Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	Av. Storey height (m)	Volume (m^3)	
Ground floor (1)	54.00	2.35	126.90	(3a)
First floor	54.00	2.65	143.10	(3b)
	108.00			**(4)**
			270.00	**(5)**

2. Ventilation rate

			m³ per hour	
	main + seondary + other heating			
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.15	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.50	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.42	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
												52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
												13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.54	0.53	0.52	0.47	0.46	0.40	0.40	0.39	0.42	0.46	0.48	0.50	
												5.56 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.65	0.64	0.63	0.61	0.60	0.58	0.58	0.58	0.59	0.60	0.61	0.62	(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			54.00	0.10	5.40	9.00	486.00	(30)
Walls Brick and block cavity wall, full fill			131.80	0.19	25.04	60.00	7908.00	(29)
Ground floors			54.00	0.14	7.56	110.00	5940.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.80 (42)

Annual average hot water usage in litres per day Vd,average 100.75 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
110.83	106.80	102.77	98.74	94.71	90.68	90.68	94.71	98.74	102.77	106.80	110.83	(44)
Energy content of hot water used												
164.36	143.75	148.33	129.32	124.09	107.08	99.22	113.86	115.22	134.28	146.57	159.17	
Energy content (annual)											1585.25	(45)
Distribution loss												
24.65	21.56	22.25	19.40	18.61	16.06	14.88	17.08	17.28	20.14	21.99	23.88	(46)

Cylinder volume, l 150.00 (47)

Manufacturer's declared cylinder loss factor (kWh/day) 1.86 (48)

Temperature Factor 0.5400 (49)

Energy lost from hot water cylinder (kWh/day) 1.00 (55)

Total storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(56)
Net storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(57)
Primary loss												
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total heat required for water heating calculated for each month												
218.76	192.88	202.73	181.97	178.49	159.72	153.62	168.26	167.86	188.68	199.22	213.57	(62)
Output from water heater for each month, kWh/month												
218.76	192.88	202.73	181.97	178.49	159.72	153.62	168.26	167.86	188.68	199.22	213.57	(64)
											2225.75	(64)
Heat gains from water heating, kWh/month												
98.17	87.10	92.84	85.11	84.78	77.72	76.51	81.38	80.43	88.17	90.85	96.44	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	(66)
Lighting gains												
68.52	60.86	49.49	37.47	28.01	23.65	25.55	33.21	44.58	56.60	66.06	70.42	(67)
Appliances gains												
400.97	405.13	394.65	372.33	344.15	317.67	299.97	295.81	306.30	328.62	356.80	383.28	(68)
Cooking gains												
54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	(71)
Water heating gains												
131.95	129.62	124.79	118.21	113.95	107.94	102.84	109.38	111.70	118.50	126.18	129.63	(72)
Total internal gains												
712.10	706.27	679.59	638.67	596.77	559.92	539.02	549.06	573.24	614.38	659.70	693.99	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 0.75

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
57.36	57.58	57.80	58.85	59.05	60.01	60.01	60.19	59.64	59.05	58.65	58.23	
alpha												
4.82	4.84	4.85	4.92	4.94	5.00	5.00	5.01	4.98	4.94	4.91	4.88	
Utilisation factor for gains for living area												
0.99	0.99	0.98	0.95	0.86	0.69	0.52	0.57	0.81	0.96	0.99	1.00	(86)
Tweekday												
19.93	20.05	20.25	20.53	20.77	20.90	20.93	20.93	20.84	20.55	20.20	19.91	
Tweekend												
20.39	20.46	20.58	20.74	20.87	20.94	20.96	20.96	20.91	20.75	20.55	20.39	
24 instead of 16												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean internal temperature in living area T1												
20.06	20.16	20.35	20.59	20.79	20.91	20.94	20.93	20.86	20.61	20.29	20.05	(87)
Temperature during heating periods in rest of dwelling Th2												
19.91	19.92	19.92	19.94	19.94	19.95	19.95	19.96	19.95	19.94	19.93	19.93	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.99	0.97	0.93	0.81	0.59	0.40	0.45	0.73	0.94	0.99	0.99	(89)
Tweekday												
18.67	18.82	19.09	19.45	19.71	19.85	19.87	19.87	19.80	19.48	19.03	18.66	
Tweekend												
18.67	18.82	19.09	19.45	19.71	19.85	19.87	19.87	19.80	19.48	19.03	18.66	
Mean internal temperature in the rest of dwelling T2												
18.67	18.82	19.09	19.45	19.71	19.85	19.87	19.87	19.80	19.48	19.03	18.66	(90)

Living area fraction (20.00 / 108.00) 0.19 (91)

Mean internal temperature (for the whole dwelling)

18.93	19.07	19.32	19.66	19.91	20.05	20.07	20.07	20.00	19.69	19.27	18.92	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.93	19.07	19.32	19.66	19.91	20.05	20.07	20.07	20.00	19.69	19.27	18.92	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.99	0.98	0.97	0.92	0.81	0.60	0.41	0.46	0.74	0.93	0.98	0.99	(94)
Useful gains												
810.68	884.50	941.87	968.56	892.01	654.71	430.43	451.74	671.08	780.54	775.11	777.56	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1912.50	1845.87	1663.33	1370.84	1043.16	680.88	433.65	457.29	741.91	1154.10	1555.76	1895.95	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
819.75	646.04	536.77	289.65	112.46	-	-	-	-	277.93	562.07	832.08	

Total space heating requirement per year (kWh/year) (October to May) 4076.74 (98)
Space heating requirement per m² (kWh/m²/year) 37.75 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	389.02%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
819.75	646.04	536.77	289.65	112.46	-	-	-	-	277.93	562.07	832.08	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
210.72	166.07	137.98	74.46	28.91	-	-	-	-	71.44	144.48	213.89	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
218.76	192.88	202.73	181.97	178.49	159.72	153.62	168.26	167.86	188.68	199.22	213.57	(64)
Efficiency of water heater												295.93 (216)
295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	(217)
Water heating fuel												
73.92	65.18	68.51	61.49	60.31	53.97	51.91	56.86	56.73	63.76	67.32	72.17	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	1047.96	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	752.13	(219)
Electricity for pumps, fans and electric keep-hot		
Total electricity for the above, kWh/year	0.00	(231)
Electricity for lighting (100.00% fixed LEL)	484.02	(232)
Energy saving/generation technologies		
Electricity generated - µCHP/heat pump	0.00	(235)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	2284.12	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	1047.959	13.190	138.23	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
High-rate percentage	100.000%			(243)
Low-rate percentage	0.000%			(244)
High-rate cost	752.13	13.190	99.21	(245)
Low-rate	0.00	13.190	0.00	(246)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	0.000	13.190	0.00	(249)
Energy for lighting	484.022	13.190	63.84	(250)
Additional standing charges			0.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			301.27	(255)

11a. SAP rating

	0.42	**(256)**
	0.83	**(257)**
SAP value	88.46	
	88	(258)
SAP band	**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	1047.96	0.519	543.89	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	752.13	0.519	390.36	(264)
Space and water heating			934.25	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	484.02	0.519	251.21	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1185.46	(272)
			kg/m²/year	
CO2 emissions per m²			**10.98**	(273)
EI value			89.62	(273a)
EI rating			**90**	(274)
EI band			**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(13.19 / 3.8902) x (1 + (0.29 x 0.25)) = 3.6364, stars = 5
Main heating environmental impact	(0.5190 / 3.8902) x (1 + (0.29 x 0.25)) = 0.1431, stars = 5
Water heating energy efficiency	13.19 / 2.9593 = 4.4572, stars = 4
Water heating environmental impact	0.52 / + (0.00 x 0.52) = 0.1754, stars = 5

Project Information

Building type Detached house

Reference

Date

Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	54.00	2.35	126.90	(3a)
First floor	54.00	2.65	143.10	(3b)
	108.00			**(4)**
			270.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.15	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.50	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.42	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.54	0.53	0.52	0.47	0.46	0.40	0.40	0.39	0.42	0.46	0.48	0.50

5.56 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.65	0.64	0.63	0.61	0.60	0.58	0.58	0.58	0.59	0.60	0.61	0.62

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			54.00	0.10	5.40	9.00	486.00	(30)
Walls Brick and block cavity wall, full fill			131.80	0.19	25.04	60.00	7908.00	(29)
Ground floors			54.00	0.14	7.56	110.00	5940.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.80 (42)

Annual average hot water usage in litres per day Vd,average 100.75 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
110.83	106.80	102.77	98.74	94.71	90.68	90.68	94.71	98.74	102.77	106.80	110.83	(44)
Energy content of hot water used												
164.36	143.75	148.33	129.32	124.09	107.08	99.22	113.86	115.22	134.28	146.57	159.17	
Energy content (annual)											1585.25	(45)
Distribution loss												
24.65	21.56	22.25	19.40	18.61	16.06	14.88	17.08	17.28	20.14	21.99	23.88	(46)

Cylinder volume, l 150.00 (47)

Manufacturer's declared cylinder loss factor (kWh/day) 1.86 (48)

Temperature Factor 0.5400 (49)

Energy lost from hot water cylinder (kWh/day) 1.00 (55)

Total storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(56)
Net storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(57)
Primary loss												
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total heat required for water heating calculated for each month												
218.76	192.88	202.73	181.97	178.49	159.72	153.62	168.26	167.86	188.68	199.22	213.57	(62)
Output from water heater for each month, kWh/month												
218.76	192.88	202.73	181.97	178.49	159.72	153.62	168.26	167.86	188.68	199.22	213.57	(64)
											2225.75	(64)
Heat gains from water heating, kWh/month												
98.17	87.10	92.84	85.11	84.78	77.72	76.51	81.38	80.43	88.17	90.85	96.44	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	(66)
Lighting gains												
27.41	24.34	19.80	14.99	11.20	9.46	10.22	13.28	17.83	22.64	26.42	28.17	(67)
Appliances gains												
268.65	271.44	264.41	249.46	230.58	212.84	200.98	198.19	205.22	220.18	239.05	256.80	(68)
Cooking gains												
37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	(71)
Water heating gains												
131.95	129.62	124.79	118.21	113.95	107.94	102.84	109.38	111.70	118.50	126.18	129.63	(72)
Total internal gains												
493.04	490.43	474.03	447.69	420.77	395.27	379.07	385.89	399.79	426.35	456.69	479.63	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 0.75

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
57.36	57.58	57.80	58.85	59.05	60.01	60.01	60.19	59.64	59.05	58.65	58.23	
alpha												
4.82	4.84	4.85	4.92	4.94	5.00	5.00	5.01	4.98	4.94	4.91	4.88	
Utilisation factor for gains for living area												
1.00	1.00	0.99	0.97	0.91	0.77	0.60	0.67	0.89	0.98	1.00	1.00	(86)
Tweekday												
19.77	19.89	20.11	20.42	20.69	20.87	20.92	20.91	20.78	20.43	20.05	19.76	
Tweekend												
20.30	20.37	20.50	20.67	20.83	20.93	20.96	20.95	20.88	20.68	20.46	20.30	
24 instead of 16												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean internal temperature in living area T1												
19.92	20.03	20.22	20.48	20.73	20.89	20.93	20.92	20.81	20.50	20.16	19.91	(87)
Temperature during heating periods in rest of dwelling Th2												
19.91	19.92	19.92	19.94	19.94	19.95	19.95	19.96	19.95	19.94	19.93	19.93	(88)
Utilisation factor for gains for rest of dwelling												
1.00	1.00	0.99	0.96	0.88	0.68	0.47	0.53	0.83	0.98	1.00	1.00	(89)
Tweekday												
18.47	18.63	18.91	19.31	19.64	19.83	19.87	19.87	19.75	19.33	18.85	18.46	
Tweekend												
18.47	18.63	18.91	19.31	19.64	19.83	19.87	19.87	19.75	19.33	18.85	18.46	
Mean internal temperature in the rest of dwelling T2												
18.47	18.63	18.91	19.31	19.64	19.83	19.87	19.87	19.75	19.33	18.85	18.46	(90)

Living area fraction (20.00 / 108.00) 0.19 (91)

Mean internal temperature (for the whole dwelling)

18.74	18.89	19.15	19.53	19.84	20.03	20.07	20.06	19.95	19.55	19.09	18.73	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.74	18.89	19.15	19.53	19.84	20.03	20.07	20.06	19.95	19.55	19.09	18.73	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
1.00	0.99	0.99	0.96	0.87	0.69	0.49	0.55	0.83	0.97	0.99	1.00	(94)
Useful gains												
597.87	679.34	757.28	825.43	811.60	632.44	426.72	444.94	611.97	629.40	583.02	568.21	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1887.58	1821.82	1641.62	1354.11	1033.98	678.46	433.23	456.53	735.29	1136.53	1533.53	1871.76	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
959.55	767.74	657.94	380.65	165.45	-	-	-	-	377.30	684.36	969.84	

Total space heating requirement per year (kWh/year) (October to May)	4962.84	(98)
Space heating requirement per m² (kWh/m²/year)	45.95	(99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

												kWh/year	
No secondary heating system selected													
Fraction of space heat from main system(s)									1.0000				(202)
Efficiency of main heating system									389.02%				(206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement													
959.55	767.74	657.94	380.65	165.45	-	-	-	-	377.30	684.36	969.84		(98)
Appendix Q - monthly energy saved (main heating system 1)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(210)
Space heating fuel (main heating system 1)													
246.66	197.35	169.13	97.85	42.53	-	-	-	-	96.99	175.92	249.31		(211)
Appendix Q - monthly energy saved (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(212)
Space heating fuel (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(213)
Appendix Q - monthly energy saved (secondary heating system)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(214)
Space heating fuel (secondary)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(215)
Water heating													
Water heating requirement													
218.76	192.88	202.73	181.97	178.49	159.72	153.62	168.26	167.86	188.68	199.22	213.57		(64)
Efficiency of water heater												295.93	(216)
295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93		(217)
Water heating fuel													
73.92	65.18	68.51	61.49	60.31	53.97	51.91	56.86	56.73	63.76	67.32	72.17		(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	1275.74	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	752.13	(219)
Electricity for pumps, fans and electric keep-hot		
Total electricity for the above, kWh/year	0.00	(231)
Electricity for lighting (100.00% fixed LEL)	484.02	(232)
Energy saving/generation technologies		
Electricity generated - µCHP/heat pump	0.00	(235)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	2511.90	(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	1275.74	0.519	662.11	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	752.13	0.519	390.36	(264)
Space and water heating			1052.47	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	484.02	0.519	251.21	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1303.67	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**12.07**	(273)

Project Information
Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 06:57:50

New dwelling as designed

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1 TER and DER
Fuel for main heating system: Standard tariff (fuel factor = 1.55)

Target Carbon Dioxide Emission Rate	TER = 26.36	
Dwelling Carbon Dioxide Emission Rate	DER = 12.07	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 58.3	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 51.1	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

---

2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

---

4 Heating efficiency
Main heating system:
Air source heat pump, underfloor, electric
Mitsubishi Electric Ecodan 6.0 kW
Source of efficiency: from boiler database
Secondary heating system:
None -

---

5 Cylinder insulation
Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	2207 Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	No	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%
Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:57 AM

Type A ASHP

Type A
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Detached house		
Ground floor (1)	area = 54.00m²	storey height = 2.35m	
First floor	area = 54.00m²	storey height = 2.65m	
Living area:	20.00 (fraction 0.185)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:57 AM

Type A ASHP

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements

Roofs	area = 54.00	U = 0.10, k = 9.0	
Walls	area = 131.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 54.00	U = 0.14, k = 110.0	

Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A] Openings lintels	0.300	0.300	21.850
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

Project Information

Building type Detached house

Reference

Date

Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:57 AM

Type A ASHP

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Heat pumps Electric Air source heat pump with flow temperature <= 35°C Index : 104634 Mitsubishi Electric Ecodan 6.0 kW PUZ-WM60VAA Underfloor, pipes in screed above insulation Pump in heated space: No Boiler has load or weather compensator: Yes Boiler Interlock: No Design flow temperature : Unknown Central heating pump 2013 or later Not MCS Approved Installer Standard tariff
Main heating controls:	2207 Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	No
Secondary heating system:	None
Water heating:	MicroCHP or Heat Pump Manufacturer's declared cylinder loss factor (kWh/day) 1.86

Project Information

Building type Detached house

Reference

Date

Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:57 AM

Type A ASHP

	Cylinder volume : 150.00
	Insulation type : Factory
	Insulation thickness : -1.00
	Cylinder heater : n/a
	Cylinder in heated space: Yes
	Insulated primary: Yes
	Cylinder thermostat: Yes
	Separate timer for domestic hot water: Yes
	Solar panel: no
Water use <= 125 litres/person/day:	Yes
Low energy lights:	100.0% of fixed lighting outlets
Total fixed lighting outlets:	30
Electricity tariff:	Standard tariff
Photovoltaics 1:	Peak kW: 0.00
Photovoltaics 2:	Peak kW: 0.00
Photovoltaics 3:	Peak kW: 0.00
Conservatory:	No
Fixed air conditioning:	No
Smoke Control Area:	Not specified

