32c)
Internal Wall 2			35.0000			100.0000	3500.0000 (32c)
Internal Floor 1			46.3300			18.0000	833.9400 (32d)
Internal Ceiling 1			46.3300			18.0000	833.9400 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 23200.6000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.3842 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.6086 (36)
Total fabric heat loss							(33) + (36) = 65.9507 (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	46.0044	45.6933	45.3883	43.9561	43.6881	42.4406	42.4406	42.2096	42.9212	43.6881	44.2302	44.7970 (38)
Heat transfer coeff	111.9551	111.6440	111.3390	109.9068	109.6388	108.3913	108.3913	108.1603	108.8719	109.6388	110.1809	110.7477 (39)
Average = Sum(39)m / 12 =												109.9055 (39)
HLP	1.2082	1.2049	1.2016	1.1861	1.1832	1.1698	1.1698	1.1673	1.1750	1.1832	1.1891	1.1952 (40)
HLP (average)												1.1861 (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												2.6604 (42)
Average daily hot water use (litres/day)												97.3847 (43)
Daily hot water use	107.1231	103.2277	99.3324	95.4370	91.5416	87.6462	87.6462	91.5416	95.4370	99.3324	103.2277	107.1231 (44)
Energy conte	158.8605	138.9404	143.3741	124.9970	119.9376	103.4970	95.9052	110.0526	111.3670	129.7875	141.6732	153.8479 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)											Total = Sum (45)m =	1532.2400 (45)
Distribution loss (46)m = 0.15 x (45)m												
	23.8291	20.8411	21.5061	18.7495	17.9906	15.5246	14.3858	16.5079	16.7050	19.4681	21.2510	23.0772 (46)
Water storage loss:												
Store volume												250.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0115 (51)
Volume factor from Table 2a												0.7830 (52)
Temperature factor from Table 2b												0.5400 (53)
Enter (49) or (54) in (55)												1.2206 (55)
Total storage loss	37.8386	34.1768	37.8386	36.6180	37.8386	36.6180	37.8386	37.8386	36.6180	37.8386	36.6180	37.8386 (56)
If cylinder contains dedicated solar storage	37.8386	34.1768	37.8386	36.6180	37.8386	36.6180	37.8386	37.8386	36.6180	37.8386	36.6180	37.8386 (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	219.9615	194.1284	204.4751	184.1270	181.0386	162.6270	157.0062	171.1536	170.4970	190.8885	200.8032	214.9489 (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	219.9615	194.1284	204.4751	184.1270	181.0386	162.6270	157.0062	171.1536	170.4970	190.8885	200.8032	214.9489 (64)
											Total per year (kWh/year) = Sum (64)m =	2251.6549 (64)
Heat gains from water heating, kWh/month	101.7019	90.3481	96.5527	88.8655	88.7600	81.7168	80.7693	85.4733	84.3335	92.0351	94.4103	100.0352 (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	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3026	19.8090	16.1098	12.1961	9.1167	7.6967	8.3166	10.8102	14.5095	18.4231	21.5025	22.9225 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.8872	246.4180	240.0405	226.4636	209.3251	193.2174	182.4564	179.9256	186.3031	199.8801	217.0185	233.1263 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020 (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)	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163 (71)
Water heating gains (Table 5)	136.6961	134.4466	129.7751	123.4243	119.3011	113.4955	108.5609	114.8835	117.1299	123.7031	131.1255	134.4560 (72)
Total internal gains	468.7921	466.5797	451.8315	427.9901	403.6491	380.3157	365.2400	371.5254	383.8486	407.9124	435.5526	456.4108 (73)

6. Solar gains

[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	or Table 6b	or Table 6c	factor	W						
North	5.3500	10.6334	0.7200	0.7000	0.7700	19.8696 (74)						
East	2.0800	19.6403	0.7200	0.7000	0.7700	14.2684 (76)						
South	5.0400	46.7521	0.7200	0.7000	0.7700	82.2991 (78)						
South	3.7800	46.7521	0.7200	0.7000	0.7700	61.7243 (78)						
Solar gains	178.1614	301.7571	410.9512	510.2672	575.6439	574.1179	552.3523	502.6246	444.9063	332.7319	213.0196	152.7474 (83)
Total gains	646.9535	768.3367	862.7826	938.2573	979.2929	954.4336	917.5923	874.1500	828.7549	740.6443	648.5722	609.1582 (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	57.5643	57.7247	57.8828	58.6371	58.7804	59.4569	59.4569	59.5839	59.1945	58.7804	58.4912	58.1918	
alpha	4.8376	4.8483	4.8589	4.9091	4.9187	4.9638	4.9638	4.9723	4.9463	4.9187	4.8994	4.8795	
util living area	0.9961	0.9906	0.9772	0.9391	0.8474	0.6789	0.5099	0.5538	0.7885	0.9545	0.9914	0.9971 (86)	
MIT	19.7727	19.9613	20.2265	20.5487	20.8090	20.9539	20.9908	20.9864	20.9015	20.5640	20.1069	19.7417 (87)	
Th 2	19.9134	19.9161	19.9187	19.9311	19.9334	19.9443	19.9443	19.9463	19.9401	19.9334	19.9287	19.9238 (88)	
util rest of house	0.9948	0.9875	0.9695	0.9176	0.7955	0.5858	0.3927	0.4347	0.7065	0.9339	0.9880	0.9961 (89)	
MIT 2	18.2931	18.5689	18.9528	19.4135	19.7512	19.9145	19.9410	19.9409	19.8658	19.4447	18.7911	18.2553 (90)	
Living area fraction	18.6883	18.9408	19.2930	19.7167	20.0337	20.1922	20.2214	20.2202	fLA = Living area / (4) =				0.2671 (91)
MIT	18.6883	18.9408	19.2930	19.7167	20.0337	20.1922	20.2214	20.2202	20.1425	19.7437	19.1426	18.6523 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	18.5383	18.7908	19.1430	19.5667	19.8837	20.0422	20.0714	20.0702	19.9925	19.5937	18.9926	18.5023 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9924	0.9830	0.9620	0.9086	0.7927	0.5951	0.4072	0.4492	0.7111	0.9254	0.9836	0.9942 (94)
Useful gains	642.0278	755.2485	829.9632	852.4843	776.3226	567.9646	373.6020	392.6517	589.2922	685.3788	637.9604	605.6064 (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	1594.0524	1550.8243	1407.6582	1172.3437	897.2535	589.8826	376.2733	396.9682	641.5231	986.0570	1310.3347	1583.9517 (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												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

708.3063	534.6270	429.8051	230.2988	89.9726	0.0000	0.0000	0.0000	0.0000	223.7046	484.1095	727.8889 (98)
Space heating											3428.7127 (98)
Space heating per m2									(98) / (4) =		37.0032 (99)

8c. Space cooling requirement

Not applicable

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 %)												90.0000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												3809.6808 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	708.3063	534.6270	429.8051	230.2988	89.9726	0.0000	0.0000	0.0000	0.0000	223.7046	484.1095	727.8889 (98)
Space heating efficiency (main heating system 1)	90.0000	90.0000	90.0000	90.0000	90.0000	0.0000	0.0000	0.0000	0.0000	90.0000	90.0000	90.0000 (210)
Space heating fuel (main heating system)	787.0070	594.0300	477.5613	255.8875	99.9695	0.0000	0.0000	0.0000	0.0000	248.5606	537.8994	808.7654 (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												
Water heating requirement	219.9615	194.1284	204.4751	184.1270	181.0386	162.6270	157.0062	171.1536	170.4970	190.8885	200.8032	214.9489 (64)
Efficiency of water heater (217)m	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000 (216)
Fuel for water heating, kWh/month	244.4017	215.6982	227.1945	204.5855	201.1540	180.6967	174.4513	190.1707	189.4411	212.0983	223.1147	238.8321 (219)
Water heating fuel used												2501.8388 (219)
Annual totals kWh/year												
Space heating fuel - main system												3809.6808 (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)												393.8716 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV Unit 0 (0.80 * 1.00 * 1080 * 0.80) =										-690.8958		-690.8958 (233)
Total delivered energy for all uses												6089.4954 (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	3809.6808	0.2160	822.8911 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2501.8388	0.2160	540.3972 (264)
Space and water heating			1363.2882 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	393.8716	0.5190	204.4193 (268)
Energy saving/generation technologies			
PV Unit	-690.8958	0.5190	-358.5749 (269)
Total CO2, kg/year			1248.0577 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			13.4700 (273)