Additional allowable electricity generation : 0.00kg/m²/year

Predicted Energy Assessment

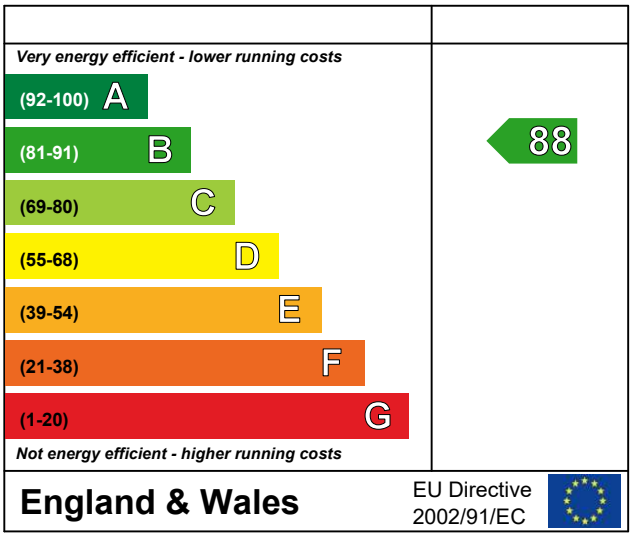
Type A
Oaklands Drive
Almondsbury
BS32 4AB

Dwelling type: Detached house
Date of assessment: 2 June 2022
Produced by Complete Energy Consultancy Ltd
Total floor area: 108 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

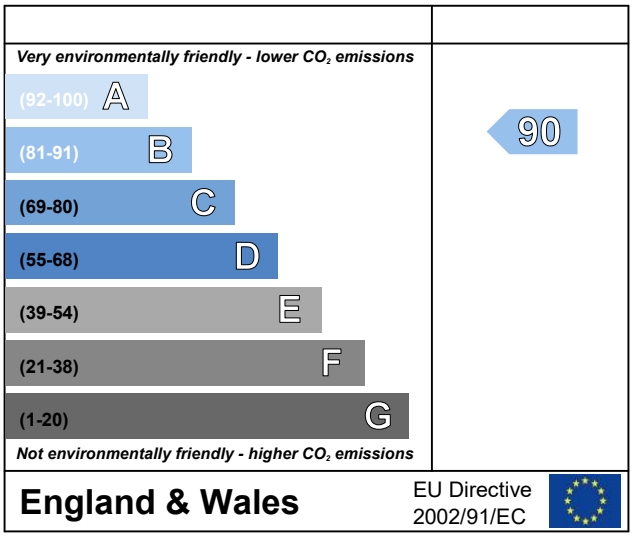
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	Av. Storey height (m)	Volume (m^3)	
Ground floor (1)	54.00	2.35	126.90	(3a)
First floor	54.00	2.65	143.10	(3b)
	108.00			**(4)**
			270.00	**(5)**

2. Ventilation rate

			m³ per hour	
	main + seondary + other heating			
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.15	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.50	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.42	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.54	0.53	0.52	0.47	0.46	0.40	0.40	0.39	0.42	0.46	0.48	0.50

5.56 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.65	0.64	0.63	0.61	0.60	0.58	0.58	0.58	0.59	0.60	0.61	0.62

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			54.00	0.10	5.40	9.00	486.00	(30)
Walls Brick and block cavity wall, full fill			131.80	0.19	25.04	60.00	7908.00	(29)
Ground floors			54.00	0.14	7.56	110.00	5940.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.80 (42)

Annual average hot water usage in litres per day Vd,average 100.75 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
110.83	106.80	102.77	98.74	94.71	90.68	90.68	94.71	98.74	102.77	106.80	110.83	(44)
Energy content of hot water used												
164.36	143.75	148.33	129.32	124.09	107.08	99.22	113.86	115.22	134.28	146.57	159.17	

Energy content (annual) 1585.25 (45)

Distribution loss

24.65	21.56	22.25	19.40	18.61	16.06	14.88	17.08	17.28	20.14	21.99	23.88	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)

Net storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)

Primary loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)

Combi loss calculated for each month

24.35	21.97	24.27	23.41	24.12	23.26	23.98	24.07	23.34	24.20	23.51	24.33	(61)

Total heat required for water heating calculated for each month

188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(62)

Output from water heater for each month, kWh/month

188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(64)

1870.08 (64)

Heat gains from water heating, kWh/month

60.74	53.29	55.39	48.85	47.29	41.42	38.99	43.88	44.15	50.70	54.61	59.01	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	(66)
Lighting gains												
68.52	60.86	49.49	37.47	28.01	23.65	25.55	33.21	44.58	56.60	66.06	70.42	(67)
Appliances gains												
400.97	405.13	394.65	372.33	344.15	317.67	299.97	295.81	306.30	328.62	356.80	383.28	(68)
Cooking gains												
54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	(71)
Water heating gains												
81.64	79.30	74.45	67.85	63.56	57.53	52.40	58.97	61.31	68.14	75.85	79.31	(72)
Total internal gains												
664.79	658.95	632.25	591.31	549.38	512.50	491.59	501.66	525.85	567.02	612.37	646.67	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
57.36	57.58	57.80	58.85	59.05	60.01	60.01	60.19	59.64	59.05	58.65	58.23	
alpha												
4.82	4.84	4.85	4.92	4.94	5.00	5.00	5.01	4.98	4.94	4.91	4.88	
Utilisation factor for gains for living area												
1.00	0.99	0.98	0.95	0.87	0.71	0.54	0.60	0.84	0.97	0.99	1.00	(86)
Mean internal temperature in living area T1												
19.78	19.92	20.16	20.50	20.78	20.95	20.99	20.98	20.87	20.52	20.10	19.77	(87)
Temperature during heating periods in rest of dwelling Th2												
19.91	19.92	19.92	19.94	19.94	19.95	19.95	19.96	19.95	19.94	19.93	19.93	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.99	0.98	0.94	0.83	0.62	0.42	0.47	0.76	0.95	0.99	1.00	(89)
Mean internal temperature in the rest of dwelling T2												
18.31	18.51	18.86	19.35	19.72	19.92	19.95	19.95	19.85	19.39	18.78	18.29	(90)

Living area fraction (20.00 / 108.00) 0.19 (91)

Mean internal temperature (for the whole dwelling)

18.58	18.77	19.10	19.56	19.92	20.11	20.14	20.14	20.04	19.60	19.03	18.57	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.58	18.77	19.10	19.56	19.92	20.11	20.14	20.14	20.04	19.60	19.03	18.57	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.99	0.99	0.97	0.93	0.83	0.63	0.44	0.50	0.77	0.94	0.98	0.99	(94)
Useful gains												
764.84	839.61	899.51	934.03	874.22	656.02	438.34	458.61	661.37	744.09	730.70	731.48	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1867.13	1807.03	1635.54	1358.50	1043.71	688.45	442.74	466.14	746.55	1142.41	1525.34	1850.27	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
820.10	650.10	547.61	305.62	126.10	-	-	-	-	296.35	572.14	832.38	

Total space heating requirement per year (kWh/year) (October to May) 4150.40 (98)

Space heating requirement per m² (kWh/m²/year) 38.43 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
820.10	650.10	547.61	305.62	126.10	-	-	-	-	296.35	572.14	832.38	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
882.78	699.79	589.46	328.97	135.74	-	-	-	-	319.00	615.87	895.99	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(64)
Efficiency of water heater												86.60 (216)
89.26	89.21	89.09	88.77	88.09	86.60	86.60	86.60	86.60	88.72	89.12	89.29	(217)
Water heating fuel												
211.41	185.77	193.75	172.05	168.25	150.50	142.27	159.27	160.00	178.63	190.84	205.52	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	4467.60	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	2118.27	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	484.02	(232)
Energy saving/generation technologies		
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	7144.89	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	4467.596	3.480	155.47	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2118.27	3.480	73.72	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	484.022	13.190	63.84	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			422.92	(255)

11a. SAP rating

	0.42	**(256)**
	1.16	**(257)**
SAP value	83.80	
	84	(258)
SAP band	**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	4467.60	0.216	965.00	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2118.27	0.216	457.55	(264)
Space and water heating			1422.55	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	484.02	0.519	251.21	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1712.68	(272)

	kg/m²/year	
CO2 emissions per m²	**15.86**	(273)
EI value	85.00	(273a)
EI rating	**85**	(274)
EI band	**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(3.48 / 0.8990) x (1 + (0.29 x 0.00)) = 3.8710, stars = 4
Main heating environmental impact	(0.2160 / 0.8990) x (1 + (0.29 x 0.00)) = 0.2403, stars = 4
Water heating energy efficiency	3.48 / 0.8816 = 3.9473, stars = 4
Water heating environmental impact	0.2160 / 0.8816 = 0.2450, stars = 4

Project Information

Building type Detached house

Reference

Date

Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	54.00	2.35	126.90	(3a)
First floor	54.00	2.65	143.10	(3b)
	108.00			**(4)**
			270.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.15	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.50	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.42	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.54	0.53	0.52	0.47	0.46	0.40	0.40	0.39	0.42	0.46	0.48	0.50

5.56 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.65	0.64	0.63	0.61	0.60	0.58	0.58	0.58	0.59	0.60	0.61	0.62

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			54.00	0.10	5.40	9.00	486.00	(30)
Walls Brick and block cavity wall, full fill			131.80	0.19	25.04	60.00	7908.00	(29)
Ground floors			54.00	0.14	7.56	110.00	5940.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.80 (42)

Annual average hot water usage in litres per day Vd,average 100.75 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
110.83	106.80	102.77	98.74	94.71	90.68	90.68	94.71	98.74	102.77	106.80	110.83	(44)
Energy content of hot water used												
164.36	143.75	148.33	129.32	124.09	107.08	99.22	113.86	115.22	134.28	146.57	159.17	

Energy content (annual) 1585.25 (45)

Distribution loss

24.65	21.56	22.25	19.40	18.61	16.06	14.88	17.08	17.28	20.14	21.99	23.88	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)

Net storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)

Primary loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)

Combi loss calculated for each month

24.35	21.97	24.27	23.41	24.12	23.26	23.98	24.07	23.34	24.20	23.51	24.33	(61)

Total heat required for water heating calculated for each month

188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(62)

Output from water heater for each month, kWh/month

188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(64)

1870.08 (64)

Heat gains from water heating, kWh/month

60.74	53.29	55.39	48.85	47.29	41.42	38.99	43.88	44.15	50.70	54.61	59.01	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	(66)
Lighting gains												
27.41	24.34	19.80	14.99	11.20	9.46	10.22	13.28	17.83	22.64	26.42	28.17	(67)
Appliances gains												
268.65	271.44	264.41	249.46	230.58	212.84	200.98	198.19	205.22	220.18	239.05	256.80	(68)
Cooking gains												
37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	(71)
Water heating gains												
81.64	79.30	74.45	67.85	63.56	57.53	52.40	58.97	61.31	68.14	75.85	79.31	(72)
Total internal gains												
445.73	443.12	426.69	400.33	373.38	347.85	331.64	338.49	352.40	378.99	409.36	432.31	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
57.36	57.58	57.80	58.85	59.05	60.01	60.01	60.19	59.64	59.05	58.65	58.23	
alpha												
4.82	4.84	4.85	4.92	4.94	5.00	5.00	5.01	4.98	4.94	4.91	4.88	
Utilisation factor for gains for living area												
1.00	1.00	0.99	0.98	0.93	0.79	0.63	0.70	0.91	0.99	1.00	1.00	(86)
Mean internal temperature in living area T1												
19.60	19.74	20.00	20.36	20.69	20.91	20.98	20.96	20.79	20.37	19.93	19.58	(87)
Temperature during heating periods in rest of dwelling Th2												
19.91	19.92	19.92	19.94	19.94	19.95	19.95	19.96	19.95	19.94	19.93	19.93	(88)
Utilisation factor for gains for rest of dwelling												
1.00	1.00	0.99	0.97	0.89	0.71	0.50	0.56	0.86	0.98	1.00	1.00	(89)
Mean internal temperature in the rest of dwelling T2												
18.03	18.25	18.62	19.16	19.61	19.89	19.95	19.94	19.76	19.18	18.54	18.03	(90)

Living area fraction (20.00 / 108.00) 0.19 (91)

Mean internal temperature (for the whole dwelling)

18.32	18.52	18.88	19.38	19.81	20.08	20.14	20.13	19.95	19.40	18.79	18.31	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.32	18.52	18.88	19.38	19.81	20.08	20.14	20.13	19.95	19.40	18.79	18.31	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
1.00	1.00	0.99	0.96	0.89	0.72	0.52	0.59	0.86	0.98	1.00	1.00	(94)
Useful gains												
551.00	632.90	712.10	785.01	784.81	627.75	432.99	448.88	591.03	586.78	536.62	521.23	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1833.72	1774.68	1606.08	1335.27	1030.24	684.59	442.02	464.84	736.31	1118.00	1495.40	1817.84	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
954.34	767.28	665.12	396.19	182.60	-	-	-	-	395.22	690.32	964.68	

Total space heating requirement per year (kWh/year) (October to May) 5015.75 (98)

Space heating requirement per m² (kWh/m²/year) 46.44 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
954.34	767.28	665.12	396.19	182.60	-	-	-	-	395.22	690.32	964.68	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
1027.28	825.92	715.95	426.47	196.56	-	-	-	-	425.43	743.08	1038.40	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(64)
Efficiency of water heater												86.60 (216)
89.34	89.30	89.20	88.96	88.39	86.60	86.60	86.60	86.60	88.93	89.23	89.36	(217)
Water heating fuel												
211.23	185.59	193.51	171.69	167.67	150.50	142.27	159.27	160.00	178.21	190.61	205.36	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	5399.09	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	2115.93	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	484.02	(232)
Energy saving/generation technologies		
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	8074.04	(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	5399.09	0.216	1166.20	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2115.93	0.216	457.04	(264)
Space and water heating			1623.24	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	484.02	0.519	251.21	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1913.38	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**17.72**	(273)

Project Information
Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 06:58:35

New dwelling as designed

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1 TER and DER
Fuel for main heating system: Gas (mains) (fuel factor = 1.00)

Target Carbon Dioxide Emission Rate	TER = 18.35	
Dwelling Carbon Dioxide Emission Rate	DER = 17.72	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 58.3	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 51.1	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

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2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

---

4 Heating efficiency
Main heating system:
Boiler and radiators, mains gas
Worcester 2000
Source of efficiency: from boiler database
Worcester 2000 GC2000iW 30 C NG
Efficiency: 89.0% SEDBUK2009
Minimum: 88.0% OK
Secondary heating system:
None -

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	Yes	OK
Hot water controls	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%

Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:58 AM

Type A baseline

Type A
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Detached house		
Ground floor (1)	area = 54.00m²	storey height = 2.35m	
First floor	area = 54.00m²	storey height = 2.65m	
Living area:	20.00 (fraction 0.185)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:58 AM

Type A baseline

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements			
Roofs	area = 54.00	U = 0.10, k = 9.0	
Walls	area = 131.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 54.00	U = 0.14, k = 110.0	

Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A]	0.300	0.300	21.850
Openings lintels			
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:58 AM

Type A baseline

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Gas boilers (including LPG) 1998 or later Condensing combi with automatic ignition Index : 18687 Eff 86.60% / 89.90% Worcester 2000 GC2000iW 30 C NG Radiators Pump in heated space: Yes Boiler has load or weather compensator: Yes Boiler Interlock: Yes Design flow temperature : Unknown Central heating pump 2013 or later Gas (mains)
Main heating controls:	Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	Yes
Secondary heating system:	None
Water heating:	Combination boiler Combination boiler type : Instantaneous Solar panel: no

Project Information

Building type Detached house

Reference

Date

Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:58 AM

Type A baseline

Water use <= 125 litres/person/day:	Yes
Low energy lights:	100.0% of fixed lighting outlets
Total fixed lighting outlets:	30
Electricity tariff:	Standard tariff
Photovoltaics 1:	Peak kW: 0.00
Photovoltaics 2:	Peak kW: 0.00
Photovoltaics 3:	Peak kW: 0.00
Conservatory:	No
Fixed air conditioning:	No
Smoke Control Area:	Not specified

Additional allowable electricity generation : 0.00kg/m²/year

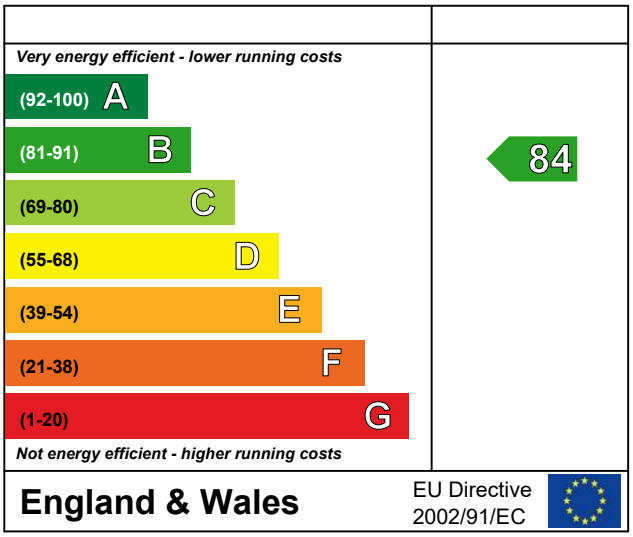
Predicted Energy Assessment

Type A	Dwelling type:	Detached house
Oaklands Drive	Date of assessment:	2 June 2022
Almondsbury	Produced by	Complete Energy Consultancy Ltd
BS32 4AB	Total floor area:	108 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