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

DER			13.4700 ZC1
Total Floor Area	TFA		92.6600
Assumed number of occupants	N		2.6604
CO2 emission factor in Table 12 for electricity displaced from grid	EF		0.5190
CO2 emissions from appliances, equation (L14)			15.5971 ZC2
CO2 emissions from cooking, equation (L16)			1.9733 ZC3
Total CO2 emissions			31.0404 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			31.0404 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	46.3300 (1b)	x 2.3800 (2b)	= 110.2654 (1b) - (3b)
First floor	46.3300 (1c)	x 2.5900 (2c)	= 119.9947 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	92.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 230.2601 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
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																3 * 10 =	30.0000 (7a)
Number of passive vents																0 * 10 =	0.0000 (7b)
Number of flueless gas fires																0 * 40 =	0.0000 (7c)
										Air changes per hour							
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000	/ (5) =	0.1303 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.3803 (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) =					0.3232 (21)		
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)				
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)				
	0.4121	0.4041	0.3960	0.3556	0.3475	0.3071	0.3071	0.2990	0.3232	0.3475	0.3636	0.3798	(22b)				
Effective ac	0.5849	0.5816	0.5784	0.5632	0.5604	0.5471	0.5471	0.5447	0.5522	0.5604	0.5661	0.5721	(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 Semi-glazed door			2.0000	1.2000	2.4000			(26a)				
TER Opening Type (Uw = 1.40)			16.2500	1.3258	21.5436			(27)				
Heat Loss Floor 1			46.3300	0.1300	6.0229			(28a)				
brick	95.9100	18.2500	77.6600	0.1800	13.9788			(29a)				
External Roof 1	46.3300		46.3300	0.1300	6.0229			(30)				
Total net area of external elements Aum(A, m2)			188.5700					(31)				
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		49.9682			(33)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								10.5237 (36)				
Total fabric heat loss						(33) + (36) =		60.4919 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 44.4463	Feb 44.1957	Mar 43.9500	Apr 42.7963	May 42.5805	Jun 41.5756	Jul 41.5756	Aug 41.3895	Sep 41.9627	Oct 42.5805	Nov 43.0171	Dec 43.4737 (38)
Heat transfer coeff	104.9381	104.6875	104.4419	103.2882	103.0723	102.0675	102.0675	101.8814	102.4545	103.0723	103.5090	103.9655 (39)
Average = Sum(39)m / 12 =												103.2872 (39)
HLP	Jan 1.1325	Feb 1.1298	Mar 1.1272	Apr 1.1147	May 1.1124	Jun 1.1015	Jul 1.1015	Aug 1.0995	Sep 1.1057	Oct 1.1124	Nov 1.1171	Dec 1.1220 (40)
HLP (average)												1.1147 (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												2.6604 (42)
Average daily hot water use (litres/day)												97.3847 (43)
Daily hot water use	Jan 107.1231	Feb 103.2277	Mar 99.3324	Apr 95.4370	May 91.5416	Jun 87.6462	Jul 87.6462	Aug 91.5416	Sep 95.4370	Oct 99.3324	Nov 103.2277	Dec 107.1231 (44)
Energy conte	158.8605	138.9404	143.3741	124.9970	119.9376	103.4970	95.9052	110.0526	111.3670	129.7875	141.6732	153.8479 (45)
Energy content (annual)										Total = Sum(45)m =		1532.2400 (45)
Distribution loss (46)m = 0.15 x (45)m												
	23.8291	20.8411	21.5061	18.7495	17.9906	15.5246	14.3858	16.5079	16.7050	19.4681	21.2510	23.0772 (46)
Water storage loss:												
Store volume												250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8903 (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)												1.0208 (55)
Total storage loss	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (56)
If cylinder contains dedicated solar storage	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (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	213.7673	188.5336	198.2809	178.1326	174.8444	156.6326	150.8120	164.9594	164.5026	184.6943	194.8088	208.7547 (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	213.7673	188.5336	198.2809	178.1326	174.8444	156.6326	150.8120	164.9594	164.5026	184.6943	194.8088	208.7547 (64)
Heat gains from water heating, kWh/month	96.7466	85.8723	91.5973	84.0700	83.8047	76.9212	75.8139	80.5179	79.5380	87.0798	89.6148	95.0799 (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	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3026	19.8090	16.1098	12.1961	9.1167	7.6967	8.3166	10.8102	14.5095	18.4231	21.5025	22.9225	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.8872	246.4180	240.0405	226.4636	209.3251	193.2174	182.4564	179.9256	186.3031	199.8801	217.0185	233.1263	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	(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)	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	(71)
Water heating gains (Table 5)	130.0357	127.7861	123.1147	116.7639	112.6407	106.8351	101.9004	108.2230	110.4695	117.0427	124.4650	127.7955	(72)
Total internal gains	462.1316	459.9192	445.1710	421.3296	396.9887	373.6553	358.5796	364.8650	377.1882	401.2520	428.8922	449.7504	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				5.3500	10.6334	0.6300	0.7000	0.7700	17.3859 (74)			
East				2.0800	19.6403	0.6300	0.7000	0.7700	12.4848 (76)			
South				8.8200	46.7521	0.6300	0.7000	0.7700	126.0205 (78)			

Solar gains	155.8912	264.0374	359.5823	446.4838	503.6884	502.3532	483.3082	439.7965	389.2930	291.1404	186.3921	133.6540 (83)
Total gains	618.0229	723.9567	804.7533	867.8134	900.6770	876.0085	841.8878	804.6615	766.4812	692.3924	615.2843	583.4044 (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	61.3192	61.4660	61.6105	62.2987	62.4292	63.0438	63.0438	63.1589	62.8056	62.4292	62.1658	61.8928	
alpha	5.0879	5.0977	5.1074	5.1532	5.1619	5.2029	5.2029	5.2106	5.1870	5.1619	5.1444	5.1262	
util living area	0.9968	0.9923	0.9810	0.9478	0.8626	0.6965	0.5238	0.5674	0.8027	0.9602	0.9927	0.9976	(86)
MIT	19.8445	20.0162	20.2622	20.5641	20.8147	20.9560	20.9917	20.9876	20.9063	20.5845	20.1557	19.8135	(87)
Th 2	19.9744	19.9766	19.9787	19.9888	19.9907	19.9996	19.9996	20.0012	19.9962	19.9907	19.9869	19.9829	(88)
util rest of house	0.9957	0.9897	0.9745	0.9292	0.8149	0.6069	0.4097	0.4518	0.7251	0.9422	0.9899	0.9968	(89)
MIT 2	18.4412	18.6925	19.0493	19.4823	19.8105	19.9705	19.9965	19.9962	19.9239	19.5190	18.9043	18.4022	(90)
Living area fraction									fLA = Living area / (4) =			0.2671	(91)
MIT	18.8160	19.0461	19.3733	19.7713	20.0787	20.2337	20.2623	20.2610	20.1863	19.8036	19.2386	18.7792	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8160	19.0461	19.3733	19.7713	20.0787	20.2337	20.2623	20.2610	20.1863	19.8036	19.2386	18.7792	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	614.2779	714.1989	780.1959	802.1066	738.2082	551.1611	370.7450	388.4787	568.2797	649.4014	607.2080	580.7092	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1523.2868	1480.9151	1344.5085	1122.8763	863.6154	575.0184	373.8066	393.3643	623.5695	948.6393	1256.4546	1515.7344	(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	676.3026	515.2333	419.8486	230.9542	93.3030	0.0000	0.0000	0.0000	0.0000	222.6330	467.4576	695.6587	(98)
Space heating												3321.3910	(98)
Space heating per m2												35.8449	(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 %)												93.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												3552.2898 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	676.3026	515.2333	419.8486	230.9542	93.3030	0.0000	0.0000	0.0000	0.0000	222.6330	467.4576	695.6587 (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)	723.3183	551.0517	449.0359	247.0098	99.7893	0.0000	0.0000	0.0000	0.0000	238.1102	499.9546	744.0200 (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												
Water heating requirement	213.7673	188.5336	198.2809	178.1326	174.8444	156.6326	150.8120	164.9594	164.5026	184.6943	194.8088	208.7547 (64)
Efficiency of water heater (217)m	87.6765	87.3619	86.7680	85.5076	83.2238	79.8000	79.8000	79.8000	79.8000	85.3131	87.0660	79.8000 (216)
Fuel for water heating, kWh/month	243.8136	215.8076	228.5184	208.3238	210.0895	196.2815	188.9875	206.7160	206.1436	216.4899	223.7485	237.8072 (219)
Water heating fuel used												2582.7270 (219)
Annual totals kWh/year												
Space heating fuel - main system												3552.2898 (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)												393.8716 (232)
Total delivered energy for all uses												6603.8884 (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	3552.2898	0.2160	767.2946 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2582.7270	0.2160	557.8690 (264)
Space and water heating			1325.1636 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	393.8716	0.5190	204.4193 (268)
Total CO2, kg/m2/year			1568.5080 (272)
Emissions per m2 for space and water heating			14.3014 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2061 (272b)
Emissions per m2 for pumps and fans			0.4201 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.3014 * 1.00) + 2.2061 + 0.4201, rounded to 2 d.p.			16.9300 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	P4 Riley			Issued on Date	01/08/2022
Assessment Reference	P4 Riley	Prop Type Ref			
Property	Plot 4, Riley Road, Reading				
SAP Rating	88 B	DER	13.56	TER	17.07
Environmental	89 B	% DER<TER	20.54		
CO ₂ Emissions (t/year)	0.94	DFEE	45.10	TFEE	49.81
General Requirements Compliance	Pass	% DFEE<TFEE	9.45		
Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com			Assessor ID	L609-0001
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

Semi-Detached House, total floor area 93 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) 17.07 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 13.56 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)49.8 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)45.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.27 (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

X X

Efficiency: 90%

Minimum: 88% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage Nominal cylinder loss: 2.01 kWh/day

Permitted by DBSCG 2.56 OK

Primary pipework insulated: Yes OK

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls: Cylinderstat OK

Independent timer for DHW OK

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: Average

Windows facing North: 5.35 m², Overhang width less than twice window, ratio 0.05

Windows facing South: 8.82 m², Overhang width less than twice window, ratio 0.05

Windows facing West: 2.08 m², Overhang width less than twice window, ratio 0.05

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Roof U-value 0.10 W/m²K

Floor U-value 0.11 W/m²K

Door U-value 1.00 W/m²K

Photovoltaic array 1.00 kW

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	46.3300 (1b)	x 2.3800 (2b)	= 110.2654 (1b) - (3b)
First floor	46.3300 (1c)	x 2.5900 (2c)	= 119.9947 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	92.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 230.2601 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 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					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) = 0.1737 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4237 (18)
Number of sides sheltered					1 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3919 (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	0.4997	0.4899	0.4801	0.4311	0.4213	0.3723	0.3723	0.3625	0.3919	0.4213	0.4409	0.4605 (22b)
Effective ac	0.6249	0.6200	0.6153	0.5929	0.5888	0.5693	0.5693	0.5657	0.5768	0.5888	0.5972	0.6060 (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
windows (Uw = 1.30)			12.4700	1.2357	15.4097		(27)
patio doors (Uw = 1.30)			3.7800	1.2357	4.6711		(27)
pers door			2.0000	1.0000	2.0000		(26a)
Heat Loss Floor 1			46.3300	0.1100	5.0963	75.0000	3474.7500 (28a)
brick	95.9100	18.2500	77.6600	0.2000	15.5320	70.0000	5436.2000 (29a)
External Roof 1	46.3300		46.3300	0.1000	4.6330	9.0000	416.9700 (30)
Total net area of external elements Aum(A, m ²)			188.5700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		47.3421		(33)
Party Wall 1			46.6100	0.0000	0.0000	180.0000	8389.8000 (32)
Internal Wall 1			35.0000			9.0000	315.0000 (32c)
Internal Wall 2			35.0000			100.0000	3500.0000 (32c)
Internal Floor 1			46.3300			18.0000	833.9400 (32d)
Internal Ceiling 1			46.3300			18.0000	833.9400 (32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss
(28)...(30) + (32) + (32a)...(32e) = 23200.6000 (34)
250.3842 (35)
18.6086 (36)
(33) + (36) = 65.9507 (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	47.4805	47.1121	46.7510	45.0548	44.7375	43.2602	43.2602	42.9866	43.8292	44.7375	45.3795	46.0506 (38)
Heat transfer coeff	113.4312	113.0628	112.7017	111.0055	110.6882	109.2109	109.2109	108.9373	109.7799	110.6882	111.3302	112.0013 (39)
Average = Sum(39)m / 12 =												111.0040 (39)
HLP	1.2242	1.2202	1.2163	1.1980	1.1946	1.1786	1.1786	1.1757	1.1848	1.1946	1.2015	1.2087 (40)
HLP (average)												1.1980 (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												2.6604 (42)
Average daily hot water use (litres/day)												97.3847 (43)
Daily hot water use	107.1231	103.2277	99.3324	95.4370	91.5416	87.6462	87.6462	91.5416	95.4370	99.3324	103.2277	107.1231 (44)
Energy conte	158.8605	138.9404	143.3741	124.9970	119.9376	103.4970	95.9052	110.0526	111.3670	129.7875	141.6732	153.8479 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	Total = Sum (45)m =											1532.2400 (45)
Distribution loss (46)m = 0.15 x (45)m												
23.8291	20.8411	21.5061	18.7495	17.9906	15.5246	14.3858	16.5079	16.7050	19.4681	21.2510	23.0772	(46)
Water storage loss:												
Store volume												250.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0103 (51)
Volume factor from Table 2a												0.7830 (52)
Temperature factor from Table 2b												0.5400 (53)
Enter (49) or (54) in (55)												1.0875 (55)
Total storage loss	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127 (56)
If cylinder contains dedicated solar storage	33.7127	30.4501	33.7127	32.6252	33.7127	32.6252	33.7127	33.7127	32.6252	33.7127	32.6252	33.7127 (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	215.8356	190.4018	200.3491	180.1341	176.9126	158.6342	152.8803	167.0277	166.5041	186.7625	196.8103	210.8230 (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	215.8356	190.4018	200.3491	180.1341	176.9126	158.6342	152.8803	167.0277	166.5041	186.7625	196.8103	210.8230 (64)
Total per year (kWh/year) = Sum (64)m =												2203.0753 (64)
Heat gains from water heating, kWh/month	98.4012	87.3668	93.2519	85.6712	85.4593	78.5225	77.4685	82.1725	81.1392	88.7344	91.2161	96.7345 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3026	19.8090	16.1098	12.1961	9.1167	7.6967	8.3166	10.8102	14.5095	18.4231	21.5025	22.9225	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.8872	246.4180	240.0405	226.4636	209.3251	193.2174	182.4564	179.9256	186.3031	199.8801	217.0185	233.1263	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	(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)	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	(71)
Water heating gains (Table 5)	132.2596	130.0101	125.3386	118.9878	114.8646	109.0590	104.1244	110.4470	112.6934	119.2666	126.6890	130.0195	(72)
Total internal gains	464.3556	462.1432	447.3950	423.5536	399.2126	375.8792	360.8035	367.0889	379.4121	403.4759	431.1161	451.9743	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				5.3500	10.6334	0.7200	0.7000	0.7700	19.8696 (74)			
South				5.0400	46.7521	0.7200	0.7000	0.7700	82.2991 (78)			
West				2.0800	19.6403	0.7200	0.7000	0.7700	14.2684 (80)			
South				3.7800	46.7521	0.7200	0.7000	0.7700	61.7243 (78)			
Solar gains	178.1614	301.7571	410.9512	510.2672	575.6439	574.1179	552.3523	502.6246	444.9063	332.7319	213.0196	152.7474 (83)
Total gains	642.5170	763.9002	858.3461	933.8208	974.8565	949.9972	913.1558	869.7135	824.3184	736.2078	644.1357	604.7217 (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	56.8151	57.0003	57.1829	58.0567	58.2231	59.0107	59.0107	59.1589	58.7048	58.2231	57.8874	57.5405
alpha	4.7877	4.8000	4.8122	4.8704	4.8815	4.9340	4.9340	4.9439	4.9137	4.8815	4.8592	4.8360
util living area	0.9963	0.9910	0.9781	0.9411	0.8517	0.6847	0.5155	0.5596	0.7939	0.9562	0.9917	0.9972 (86)
MIT	19.7473	19.9371	20.2051	20.5340	20.8001	20.9512	20.9901	20.9854	20.8964	20.5509	20.0886	19.7193 (87)
Th 2	19.9007	19.9039	19.9070	19.9216	19.9244	19.9371	19.9371	19.9395	19.9322	19.9244	19.9188	19.9130 (88)
util rest of house	0.9950	0.9879	0.9705	0.9201	0.8004	0.5910	0.3965	0.4389	0.7121	0.9361	0.9884	0.9962 (89)
MIT 2	18.2471	18.5252	18.9137	19.3863	19.7330	19.9056	19.9337	19.9338	19.8537	19.4200	18.7577	18.2150 (90)
Living area fraction									fLA = Living area / (4) =			0.2671 (91)
MIT	18.6478	18.9024	19.2587	19.6928	20.0180	20.1849	20.2158	20.2147	20.1322	19.7221	19.1132	18.6168 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.4978	18.7524	19.1087	19.5428	19.8680	20.0349	20.0658	20.0647	19.9822	19.5721	18.9632	18.4668 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9926	0.9834	0.9630	0.9109	0.7973	0.6003	0.4113	0.4537	0.7164	0.9275	0.9841	0.9943	(94)
Useful gains	637.7493	751.2341	826.6080	850.6631	777.2179	570.2451	375.6183	394.5785	590.5810	682.8571	633.9088	601.2881	(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	1610.4764	1566.1879	1421.0183	1181.4140	904.1043	593.5454	378.5077	399.2215	645.7513	993.1042	1320.7297	1597.9061	(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													

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

723.7089	547.6490	442.2412	238.1406	94.4035	0.0000	0.0000	0.0000	0.0000	230.8238	494.5111	741.4838 (98)
Space heating											3512.9619 (98)
Space heating per m2											(98) / (4) = 37.9124 (99)

8c. Space cooling requirement

Not applicable

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 %)	90.0000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Space heating requirement	3903.2910 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	723.7089	547.6490	442.2412	238.1406	94.4035	0.0000	0.0000	0.0000	0.0000	230.8238	494.5111	741.4838	(98)
Space heating efficiency (main heating system 1)	90.0000	90.0000	90.0000	90.0000	90.0000	0.0000	0.0000	0.0000	0.0000	90.0000	90.0000	90.0000	(210)
Space heating fuel (main heating system)	804.1210	608.4989	491.3791	264.6007	104.8928	0.0000	0.0000	0.0000	0.0000	256.4709	549.4567	823.8709	(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	215.8356	190.4018	200.3491	180.1341	176.9126	158.6342	152.8803	167.0277	166.5041	186.7625	196.8103	210.8230	(64)
Efficiency of water heater (217)m	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	(216)
Fuel for water heating, kWh/month	239.8173	211.5575	222.6101	200.1490	196.5696	176.2602	169.8669	185.5863	185.0046	207.5139	218.6782	234.2478	(219)
Water heating fuel used												2447.8615	(219)
Annual totals kWh/year													
Space heating fuel - main system												3903.2910	(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)												393.8716	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV Unit 0 (0.80 * 1.00 * 1080 * 0.80) =										-690.8958		-690.8958	(233)
Total delivered energy for all uses												6129.1282	(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	3903.2910	0.2160	843.1109	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2447.8615	0.2160	528.7381	(264)
Space and water heating			1371.8489	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	393.8716	0.5190	204.4193	(268)
Energy saving/generation technologies				
PV Unit	-690.8958	0.5190	-358.5749	(269)
Total CO2, kg/year			1256.6184	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			13.5600	(273)

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

DER		13.5600	ZC1
Total Floor Area	TFA	92.6600	
Assumed number of occupants	N	2.6604	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		15.5971	ZC2
CO2 emissions from cooking, equation (L16)		1.9733	ZC3
Total CO2 emissions		31.1304	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		31.1304	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	46.3300 (1b)	x 2.3800 (2b)	= 110.2654 (1b) - (3b)
First floor	46.3300 (1c)	x 2.5900 (2c)	= 119.9947 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	92.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 230.2601 (5)

2. Ventilation rate

										main	secondary	other	total	m3 per hour			
										heating	heating						
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																3 * 10 =	30.0000 (7a)
Number of passive vents																0 * 10 =	0.0000 (7b)
Number of flueless gas fires																0 * 40 =	0.0000 (7c)
										Air changes per hour							
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000	/ (5) =	0.1303 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.3803 (18)							
Number of sides sheltered										1 (19)							
Shelter factor										(20) = 1 - [0.075 x (19)] =					0.9250 (20)		
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) =					0.3518 (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	0.4485	0.4397	0.4309	0.3869	0.3781	0.3342	0.3342	0.3254	0.3518	0.3781	0.3957	0.4133 (22b)					
Effective ac	0.6006	0.5967	0.5928	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854 (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 Semi-glazed door			2.0000	1.2000	2.4000			(26a)					
TER Opening Type (Uw = 1.40)			16.2500	1.3258	21.5436			(27)					
Heat Loss Floor 1			46.3300	0.1300	6.0229			(28a)					
brick	95.9100	18.2500	77.6600	0.1800	13.9788			(29a)					
External Roof 1	46.3300		46.3300	0.1300	6.0229			(30)					
Total net area of external elements Aum(A, m2)			188.5700					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		49.9682			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								10.5237 (36)					
Total fabric heat loss						(33) + (36) =		60.4919 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 45.6353	Feb 45.3386	Mar 45.0477	Apr 43.6814	May 43.4258	Jun 42.2358	Jul 42.2358	Aug 42.0154	Sep 42.6941	Oct 43.4258	Nov 43.9429	Dec 44.4835	(38)
Heat transfer coeff	106.1272	105.8304	105.5395	104.1732	103.9176	102.7276	102.7276	102.5073	103.1860	103.9176	104.4348	104.9754	(39)
Average = Sum(39)m / 12 =												104.1720	(39)
HLP	Jan 1.1453	Feb 1.1421	Mar 1.1390	Apr 1.1243	May 1.1215	Jun 1.1087	Jul 1.1087	Aug 1.1063	Sep 1.1136	Oct 1.1215	Nov 1.1271	Dec 1.1329	(40)
HLP (average)												1.1242	(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												2.6604 (42)
Average daily hot water use (litres/day)												97.3847 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	107.1231	103.2277	99.3324	95.4370	91.5416	87.6462	87.6462	91.5416	95.4370	99.3324	103.2277	107.1231 (44)
Energy conte	158.8605	138.9404	143.3741	124.9970	119.9376	103.4970	95.9052	110.0526	111.3670	129.7875	141.6732	153.8479 (45)
Energy content (annual)											Total = Sum(45)m =	1532.2400 (45)
Distribution loss	(46)m = 0.15 x (45)m											
	23.8291	20.8411	21.5061	18.7495	17.9906	15.5246	14.3858	16.5079	16.7050	19.4681	21.2510	23.0772 (46)
Water storage loss:												
Store volume												250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8903 (48)
Temperature factor from Table 2b												0.5400 (49)