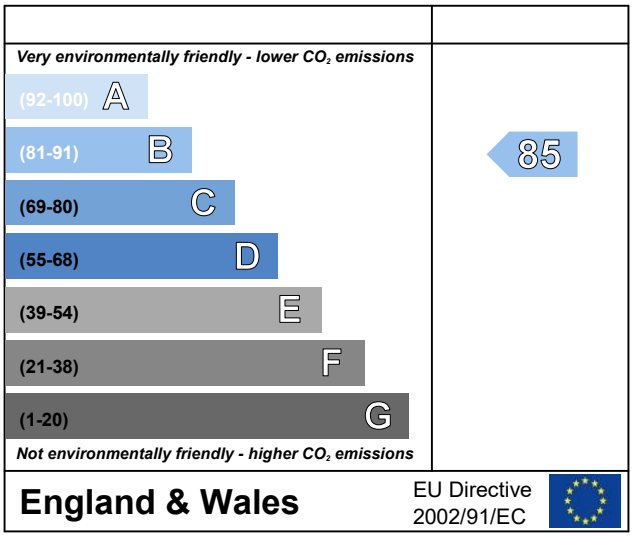
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	Av. Storey height (m)	Volume (m^3)	
Ground floor (1)	54.00	2.35	126.90	(3a)
First floor	54.00	2.65	143.10	(3b)
	108.00			**(4)**
			270.00	**(5)**

2. Ventilation rate

			m³ per hour	
	main + seondary + other heating			
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.15	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.50	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.42	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.54	0.53	0.52	0.47	0.46	0.40	0.40	0.39	0.42	0.46	0.48	0.50

5.56 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.65	0.64	0.63	0.61	0.60	0.58	0.58	0.58	0.59	0.60	0.61	0.62

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			54.00	0.10	5.40	9.00	486.00	(30)
Walls Brick and block cavity wall, full fill			131.80	0.19	25.04	60.00	7908.00	(29)
Ground floors			54.00	0.14	7.56	110.00	5940.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.80 (42)

Annual average hot water usage in litres per day Vd,average 100.75 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
110.83	106.80	102.77	98.74	94.71	90.68	90.68	94.71	98.74	102.77	106.80	110.83	(44)
Energy content of hot water used												
164.36	143.75	148.33	129.32	124.09	107.08	99.22	113.86	115.22	134.28	146.57	159.17	

Energy content (annual) 1585.25 (45)

Distribution loss

24.65	21.56	22.25	19.40	18.61	16.06	14.88	17.08	17.28	20.14	21.99	23.88	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)

Net storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)

Primary loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)

Combi loss calculated for each month

24.35	21.97	24.27	23.41	24.12	23.26	23.98	24.07	23.34	24.20	23.51	24.33	(61)

Total heat required for water heating calculated for each month

188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(62)

Output from water heater for each month, kWh/month

188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(64)

1870.08 (64)

Heat gains from water heating, kWh/month

60.74	53.29	55.39	48.85	47.29	41.42	38.99	43.88	44.15	50.70	54.61	59.01	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	168.14	(66)
Lighting gains												
68.52	60.86	49.49	37.47	28.01	23.65	25.55	33.21	44.58	56.60	66.06	70.42	(67)
Appliances gains												
400.97	405.13	394.65	372.33	344.15	317.67	299.97	295.81	306.30	328.62	356.80	383.28	(68)
Cooking gains												
54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	54.62	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	(71)
Water heating gains												
81.64	79.30	74.45	67.85	63.56	57.53	52.40	58.97	61.31	68.14	75.85	79.31	(72)
Total internal gains												
664.79	658.95	632.25	591.31	549.38	512.50	491.59	501.66	525.85	567.02	612.37	646.67	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
57.36	57.58	57.80	58.85	59.05	60.01	60.01	60.19	59.64	59.05	58.65	58.23	
alpha												
4.82	4.84	4.85	4.92	4.94	5.00	5.00	5.01	4.98	4.94	4.91	4.88	
Utilisation factor for gains for living area												
1.00	0.99	0.98	0.95	0.87	0.71	0.54	0.60	0.84	0.97	0.99	1.00	(86)
Mean internal temperature in living area T1												
19.78	19.92	20.16	20.50	20.78	20.95	20.99	20.98	20.87	20.52	20.10	19.77	(87)
Temperature during heating periods in rest of dwelling Th2												
19.91	19.92	19.92	19.94	19.94	19.95	19.95	19.96	19.95	19.94	19.93	19.93	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.99	0.98	0.94	0.83	0.62	0.42	0.47	0.76	0.95	0.99	1.00	(89)
Mean internal temperature in the rest of dwelling T2												
18.31	18.51	18.86	19.35	19.72	19.92	19.95	19.95	19.85	19.39	18.78	18.29	(90)

Living area fraction (20.00 / 108.00) 0.19 (91)

Mean internal temperature (for the whole dwelling)

18.58	18.77	19.10	19.56	19.92	20.11	20.14	20.14	20.04	19.60	19.03	18.57	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.58	18.77	19.10	19.56	19.92	20.11	20.14	20.14	20.04	19.60	19.03	18.57	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.99	0.99	0.97	0.93	0.83	0.63	0.44	0.50	0.77	0.94	0.98	0.99	(94)
Useful gains												
764.84	839.61	899.51	934.03	874.22	656.02	438.34	458.61	661.37	744.09	730.70	731.48	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1867.13	1807.03	1635.54	1358.50	1043.71	688.45	442.74	466.14	746.55	1142.41	1525.34	1850.27	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
820.10	650.10	547.61	305.62	126.10	-	-	-	-	296.35	572.14	832.38	

Total space heating requirement per year (kWh/year) (October to May) 4150.40 (98)

Space heating requirement per m² (kWh/m²/year) 38.43 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
820.10	650.10	547.61	305.62	126.10	-	-	-	-	296.35	572.14	832.38	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
882.78	699.79	589.46	328.97	135.74	-	-	-	-	319.00	615.87	895.99	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(64)
Efficiency of water heater												86.60 (216)
89.26	89.21	89.09	88.77	88.09	86.60	86.60	86.60	86.60	88.72	89.12	89.29	(217)
Water heating fuel												
211.41	185.77	193.75	172.05	168.25	150.50	142.27	159.27	160.00	178.63	190.84	205.52	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	4467.60	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	2118.27	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	484.02	(232)
Energy saving/generation technologies		
PVs 0.80 x 1.000 x 1029.187 x 1.000	823.349	
PVs 0.80 x 0.000 x 0.000 x 0.500	0.000	
PVs 0.80 x 0.000 x 0.000 x 0.500	0.000	
	823.349	(233)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	6321.54	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	4467.596	3.480	155.47	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2118.27	3.480	73.72	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	484.022	13.190	63.84	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	823.349	13.190	-108.60	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			314.32	(255)

11a. SAP rating

	0.42	**(256)**
	0.86	**(257)**
SAP value	87.96	
	88	(258)
SAP band	**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	4467.60	0.216	965.00	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2118.27	0.216	457.55	(264)
Space and water heating			1422.55	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	484.02	0.519	251.21	(268)
Electricity generated - PVs	-823.35	0.519	-427.32	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1285.36	(272)

	kg/m²/year	
CO2 emissions per m²	**11.90**	(273)
EI value	88.74	(273a)
EI rating	**89**	(274)
EI band	**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(3.48 / 0.8990) x (1 + (0.29 x 0.00)) = 3.8710, stars = 4
Main heating environmental impact	(0.2160 / 0.8990) x (1 + (0.29 x 0.00)) = 0.2403, stars = 4
Water heating energy efficiency	3.48 / 0.8816 = 3.9473, stars = 4
Water heating environmental impact	0.2160 / 0.8816 = 0.2450, stars = 4

Project Information

Building type Detached house

Reference

Date

Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	54.00	2.35	126.90	(3a)
First floor	54.00	2.65	143.10	(3b)
	108.00			**(4)**
			270.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.15	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.50	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.42	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.54	0.53	0.52	0.47	0.46	0.40	0.40	0.39	0.42	0.46	0.48	0.50

5.56 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.65	0.64	0.63	0.61	0.60	0.58	0.58	0.58	0.59	0.60	0.61	0.62

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			54.00	0.10	5.40	9.00	486.00	(30)
Walls Brick and block cavity wall, full fill			131.80	0.19	25.04	60.00	7908.00	(29)
Ground floors			54.00	0.14	7.56	110.00	5940.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.80 (42)

Annual average hot water usage in litres per day Vd,average 100.75 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
110.83	106.80	102.77	98.74	94.71	90.68	90.68	94.71	98.74	102.77	106.80	110.83	(44)
Energy content of hot water used												
164.36	143.75	148.33	129.32	124.09	107.08	99.22	113.86	115.22	134.28	146.57	159.17	

Energy content (annual) 1585.25 (45)

Distribution loss

24.65	21.56	22.25	19.40	18.61	16.06	14.88	17.08	17.28	20.14	21.99	23.88	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)

Net storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)

Primary loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)

Combi loss calculated for each month

24.35	21.97	24.27	23.41	24.12	23.26	23.98	24.07	23.34	24.20	23.51	24.33	(61)

Total heat required for water heating calculated for each month

188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(62)

Output from water heater for each month, kWh/month

188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(64)

1870.08 (64)

Heat gains from water heating, kWh/month

60.74	53.29	55.39	48.85	47.29	41.42	38.99	43.88	44.15	50.70	54.61	59.01	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	140.11	(66)
Lighting gains												
27.41	24.34	19.80	14.99	11.20	9.46	10.22	13.28	17.83	22.64	26.42	28.17	(67)
Appliances gains												
268.65	271.44	264.41	249.46	230.58	212.84	200.98	198.19	205.22	220.18	239.05	256.80	(68)
Cooking gains												
37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	37.01	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	-112.09	(71)
Water heating gains												
81.64	79.30	74.45	67.85	63.56	57.53	52.40	58.97	61.31	68.14	75.85	79.31	(72)
Total internal gains												
445.73	443.12	426.69	400.33	373.38	347.85	331.64	338.49	352.40	378.99	409.36	432.31	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
57.36	57.58	57.80	58.85	59.05	60.01	60.01	60.19	59.64	59.05	58.65	58.23	
alpha												
4.82	4.84	4.85	4.92	4.94	5.00	5.00	5.01	4.98	4.94	4.91	4.88	
Utilisation factor for gains for living area												
1.00	1.00	0.99	0.98	0.93	0.79	0.63	0.70	0.91	0.99	1.00	1.00	(86)
Mean internal temperature in living area T1												
19.60	19.74	20.00	20.36	20.69	20.91	20.98	20.96	20.79	20.37	19.93	19.58	(87)
Temperature during heating periods in rest of dwelling Th2												
19.91	19.92	19.92	19.94	19.94	19.95	19.95	19.96	19.95	19.94	19.93	19.93	(88)
Utilisation factor for gains for rest of dwelling												
1.00	1.00	0.99	0.97	0.89	0.71	0.50	0.56	0.86	0.98	1.00	1.00	(89)
Mean internal temperature in the rest of dwelling T2												
18.03	18.25	18.62	19.16	19.61	19.89	19.95	19.94	19.76	19.18	18.54	18.03	(90)

Living area fraction (20.00 / 108.00) 0.19 (91)

Mean internal temperature (for the whole dwelling)

18.32	18.52	18.88	19.38	19.81	20.08	20.14	20.13	19.95	19.40	18.79	18.31	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.32	18.52	18.88	19.38	19.81	20.08	20.14	20.13	19.95	19.40	18.79	18.31	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
1.00	1.00	0.99	0.96	0.89	0.72	0.52	0.59	0.86	0.98	1.00	1.00	(94)
Useful gains												
551.00	632.90	712.10	785.01	784.81	627.75	432.99	448.88	591.03	586.78	536.62	521.23	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1833.72	1774.68	1606.08	1335.27	1030.24	684.59	442.02	464.84	736.31	1118.00	1495.40	1817.84	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
954.34	767.28	665.12	396.19	182.60	-	-	-	-	395.22	690.32	964.68	

Total space heating requirement per year (kWh/year) (October to May) 5015.75 (98)

Space heating requirement per m² (kWh/m²/year) 46.44 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
954.34	767.28	665.12	396.19	182.60	-	-	-	-	395.22	690.32	964.68	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
1027.28	825.92	715.95	426.47	196.56	-	-	-	-	425.43	743.08	1038.40	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
188.71	165.72	172.61	152.73	148.21	130.34	123.21	137.93	138.56	158.48	170.08	183.50	(64)
Efficiency of water heater												86.60 (216)
89.34	89.30	89.20	88.96	88.39	86.60	86.60	86.60	86.60	88.93	89.23	89.36	(217)
Water heating fuel												
211.23	185.59	193.51	171.69	167.67	150.50	142.27	159.27	160.00	178.21	190.61	205.36	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	5399.09	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	2115.93	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	484.02	(232)
Energy saving/generation technologies		
PVs 0.80 x 1.000 x 1029.187 x 1.000	823.349	
PVs 0.80 x 0.000 x 0.000 x 0.500	0.000	
PVs 0.80 x 0.000 x 0.000 x 0.500	0.000	
	823.349	(233)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	7250.69	(238)

10a. Does not apply

11a. Does not apply

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	5399.09	0.216	1166.20	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2115.93	0.216	457.04	(264)
Space and water heating			1623.24	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	484.02	0.519	251.21	(268)
Electricity generated - PVs	-823.35	0.519	-427.32	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1486.06	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**13.76**	(273)

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 06:58:51

New dwelling as designed

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1 TER and DER

Fuel for main heating system: Gas (mains) (fuel factor = 1.00)

Target Carbon Dioxide Emission Rate	TER = 18.35	
Dwelling Carbon Dioxide Emission Rate	DER = 13.76	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 58.3	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 51.1	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

---

2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

---

4 Heating efficiency

Main heating system:
Boiler and radiators, mains gas
Worcester 2000
Source of efficiency: from boiler database
Worcester 2000 GC2000iW 30 C NG
Efficiency: 89.0% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system:
None -

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	Yes	OK
Hot water controls	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%

Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Photovoltaic array

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:58 AM

Type A pv

Type A
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Detached house		
Ground floor (1)	area = 54.00m²	storey height = 2.35m	
First floor	area = 54.00m²	storey height = 2.65m	
Living area:	20.00 (fraction 0.185)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:58 AM

Type A pv

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements			
Roofs	area = 54.00	U = 0.10, k = 9.0	
Walls	area = 131.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 54.00	U = 0.14, k = 110.0	

Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A] Openings lintels	0.300	0.300	21.850
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

Project Information

Building type Detached house

Reference
Date
Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:58 AM

Type A pv

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Gas boilers (including LPG) 1998 or later
	Condensing combi with automatic ignition
	Index : 18687
	Eff 86.60% / 89.90% Worcester 2000 GC2000iW 30 C NG
	Radiators
	Pump in heated space: Yes
	Boiler has load or weather compensator: Yes
	Boiler Interlock: Yes
	Design flow temperature : Unknown
	Central heating pump 2013 or later
	Gas (mains)
Main heating controls:	Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	Yes
Secondary heating system:	None
Water heating:	Combination boiler Combination boiler type : Instantaneous
	Solar panel: no

Project Information

Building type Detached house

Reference

Date

Project Type A
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:58 AM

Type A pv

Water use <= 125 litres/person/day:	Yes
Low energy lights:	100.0% of fixed lighting outlets
Total fixed lighting outlets:	30
Electricity tariff:	Standard tariff
Photovoltaics 1:	Peak kW: 1.00
	30 degrees
	SE/SW
	None or very little (<20 % sky blocked)
Photovoltaics 2:	Peak kW: 0.00
	Heavy (>80 % sky blocked)
Photovoltaics 3:	Peak kW: 0.00
	Heavy (>80 % sky blocked)
Conservatory:	No
Fixed air conditioning:	No
Smoke Control Area:	Not specified

Additional allowable electricity generation : 0.00kg/m²/year

Predicted Energy Assessment

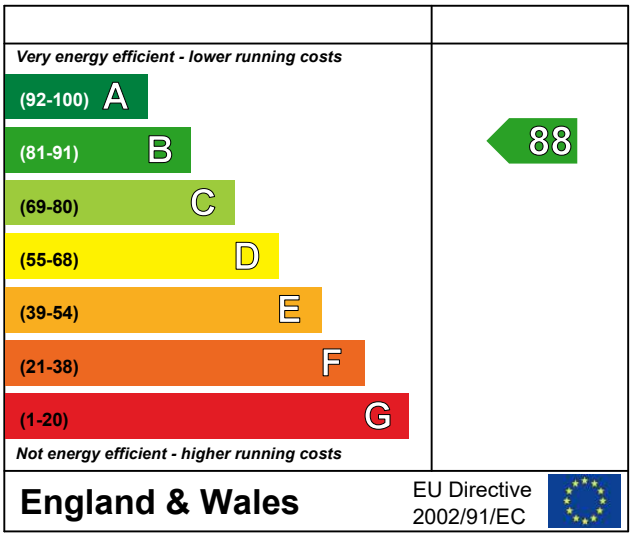
Type A
Oaklands Drive
Almondsbury
BS32 4AB

Dwelling type: Detached house
Date of assessment: 2 June 2022
Produced by Complete Energy Consultancy Ltd
Total floor area: 108 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

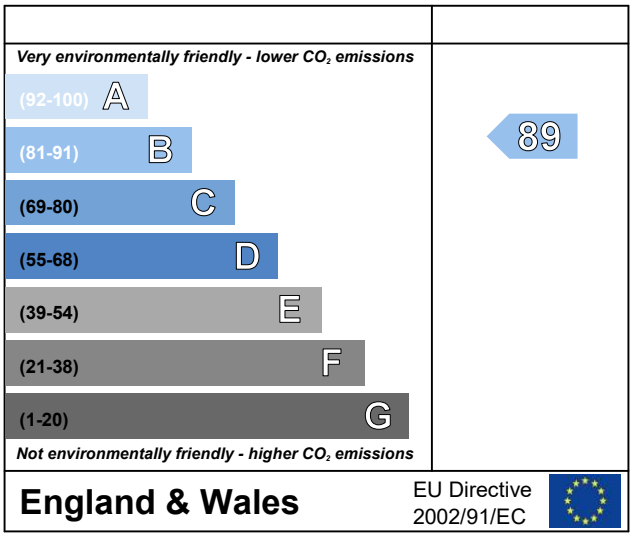
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Project Information