Enter (49) or (54) in (55)											1.0208 (55)	
Total storage loss	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (56)
If cylinder contains dedicated solar storage	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (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	213.7673	188.5336	198.2809	178.1326	174.8444	156.6326	150.8120	164.9594	164.5026	184.6943	194.8088	208.7547 (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	213.7673	188.5336	198.2809	178.1326	174.8444	156.6326	150.8120	164.9594	164.5026	184.6943	194.8088	208.7547 (64)
	Total per year (kWh/year) = Sum(64)m =										2178.7231 (64)	
Heat gains from water heating, kWh/month	96.7466	85.8723	91.5973	84.0700	83.8047	76.9212	75.8139	80.5179	79.5380	87.0798	89.6148	95.0799 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3026	19.8090	16.1098	12.1961	9.1167	7.6967	8.3166	10.8102	14.5095	18.4231	21.5025	22.9225 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.8872	246.4180	240.0405	226.4636	209.3251	193.2174	182.4564	179.9256	186.3031	199.8801	217.0185	233.1263 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020 (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)	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163 (71)
Water heating gains (Table 5)	130.0357	127.7861	123.1147	116.7639	112.6407	106.8351	101.9004	108.2230	110.4695	117.0427	124.4650	127.7955 (72)
Total internal gains	462.1316	459.9192	445.1710	421.3296	396.9887	373.6553	358.5796	364.8650	377.1882	401.2520	428.8922	449.7504 (73)

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				5.3500	10.6334	0.6300	0.7000	0.7700	17.3859 (74)			
South				8.8200	46.7521	0.6300	0.7000	0.7700	126.0205 (78)			
West				2.0800	19.6403	0.6300	0.7000	0.7700	12.4848 (80)			
Solar gains	155.8912	264.0374	359.5823	446.4838	503.6884	502.3532	483.3082	439.7965	389.2930	291.1404	186.3921	133.6540 (83)
Total gains	618.0229	723.9567	804.7533	867.8134	900.6770	876.0085	841.8878	804.6615	766.4812	692.3924	615.2843	583.4044 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nll,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	60.6322	60.8022	60.9698	61.7694	61.9214	62.6387	62.6387	62.7733	62.3604	61.9214	61.6148	61.2974
alpha	5.0421	5.0535	5.0647	5.1180	5.1281	5.1759	5.1759	5.1849	5.1574	5.1281	5.1077	5.0865
util living area	0.9968	0.9923	0.9813	0.9487	0.8648	0.6994	0.5267	0.5702	0.8052	0.9608	0.9928	0.9976 (86)
MIT	19.8270	19.9998	20.2479	20.5547	20.8090	20.9543	20.9913	20.9870	20.9033	20.5767	20.1442	19.7987 (87)
Th 2	19.9640	19.9666	19.9691	19.9811	19.9833	19.9938	19.9938	19.9957	19.9897	19.9833	19.9788	19.9740 (88)
util rest of house	0.9957	0.9898	0.9749	0.9302	0.8173	0.6094	0.4116	0.4537	0.7276	0.9429	0.9899	0.9968 (89)
MIT 2	18.4084	18.6614	19.0216	19.4633	19.7973	19.9635	19.9906	19.9905	19.9150	19.5025	18.8817	18.3742 (90)
Living area fraction	18.7873	19.0189	19.3492	19.7549	20.0675	20.2282	20.2579	20.2566	fLa = Living area / (4) =	20.1790	19.7894	19.2190
MIT	18.7873	19.0189	19.3492	19.7549	20.0675	20.2282	20.2579	20.2566	20.1790	19.7894	19.2190	18.7547 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7873	19.0189	19.3492	19.7549	20.0675	20.2282	20.2579	20.2566	20.1790	19.7894	19.2190	18.7547 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9939	0.9866	0.9698	0.9252	0.8217	0.6317	0.4425	0.4850	0.7438	0.9386	0.9869	0.9954 (94)
Useful gains	614.2752	714.2505	780.4456	802.8806	740.1257	553.3819	372.5439	390.2234	570.1059	649.8525	607.2424	580.7032 (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	1537.4979	1494.2098	1356.0934	1130.7858	869.5310	578.1697	375.7637	395.3343	627.2651	954.9401	1265.6408	1527.8817 (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	686.8777	524.1327	428.2819	236.0917	96.2775	0.0000	0.0000	0.0000	0.0000	226.9852	474.0469	704.7008 (98)
Space heating												3377.3943 (98)
Space heating per m2										(98) / (4) =		36.4493 (99)

Regs Region: England
Elmhurst Energy Systems
SAP2012 Calculator (Design
System) version 4.14r19

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 %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3612.1865 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	686.8777	524.1327	428.2819	236.0917	96.2775	0.0000	0.0000	0.0000	0.0000	226.9852	474.0469	704.7008	(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)	734.6285	560.5697	458.0555	252.5045	102.9706	0.0000	0.0000	0.0000	0.0000	242.7649	507.0020	753.6907	(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	213.7673	188.5336	198.2809	178.1326	174.8444	156.6326	150.8120	164.9594	164.5026	184.6943	194.8088	208.7547	(64)
Efficiency of water heater (217)m	87.7087	87.3998	86.8162	85.5661	83.2972	79.8000	79.8000	79.8000	79.8000	85.3648	87.0985	79.8000	(216)
Fuel for water heating, kWh/month	243.7242	215.7141	228.3916	208.1813	209.9041	196.2815	188.9875	206.7160	206.1436	216.3587	223.6649	237.7365	(219)
Water heating fuel used												2581.8041	(219)
Annual totals kWh/year													
Space heating fuel - main system												3612.1865	(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)												393.8716	(232)
Total delivered energy for all uses												6662.8621	(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	3612.1865	0.2160	780.2323 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2581.8041	0.2160	557.6697 (264)
Space and water heating			1337.9020 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	393.8716	0.5190	204.4193 (268)
Total CO2, kg/m2/year			1581.2463 (272)
Emissions per m2 for space and water heating			14.4388 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2061 (272b)
Emissions per m2 for pumps and fans			0.4201 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.4388 * 1.00) + 2.2061 + 0.4201, rounded to 2 d.p.			17.0700 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	P3 Riley	Issued on Date	01/08/2022
Assessment Reference	P3 Riley	Prop Type Ref	
Property	Plot 3, Riley Road, Reading		

SAP Rating	88 B	DER	13.47	TER	16.93
Environmental	89 B	% DER<TER	20.43		
CO ₂ Emissions (t/year)	0.94	DFEE	44.48	TFEE	49.08
General Requirements Compliance	Pass	% DFEE<TFEE	9.38		

Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com	Assessor ID	L609-0001
------------------	--	-------------	-----------

Client	
--------	--

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	46.3300 (1b)	x 2.3800 (2b)	= 110.2654 (1b) - (3b)
First floor	46.3300 (1c)	x 2.5900 (2c)	= 119.9947 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	92.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 230.2601 (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								3 * 10 =	30.0000 (7a)			
Number of passive vents								0 * 10 =	0.0000 (7b)			
Number of flueless gas fires								0 * 40 =	0.0000 (7c)			
									Air changes per hour			
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =							30.0000 / (5) =	0.1303 (8)			
Pressure test								Yes				
Measured/design AP50									5.0000			
Infiltration rate									0.3803 (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) =	0.3232 (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	0.4121	0.4041	0.3960	0.3556	0.3475	0.3071	0.3071	0.2990	0.3232	0.3475	0.3636	0.3798 (22b)
Effective ac	0.5849	0.5816	0.5784	0.5632	0.5604	0.5471	0.5471	0.5447	0.5522	0.5604	0.5661	0.5721 (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
windows (Uw = 1.30)			12.4700	1.2357	15.4097		(27)
patio doors (Uw = 1.30)			3.7800	1.2357	4.6711		(27)
pers door			2.0000	1.0000	2.0000		(26a)
Heat Loss Floor 1			46.3300	0.1100	5.0963	75.0000	3474.7500 (28a)
brick	95.9100	18.2500	77.6600	0.2000	15.5320	70.0000	5436.2000 (29a)
External Roof 1	46.3300		46.3300	0.1000	4.6330	9.0000	416.9700 (30)
Total net area of external elements Aum(A, m ²)			188.5700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	47.3421			(33)
Party Wall 1			46.6100	0.0000	0.0000	180.0000	8389.8000 (32)
Internal Wall 1			35.0000			9.0000	315.0000 (32c)
Internal Wall 2			35.0000			100.0000	3500.0000 (32c)
Internal Floor 1			46.3300			18.0000	833.9400 (32d)
Internal Ceiling 1			46.3300			9.0000	416.9700 (32e)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	22783.6300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							245.8842 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.6086 (36)
Total fabric heat loss						(33) + (36) =	65.9507 (37)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)m \times (5)$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.4463	44.1957	43.9500	42.7963	42.5805	41.5756	41.5756	41.3895	41.9627	42.5805	43.0171	43.4737	(38)
Heat transfer coeff	110.3970	110.1464	109.9007	108.7470	108.5312	107.5263	107.5263	107.3402	107.9134	108.5312	108.9678	109.4244	(39)
Average = Sum(39)m / 12 =												108.7460	(39)
HLP	1.1914	1.1887	1.1861	1.1736	1.1713	1.1604	1.1604	1.1584	1.1646	1.1713	1.1760	1.1809	(40)
HLP (average)												1.1736	(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												2.6604	(42)
Average daily hot water use (litres/day)												97.3847	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	107.1231	103.2277	99.3324	95.4370	91.5416	87.6462	87.6462	91.5416	95.4370	99.3324	103.2277	107.1231	(44)
Energy conte	158.8605	138.9404	143.3741	124.9970	119.9376	103.4970	95.9052	110.0526	111.3670	129.7875	141.6732	153.8479	(45)
Energy content (annual)											Total = Sum(45)m =	1532.2400	(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													
	33.7579	29.5248	30.4670	26.5619	25.4867	21.9931	20.3799	23.3862	23.6655	27.5798	30.1056	32.6927	(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	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3026	19.8090	16.1098	12.1961	9.1167	7.6967	8.3166	10.8102	14.5095	18.4231	21.5025	22.9225	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.8872	246.4180	240.0405	226.4636	209.3251	193.2174	182.4564	179.9256	186.3031	199.8801	217.0185	233.1263	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	(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)	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	(71)
Water heating gains (Table 5)	45.3735	43.9358	40.9503	36.8915	34.2564	30.5460	27.3923	31.4330	32.8687	37.0697	41.8133	43.9418	(72)
Total internal gains	374.4694	373.0689	360.0066	338.4573	315.6043	294.3662	281.0714	285.0750	296.5875	318.2790	343.2404	362.8966	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c	Access factor Table 6d		Gains W	
North					5.3500	10.6334	0.7200		0.7000	0.7700		19.8696 (74)	
East					2.0800	19.6403	0.7200		0.7000	0.7700		14.2684 (76)	
South					5.0400	46.7521	0.7200		0.7000	0.7700		82.2991 (78)	
South					3.7800	46.7521	0.7200		0.7000	0.7700		61.7243 (78)	
Solar gains	178.1614	301.7571	410.9512	510.2672	575.6439	574.1179	552.3523	502.6246	444.9063	332.7319	213.0196	152.7474 (83)	
Total gains	552.6308	674.8259	770.9578	848.7244	891.2482	868.4841	833.4237	787.6996	741.4938	651.0108	556.2600	515.6440 (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	57.3275	57.4580	57.5864	58.1973	58.3131	58.8580	58.8580	58.9601	58.6469	58.3131	58.0794	57.8371	
alpha	4.8218	4.8305	4.8391	4.8798	4.8875	4.9239	4.9239	4.9307	4.9098	4.8875	4.8720	4.8558	
util living area	0.9979	0.9942	0.9844	0.9548	0.8774	0.7225	0.5520	0.6019	0.8325	0.9701	0.9952	0.9985 (86)	
MIT	19.6831	19.8759	20.1486	20.4832	20.7674	20.9378	20.9866	20.9799	20.8696	20.4914	20.0178	19.6486 (87)	
Th 2	19.9269	19.9290	19.9312	19.9412	19.9430	19.9518	19.9518	19.9534	19.9484	19.9430	19.9393	19.9353 (88)	
util rest of house	0.9972	0.9922	0.9789	0.9380	0.8317	0.6303	0.4285	0.4771	0.7577	0.9557	0.9932	0.9980 (89)	
MIT 2	18.7303	18.9238	19.1952	19.5275	19.7862	19.9230	19.9484	19.9477	19.8774	19.5422	19.0740	18.7026 (90)	
Living area fraction									fLA = Living area / (4) =			0.2671 (91)	
MIT	18.9848	19.1781	19.4499	19.7828	20.0483	20.1941	20.2257	20.2234	20.1424	19.7958	19.3261	18.9553 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.9848	19.1781	19.4499	19.7828	20.0483	20.1941	20.2257	20.2234	20.1424	19.7958	19.3261	18.9553 (93)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9963	0.9903	0.9757	0.9349	0.8369	0.6532	0.4618	0.5108	0.7733	0.9531	0.9917	0.9973	(94)
Useful gains	550.5959	668.3109	752.2459	793.5130	745.8958	567.3264	384.8788	402.3372	573.4295	620.4971	551.6346	514.2677	(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	1621.1599	1572.6852	1423.2019	1183.4674	906.0465	601.5108	389.8581	410.4020	652.0600	998.0269	1332.2536	1614.5890	(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	796.4996	607.7395	499.1912	280.7671	119.1522	0.0000	0.0000	0.0000	0.0000	280.8821	562.0457	818.6390	(98)
Space heating												3964.9165	(98)
Space heating per m2												(98) / (4) =	42.7899 (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	1010.7475	795.6948	815.7858	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8696	0.9285	0.9097	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	878.9121	738.8376	742.1425	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1116.0499	1072.9444	1021.3186	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	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 kWh	0.0000	0.0000	0.0000	0.0000	0.0000	170.7392	248.5754	207.7070	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												627.0216	(104)
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	42.6848	62.1439	51.9267	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling												156.7554	(107)
Space cooling per m2												1.6917	(108)
Energy for space heating												42.7899	(99)
Energy for space cooling												1.6917	(108)
Total												44.4817	(109)
Dwelling Fabric Energy Efficiency (DFEE)												44.5	(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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	46.3300 (1b)	x 2.3800 (2b)	= 110.2654 (1b) - (3b)
First floor	46.3300 (1c)	x 2.5900 (2c)	= 119.9947 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	92.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 230.2601 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 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) = 0.1303 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3803 (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) =	0.3232 (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	0.4121	0.4041	0.3960	0.3556	0.3475	0.3071	0.3071	0.2990	0.3232	0.3475	0.3636	0.3798 (22b)
Effective ac	0.5849	0.5816	0.5784	0.5632	0.5604	0.5471	0.5471	0.5447	0.5522	0.5604	0.5661	0.5721 (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 Semi-glazed door			2.0000	1.2000	2.4000		(26a)
TER Opening Type (Uw = 1.40)			16.2500	1.3258	21.5436		(27)
Heat Loss Floor 1			46.3300	0.1300	6.0229		(28a)
brick	95.9100	18.2500	77.6600	0.1800	13.9788		(29a)
External Roof 1	46.3300		46.3300	0.1300	6.0229		(30)
Total net area of external elements Aum(A, m ²)			188.5700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		49.9682		(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)							10.5237 (36)
Total fabric heat loss						(33) + (36) =	60.4919 (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	44.4463	44.1957	43.9500	42.7963	42.5805	41.5756	41.5756	41.3895	41.9627	42.5805	43.0171	43.4737 (38)
Heat transfer coeff	104.9381	104.6875	104.4419	103.2882	103.0723	102.0675	102.0675	101.8814	102.4545	103.0723	103.5090	103.9655 (39)
Average = Sum(39)m / 12 =												103.2872 (39)
HLP	1.1325	1.1298	1.1272	1.1147	1.1124	1.1015	1.1015	1.0995	1.1057	1.1124	1.1171	1.1220 (40)
HLP (average)												1.1147 (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												2.6604 (42)
Average daily hot water use (litres/day)												97.3847 (43)
Daily hot water use	107.1231	103.2277	99.3324	95.4370	91.5416	87.6462	87.6462	91.5416	95.4370	99.3324	103.2277	107.1231 (44)
Energy conte	158.8605	138.9404	143.3741	124.9970	119.9376	103.4970	95.9052	110.0526	111.3670	129.7875	141.6732	153.8479 (45)
Energy content (annual)										Total = Sum(45)m =		1532.2400 (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

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Heat gains from water heating, kWh/month	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)
	33.7579	29.5248	30.4670	26.5619	25.4867	21.9931	20.3799	23.3862	23.6655	27.5798	30.1056	32.6927 (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	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3026	19.8090	16.1098	12.1961	9.1167	7.6967	8.3166	10.8102	14.5095	18.4231	21.5025	22.9225	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.8872	246.4180	240.0405	226.4636	209.3251	193.2174	182.4564	179.9256	186.3031	199.8801	217.0185	233.1263	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	(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)	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	(71)
Water heating gains (Table 5)	45.3735	43.9358	40.9503	36.8915	34.2564	30.5460	27.3923	31.4330	32.8687	37.0697	41.8133	43.9418	(72)
Total internal gains	374.4694	373.0689	360.0066	338.4573	315.6043	294.3662	281.0714	285.0750	296.5875	318.2790	343.2404	362.8966	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				5.3500	10.6334		0.6300		0.7000		0.7700		17.3859 (74)
East				2.0800	19.6403		0.6300		0.7000		0.7700		12.4848 (76)
South				8.8200	46.7521		0.6300		0.7000		0.7700		126.0205 (78)
Solar gains	155.8912	264.0374	359.5823	446.4838	503.6884	502.3532	483.3082	439.7965	389.2930	291.1404	186.3921	133.6540	(83)
Total gains	530.3607	637.1063	719.5889	784.9410	819.2927	796.7194	764.3797	724.8715	685.8805	609.4194	529.6325	496.5506	(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	61.3192	61.4660	61.6105	62.2987	62.4292	63.0438	63.0438	63.1589	62.8056	62.4292	62.1658	61.8928		
alpha	5.0879	5.0977	5.1074	5.1532	5.1619	5.2029	5.2029	5.2106	5.1870	5.1619	5.1444	5.1262		
util living area	0.9984	0.9956	0.9881	0.9641	0.8958	0.7457	0.5717	0.6213	0.8508	0.9759	0.9963	0.9989	(86)	
MIT	19.7565	19.9307	20.1824	20.4971	20.7707	20.9395	20.9876	20.9813	20.8739	20.5130	20.0710	19.7259	(87)	
Th 2	19.9744	19.9766	19.9787	19.9888	19.9907	19.9996	19.9996	20.0012	19.9962	19.9907	19.9869	19.9829	(88)	
util rest of house	0.9979	0.9941	0.9839	0.9502	0.8548	0.6569	0.4498	0.4989	0.7809	0.9639	0.9948	0.9985	(89)	
MIT 2	18.8400	19.0153	19.2665	19.5813	19.8334	19.9712	19.9964	19.9958	19.9262	19.6024	19.1640	18.8163	(90)	
Living area fraction									fLA = Living area / (4) =			0.2671	(91)	
MIT	19.0848	19.2598	19.5111	19.8259	20.0838	20.2298	20.2612	20.2590	20.1793	19.8456	19.4062	19.0593	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.0848	19.2598	19.5111	19.8259	20.0838	20.2298	20.2612	20.2590	20.1793	19.8456	19.4062	19.0593	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.9972	0.9927	0.9813	0.9475	0.8592	0.6789	0.4828	0.5319	0.7954	0.9617	0.9936	0.9980	(94)	
Ext temp.	528.8759	632.4664	706.1465	743.7286	703.9219	540.9284	369.0168	385.5696	545.5708	586.0785	526.2296	495.5479	(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	1551.4915	1503.2888	1358.9072	1128.5203	864.1329	574.6220	373.6845	393.1643	622.8535	952.9690	1273.8076	1544.8548	(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	760.8259	585.1927	485.6540	277.0500	119.1970	0.0000	0.0000	0.0000	0.0000	272.9665	538.2561	780.6843	(98)	
Space heating												3819.8266	(98)	
Space heating per m2												41.2241	(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	959.4344	755.2994	774.2987	0.0000	0.0000	0.0000	0.0000	(100)	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8678	0.9292	0.9108	0.0000	0.0000	0.0000	0.0000	(101)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	832.5975	701.8495	705.2018	0.0000	0.0000	0.0000	0.0000	(102)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1032.1691	992.2435	947.8832	0.0000	0.0000	0.0000	0.0000	(103)	
Month fracti	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 kWh	0.0000	0.0000	0.0000	0.0000	0.0000	143.6915	216.0532	180.5550	0.0000	0.0000	0.0000	0.0000	(104)	
Space cooling												540.2996	(104)	