Building type Detached house

Reference
Date
Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	42.00	2.35	98.70	(3a)
First floor	42.00	2.65	111.30	(3b)
	84.00			**(4)**
			210.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.19	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.54	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.46	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.59	0.57	0.56	0.51	0.49	0.44	0.44	0.42	0.46	0.49	0.52	0.54

6.03 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.67	0.66	0.66	0.63	0.62	0.60	0.60	0.59	0.61	0.62	0.63	0.65

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			42.00	0.10	4.20	9.00	378.00	(30)
Walls Brick and block cavity wall, full fill			111.80	0.19	21.24	60.00	6708.00	(29)
Ground floors			42.00	0.14	5.88	110.00	4620.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.53 (42)

Annual average hot water usage in litres per day Vd,average 94.39 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
103.83	100.06	96.28	92.50	88.73	84.95	84.95	88.73	92.50	96.28	100.06	103.83	(44)
Energy content of hot water used												
153.98	134.67	138.97	121.16	116.25	100.32	92.96	106.67	107.94	125.80	137.32	149.12	

Energy content (annual) 1485.15 (45)

Distribution loss												
23.10	20.20	20.85	18.17	17.44	15.05	13.94	16.00	16.19	18.87	20.60	22.37	(46)

Cylinder volume, l 150.00 (47)

Manufacturer's declared cylinder loss factor (kWh/day) 1.86 (48)

Temperature Factor 0.5400 (49)

Energy lost from hot water cylinder (kWh/day) 1.00 (55)

Total storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(56)
Net storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(57)
Primary loss												
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total heat required for water heating calculated for each month												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(62)
Output from water heater for each month, kWh/month												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(64)

2125.65 (64)

Heat gains from water heating, kWh/month												
94.72	84.09	89.73	82.40	82.17	75.47	74.43	78.99	78.01	85.35	87.77	93.10	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	(66)
Lighting gains												
54.93	48.79	39.68	30.04	22.45	18.96	20.48	26.62	35.74	45.37	52.96	56.46	(67)
Appliances gains												
339.70	343.22	334.34	315.43	291.56	269.12	254.13	250.61	259.49	278.40	302.27	324.71	(68)
Cooking gains												
52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
Water heating gains												
127.31	125.13	120.60	114.44	110.45	104.82	100.04	106.17	108.34	114.71	121.91	125.14	(72)
Total internal gains												
625.36	620.57	598.04	563.34	527.89	496.33	478.08	486.83	507.00	541.92	580.57	609.73	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 0.75

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
51.59	51.80	52.01	53.01	53.20	54.12	54.12	54.29	53.76	53.20	52.82	52.42	
alpha												
4.44	4.45	4.47	4.53	4.55	4.61	4.61	4.62	4.58	4.55	4.52	4.49	
Utilisation factor for gains for living area												
0.99	0.98	0.97	0.92	0.81	0.63	0.48	0.53	0.77	0.94	0.98	0.99	(86)
Tweekday												
19.86	19.99	20.22	20.53	20.77	20.89	20.92	20.92	20.84	20.54	20.15	19.84	
Tweekend												
20.35	20.43	20.56	20.73	20.87	20.94	20.96	20.95	20.91	20.74	20.52	20.34	
24 instead of 16												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean internal temperature in living area T1												
20.00	20.12	20.32	20.58	20.80	20.91	20.93	20.93	20.86	20.60	20.25	19.99	(87)
Temperature during heating periods in rest of dwelling Th2												
19.80	19.81	19.81	19.83	19.84	19.85	19.85	19.86	19.85	19.84	19.83	19.82	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.98	0.96	0.89	0.75	0.54	0.36	0.40	0.68	0.91	0.98	0.99	(89)
Tweekday												
18.49	18.67	18.96	19.35	19.62	19.75	19.77	19.77	19.70	19.37	18.89	18.49	
Tweekend												
18.49	18.67	18.96	19.35	19.62	19.75	19.77	19.77	19.70	19.37	18.89	18.49	
Mean internal temperature in the rest of dwelling T2												
18.49	18.67	18.96	19.35	19.62	19.75	19.77	19.77	19.70	19.37	18.89	18.49	(90)

Living area fraction (15.00 / 84.00) 0.18 (91)

Mean internal temperature (for the whole dwelling)

18.76	18.93	19.21	19.57	19.83	19.95	19.97	19.97	19.91	19.59	19.13	18.76	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.76	18.93	19.21	19.57	19.83	19.95	19.97	19.97	19.91	19.59	19.13	18.76	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.98	0.97	0.95	0.89	0.75	0.55	0.37	0.42	0.69	0.91	0.97	0.99	(94)
Useful gains												
720.28	792.14	847.14	865.63	780.68	558.38	361.29	379.96	577.73	692.03	690.06	690.28	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1635.43	1580.09	1425.26	1174.30	891.14	577.16	363.70	384.10	630.13	985.83	1329.24	1619.89	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
680.87	529.51	430.13	222.25	82.18	-	-	-	-	218.59	460.21	691.63	

Total space heating requirement per year (kWh/year) (October to May)	3315.36	(98)
Space heating requirement per m² (kWh/m²/year)	39.47	(99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	394.21%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
680.87	529.51	430.13	222.25	82.18	-	-	-	-	218.59	460.21	691.63	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
172.72	134.32	109.11	56.38	20.85	-	-	-	-	55.45	116.74	175.45	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(64)
Efficiency of water heater												295.93 (216)
295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	(217)
Water heating fuel												
70.42	62.11	65.34	58.73	57.67	51.69	49.80	54.43	54.27	60.89	64.19	68.77	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	841.01	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	718.31	(219)
Electricity for pumps, fans and electric keep-hot		
Total electricity for the above, kWh/year	0.00	(231)
Electricity for lighting (100.00% fixed LEL)	388.03	(232)
Energy saving/generation technologies		
Electricity generated - µCHP/heat pump	0.00	(235)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	1947.34	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	841.008	13.190	110.93	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
High-rate percentage	100.000%			(243)
Low-rate percentage	0.000%			(244)
High-rate cost	718.31	13.190	94.74	(245)
Low-rate	0.00	13.190	0.00	(246)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	0.000	13.190	0.00	(249)
Energy for lighting	388.029	13.190	51.18	(250)
Additional standing charges			0.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			256.85	(255)

11a. SAP rating

	0.42	**(256)**
	0.84	**(257)**
SAP value	88.33	
	88	(258)
SAP band	**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	841.01	0.519	436.48	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	718.31	0.519	372.80	(264)
Space and water heating			809.28	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	388.03	0.519	201.39	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1010.67	(272)
			kg/m²/year	
CO2 emissions per m²			**12.03**	(273)
EI value			89.50	(273a)
EI rating			**90**	(274)
EI band			**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(13.19 / 3.9421) x (1 + (0.29 x 0.25)) = 3.5885, stars = 5
Main heating environmental impact	(0.5190 / 3.9421) x (1 + (0.29 x 0.25)) = 0.1412, stars = 5
Water heating energy efficiency	13.19 / 2.9593 = 4.4572, stars = 4
Water heating environmental impact	0.52 / + (0.00 x 0.52) = 0.1754, stars = 5

Project Information

Building type Detached house

Reference

Date

Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	Av. Storey height (m)	Volume (m^3)	
Ground floor (1)	42.00	2.35	98.70	(3a)
First floor	42.00	2.65	111.30	(3b)
	84.00			**(4)**
			210.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.19	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.54	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.46	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.59	0.57	0.56	0.51	0.49	0.44	0.44	0.42	0.46	0.49	0.52	0.54

6.03 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.67	0.66	0.66	0.63	0.62	0.60	0.60	0.59	0.61	0.62	0.63	0.65

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			42.00	0.10	4.20	9.00	378.00	(30)
Walls Brick and block cavity wall, full fill			111.80	0.19	21.24	60.00	6708.00	(29)
Ground floors			42.00	0.14	5.88	110.00	4620.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.53 (42)

Annual average hot water usage in litres per day Vd,average 94.39 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
103.83	100.06	96.28	92.50	88.73	84.95	84.95	88.73	92.50	96.28	100.06	103.83	(44)
Energy content of hot water used												
153.98	134.67	138.97	121.16	116.25	100.32	92.96	106.67	107.94	125.80	137.32	149.12	

Energy content (annual) 1485.15 (45)

Distribution loss												
23.10	20.20	20.85	18.17	17.44	15.05	13.94	16.00	16.19	18.87	20.60	22.37	(46)

Cylinder volume, l 150.00 (47)

Manufacturer's declared cylinder loss factor (kWh/day) 1.86 (48)

Temperature Factor 0.5400 (49)

Energy lost from hot water cylinder (kWh/day) 1.00 (55)

Total storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(56)
Net storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(57)
Primary loss												
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total heat required for water heating calculated for each month												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(62)
Output from water heater for each month, kWh/month												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(64)

2125.65 (64)

Heat gains from water heating, kWh/month												
94.72	84.09	89.73	82.40	82.17	75.47	74.43	78.99	78.01	85.35	87.77	93.10	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	(66)
Lighting gains												
21.97	19.52	15.87	12.02	8.98	7.58	8.19	10.65	14.29	18.15	21.18	22.58	(67)
Appliances gains												
227.60	229.96	224.01	211.34	195.34	180.31	170.27	167.91	173.86	186.53	202.52	217.55	(68)
Cooking gains												
35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
Water heating gains												
127.31	125.13	120.60	114.44	110.45	104.82	100.04	106.17	108.34	114.71	121.91	125.14	(72)
Total internal gains												
437.89	435.62	421.49	398.81	375.79	353.73	339.52	345.74	357.51	380.41	406.63	426.29	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 0.75

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
51.59	51.80	52.01	53.01	53.20	54.12	54.12	54.29	53.76	53.20	52.82	52.42	
alpha												
4.44	4.45	4.47	4.53	4.55	4.61	4.61	4.62	4.58	4.55	4.52	4.49	
Utilisation factor for gains for living area												
1.00	0.99	0.99	0.96	0.87	0.71	0.55	0.61	0.85	0.97	0.99	1.00	(86)
Tweekday												
19.69	19.83	20.08	20.42	20.70	20.87	20.92	20.91	20.78	20.42	20.00	19.67	
Tweekend												
20.26	20.34	20.48	20.67	20.83	20.93	20.95	20.95	20.88	20.67	20.43	20.25	
24 instead of 16												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean internal temperature in living area T1												
19.85	19.98	20.19	20.48	20.74	20.89	20.93	20.92	20.81	20.49	20.12	19.84	(87)
Temperature during heating periods in rest of dwelling Th2												
19.80	19.81	19.81	19.83	19.84	19.85	19.85	19.86	19.85	19.84	19.83	19.82	(88)
Utilisation factor for gains for rest of dwelling												
1.00	0.99	0.98	0.94	0.82	0.61	0.41	0.47	0.78	0.96	0.99	1.00	(89)
Tweekday												
18.28	18.47	18.78	19.22	19.55	19.73	19.76	19.76	19.66	19.23	18.70	18.28	
Tweekend												
18.28	18.47	18.78	19.22	19.55	19.73	19.76	19.76	19.66	19.23	18.70	18.28	
Mean internal temperature in the rest of dwelling T2												
18.28	18.47	18.78	19.22	19.55	19.73	19.76	19.76	19.66	19.23	18.70	18.28	(90)

Living area fraction (15.00 / 84.00) 0.18 (91)

Mean internal temperature (for the whole dwelling)

18.56	18.74	19.03	19.45	19.77	19.94	19.97	19.97	19.86	19.45	18.95	18.56	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.56	18.74	19.03	19.45	19.77	19.94	19.97	19.97	19.86	19.45	18.95	18.56	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.99	0.99	0.98	0.93	0.82	0.62	0.43	0.49	0.78	0.95	0.99	1.00	(94)
Useful gains												
541.43	621.63	697.50	756.57	725.41	544.53	359.00	375.74	537.79	573.50	530.55	513.88	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1612.56	1558.24	1406.00	1160.43	884.35	575.54	363.41	383.59	625.31	970.81	1309.06	1597.64	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
796.92	629.40	527.12	290.78	118.25	-	-	-	-	295.59	560.53	806.32	

Total space heating requirement per year (kWh/year) (October to May)	4024.91	(98)
Space heating requirement per m² (kWh/m²/year)	47.92	(99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

												kWh/year	
No secondary heating system selected													
Fraction of space heat from main system(s)									1.0000				(202)
Efficiency of main heating system									394.21%				(206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement													
796.92	629.40	527.12	290.78	118.25	-	-	-	-	295.59	560.53	806.32		(98)
Appendix Q - monthly energy saved (main heating system 1)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(210)
Space heating fuel (main heating system 1)													
202.15	159.66	133.72	73.76	30.00	-	-	-	-	74.98	142.19	204.54		(211)
Appendix Q - monthly energy saved (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(212)
Space heating fuel (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(213)
Appendix Q - monthly energy saved (secondary heating system)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(214)
Space heating fuel (secondary)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(215)
Water heating													
Water heating requirement													
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52		(64)
Efficiency of water heater												295.93	(216)
295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93		(217)
Water heating fuel													
70.42	62.11	65.34	58.73	57.67	51.69	49.80	54.43	54.27	60.89	64.19	68.77		(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	1021.00	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	718.31	(219)
Electricity for pumps, fans and electric keep-hot		
Total electricity for the above, kWh/year	0.00	(231)
Electricity for lighting (100.00% fixed LEL)	388.03	(232)
Energy saving/generation technologies		
Electricity generated - µCHP/heat pump	0.00	(235)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	2127.33	(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	1021.00	0.519	529.90	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	718.31	0.519	372.80	(264)
Space and water heating			902.70	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	388.03	0.519	201.39	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1104.09	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**13.14**	(273)

Project Information
Building type Detached house

Reference
Date
Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 06:59:08

New dwelling as designed

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1 TER and DER
Fuel for main heating system: Standard tariff (fuel factor = 1.55)

Target Carbon Dioxide Emission Rate	TER = 28.77	
Dwelling Carbon Dioxide Emission Rate	DER = 13.14	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 61.4	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 53.3	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

---

2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

---

4 Heating efficiency
Main heating system:
Air source heat pump, underfloor, electric
Mitsubishi Electric Ecodan 6.0 kW
Source of efficiency: from boiler database
Secondary heating system:
None -

---

5 Cylinder insulation
Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	2207 Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	No	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%
Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Project Information

Building type Detached house

Reference
Date
Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:59 AM

Type B ASHP

Type B
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Detached house		
Ground floor (1)	area = 42.00m²	storey height = 2.35m	
First floor	area = 42.00m²	storey height = 2.65m	
Living area:	15.00 (fraction 0.179)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type Detached house

Reference
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Project Type B
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Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:59 AM

Type B ASHP

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements

Roofs	area = 42.00	U = 0.10, k = 9.0	
Walls	area = 111.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 42.00	U = 0.14, k = 110.0	

Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A]	0.300	0.300	21.850
Openings lintels			
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

Project Information

Building type Detached house

Reference

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Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:59 AM

Type B ASHP

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Heat pumps Electric Air source heat pump with flow temperature <= 35°C Index : 104634 Mitsubishi Electric Ecodan 6.0 kW PUZ-WM60VAA Underfloor, pipes in screed above insulation Pump in heated space: No Boiler has load or weather compensator: Yes Boiler Interlock: No Design flow temperature : Unknown Central heating pump 2013 or later Not MCS Approved Installer Standard tariff
Main heating controls:	2207 Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	No
Secondary heating system:	None
Water heating:	MicroCHP or Heat Pump Manufacturer's declared cylinder loss factor (kWh/day) 1.86

Project Information

Building type Detached house

Reference

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Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:59 AM

Type B ASHP

Cylinder volume : 150.00
Insulation type : Factory
Insulation thickness : -1.00
Cylinder heater : n/a
Cylinder in heated space: Yes
Insulated primary: Yes
Cylinder thermostat: Yes
Separate timer for domestic hot water: Yes
Solar panel: no

Water use <= 125 litres/person/day: Yes

Low energy lights: 100.0% of fixed lighting outlets
Total fixed lighting outlets: 30
Electricity tariff: Standard tariff
Photovoltaics 1: Peak kW: 0.00
Photovoltaics 2: Peak kW: 0.00
Photovoltaics 3: Peak kW: 0.00
Conservatory: No
Fixed air conditioning: No
Smoke Control Area: Not specified
Additional allowable electricity generation : 0.00kg/m²/year

Predicted Energy Assessment

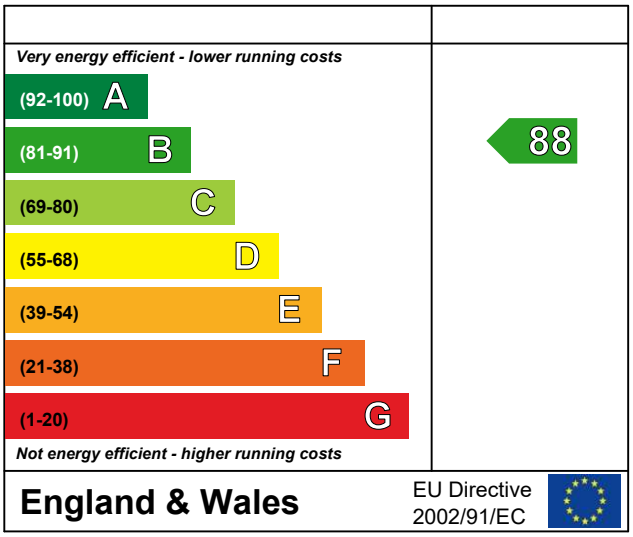
Type B
Oaklands Drive
Almondsbury
BS32 4AB