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	35.9229	54.0133	45.1387	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												135.0749 (107)
Space cooling per m2												1.4577 (108)
Energy for space heating												41.2241 (99)
Energy for space cooling												1.4577 (108)
Total												42.6819 (109)
Target Fabric Energy Efficiency (TFEE)												49.1 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	P4 Riley	Issued on Date	01/08/2022
Assessment Reference	P4 Riley	Prop Type Ref	
Property	Plot 4, Riley Road, Reading		

SAP Rating	88 B	DER	13.56	TER	17.07
Environmental	89 B	% DER<TER	20.54		
CO ₂ Emissions (t/year)	0.94	DFEE	45.10	TFEE	49.81
General Requirements Compliance	Pass	% DFEE<TFEE	9.45		

Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com	Assessor ID	L609-0001
------------------	--	-------------	-----------

Client	
--------	--

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	46.3300 (1b)	x 2.3800 (2b)	= 110.2654 (1b) - (3b)
First floor	46.3300 (1c)	x 2.5900 (2c)	= 119.9947 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	92.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 230.2601 (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								3 * 10 =	30.0000 (7a)			
Number of passive vents								0 * 10 =	0.0000 (7b)			
Number of flueless gas fires								0 * 40 =	0.0000 (7c)			
									Air changes per hour			
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =							30.0000 / (5) =	0.1303 (8)			
Pressure test								Yes				
Measured/design AP50									5.0000			
Infiltration rate									0.3803 (18)			
Number of sides sheltered									1 (19)			
Shelter factor								(20) = 1 - [0.075 x (19)] =	0.9250 (20)			
Infiltration rate adjusted to include shelter factor								(21) = (18) x (20) =	0.3518 (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	0.4485	0.4397	0.4309	0.3869	0.3781	0.3342	0.3342	0.3254	0.3518	0.3781	0.3957	0.4133 (22b)
Effective ac	0.6006	0.5967	0.5928	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854 (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
windows (Uw = 1.30)			12.4700	1.2357	15.4097		(27)
patio doors (Uw = 1.30)			3.7800	1.2357	4.6711		(27)
pers door			2.0000	1.0000	2.0000		(26a)
Heat Loss Floor 1			46.3300	0.1100	5.0963	75.0000	3474.7500 (28a)
brick	95.9100	18.2500	77.6600	0.2000	15.5320	70.0000	5436.2000 (29a)
External Roof 1	46.3300		46.3300	0.1000	4.6330	9.0000	416.9700 (30a)
Total net area of external elements Aum(A, m ²)			188.5700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	47.3421			(33)
Party Wall 1			46.6100	0.0000	0.0000	180.0000	8389.8000 (32)
Internal Wall 1			35.0000			9.0000	315.0000 (32c)
Internal Wall 2			35.0000			100.0000	3500.0000 (32c)
Internal Floor 1			46.3300			18.0000	833.9400 (32d)
Internal Ceiling 1			46.3300			9.0000	416.9700 (32e)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	22783.6300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							245.8842 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							18.6086 (36)
Total fabric heat loss						(33) + (36) =	65.9507 (37)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

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	45.6353	45.3386	45.0477	43.6814	43.4258	42.2358	42.2358	42.0154	42.6941	43.4258	43.9429	44.4835	(38)
Heat transfer coeff	111.5860	111.2893	110.9984	109.6321	109.3765	108.1865	108.1865	107.9661	108.6448	109.3765	109.8936	110.4342	(39)
Average = Sum(39)m / 12 =												109.6309	(39)
HLP	1.2043	1.2010	1.1979	1.1832	1.1804	1.1676	1.1676	1.1652	1.1725	1.1804	1.1860	1.1918	(40)
HLP (average)												1.1832	(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												2.6604	(42)
Average daily hot water use (litres/day)												97.3847	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.1231	103.2277	99.3324	95.4370	91.5416	87.6462	87.6462	91.5416	95.4370	99.3324	103.2277	107.1231	(44)
Energy conte	158.8605	138.9404	143.3741	124.9970	119.9376	103.4970	95.9052	110.0526	111.3670	129.7875	141.6732	153.8479	(45)
Energy content (annual)												1532.2400	(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 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	33.7579	29.5248	30.4670	26.5619	25.4867	21.9931	20.3799	23.3862	23.6655	27.5798	30.1056	32.6927	(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	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3026	19.8090	16.1098	12.1961	9.1167	7.6967	8.3166	10.8102	14.5095	18.4231	21.5025	22.9225	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.8872	246.4180	240.0405	226.4636	209.3251	193.2174	182.4564	179.9256	186.3031	199.8801	217.0185	233.1263	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	(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)	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	(71)
Water heating gains (Table 5)	45.3735	43.9358	40.9503	36.8915	34.2564	30.5460	27.3923	31.4330	32.8687	37.0697	41.8133	43.9418	(72)
Total internal gains	374.4694	373.0689	360.0066	338.4573	315.6043	294.3662	281.0714	285.0750	296.5875	318.2790	343.2404	362.8966	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
North				5.3500	10.6334	0.7200	0.7000	0.7700	19.8696 (74)				
South				5.0400	46.7521	0.7200	0.7000	0.7700	82.2991 (78)				
West				2.0800	19.6403	0.7200	0.7000	0.7700	14.2684 (80)				
South				3.7800	46.7521	0.7200	0.7000	0.7700	61.7243 (78)				
Solar gains	178.1614	301.7571	410.9512	510.2672	575.6439	574.1179	552.3523	502.6246	444.9063	332.7319	213.0196	152.7474	(83)
Total gains	552.6308	674.8259	770.9578	848.7244	891.2482	868.4841	833.4237	787.6996	741.4938	651.0108	556.2600	515.6440	(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	56.7167	56.8679	57.0169	57.7275	57.8624	58.4989	58.4989	58.6183	58.2521	57.8624	57.5901	57.3082	
alpha	4.7811	4.7912	4.8011	4.8485	4.8575	4.8999	4.8999	4.9079	4.8835	4.8575	4.8393	4.8205	
util living area	0.9979	0.9942	0.9846	0.9554	0.8791	0.7250	0.5548	0.6046	0.8345	0.9704	0.9952	0.9985 (86)	
MIT	19.6660	19.8597	20.1343	20.4737	20.7614	20.9358	20.9861	20.9791	20.8662	20.4835	20.0064	19.6340 (87)	
Th 2	19.9166	19.9192	19.9217	19.9335	19.9357	19.9460	19.9460	19.9480	19.9421	19.9357	19.9312	19.9265 (88)	
util rest of house	0.9972	0.9922	0.9791	0.9388	0.8337	0.6326	0.4302	0.4789	0.7598	0.9562	0.9933	0.9980 (89)	
MIT 2	18.7051	18.8999	19.1736	19.5121	19.7746	19.9164	19.9425	19.9420	19.8691	19.5286	19.0564	18.6811 (90)	
Living area fraction									fLA = Living area / (4) =			0.2671 (91)	
MIT	18.9618	19.1563	19.4302	19.7689	20.0381	20.1887	20.2212	20.2190	20.1354	19.7837	19.3102	18.9356 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.9618	19.1563	19.4302	19.7689	20.0381	20.1887	20.2212	20.2190	20.1354	19.7837	19.3102	18.9356 (93)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9963	0.9904	0.9759	0.9356	0.8387	0.6555	0.4638	0.5128	0.7753	0.9535	0.9917	0.9973	(94)
Useful gains	550.5862	668.3265	752.3951	794.0838	747.4701	569.2995	386.5687	403.9453	574.8884	620.7599	551.6397	514.2594	(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	1636.0507	1586.5702	1435.2324	1191.5827	911.9971	604.6170	391.7681	412.3249	655.7164	1004.4786	1341.8177	1627.3193	(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	807.5856	617.0598	508.0309	286.1992	122.4081	0.0000	0.0000	0.0000	0.0000	285.4867	568.9281	828.1166	(98)
Space heating												4023.8151	(98)
Space heating per m2												43.4256	(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	1016.9527	800.5798	820.5423	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8667	0.9265	0.9075	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	881.3584	741.7209	744.6122	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1116.0499	1072.9444	1021.3186	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	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 kWh	0.0000	0.0000	0.0000	0.0000	0.0000	168.9779	246.4303	205.8696	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												621.2778	(104)
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	42.2445	61.6076	51.4674	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling												155.3194	(107)
Space cooling per m2												1.6762	(108)
Energy for space heating												43.4256	(99)
Energy for space cooling												1.6762	(108)
Total												45.1018	(109)
Dwelling Fabric Energy Efficiency (DFEE)												45.1	(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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	46.3300 (1b)	x 2.3800 (2b)	= 110.2654 (1b) - (3b)
First floor	46.3300 (1c)	x 2.5900 (2c)	= 119.9947 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	92.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 230.2601 (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																3 * 10 =	30.0000 (7a)
Number of passive vents																0 * 10 =	0.0000 (7b)
Number of flueless gas fires																0 * 40 =	0.0000 (7c)
										Air changes per hour							
Infiltration due to chimneys, flues and fans										= (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000	/ (5) =	0.1303 (8)
Pressure test										Yes							
Measured/design AP50										5.0000							
Infiltration rate										0.3803 (18)							
Number of sides sheltered										1 (19)							
Shelter factor										(20) = 1 - [0.075 x (19)] =					0.9250 (20)		
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) =					0.3518 (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	0.4485	0.4397	0.4309	0.3869	0.3781	0.3342	0.3342	0.3254	0.3518	0.3781	0.3957	0.4133	(22b)				
Effective ac	0.6006	0.5967	0.5928	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854	(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 Semi-glazed door			2.0000	1.2000	2.4000			(26a)					
TER Opening Type (Uw = 1.40)			16.2500	1.3258	21.5436			(27)					
Heat Loss Floor 1			46.3300	0.1300	6.0229			(28a)					
brick	95.9100	18.2500	77.6600	0.1800	13.9788			(29a)					
External Roof 1	46.3300		46.3300	0.1300	6.0229			(30)					
Total net area of external elements Aum(A, m2)			188.5700					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		49.9682			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								10.5237 (36)					
Total fabric heat loss						(33) + (36) =		60.4919 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 45.6353	Feb 45.3386	Mar 45.0477	Apr 43.6814	May 43.4258	Jun 42.2358	Jul 42.2358	Aug 42.0154	Sep 42.6941	Oct 43.4258	Nov 43.9429	Dec 44.4835	(38)
Heat transfer coeff	106.1272	105.8304	105.5395	104.1732	103.9176	102.7276	102.7276	102.5073	103.1860	103.9176	104.4348	104.9754	(39)
Average = Sum(39)m / 12 =												104.1720	(39)
HLP	Jan 1.1453	Feb 1.1421	Mar 1.1390	Apr 1.1243	May 1.1215	Jun 1.1087	Jul 1.1087	Aug 1.1063	Sep 1.1136	Oct 1.1215	Nov 1.1271	Dec 1.1329	(40)
HLP (average)												1.1242	(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												2.6604 (42)
Average daily hot water use (litres/day)												97.3847 (43)
Daily hot water use	Jan 107.1231	Feb 103.2277	Mar 99.3324	Apr 95.4370	May 91.5416	Jun 87.6462	Jul 87.6462	Aug 91.5416	Sep 95.4370	Oct 99.3324	Nov 103.2277	Dec 107.1231 (44)
Energy conte	158.8605	138.9404	143.3741	124.9970	119.9376	103.4970	95.9052	110.0526	111.3670	129.7875	141.6732	153.8479 (45)
Energy content (annual)										Total = Sum(45)m =		1532.2400 (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	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