Dwelling type: Detached house
Date of assessment: 2 June 2022
Produced by Complete Energy Consultancy Ltd
Total floor area: 84 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

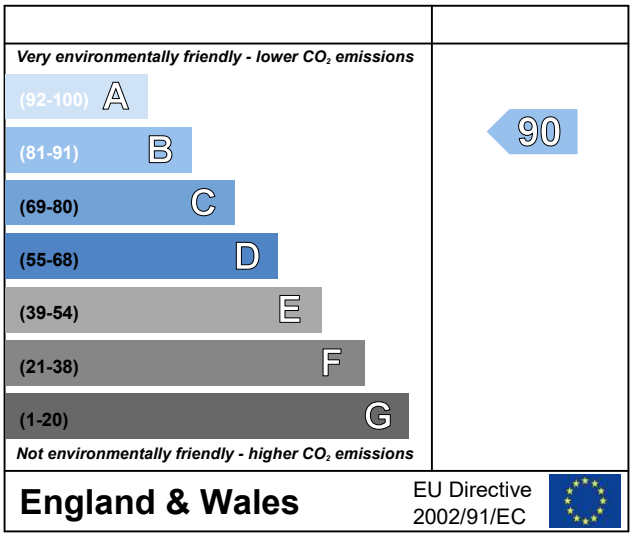
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Project Information

Building type Detached house

Reference
Date
Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	Av. Storey height (m)	Volume (m^3)	
Ground floor (1)	42.00	2.35	98.70	(3a)
First floor	42.00	2.65	111.30	(3b)
	84.00			**(4)**
			210.00	**(5)**

2. Ventilation rate

			m³ per hour	
	main + seondary + other heating			
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.19	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.54	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.46	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.59	0.57	0.56	0.51	0.49	0.44	0.44	0.42	0.46	0.49	0.52	0.54

6.03 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.67	0.66	0.66	0.63	0.62	0.60	0.60	0.59	0.61	0.62	0.63	0.65

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			42.00	0.10	4.20	9.00	378.00	(30)
Walls Brick and block cavity wall, full fill			111.80	0.19	21.24	60.00	6708.00	(29)
Ground floors			42.00	0.14	5.88	110.00	4620.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.53 (42)

Annual average hot water usage in litres per day Vd,average 94.39 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
103.83	100.06	96.28	92.50	88.73	84.95	84.95	88.73	92.50	96.28	100.06	103.83	(44)
Energy content of hot water used												
153.98	134.67	138.97	121.16	116.25	100.32	92.96	106.67	107.94	125.80	137.32	149.12	

Energy content (annual) 1485.15 (45)

Distribution loss												
23.10	20.20	20.85	18.17	17.44	15.05	13.94	16.00	16.19	18.87	20.60	22.37	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss calculated for each month												
24.30	21.93	24.20	23.33	24.05	23.20	23.93	24.01	23.27	24.14	23.46	24.28	(61)
Total heat required for water heating calculated for each month												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(62)
Output from water heater for each month, kWh/month												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(64)

1769.24 (64)

Heat gains from water heating, kWh/month												
57.27	50.26	52.26	46.12	44.67	39.16	36.89	41.47	41.71	47.86	51.52	55.65	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	(66)
Lighting gains												
54.93	48.79	39.68	30.04	22.45	18.96	20.48	26.62	35.74	45.37	52.96	56.46	(67)
Appliances gains												
339.70	343.22	334.34	315.43	291.56	269.12	254.13	250.61	259.49	278.40	302.27	324.71	(68)
Cooking gains												
52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
Water heating gains												
76.98	74.79	70.24	64.05	60.03	54.38	49.58	55.74	57.93	64.33	71.56	74.80	(72)
Total internal gains												
578.04	573.23	550.68	515.95	480.47	448.89	430.63	439.40	459.59	494.54	533.22	562.39	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
51.59	51.80	52.01	53.01	53.20	54.12	54.12	54.29	53.76	53.20	52.82	52.42	
alpha												
4.44	4.45	4.47	4.53	4.55	4.61	4.61	4.62	4.58	4.55	4.52	4.49	
Utilisation factor for gains for living area												
0.99	0.99	0.97	0.93	0.83	0.66	0.50	0.55	0.80	0.95	0.99	0.99	(86)
Mean internal temperature in living area T1												
19.70	19.86	20.13	20.49	20.79	20.95	20.99	20.98	20.87	20.50	20.04	19.68	(87)
Temperature during heating periods in rest of dwelling Th2												
19.80	19.81	19.81	19.83	19.84	19.85	19.85	19.86	19.85	19.84	19.83	19.82	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.98	0.96	0.91	0.77	0.56	0.37	0.42	0.71	0.93	0.98	0.99	(89)
Mean internal temperature in the rest of dwelling T2												
18.10	18.34	18.74	19.26	19.64	19.82	19.85	19.85	19.75	19.28	18.63	18.09	(90)

Living area fraction (15.00 / 84.00) 0.18 (91)

Mean internal temperature (for the whole dwelling)

18.39	18.61	18.99	19.48	19.84	20.02	20.05	20.05	19.95	19.50	18.88	18.37	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.39	18.61	18.99	19.48	19.84	20.02	20.05	20.05	19.95	19.50	18.88	18.37	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.99	0.98	0.96	0.90	0.77	0.58	0.40	0.45	0.72	0.92	0.98	0.99	(94)
Useful gains												
675.21	748.49	806.97	835.09	767.28	561.04	368.93	386.78	571.06	658.82	647.00	644.88	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1593.17	1544.46	1400.53	1164.37	892.78	584.51	372.24	392.44	635.00	975.85	1301.25	1577.29	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
682.96	534.89	441.61	237.08	93.37	-	-	-	-	235.87	471.06	693.71	

Total space heating requirement per year (kWh/year) (October to May) 3390.55 (98)

Space heating requirement per m² (kWh/m²/year) 40.36 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
682.96	534.89	441.61	237.08	93.37	-	-	-	-	235.87	471.06	693.71	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
735.16	575.77	475.36	255.20	100.51	-	-	-	-	253.89	507.06	746.73	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(64)
Efficiency of water heater												86.60 (216)
89.20	89.13	88.99	88.62	87.89	86.60	86.60	86.60	86.60	88.59	89.04	89.22	(217)
Water heating fuel												
199.87	175.70	183.37	163.04	159.63	142.63	134.97	150.90	151.52	169.25	180.58	194.35	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	3649.68	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	2005.80	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	388.03	(232)
Energy saving/generation technologies		
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	6118.51	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	3649.680	3.480	127.01	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2005.80	3.480	69.80	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	388.029	13.190	51.18	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			377.88	(255)

11a. SAP rating

	0.42	**(256)**
	1.23	**(257)**
SAP value	82.84	
	83	(258)
SAP band	**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	3649.68	0.216	788.33	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2005.80	0.216	433.25	(264)
Space and water heating			1221.58	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	388.03	0.519	201.39	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1461.90	(272)

	kg/m²/year	
CO2 emissions per m²	**17.40**	(273)
EI value	84.81	(273a)
EI rating	**85**	(274)
EI band	**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(3.48 / 0.8990) x (1 + (0.29 x 0.00)) = 3.8710, stars = 4
Main heating environmental impact	(0.2160 / 0.8990) x (1 + (0.29 x 0.00)) = 0.2403, stars = 4
Water heating energy efficiency	3.48 / 0.8809 = 3.9506, stars = 4
Water heating environmental impact	0.2160 / 0.8809 = 0.2452, stars = 4

Project Information

Building type Detached house

Reference

Date

Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	42.00	2.35	98.70	(3a)
First floor	42.00	2.65	111.30	(3b)
	84.00			**(4)**
			210.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.19	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.54	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.46	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.59	0.57	0.56	0.51	0.49	0.44	0.44	0.42	0.46	0.49	0.52	0.54

6.03 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.67	0.66	0.66	0.63	0.62	0.60	0.60	0.59	0.61	0.62	0.63	0.65

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			42.00	0.10	4.20	9.00	378.00	(30)
Walls Brick and block cavity wall, full fill			111.80	0.19	21.24	60.00	6708.00	(29)
Ground floors			42.00	0.14	5.88	110.00	4620.00	(28)

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.53 (42)

Annual average hot water usage in litres per day Vd,average 94.39 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
103.83	100.06	96.28	92.50	88.73	84.95	84.95	88.73	92.50	96.28	100.06	103.83	(44)
Energy content of hot water used												
153.98	134.67	138.97	121.16	116.25	100.32	92.96	106.67	107.94	125.80	137.32	149.12	

Energy content (annual) 1485.15 (45)

Distribution loss												
23.10	20.20	20.85	18.17	17.44	15.05	13.94	16.00	16.19	18.87	20.60	22.37	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss calculated for each month												
24.30	21.93	24.20	23.33	24.05	23.20	23.93	24.01	23.27	24.14	23.46	24.28	(61)
Total heat required for water heating calculated for each month												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(62)
Output from water heater for each month, kWh/month												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(64)

1769.24 (64)

Heat gains from water heating, kWh/month												
57.27	50.26	52.26	46.12	44.67	39.16	36.89	41.47	41.71	47.86	51.52	55.65	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	(66)
Lighting gains												
21.97	19.52	15.87	12.02	8.98	7.58	8.19	10.65	14.29	18.15	21.18	22.58	(67)
Appliances gains												
227.60	229.96	224.01	211.34	195.34	180.31	170.27	167.91	173.86	186.53	202.52	217.55	(68)
Cooking gains												
35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
Water heating gains												
76.98	74.79	70.24	64.05	60.03	54.38	49.58	55.74	57.93	64.33	71.56	74.80	(72)
Total internal gains												
390.57	388.28	374.13	351.42	328.38	306.29	292.06	298.31	310.10	333.03	359.28	378.95	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
51.59	51.80	52.01	53.01	53.20	54.12	54.12	54.29	53.76	53.20	52.82	52.42	
alpha												
4.44	4.45	4.47	4.53	4.55	4.61	4.61	4.62	4.58	4.55	4.52	4.49	
Utilisation factor for gains for living area												
1.00	1.00	0.99	0.96	0.89	0.74	0.58	0.64	0.88	0.98	1.00	1.00	(86)
Mean internal temperature in living area T1												
19.50	19.67	19.96	20.35	20.70	20.92	20.98	20.97	20.80	20.35	19.86	19.48	(87)
Temperature during heating periods in rest of dwelling Th2												
19.80	19.81	19.81	19.83	19.84	19.85	19.85	19.86	19.85	19.84	19.83	19.82	(88)
Utilisation factor for gains for rest of dwelling												
1.00	0.99	0.98	0.95	0.84	0.64	0.44	0.50	0.81	0.97	0.99	1.00	(89)
Mean internal temperature in the rest of dwelling T2												
17.82	18.07	18.49	19.07	19.54	19.80	19.85	19.84	19.68	19.08	18.37	17.80	(90)

Living area fraction (15.00 / 84.00) 0.18 (91)

Mean internal temperature (for the whole dwelling)

18.12	18.35	18.75	19.30	19.75	20.00	20.05	20.04	19.88	19.31	18.63	18.10	(92)
Apply adjustment to the mean internal temperature, where appropriate												
18.12	18.35	18.75	19.30	19.75	20.00	20.05	20.04	19.88	19.31	18.63	18.10	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
1.00	0.99	0.98	0.94	0.84	0.65	0.46	0.53	0.81	0.96	0.99	1.00	(94)
Useful gains												
494.91	575.87	653.79	719.67	704.24	543.06	365.59	380.64	522.02	533.42	484.86	467.19	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1562.39	1514.90	1374.15	1144.79	882.63	581.89	371.76	391.55	627.38	954.61	1273.90	1547.38	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
794.20	631.03	535.95	306.08	132.72	-	-	-	-	313.36	568.11	803.66	

Total space heating requirement per year (kWh/year) (October to May) 4085.12 (98)

Space heating requirement per m² (kWh/m²/year) 48.63 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
794.20	631.03	535.95	306.08	132.72	-	-	-	-	313.36	568.11	803.66	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
854.90	679.26	576.91	329.48	142.86	-	-	-	-	337.31	611.53	865.08	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(64)
Efficiency of water heater												86.60 (216)
89.28	89.22	89.11	88.81	88.17	86.60	86.60	86.60	86.60	88.80	89.15	89.30	(217)
Water heating fuel												
199.70	175.51	183.11	162.69	159.12	142.63	134.97	150.90	151.52	168.84	180.35	194.18	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	4397.33	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	2003.51	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	388.03	(232)
Energy saving/generation technologies		
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	6863.87	(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	4397.33	0.216	949.82	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2003.51	0.216	432.76	(264)
Space and water heating			1382.58	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	388.03	0.519	201.39	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1622.89	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**19.32**	(273)

Project Information
Building type Detached house

Reference
Date
Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 06:59:46

New dwelling as designed

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1 TER and DER
Fuel for main heating system: Gas (mains) (fuel factor = 1.00)

Target Carbon Dioxide Emission Rate	TER = 19.98	
Dwelling Carbon Dioxide Emission Rate	DER = 19.32	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 61.4	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 53.3	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

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2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

---

4 Heating efficiency
Main heating system:
Boiler and radiators, mains gas
Worcester 2000
Source of efficiency: from boiler database
Worcester 2000 GC2000iW 30 C NG
Efficiency: 89.0% SEDBUK2009
Minimum: 88.0% OK
Secondary heating system:
None -

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	Yes	OK
Hot water controls	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%

Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Project Information

Building type Detached house

Reference
Date
Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:59 AM

Type B baseline

Type B
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Detached house		
Ground floor (1)	area = 42.00m²	storey height = 2.35m	
First floor	area = 42.00m²	storey height = 2.65m	
Living area:	15.00 (fraction 0.179)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type Detached house

Reference
Date
Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:59 AM

Type B baseline

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements			
Roofs	area = 42.00	U = 0.10, k = 9.0	
Walls	area = 111.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 42.00	U = 0.14, k = 110.0	

Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A] Openings lintels	0.300	0.300	21.850
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

Project Information

Building type Detached house

Reference

Date

Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:59 AM

Type B baseline

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Gas boilers (including LPG) 1998 or later
	Condensing combi with automatic ignition
	Index : 18687
	Eff 86.60% / 89.90% Worcester 2000 GC2000iW 30 C NG
	Radiators
	Pump in heated space: Yes
	Boiler has load or weather compensator: Yes
	Boiler Interlock: Yes
	Design flow temperature : Unknown
	Central heating pump 2013 or later
	Gas (mains)
Main heating controls:	Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	Yes
Secondary heating system:	None
Water heating:	Combination boiler Combination boiler type : Instantaneous
	Solar panel: no

Project Information

Building type Detached house

Reference
Date
Project Type B
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 06:59 AM

Type B baseline

Water use <= 125 litres/person/day:	Yes
Low energy lights:	100.0% of fixed lighting outlets
Total fixed lighting outlets:	30
Electricity tariff:	Standard tariff
Photovoltaics 1:	Peak kW: 0.00
Photovoltaics 2:	Peak kW: 0.00
Photovoltaics 3:	Peak kW: 0.00
Conservatory:	No
Fixed air conditioning:	No
Smoke Control Area:	Not specified

Additional allowable electricity generation : 0.00kg/m²/year

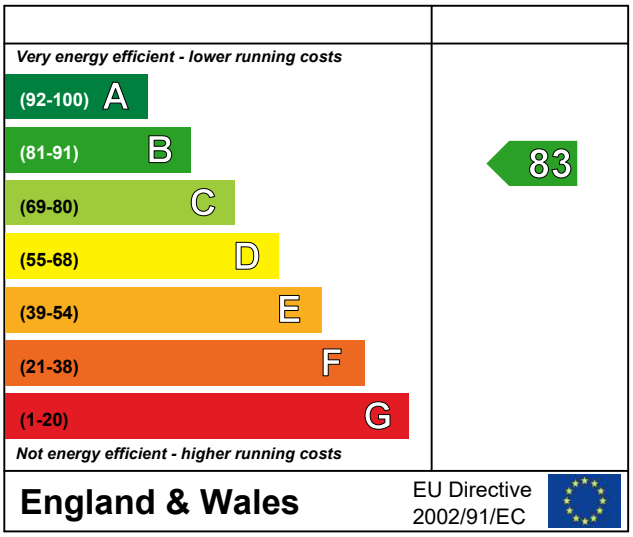
Predicted Energy Assessment

Type B	Dwelling type:	Detached house
Oaklands Drive	Date of assessment:	2 June 2022
Almondsbury	Produced by	Complete Energy Consultancy Ltd
BS32 4AB	Total floor area:	84 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