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Heat gains from water heating, kWh/month	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)
	33.7579	29.5248	30.4670	26.5619	25.4867	21.9931	20.3799	23.3862	23.6655	27.5798	30.1056	32.6927 (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	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203	133.0203 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3026	19.8090	16.1098	12.1961	9.1167	7.6967	8.3166	10.8102	14.5095	18.4231	21.5025	22.9225 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.8872	246.4180	240.0405	226.4636	209.3251	193.2174	182.4564	179.9256	186.3031	199.8801	217.0185	233.1263 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020	36.3020 (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)	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163	-106.4163 (71)
Water heating gains (Table 5)	45.3735	43.9358	40.9503	36.8915	34.2564	30.5460	27.3923	31.4330	32.8687	37.0697	41.8133	43.9418 (72)
Total internal gains	374.4694	373.0689	360.0066	338.4573	315.6043	294.3662	281.0714	285.0750	296.5875	318.2790	343.2404	362.8966 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				5.3500	10.6334	0.6300	0.7000	0.7700	17.3859 (74)			
South				8.8200	46.7521	0.6300	0.7000	0.7700	126.0205 (78)			
West				2.0800	19.6403	0.6300	0.7000	0.7700	12.4848 (80)			
Solar gains	155.8912	264.0374	359.5823	446.4838	503.6884	502.3532	483.3082	439.7965	389.2930	291.1404	186.3921	133.6540 (83)
Total gains	530.3607	637.1063	719.5889	784.9410	819.2927	796.7194	764.3797	724.8715	685.8805	609.4194	529.6325	496.5506 (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, nilm (see Table 9a)												
tau	60.6322	60.8022	60.9698	61.7694	61.9214	62.6387	62.6387	62.7733	62.3604	61.9214	61.6148	61.2974
alpha	5.0421	5.0535	5.0647	5.1180	5.1281	5.1759	5.1759	5.1849	5.1574	5.1281	5.1077	5.0865
util living area	0.9984	0.9956	0.9883	0.9646	0.8975	0.7484	0.5748	0.6242	0.8528	0.9762	0.9963	0.9989 (86)
MIT	19.7393	19.9144	20.1681	20.4875	20.7645	20.9375	20.9871	20.9805	20.8704	20.5050	20.0596	19.7112 (87)
Th 2	19.9640	19.9666	19.9691	19.9811	19.9833	19.9938	19.9938	19.9957	19.9897	19.9833	19.9788	19.9740 (88)
util rest of house	0.9979	0.9942	0.9840	0.9509	0.8568	0.6593	0.4518	0.5009	0.7831	0.9643	0.9948	0.9985 (89)
MIT 2	18.8145	18.9910	19.2446	19.5657	19.8215	19.9643	19.9904	19.9901	19.9177	19.5886	19.1461	18.7946 (90)
Living area fraction									fLA = Living area / (4) =			0.2671 (91)
MIT	19.0615	19.2377	19.4912	19.8119	20.0734	20.2243	20.2566	20.2546	20.1721	19.8334	19.3901	19.0394 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0615	19.2377	19.4912	19.8119	20.0734	20.2243	20.2566	20.2546	20.1721	19.8334	19.3901	19.0394 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9972	0.9927	0.9815	0.9481	0.8609	0.6814	0.4850	0.5342	0.7975	0.9621	0.9936	0.9980 (94)
Useful gains	528.8680	632.4775	706.2623	744.2048	705.3549	542.8789	370.7437	387.2095	546.9780	586.3043	526.2338	495.5413 (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	1566.5969	1517.3613	1371.0892	1136.7254	870.1405	577.7694	375.6366	395.1275	626.5587	959.5110	1283.5130	1557.7715 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	772.0703	594.6419	494.6312	282.6148	122.6005	0.0000	0.0000	0.0000	0.0000	277.6658	545.2410	790.2992 (98)
Space heating												3879.7648 (98)
Space heating per m2										(98) / (4) =		41.8710 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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	965.6397	760.1844	779.0551	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8647	0.9270	0.9083	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	834.9473	704.7026	707.6421	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1032.1691	992.2435	947.8832	0.0000	0.0000	0.0000	0.0000 (103)
Month fracti	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 kWh	0.0000	0.0000	0.0000	0.0000	0.0000	141.9997	213.9305	178.7394	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												534.6696 (104)

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	35.4999	53.4826	44.6848	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling												133.6674 (107)
Space cooling per m2												1.4426 (108)
Energy for space heating												41.8710 (99)
Energy for space cooling												1.4426 (108)
Total												43.3135 (109)
Target Fabric Energy Efficiency (TFEE)												49.8 (109)

PREDICTED ENERGY ASSESSMENT

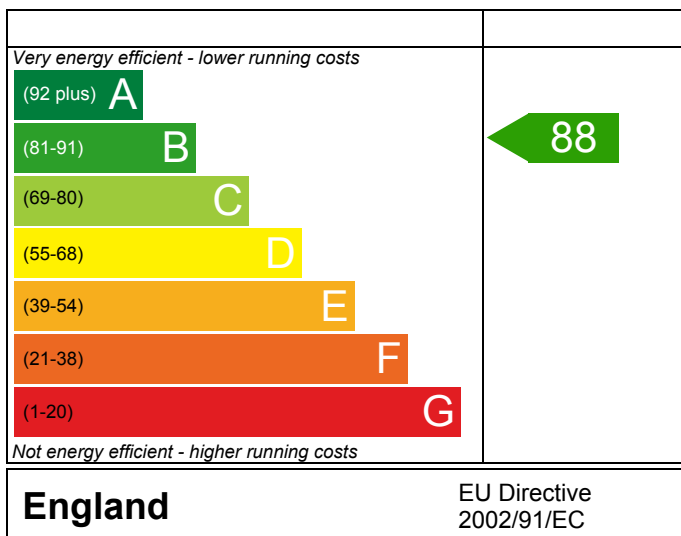
Plot 3, Riley Road,
Reading

Dwelling type: House, Semi-Detached
Date of assessment: 01/08/2022
Produced by: Forum Energy Consultants
Total floor area: 92.66 m²
DRRN: 1289-2608-0824

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.