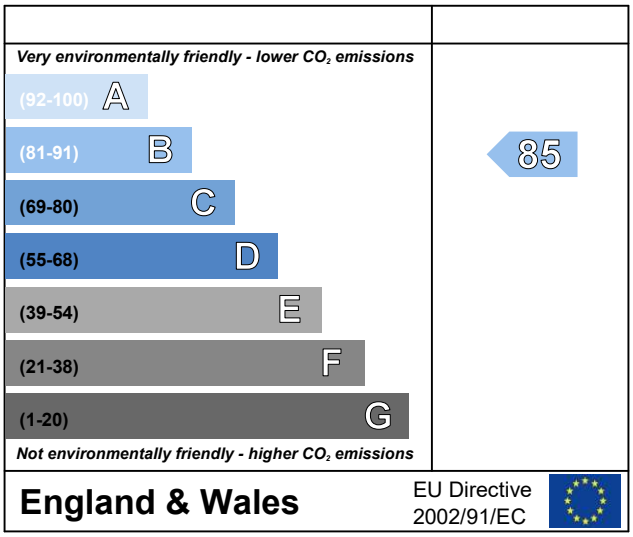
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Project Information

Building type Semi-detached house

Reference
Date
Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	42.00	2.35	98.70	(3a)
First floor	42.00	2.65	111.30	(3b)
	84.00			**(4)**
			210.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.19	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.54	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.46	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.59	0.57	0.56	0.51	0.49	0.44	0.44	0.42	0.46	0.49	0.52	0.54

6.03 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.67	0.66	0.66	0.63	0.62	0.60	0.60	0.59	0.61	0.62	0.63	0.65

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			42.00	0.10	4.20	9.00	378.00	(30)
Walls Brick and block cavity wall, full fill			76.80	0.19	14.59	60.00	4608.00	(29)
Ground floors			42.00	0.14	5.88	110.00	4620.00	(28)
Party wall			35.00	0.00	0.00	70.00	2450.00	

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.53 (42)

Annual average hot water usage in litres per day Vd,average 94.39 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
103.83	100.06	96.28	92.50	88.73	84.95	84.95	88.73	92.50	96.28	100.06	103.83	(44)
Energy content of hot water used												
153.98	134.67	138.97	121.16	116.25	100.32	92.96	106.67	107.94	125.80	137.32	149.12	

Energy content (annual) 1485.15 (45)

Distribution loss												
23.10	20.20	20.85	18.17	17.44	15.05	13.94	16.00	16.19	18.87	20.60	22.37	(46)

Cylinder volume, l 150.00 (47)

Manufacturer's declared cylinder loss factor (kWh/day) 1.86 (48)

Temperature Factor 0.5400 (49)

Energy lost from hot water cylinder (kWh/day) 1.00 (55)

Total storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(56)
Net storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(57)
Primary loss												
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total heat required for water heating calculated for each month												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(62)
Output from water heater for each month, kWh/month												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(64)

2125.65 (64)

Heat gains from water heating, kWh/month												
94.72	84.09	89.73	82.40	82.17	75.47	74.43	78.99	78.01	85.35	87.77	93.10	(65)

5. Internal gains

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	(66)
Lighting gains	54.93	48.79	39.68	30.04	22.45	18.96	20.48	26.62	35.74	45.37	52.96	56.46	(67)
Appliances gains	339.70	343.22	334.34	315.43	291.56	269.12	254.13	250.61	259.49	278.40	302.27	324.71	(68)
Cooking gains	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	(69)
Pumps and fans gains	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
Water heating gains	127.31	125.13	120.60	114.44	110.45	104.82	100.04	106.17	108.34	114.71	121.91	125.14	(72)
Total internal gains	625.36	620.57	598.04	563.34	527.89	496.33	478.08	486.83	507.00	541.92	580.57	609.73	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 0.75

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
54.81	55.05	55.28	56.42	56.64	57.67	57.67	57.87	57.27	56.64	56.20	55.75	
alpha												
4.65	4.67	4.69	4.76	4.78	4.84	4.84	4.86	4.82	4.78	4.75	4.72	
Utilisation factor for gains for living area												
0.99	0.98	0.97	0.91	0.79	0.61	0.45	0.50	0.75	0.93	0.98	0.99	(86)
Tweekday												
19.95	20.08	20.31	20.59	20.81	20.91	20.93	20.93	20.86	20.60	20.23	19.93	
Tweekend												
20.40	20.48	20.61	20.77	20.89	20.95	20.96	20.96	20.92	20.77	20.57	20.40	
24 instead of 16												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean internal temperature in living area T1												
20.08	20.20	20.39	20.64	20.83	20.92	20.94	20.94	20.88	20.65	20.32	20.07	(87)
Temperature during heating periods in rest of dwelling Th2												
19.87	19.87	19.88	19.90	19.90	19.92	19.92	19.92	19.91	19.90	19.89	19.88	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.98	0.95	0.88	0.73	0.51	0.34	0.39	0.66	0.91	0.98	0.99	(89)
Tweekday												
18.66	18.83	19.11	19.48	19.71	19.82	19.83	19.84	19.78	19.49	19.04	18.65	
Tweekend												
18.66	18.83	19.11	19.48	19.71	19.82	19.83	19.84	19.78	19.49	19.04	18.65	
Mean internal temperature in the rest of dwelling T2												
18.66	18.83	19.11	19.48	19.71	19.82	19.83	19.84	19.78	19.49	19.04	18.65	(90)

Living area fraction (15.00 / 84.00) 0.18 (91)

Mean internal temperature (for the whole dwelling)

18.91	19.08	19.34	19.69	19.91	20.02	20.03	20.03	19.98	19.70	19.27	18.91	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.91	19.08	19.34	19.69	19.91	20.02	20.03	20.03	19.98	19.70	19.27	18.91	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.98	0.97	0.95	0.88	0.73	0.52	0.35	0.40	0.67	0.90	0.97	0.99	(94)
Useful gains												
720.04	791.29	844.36	856.37	760.86	535.20	345.51	363.50	559.96	686.52	689.16	690.13	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1555.16	1502.34	1355.15	1115.33	845.91	547.90	347.00	366.12	598.80	937.17	1263.09	1538.87	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
621.33	477.82	380.03	186.45	63.28	-	-	-	-	186.48	413.23	631.46	

Total space heating requirement per year (kWh/year) (October to May) 2960.08 (98)

Space heating requirement per m² (kWh/m²/year) 35.24 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	368.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
621.33	477.82	380.03	186.45	63.28	-	-	-	-	186.48	413.23	631.46	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
168.43	129.53	103.02	50.54	17.15	-	-	-	-	50.55	112.02	171.17	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(64)
Efficiency of water heater												295.93 (216)
295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	(217)
Water heating fuel												
70.42	62.11	65.34	58.73	57.67	51.69	49.80	54.43	54.27	60.89	64.19	68.77	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	802.41	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	718.31	(219)
Electricity for pumps, fans and electric keep-hot		
Total electricity for the above, kWh/year	0.00	(231)
Electricity for lighting (100.00% fixed LEL)	388.03	(232)
Energy saving/generation technologies		
Electricity generated - µCHP/heat pump	0.00	(235)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	1908.75	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	802.409	13.190	105.84	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
High-rate percentage	100.000%			(243)
Low-rate percentage	0.000%			(244)
High-rate cost	718.31	13.190	94.74	(245)
Low-rate	0.00	13.190	0.00	(246)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	0.000	13.190	0.00	(249)
Energy for lighting	388.029	13.190	51.18	(250)
Additional standing charges			0.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			251.76	(255)

11a. SAP rating

			0.42	**(256)**
			0.82	**(257)**
SAP value			88.57	
			89	(258)
SAP band			**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	802.41	0.519	416.45	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	718.31	0.519	372.80	(264)
Space and water heating			789.25	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	388.03	0.519	201.39	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			990.64	(272)
			kg/m²/year	
CO2 emissions per m²			**11.79**	(273)
EI value			89.71	(273a)
EI rating			**90**	(274)
EI band			**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(13.19 / 3.6890) x (1 + (0.29 x 0.25)) = 3.8347, stars = 4
Main heating environmental impact	(0.5190 / 3.6890) x (1 + (0.29 x 0.25)) = 0.1509, stars = 5
Water heating energy efficiency	13.19 / 2.9593 = 4.4572, stars = 4
Water heating environmental impact	0.52 / + (0.00 x 0.52) = 0.1754, stars = 5

Project Information

Building type Semi-detached house

Reference

Date

Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	42.00	2.35	98.70	(3a)
First floor	42.00	2.65	111.30	(3b)
	84.00			**(4)**
			210.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.19	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.54	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.46	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.59	0.57	0.56	0.51	0.49	0.44	0.44	0.42	0.46	0.49	0.52	0.54

6.03 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.67	0.66	0.66	0.63	0.62	0.60	0.60	0.59	0.61	0.62	0.63	0.65

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			42.00	0.10	4.20	9.00	378.00	(30)
Walls Brick and block cavity wall, full fill			76.80	0.19	14.59	60.00	4608.00	(29)
Ground floors			42.00	0.14	5.88	110.00	4620.00	(28)
Party wall			35.00	0.00	0.00	70.00	2450.00	

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.53 (42)

Annual average hot water usage in litres per day Vd,average 94.39 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
103.83	100.06	96.28	92.50	88.73	84.95	84.95	88.73	92.50	96.28	100.06	103.83	(44)
Energy content of hot water used												
153.98	134.67	138.97	121.16	116.25	100.32	92.96	106.67	107.94	125.80	137.32	149.12	

Energy content (annual) 1485.15 (45)

Distribution loss												
23.10	20.20	20.85	18.17	17.44	15.05	13.94	16.00	16.19	18.87	20.60	22.37	(46)

Cylinder volume, l 150.00 (47)

Manufacturer's declared cylinder loss factor (kWh/day) 1.86 (48)

Temperature Factor 0.5400 (49)

Energy lost from hot water cylinder (kWh/day) 1.00 (55)

Total storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(56)
Net storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(57)
Primary loss												
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total heat required for water heating calculated for each month												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(62)
Output from water heater for each month, kWh/month												
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52	(64)

2125.65 (64)

Heat gains from water heating, kWh/month												
94.72	84.09	89.73	82.40	82.17	75.47	74.43	78.99	78.01	85.35	87.77	93.10	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	(66)
Lighting gains												
21.97	19.52	15.87	12.02	8.98	7.58	8.19	10.65	14.29	18.15	21.18	22.58	(67)
Appliances gains												
227.60	229.96	224.01	211.34	195.34	180.31	170.27	167.91	173.86	186.53	202.52	217.55	(68)
Cooking gains												
35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
Water heating gains												
127.31	125.13	120.60	114.44	110.45	104.82	100.04	106.17	108.34	114.71	121.91	125.14	(72)
Total internal gains												
437.89	435.62	421.49	398.81	375.79	353.73	339.52	345.74	357.51	380.41	406.63	426.29	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 0.75

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
54.81	55.05	55.28	56.42	56.64	57.67	57.67	57.87	57.27	56.64	56.20	55.75	
alpha												
4.65	4.67	4.69	4.76	4.78	4.84	4.84	4.86	4.82	4.78	4.75	4.72	
Utilisation factor for gains for living area												
1.00	0.99	0.98	0.95	0.86	0.68	0.52	0.58	0.83	0.97	0.99	1.00	(86)
Tweekday												
19.78	19.92	20.16	20.48	20.75	20.89	20.93	20.92	20.82	20.48	20.08	19.77	
Tweekend												
20.31	20.39	20.52	20.71	20.86	20.94	20.96	20.96	20.90	20.70	20.48	20.30	
24 instead of 16												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean internal temperature in living area T1												
19.93	20.05	20.26	20.54	20.78	20.91	20.94	20.93	20.84	20.54	20.18	19.92	(87)
Temperature during heating periods in rest of dwelling Th2												
19.87	19.87	19.88	19.90	19.90	19.92	19.92	19.92	19.91	19.90	19.89	19.88	(88)
Utilisation factor for gains for rest of dwelling												
1.00	0.99	0.98	0.93	0.81	0.59	0.40	0.45	0.76	0.96	0.99	1.00	(89)
Tweekday												
18.44	18.63	18.93	19.35	19.66	19.81	19.83	19.83	19.75	19.35	18.85	18.44	
Tweekend												
18.44	18.63	18.93	19.35	19.66	19.81	19.83	19.83	19.75	19.35	18.85	18.44	
Mean internal temperature in the rest of dwelling T2												
18.44	18.63	18.93	19.35	19.66	19.81	19.83	19.83	19.75	19.35	18.85	18.44	(90)

Living area fraction (15.00 / 84.00) 0.18 (91)

Mean internal temperature (for the whole dwelling)

18.71	18.88	19.17	19.57	19.86	20.01	20.03	20.03	19.94	19.57	19.08	18.70	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.71	18.88	19.17	19.57	19.86	20.01	20.03	20.03	19.94	19.57	19.08	18.70	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.99	0.99	0.97	0.93	0.80	0.60	0.41	0.47	0.76	0.95	0.99	1.00	(94)
Useful gains												
541.50	621.61	696.84	752.46	712.41	524.74	343.97	360.56	526.16	571.86	530.53	513.95	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1533.37	1481.58	1337.04	1102.78	840.28	546.73	346.81	365.78	594.94	923.34	1243.97	1517.68	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
737.95	577.90	476.31	252.23	95.14	-	-	-	-	261.51	513.67	746.78	

Total space heating requirement per year (kWh/year) (October to May)	3661.48	(98)
Space heating requirement per m² (kWh/m²/year)	43.59	(99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

												kWh/year	
No secondary heating system selected													
Fraction of space heat from main system(s)									1.0000				(202)
Efficiency of main heating system									368.90%				(206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement													
737.95	577.90	476.31	252.23	95.14	-	-	-	-	261.51	513.67	746.78		(98)
Appendix Q - monthly energy saved (main heating system 1)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(210)
Space heating fuel (main heating system 1)													
200.04	156.66	129.12	68.37	25.79	-	-	-	-	70.89	139.25	202.43		(211)
Appendix Q - monthly energy saved (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(212)
Space heating fuel (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(213)
Appendix Q - monthly energy saved (secondary heating system)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(214)
Space heating fuel (secondary)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(215)
Water heating													
Water heating requirement													
208.38	183.80	193.37	173.80	170.65	152.96	147.36	161.07	160.59	180.20	189.96	203.52		(64)
Efficiency of water heater												295.93	(216)
295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93		(217)
Water heating fuel													
70.42	62.11	65.34	58.73	57.67	51.69	49.80	54.43	54.27	60.89	64.19	68.77		(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	992.54	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	718.31	(219)
Electricity for pumps, fans and electric keep-hot		
Total electricity for the above, kWh/year	0.00	(231)
Electricity for lighting (100.00% fixed LEL)	388.03	(232)
Energy saving/generation technologies		
Electricity generated - µCHP/heat pump	0.00	(235)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	2098.88	(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	992.54	0.519	515.13	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	718.31	0.519	372.80	(264)
Space and water heating			887.93	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	388.03	0.519	201.39	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1089.32	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**12.97**	(273)

Project Information
Building type Semi-detached house

Reference
Date
Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 07:00:03

New dwelling as designed

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1 TER and DER
Fuel for main heating system: Standard tariff (fuel factor = 1.55)

Target Carbon Dioxide Emission Rate	TER = 27.39	
Dwelling Carbon Dioxide Emission Rate	DER = 12.97	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 56.7	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 49.0	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

---

2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

---

4 Heating efficiency
Main heating system:
Air source heat pump, underfloor, electric
Mitsubishi Electric Ecodan 6.0 kW
Source of efficiency: from boiler database
Secondary heating system:
None -

---

5 Cylinder insulation
Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	2207 Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	No	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%
Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Project Information

Building type Semi-detached house

Reference
Date
Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type C ASHP

Type C
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Semi-detached house		
Ground floor (1)	area = 42.00m²	storey height = 2.35m	
First floor	area = 42.00m²	storey height = 2.65m	
Living area:	15.00 (fraction 0.179)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type	Semi-detached house
Reference	
Date	
Project	Type C Oaklands Drive Almondsbury BS32 4AB

SAP 2012 input data   Printed on 2 Jun 2022 at 07:00 AM

Type C ASHP

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Rooflights			
Opaque Elements			
Roofs	area = 42.00	U = 0.10, k = 9.0	
Walls	area = 76.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 42.00	U = 0.14, k = 110.0	
Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A] Openings lintels	0.300	0.300	21.850
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

Project Information

Building type Semi-detached house

Reference

Date

Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type C ASHP

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Heat pumps Electric Air source heat pump with flow temperature <= 35°C Index : 104634 Mitsubishi Electric Ecodan 6.0 kW PUZ-WM60VAA Underfloor, pipes in screed above insulation Pump in heated space: No Boiler has load or weather compensator: Yes Boiler Interlock: No Design flow temperature : Unknown Central heating pump 2013 or later Not MCS Approved Installer Standard tariff
Main heating controls:	2207 Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	No
Secondary heating system:	None
Water heating:	MicroCHP or Heat Pump Manufacturer's declared cylinder loss factor (kWh/day) 1.86

Project Information

Building type Semi-detached house

Reference

Date

Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type C ASHP

Cylinder volume : 150.00
Insulation type : Factory
Insulation thickness : -1.00
Cylinder heater : n/a
Cylinder in heated space: Yes
Insulated primary: Yes
Cylinder thermostat: Yes
Separate timer for domestic hot water: Yes
Solar panel: no

Water use <= 125 litres/person/day: Yes

Low energy lights: 100.0% of fixed lighting outlets
Total fixed lighting outlets: 30
Electricity tariff: Standard tariff
Photovoltaics 1: Peak kW: 0.00
Photovoltaics 2: Peak kW: 0.00
Photovoltaics 3: Peak kW: 0.00
Conservatory: No
Fixed air conditioning: No
Smoke Control Area: Not specified
Additional allowable electricity generation : 0.00kg/m²/year

Predicted Energy Assessment

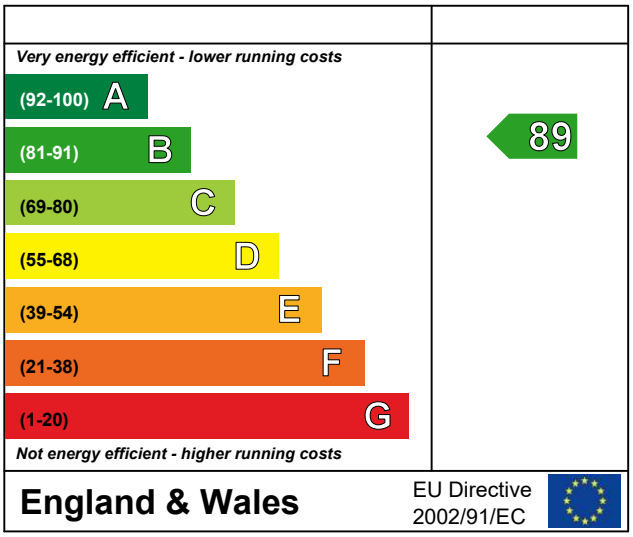
Type C
Oaklands Drive
Almondsbury
BS32 4AB

Dwelling type: Semi-detached house
Date of assessment: 2 June 2022
Produced by Complete Energy Consultancy Ltd
Total floor area: 84 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

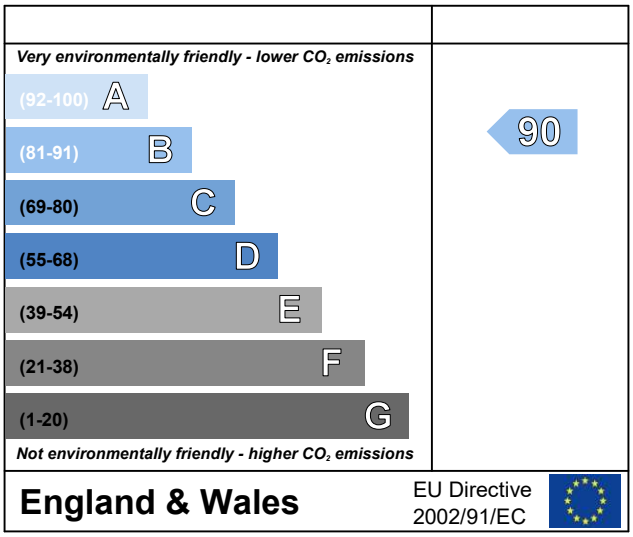
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Project Information

Building type Semi-detached house

Reference
Date
Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	42.00	2.35	98.70	(3a)
First floor	42.00	2.65	111.30	(3b)
	84.00			**(4)**
			210.00	**(5)**

2. Ventilation rate

			m³ per hour	
	main + seondary + other heating			
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.19	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.54	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.46	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.59	0.57	0.56	0.51	0.49	0.44	0.44	0.42	0.46	0.49	0.52	0.54

6.03 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.67	0.66	0.66	0.63	0.62	0.60	0.60	0.59	0.61	0.62	0.63	0.65

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			42.00	0.10	4.20	9.00	378.00	(30)
Walls Brick and block cavity wall, full fill			76.80	0.19	14.59	60.00	4608.00	(29)
Ground floors			42.00	0.14	5.88	110.00	4620.00	(28)
Party wall			35.00	0.00	0.00	70.00	2450.00	

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.53 (42)

Annual average hot water usage in litres per day Vd,average 94.39 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
103.83	100.06	96.28	92.50	88.73	84.95	84.95	88.73	92.50	96.28	100.06	103.83	(44)
Energy content of hot water used												
153.98	134.67	138.97	121.16	116.25	100.32	92.96	106.67	107.94	125.80	137.32	149.12	

Energy content (annual) 1485.15 (45)

Distribution loss												
23.10	20.20	20.85	18.17	17.44	15.05	13.94	16.00	16.19	18.87	20.60	22.37	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss calculated for each month												
24.30	21.93	24.20	23.33	24.05	23.20	23.93	24.01	23.27	24.14	23.46	24.28	(61)
Total heat required for water heating calculated for each month												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(62)
Output from water heater for each month, kWh/month												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(64)

1769.24 (64)

Heat gains from water heating, kWh/month												
57.27	50.26	52.26	46.12	44.67	39.16	36.89	41.47	41.71	47.86	51.52	55.65	(65)

5. Internal gains

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	152.06	(66)
Lighting gains	54.93	48.79	39.68	30.04	22.45	18.96	20.48	26.62	35.74	45.37	52.96	56.46	(67)
Appliances gains	339.70	343.22	334.34	315.43	291.56	269.12	254.13	250.61	259.49	278.40	302.27	324.71	(68)
Cooking gains	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	52.74	(69)
Pumps and fans gains	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
Water heating gains	76.98	74.79	70.24	64.05	60.03	54.38	49.58	55.74	57.93	64.33	71.56	74.80	(72)
Total internal gains	578.04	573.23	550.68	515.95	480.47	448.89	430.63	439.40	459.59	494.54	533.22	562.39	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
54.81	55.05	55.28	56.42	56.64	57.67	57.67	57.87	57.27	56.64	56.20	55.75	
alpha												
4.65	4.67	4.69	4.76	4.78	4.84	4.84	4.86	4.82	4.78	4.75	4.72	
Utilisation factor for gains for living area												
0.99	0.99	0.97	0.92	0.81	0.63	0.47	0.52	0.77	0.95	0.99	0.99	(86)
Mean internal temperature in living area T1												
19.80	19.96	20.22	20.57	20.83	20.96	20.99	20.99	20.90	20.57	20.13	19.78	(87)
Temperature during heating periods in rest of dwelling Th2												
19.87	19.87	19.88	19.90	19.90	19.92	19.92	19.92	19.91	19.90	19.89	19.88	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.98	0.96	0.90	0.76	0.54	0.36	0.41	0.69	0.92	0.98	0.99	(89)
Mean internal temperature in the rest of dwelling T2												
18.30	18.53	18.91	19.41	19.74	19.89	19.91	19.92	19.84	19.42	18.80	18.28	(90)

Living area fraction (15.00 / 84.00) 0.18 (91)

Mean internal temperature (for the whole dwelling)

18.57	18.79	19.15	19.62	19.94	20.09	20.11	20.11	20.03	19.62	19.04	18.55	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.57	18.79	19.15	19.62	19.94	20.09	20.11	20.11	20.03	19.62	19.04	18.55	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.99	0.98	0.95	0.89	0.76	0.55	0.38	0.43	0.70	0.92	0.98	0.99	(94)
Useful gains												
675.16	748.02	805.06	827.87	750.06	538.63	352.62	370.02	555.35	654.92	646.52	644.88	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1518.26	1471.61	1334.39	1107.90	848.40	554.78	354.69	373.67	603.79	929.37	1239.05	1501.68	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
627.27	486.25	393.82	201.63	73.17	-	-	-	-	204.19	426.62	637.46	

Total space heating requirement per year (kWh/year) (October to May) 3050.41 (98)

Space heating requirement per m² (kWh/m²/year) 36.31 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
627.27	486.25	393.82	201.63	73.17	-	-	-	-	204.19	426.62	637.46	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
675.21	523.41	423.92	217.04	78.76	-	-	-	-	219.80	459.23	686.18	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(64)
Efficiency of water heater												86.60 (216)
89.15	89.07	88.91	88.49	87.70	86.60	86.60	86.60	86.60	88.47	88.97	89.17	(217)
Water heating fuel												
199.98	175.81	183.53	163.28	159.97	142.63	134.97	150.90	151.52	169.47	180.71	194.45	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	3283.54	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	2007.21	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	388.03	(232)
Energy saving/generation technologies		
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	5753.79	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	3283.542	3.480	114.27	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	2007.21	3.480	69.85	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	388.029	13.190	51.18	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			365.19	(255)

11a. SAP rating

	0.42	**(256)**
	1.19	**(257)**
SAP value	83.41	
	83	(258)
SAP band	**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	3283.54	0.216	709.25	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2007.21	0.216	433.56	(264)
Space and water heating			1142.80	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	388.03	0.519	201.39	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1383.12	(272)

	kg/m²/year	
CO2 emissions per m²	**16.47**	(273)
EI value	85.63	(273a)
EI rating	**86**	(274)
EI band	**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(3.48 / 0.8990) x (1 + (0.29 x 0.00)) = 3.8710, stars = 4
Main heating environmental impact	(0.2160 / 0.8990) x (1 + (0.29 x 0.00)) = 0.2403, stars = 4
Water heating energy efficiency	3.48 / 0.8803 = 3.9533, stars = 4
Water heating environmental impact	0.2160 / 0.8803 = 0.2454, stars = 4

Project Information

Building type Semi-detached house

Reference

Date

Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	42.00	2.35	98.70	(3a)
First floor	42.00	2.65	111.30	(3b)
	84.00			**(4)**
			210.00	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.19	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.54	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.46	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.59	0.57	0.56	0.51	0.49	0.44	0.44	0.42	0.46	0.49	0.52	0.54

6.03 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.67	0.66	0.66	0.63	0.62	0.60	0.60	0.59	0.61	0.62	0.63	0.65

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			42.00	0.10	4.20	9.00	378.00	(30)
Walls Brick and block cavity wall, full fill			76.80	0.19	14.59	60.00	4608.00	(29)
Ground floors			42.00	0.14	5.88	110.00	4620.00	(28)
Party wall			35.00	0.00	0.00	70.00	2450.00	

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.53 (42)

Annual average hot water usage in litres per day Vd,average 94.39 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
103.83	100.06	96.28	92.50	88.73	84.95	84.95	88.73	92.50	96.28	100.06	103.83	(44)
Energy content of hot water used												
153.98	134.67	138.97	121.16	116.25	100.32	92.96	106.67	107.94	125.80	137.32	149.12	

Energy content (annual) 1485.15 (45)

Distribution loss												
23.10	20.20	20.85	18.17	17.44	15.05	13.94	16.00	16.19	18.87	20.60	22.37	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss calculated for each month												
24.30	21.93	24.20	23.33	24.05	23.20	23.93	24.01	23.27	24.14	23.46	24.28	(61)
Total heat required for water heating calculated for each month												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(62)
Output from water heater for each month, kWh/month												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(64)

1769.24 (64)

Heat gains from water heating, kWh/month												
57.27	50.26	52.26	46.12	44.67	39.16	36.89	41.47	41.71	47.86	51.52	55.65	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	126.72	(66)
Lighting gains												
21.97	19.52	15.87	12.02	8.98	7.58	8.19	10.65	14.29	18.15	21.18	22.58	(67)
Appliances gains												
227.60	229.96	224.01	211.34	195.34	180.31	170.27	167.91	173.86	186.53	202.52	217.55	(68)
Cooking gains												
35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	35.67	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	-101.38	(71)
Water heating gains												
76.98	74.79	70.24	64.05	60.03	54.38	49.58	55.74	57.93	64.33	71.56	74.80	(72)
Total internal gains												
390.57	388.28	374.13	351.42	328.38	306.29	292.06	298.31	310.10	333.03	359.28	378.95	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
54.81	55.05	55.28	56.42	56.64	57.67	57.67	57.87	57.27	56.64	56.20	55.75	
alpha												
4.65	4.67	4.69	4.76	4.78	4.84	4.84	4.86	4.82	4.78	4.75	4.72	
Utilisation factor for gains for living area												
1.00	1.00	0.99	0.96	0.88	0.71	0.55	0.61	0.86	0.98	1.00	1.00	(86)
Mean internal temperature in living area T1												
19.60	19.76	20.05	20.43	20.75	20.94	20.99	20.98	20.84	20.42	19.95	19.58	(87)
Temperature during heating periods in rest of dwelling Th2												
19.87	19.87	19.88	19.90	19.90	19.92	19.92	19.92	19.91	19.90	19.89	19.88	(88)
Utilisation factor for gains for rest of dwelling												
1.00	0.99	0.98	0.94	0.83	0.62	0.42	0.48	0.79	0.97	0.99	1.00	(89)
Mean internal temperature in the rest of dwelling T2												
18.01	18.25	18.66	19.23	19.66	19.88	19.91	19.91	19.78	19.22	18.53	18.00	(90)

Living area fraction (15.00 / 84.00) 0.18 (91)

Mean internal temperature (for the whole dwelling)

18.29	18.52	18.91	19.44	19.85	20.07	20.10	20.10	19.97	19.43	18.79	18.28	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.29	18.52	18.91	19.44	19.85	20.07	20.10	20.10	19.97	19.43	18.79	18.28	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
1.00	0.99	0.98	0.94	0.83	0.63	0.44	0.51	0.80	0.96	0.99	1.00	(94)
Useful gains												
495.00	575.93	653.47	716.80	693.74	524.74	350.34	365.65	512.77	532.51	484.92	467.28	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1488.91	1443.50	1309.50	1090.03	839.85	552.86	354.37	373.06	597.56	909.67	1213.08	1473.18	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
739.47	583.00	488.09	268.72	108.71	-	-	-	-	280.61	524.28	748.39	

Total space heating requirement per year (kWh/year) (October to May) 3741.26 (98)

Space heating requirement per m² (kWh/m²/year) 44.54 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
739.47	583.00	488.09	268.72	108.71	-	-	-	-	280.61	524.28	748.39	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
795.98	627.56	525.39	289.26	117.02	-	-	-	-	302.05	564.35	805.59	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
178.28	156.60	163.17	144.49	140.30	123.52	116.89	130.68	131.22	149.94	160.78	173.40	(64)
Efficiency of water heater												86.60 (216)
89.24	89.18	89.05	88.72	88.01	86.60	86.60	86.60	86.60	88.72	89.10	89.26	(217)
Water heating fuel												
199.78	175.60	183.23	162.86	159.41	142.63	134.97	150.90	151.52	169.00	180.44	194.26	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	4027.19	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	2004.60	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	388.03	(232)
Energy saving/generation technologies		
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	6494.82	(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	4027.19	0.216	869.87	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2004.60	0.216	432.99	(264)
Space and water heating			1302.87	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	388.03	0.519	201.39	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1543.18	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**18.37**	(273)

Project Information

Building type Semi-detached house

Reference
Date
Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 07:00:19

New dwelling as designed

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1 TER and DER

Fuel for main heating system: Gas (mains) (fuel factor = 1.00)

Target Carbon Dioxide Emission Rate	TER = 19.09	
Dwelling Carbon Dioxide Emission Rate	DER = 18.37	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 56.7	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 49.0	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

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2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

---

4 Heating efficiency

Main heating system:
Boiler and radiators, mains gas
Worcester 2000
Source of efficiency: from boiler database
Worcester 2000 GC2000iW 30 C NG
Efficiency: 89.0% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system:
None -

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	Yes	OK
Hot water controls	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%

Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Project Information

Building type Semi-detached house

Reference
Date
Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type C baseline

Type C
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Semi-detached house		
Ground floor (1)	area = 42.00m²	storey height = 2.35m	
First floor	area = 42.00m²	storey height = 2.65m	
Living area:	15.00 (fraction 0.179)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type Semi-detached house

Reference

Date

Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type C baseline

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements			
Roofs	area = 42.00	U = 0.10, k = 9.0	
Walls	area = 76.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 42.00	U = 0.14, k = 110.0	

Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A]	0.300	0.300	21.850
Openings lintels			
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

Project Information

Building type Semi-detached house

Reference
Date
Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type C baseline

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Gas boilers (including LPG) 1998 or later
	Condensing combi with automatic ignition
	Index : 18687
	Eff 86.60% / 89.90% Worcester 2000 GC2000iW 30 C NG
	Radiators
	Pump in heated space: Yes
	Boiler has load or weather compensator: Yes
	Boiler Interlock: Yes
	Design flow temperature : Unknown
	Central heating pump 2013 or later
	Gas (mains)
Main heating controls:	Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	Yes
Secondary heating system:	None
Water heating:	Combination boiler Combination boiler type : Instantaneous
	Solar panel: no

Project Information

Building type Semi-detached house

Reference
Date
Project Type C
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type C baseline

Water use <= 125 litres/person/day:	Yes
Low energy lights:	100.0% of fixed lighting outlets
Total fixed lighting outlets:	30
Electricity tariff:	Standard tariff
Photovoltaics 1:	Peak kW: 0.00
Photovoltaics 2:	Peak kW: 0.00
Photovoltaics 3:	Peak kW: 0.00
Conservatory:	No
Fixed air conditioning:	No
Smoke Control Area:	Not specified

Additional allowable electricity generation : 0.00kg/m²/year

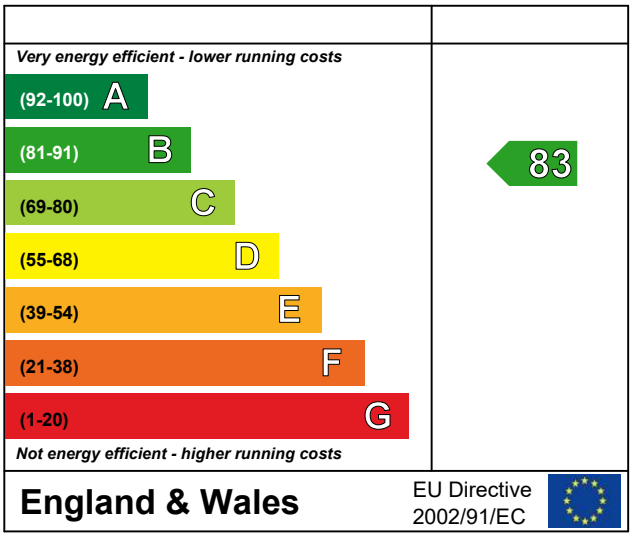
Predicted Energy Assessment

Type C	Dwelling type:	Semi-detached house
Oaklands Drive	Date of assessment:	2 June 2022
Almondsbury	Produced by	Complete Energy Consultancy Ltd
BS32 4AB	Total floor area:	84 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