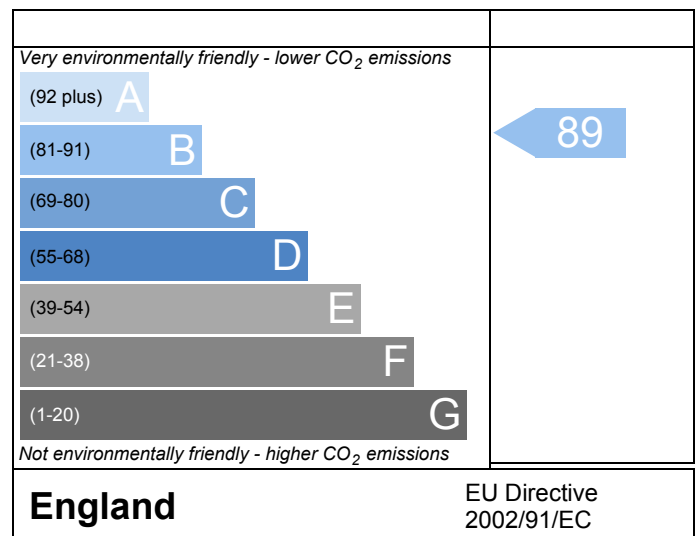
The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating



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



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 been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Property Reference	P3 Riley	Issued on Date	01/08/2022
Assessment Reference	P3 Riley	Prop Type Ref	
Property	Plot 3, Riley Road, Reading		
SAP Rating	88 B	DER	13.47
Environmental	89 B	TER	16.93
CO ₂ Emissions (t/year)	0.94	% DER<TER	20.43
General Requirements Compliance	Pass	DLEE	44.48
		TLEE	49.08
		% DLEE<TLEE	9.38
Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com		Assessor ID
			L609-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TLEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	16.93	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.47	kgCO ₂ /m ²	Pass
	-3.46 (-20.4%)	kgCO ₂ /m ²	

1b TLEE and DLEE

Target Fabric Energy Efficiency (TLEE)	49.08	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DLEE)	44.48	kWh/m ² /yr	
	-4.6 (-9.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.27 (max. 2.00)	1.30 (max. 3.30)	Pass

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)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

This report has been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
X X

Efficiency: 90%
Minimum: 88%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.26 kWh/day
Permitted by DBSCG 2.56

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

5.35 m², Overhang width less than twice window, ratio 0.05

Windows facing East

2.08 m², Overhang width less than twice window, ratio 0.05

Windows facing South

8.82 m², Overhang width less than twice window, ratio 0.05

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

m³/(h.m²) @ 50 Pa

Maximum

10.0

m³/(h.m²) @ 50 Pa

Pass

This report has been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.11	W/m ² K
Door U-value	1.00	W/m ² K
Photovoltaic array	1.00	kW

This report has been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.



PREDICTED ENERGY ASSESSMENT

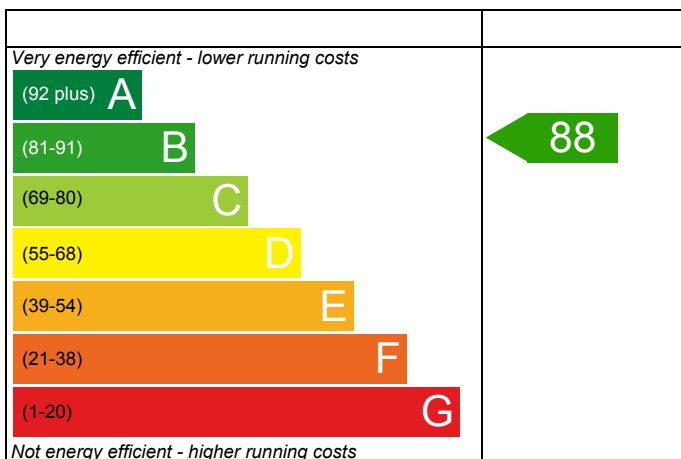
Plot 4, Riley Road,
Reading

Dwelling type: House, Semi-Detached
Date of assessment: 01/08/2022
Produced by: Forum Energy Consultants
Total floor area: 92.66 m²
DRRN: 4789-2608-0724

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

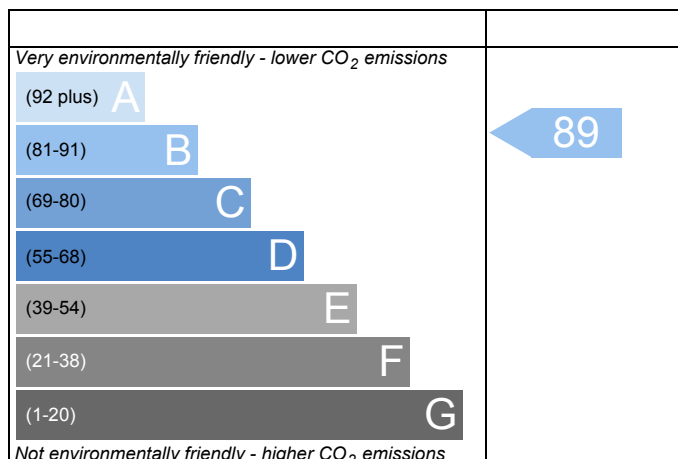


England

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 been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Property Reference	P4 Riley	Issued on Date	01/08/2022
Assessment Reference	P4 Riley	Prop Type Ref	
Property	Plot 4, Riley Road, Reading		
SAP Rating	88 B	DER	13.56
Environmental	89 B	TER	17.07
CO ₂ Emissions (t/year)	0.94	% DER<TER	20.54
General Requirements Compliance	Pass	DfEE	45.10
		TfEE	49.81
		% DfEE<TfEE	9.45
Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com		Assessor ID
			L609-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TfEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	17.07	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.56	kgCO ₂ /m ²	Pass
	-3.51 (-20.6%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	49.81	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	45.10	kWh/m ² /yr	
	-4.7 (-9.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.27 (max. 2.00)	1.30 (max. 3.30)	Pass

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)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

This report has been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
X X

Efficiency: 90%
Minimum: 88%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.01 kWh/day
Permitted by DBSCG 2.56

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

5.35 m², Overhang width less than twice window, ratio 0.05

Windows facing South

8.82 m², Overhang width less than twice window, ratio 0.05

Windows facing West

2.08 m², Overhang width less than twice window, ratio 0.05

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

m³/(h.m²) @ 50 Pa

Maximum

10.0

m³/(h.m²) @ 50 Pa

Pass

This report has been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.

BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.11	W/m ² K
Door U-value	1.00	W/m ² K
Photovoltaic array	1.00	kW

This report has been produced by an accredited Elmhurst member whose work is subject to quality assurance audits. The data used to produce the report has been verified by the Elmhurst members' portal.



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	P3 Riley	Issued on Date	01/08/2022
Assessment Reference	P3 Riley	Prop Type Ref	
Property	Plot 3, Riley Road, Reading		
SAP Rating	88 B	DER	13.47
Environmental	89 B	% DER<TER	20.43
CO ₂ Emissions (t/year)	0.94	DFEE	44.48
General Requirements Compliance	Pass	% DFEE<TFEE	9.38
Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com		Assessor ID
Client	L609-0001		

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	SemiDetached House
Number of storeys	2
Cross ventilation possible	Yes
SAP Region	Thames Valley
Front of dwelling faces	North
Overshading	Average or unknown
Thermal mass parameter	250.4 (calculated from construction elements)
Night ventilation	Yes
Ventilation rate during hot weather (ach)	4.00 (Windows half open)

Overheating Calculation

Summer ventilation heat loss coefficient	303.94 (P1)
Transmission heat loss coefficient	65.95 (37)
Summer heat loss coefficient	369.89 (P2)

Overhangs	Ratio	Z_overhangs	Overhang type
Orientation			
North	0.050	0.985	Normal overhang
East	0.050	0.973	Normal overhang
South	0.050	0.948	Normal overhang

Solar shading	Z blinds	Solar access	Z overhangs	Z summer
Orientation				
North	1.000	0.90	0.985	0.885 (P8)
East	1.000	0.90	0.973	0.873 (P8)
South	1.000	0.90	0.948	0.848 (P8)

[Jul]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	FF Specific data or Table 6c	Shading	Gains W
North	5.3500	81.1852	0.7200	0.7000	0.8850	174.3600
East	2.0800	117.5071	0.7200	0.7000	0.8725	96.7310
South	5.0400	112.2060	0.7200	0.7000	0.8475	217.3999
South	3.7800	112.2060	0.7200	0.7000	0.8475	163.0499
total:						651.5409

	Jun	Jul	Aug	
Solar gains	686	652	602	(P3)
Internal gains	528	509	517	
Total summer gains	1214	1160	1120	(P5)
Summer gain/loss ratio	3.28	3.14	3.03	(P6)
Summer external temperature	16.00	17.90	17.80	
Thermal mass temperature increment (TMP = 250.4)	0.25	0.25	0.25	
Threshold temperature	19.53	21.28	21.07	(P7)
Likelihood of high internal temperature	Not significant	Slight	Slight	
Assessment of likelihood of high internal temperature:	Slight			

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	P4 Riley	Issued on Date	01/08/2022
Assessment Reference	P4 Riley	Prop Type Ref	
Property	Plot 4, Riley Road, Reading		
SAP Rating	88 B	DER	13.56
Environmental	89 B	TER	17.07
CO ₂ Emissions (t/year)	0.94	% DER<TER	20.54
General Requirements Compliance	Pass	DFEE	45.10
		TFEE	49.81
		% DFEE<TFEE	9.45
Assessor Details	Mr. Alan Ironmonger, Forum Energy Consultants, Tel: 01303 260656, forumenergy@btinternet.com		Assessor ID
			L609-0001
Client			

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	SemiDetached House
Number of storeys	2
Cross ventilation possible	Yes
SAP Region	Thames Valley
Front of dwelling faces	North
Overshading	Average or unknown
Thermal mass parameter	250.4 (calculated from construction elements)
Night ventilation	Yes
Ventilation rate during hot weather (ach)	4.00 (Windows half open)

Overheating Calculation

Summer ventilation heat loss coefficient	303.94 (P1)
Transmission heat loss coefficient	65.95 (37)
Summer heat loss coefficient	369.89 (P2)

Overhangs	Ratio	Z_overhangs	Overhang type
Orientation			
North	0.050	0.985	Normal overhang
South	0.050	0.948	Normal overhang
West	0.050	0.973	Normal overhang

Solar shading	Z blinds	Solar access	Z overhangs	Z summer
Orientation				
North	1.000	0.90	0.985	0.885 (P8)
South	1.000	0.90	0.948	0.848 (P8)
West	1.000	0.90	0.973	0.873 (P8)

[Jul]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	FF Specific data or Table 6c	Shading	Gains W
North	5.3500	81.1852	0.7200	0.7000	0.8850	174.3600
South	5.0400	112.2060	0.7200	0.7000	0.8475	217.3999
West	2.0800	117.5071	0.7200	0.7000	0.8725	96.7310
South	3.7800	112.2060	0.7200	0.7000	0.8475	163.0499
total:						651.5409

	Jun	Jul	Aug	
Solar gains	686	652	602	(P3)
Internal gains	524	504	513	
Total summer gains	1209	1156	1115	(P5)
Summer gain/loss ratio	3.27	3.12	3.01	(P6)
Summer external temperature	16.00	17.90	17.80	
Thermal mass temperature increment (TMP = 250.4)	0.25	0.25	0.25	
Threshold temperature	19.52	21.27	21.06	(P7)
Likelihood of high internal temperature	Not significant	Slight	Slight	
Assessment of likelihood of high internal temperature:	Slight			