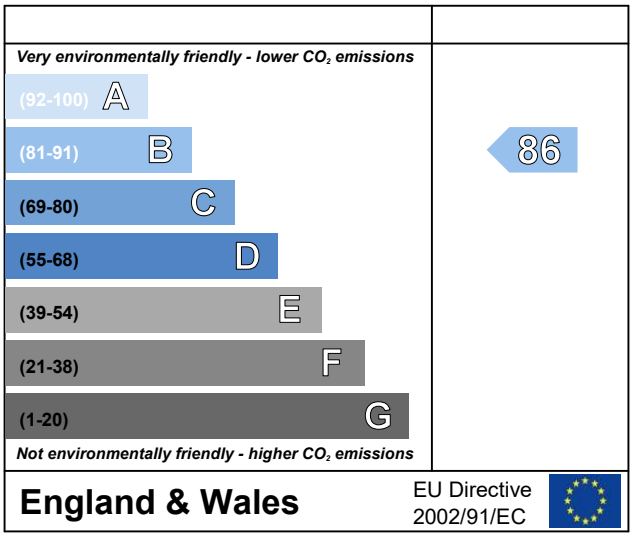
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Project Information

Building type Semi-detached house

Reference
Date
Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	35.50	2.35	83.42	(3a)
First floor	35.50	2.65	94.08	(3b)
	71.00			**(4)**
			177.50	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.23	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.58	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.49	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.62	0.61	0.60	0.54	0.53	0.46	0.46	0.45	0.49	0.53	0.55	0.57

6.42 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.69	0.69	0.68	0.64	0.64	0.61	0.61	0.60	0.62	0.64	0.65	0.67

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			35.50	0.10	3.55	9.00	319.50	(30)
Walls Brick and block cavity wall, full fill			66.80	0.19	12.69	60.00	4008.00	(29)
Ground floors			35.50	0.14	4.97	110.00	3905.00	(28)
Party wall			35.00	0.00	0.00	70.00	2450.00	

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.27 (42)

Annual average hot water usage in litres per day Vd,average 88.12 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
96.93	93.40	89.88	86.35	82.83	79.30	79.30	82.83	86.35	89.88	93.40	96.93	(44)
Energy content of hot water used												
143.74	125.72	129.73	113.10	108.52	93.65	86.78	99.58	100.77	117.44	128.19	139.21	

Energy content (annual) 1386.41 (45)

Distribution loss												
21.56	18.86	19.46	16.97	16.28	14.05	13.02	14.94	15.12	17.62	19.23	20.88	(46)

Cylinder volume, l 150.00 (47)

Manufacturer's declared cylinder loss factor (kWh/day) 1.86 (48)

Temperature Factor 0.5400 (49)

Energy lost from hot water cylinder (kWh/day) 1.00 (55)

Total storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(56)
Net storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(57)
Primary loss												
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total heat required for water heating calculated for each month												
198.14	174.85	184.13	165.74	162.92	146.29	141.18	153.98	153.41	171.83	180.83	193.60	(62)
Output from water heater for each month, kWh/month												
198.14	174.85	184.13	165.74	162.92	146.29	141.18	153.98	153.41	171.83	180.83	193.60	(64)

2026.91 (64)

Heat gains from water heating, kWh/month												
91.31	81.11	86.65	79.72	79.60	73.25	72.37	76.63	75.62	82.57	84.74	89.80	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	(66)
Lighting gains												
46.49	41.29	33.58	25.42	19.00	16.04	17.34	22.53	30.24	38.40	44.82	47.78	(67)
Appliances gains												
297.94	301.03	293.24	276.65	255.72	236.04	222.89	219.80	227.59	244.18	265.12	284.79	(68)
Cooking gains												
50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	(71)
Water heating gains												
122.73	120.70	116.47	110.72	106.99	101.74	97.27	103.00	105.03	110.98	117.69	120.71	(72)
Total internal gains												
563.46	559.31	539.59	509.10	478.01	450.12	433.80	441.63	459.16	489.85	523.92	549.58	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 0.75

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
50.77	51.01	51.24	52.34	52.56	53.57	53.57	53.76	53.17	52.56	52.13	51.69	
alpha												
4.38	4.40	4.42	4.49	4.50	4.57	4.57	4.58	4.54	4.50	4.48	4.45	
Utilisation factor for gains for living area												
0.99	0.98	0.96	0.89	0.76	0.58	0.43	0.48	0.72	0.92	0.98	0.99	(86)
Tweekday												
19.88	20.04	20.28	20.58	20.80	20.91	20.93	20.92	20.86	20.58	20.19	19.87	
Tweekend												
20.37	20.45	20.59	20.76	20.89	20.95	20.96	20.96	20.92	20.76	20.54	20.36	
24 instead of 16												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean internal temperature in living area T1												
20.02	20.15	20.37	20.63	20.83	20.92	20.94	20.93	20.88	20.63	20.28	20.01	(87)
Temperature during heating periods in rest of dwelling Th2												
19.79	19.79	19.80	19.82	19.82	19.84	19.84	19.85	19.84	19.82	19.82	19.81	(88)
Utilisation factor for gains for rest of dwelling												
0.98	0.97	0.94	0.86	0.70	0.48	0.32	0.36	0.63	0.89	0.97	0.99	(89)
Tweekday												
18.52	18.71	19.01	19.40	19.64	19.74	19.76	19.76	19.70	19.41	18.93	18.51	
Tweekend												
18.52	18.71	19.01	19.40	19.64	19.74	19.76	19.76	19.70	19.41	18.93	18.51	
Mean internal temperature in the rest of dwelling T2												
18.52	18.71	19.01	19.40	19.64	19.74	19.76	19.76	19.70	19.41	18.93	18.51	(90)

Living area fraction (15.00 / 71.00) 0.21 (91)

Mean internal temperature (for the whole dwelling)

18.84	19.02	19.30	19.66	19.89	19.99	20.00	20.01	19.95	19.67	19.21	18.83	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.84	19.02	19.30	19.66	19.89	19.99	20.00	20.01	19.95	19.67	19.21	18.83	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.98	0.97	0.93	0.85	0.70	0.50	0.33	0.38	0.64	0.88	0.96	0.98	(94)
Useful gains												
656.25	726.40	778.65	788.27	694.68	484.87	311.95	328.24	507.93	627.90	629.63	628.41	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1411.48	1364.51	1231.80	1013.59	768.09	496.18	313.37	330.73	542.57	850.49	1145.71	1395.57	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
561.89	428.82	337.15	162.23	54.62	-	-	-	-	165.61	371.58	570.76	

Total space heating requirement per year (kWh/year) (October to May)	2652.65	(98)
Space heating requirement per m² (kWh/m²/year)	37.36	(99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	334.23%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
561.89	428.82	337.15	162.23	54.62	-	-	-	-	165.61	371.58	570.76	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
168.11	128.30	100.87	48.54	16.34	-	-	-	-	49.55	111.18	170.77	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
198.14	174.85	184.13	165.74	162.92	146.29	141.18	153.98	153.41	171.83	180.83	193.60	(64)
Efficiency of water heater												295.93 (216)
295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	(217)
Water heating fuel												
66.96	59.09	62.22	56.01	55.05	49.44	47.71	52.03	51.84	58.07	61.11	65.42	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	793.66	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	684.94	(219)
Electricity for pumps, fans and electric keep-hot		
Total electricity for the above, kWh/year	0.00	(231)
Electricity for lighting (100.00% fixed LEL)	328.41	(232)
Energy saving/generation technologies		
Electricity generated - µCHP/heat pump	0.00	(235)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	1807.01	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	793.657	13.190	104.68	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
High-rate percentage	100.000%			(243)
Low-rate percentage	0.000%			(244)
High-rate cost	684.94	13.190	90.34	(245)
Low-rate	0.00	13.190	0.00	(246)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	0.000	13.190	0.00	(249)
Energy for lighting	328.407	13.190	43.32	(250)
Additional standing charges			0.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			238.34	(255)

11a. SAP rating

	0.42	**(256)**
	0.86	**(257)**
SAP value	87.96	
	88	(258)
SAP band	**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	793.66	0.519	411.91	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	684.94	0.519	355.48	(264)
Space and water heating			767.39	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	328.41	0.519	170.44	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			937.84	(272)

	kg/m²/year	
CO2 emissions per m²	**13.21**	(273)
EI value	89.17	(273a)
EI rating	**89**	(274)
EI band	**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(13.19 / 3.3423) x (1 + (0.29 x 0.25)) = 4.2325, stars = 4
Main heating environmental impact	(0.5190 / 3.3423) x (1 + (0.29 x 0.25)) = 0.1665, stars = 5
Water heating energy efficiency	13.19 / 2.9593 = 4.4572, stars = 4
Water heating environmental impact	0.52 / + (0.00 x 0.52) = 0.1754, stars = 5

Project Information

Building type Semi-detached house

Reference

Date

Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	35.50	2.35	83.42	(3a)
First floor	35.50	2.65	94.08	(3b)
	71.00			**(4)**
			177.50	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.23	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.58	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.49	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.62	0.61	0.60	0.54	0.53	0.46	0.46	0.45	0.49	0.53	0.55	0.57

6.42 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.69	0.69	0.68	0.64	0.64	0.61	0.61	0.60	0.62	0.64	0.65	0.67

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			35.50	0.10	3.55	9.00	319.50	(30)
Walls Brick and block cavity wall, full fill			66.80	0.19	12.69	60.00	4008.00	(29)
Ground floors			35.50	0.14	4.97	110.00	3905.00	(28)
Party wall			35.00	0.00	0.00	70.00	2450.00	

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.27 (42)

Annual average hot water usage in litres per day Vd,average 88.12 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
96.93	93.40	89.88	86.35	82.83	79.30	79.30	82.83	86.35	89.88	93.40	96.93	(44)
Energy content of hot water used												
143.74	125.72	129.73	113.10	108.52	93.65	86.78	99.58	100.77	117.44	128.19	139.21	
Energy content (annual)											1386.41	(45)
Distribution loss												
21.56	18.86	19.46	16.97	16.28	14.05	13.02	14.94	15.12	17.62	19.23	20.88	(46)

Cylinder volume, l 150.00 (47)

Manufacturer's declared cylinder loss factor (kWh/day) 1.86 (48)

Temperature Factor 0.5400 (49)

Energy lost from hot water cylinder (kWh/day) 1.00 (55)

Total storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(56)
Net storage loss												
31.14	28.12	31.14	30.13	31.14	30.13	31.14	31.14	30.13	31.14	30.13	31.14	(57)
Primary loss												
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total heat required for water heating calculated for each month												
198.14	174.85	184.13	165.74	162.92	146.29	141.18	153.98	153.41	171.83	180.83	193.60	(62)
Output from water heater for each month, kWh/month												
198.14	174.85	184.13	165.74	162.92	146.29	141.18	153.98	153.41	171.83	180.83	193.60	(64)
											2026.91	(64)
Heat gains from water heating, kWh/month												
91.31	81.11	86.65	79.72	79.60	73.25	72.37	76.63	75.62	82.57	84.74	89.80	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	(66)
Lighting gains												
18.60	16.52	13.43	10.17	7.60	6.42	6.93	9.01	12.10	15.36	17.93	19.11	(67)
Appliances gains												
199.62	201.69	196.47	185.36	171.33	158.15	149.34	147.27	152.49	163.60	177.63	190.81	(68)
Cooking gains												
34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	(71)
Water heating gains												
122.73	120.70	116.47	110.72	106.99	101.74	97.27	103.00	105.03	110.98	117.69	120.71	(72)
Total internal gains												
398.00	395.96	383.43	363.30	342.98	323.36	310.60	316.33	326.67	346.99	370.30	387.68	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 0.75

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
50.77	51.01	51.24	52.34	52.56	53.57	53.57	53.76	53.17	52.56	52.13	51.69	
alpha												
4.38	4.40	4.42	4.49	4.50	4.57	4.57	4.58	4.54	4.50	4.48	4.45	
Utilisation factor for gains for living area												
1.00	0.99	0.98	0.93	0.83	0.65	0.49	0.55	0.81	0.96	0.99	1.00	(86)
Tweekday												
19.71	19.87	20.13	20.48	20.75	20.89	20.92	20.92	20.81	20.46	20.03	19.70	
Tweekend												
20.27	20.36	20.51	20.70	20.86	20.94	20.96	20.95	20.89	20.69	20.45	20.26	
24 instead of 16												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
24 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16 instead of 9												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mean internal temperature in living area T1												
19.87	20.01	20.24	20.54	20.78	20.90	20.93	20.93	20.84	20.53	20.15	19.86	(87)
Temperature during heating periods in rest of dwelling Th2												
19.79	19.79	19.80	19.82	19.82	19.84	19.84	19.85	19.84	19.82	19.82	19.81	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.99	0.97	0.91	0.77	0.55	0.37	0.42	0.72	0.94	0.99	1.00	(89)
Tweekday												
18.30	18.50	18.84	19.28	19.59	19.73	19.75	19.76	19.67	19.27	18.73	18.30	
Tweekend												
18.30	18.50	18.84	19.28	19.59	19.73	19.75	19.76	19.67	19.27	18.73	18.30	
Mean internal temperature in the rest of dwelling T2												
18.30	18.50	18.84	19.28	19.59	19.73	19.75	19.76	19.67	19.27	18.73	18.30	(90)

Living area fraction (15.00 / 71.00) 0.21 (91)

Mean internal temperature (for the whole dwelling)

18.63	18.82	19.13	19.55	19.84	19.98	20.00	20.00	19.92	19.54	19.03	18.63	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.63	18.82	19.13	19.55	19.84	19.98	20.00	20.00	19.92	19.54	19.03	18.63	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.99	0.99	0.97	0.90	0.77	0.56	0.38	0.44	0.73	0.94	0.99	0.99	(94)
Useful gains												
500.68	579.78	653.40	703.41	656.97	476.82	310.70	325.87	481.27	532.05	492.49	474.62	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1391.52	1345.65	1215.65	1002.88	763.55	495.25	313.21	330.44	539.41	838.39	1128.34	1376.14	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
662.79	514.67	418.31	215.62	79.30	-	-	-	-	227.92	457.81	670.73	

Total space heating requirement per year (kWh/year) (October to May)	3247.13	(98)
Space heating requirement per m² (kWh/m²/year)	45.73	(99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

												kWh/year	
No secondary heating system selected													
Fraction of space heat from main system(s)									1.0000				(202)
Efficiency of main heating system									334.23%				(206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement													
662.79	514.67	418.31	215.62	79.30	-	-	-	-	227.92	457.81	670.73		(98)
Appendix Q - monthly energy saved (main heating system 1)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(210)
Space heating fuel (main heating system 1)													
198.30	153.99	125.16	64.51	23.72	-	-	-	-	68.19	136.97	200.68		(211)
Appendix Q - monthly energy saved (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(212)
Space heating fuel (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(213)
Appendix Q - monthly energy saved (secondary heating system)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(214)
Space heating fuel (secondary)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(215)
Water heating													
Water heating requirement													
198.14	174.85	184.13	165.74	162.92	146.29	141.18	153.98	153.41	171.83	180.83	193.60		(64)
Efficiency of water heater												295.93	(216)
295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93	295.93		(217)
Water heating fuel													
66.96	59.09	62.22	56.01	55.05	49.44	47.71	52.03	51.84	58.07	61.11	65.42		(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	971.52	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	684.94	(219)
Electricity for pumps, fans and electric keep-hot		
Total electricity for the above, kWh/year	0.00	(231)
Electricity for lighting (100.00% fixed LEL)	328.41	(232)
Energy saving/generation technologies		
Electricity generated - µCHP/heat pump	0.00	(235)
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	1984.87	(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	971.52	0.519	504.22	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	684.94	0.519	355.48	(264)
Space and water heating			859.70	(265)
Electricity for pumps and fans	0.00	0.519	0.00	(267)
Electricity for lighting	328.41	0.519	170.44	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.519	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1030.15	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**14.51**	(273)

Project Information
Building type Semi-detached house

Reference
Date
Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 07:00:35

New dwelling as designed

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1 TER and DER
Fuel for main heating system: Standard tariff (fuel factor = 1.55)

Target Carbon Dioxide Emission Rate	TER = 29.44	
Dwelling Carbon Dioxide Emission Rate	DER = 14.51	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 60.1	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 51.8	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

---

2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

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4 Heating efficiency
Main heating system:
Air source heat pump, underfloor, electric
Mitsubishi Electric Ecodan 6.0 kW
Source of efficiency: from boiler database
Secondary heating system:
None -

---

5 Cylinder insulation
Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	2207 Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	No	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%
Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Project Information

Building type Semi-detached house

Reference
Date
Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type D ASHP

Type D
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Semi-detached house		
Ground floor (1)	area = 35.50m²	storey height = 2.35m	
First floor	area = 35.50m²	storey height = 2.65m	
Living area:	15.00 (fraction 0.211)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type Semi-detached house

Reference

Date

Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type D ASHP

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements			
Roofs	area = 35.50	U = 0.10, k = 9.0	
Walls	area = 66.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 35.50	U = 0.14, k = 110.0	

Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A]	0.300	0.300	21.850
Openings lintels			
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

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Oaklands Drive
Almondsbury
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SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type D ASHP

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Heat pumps Electric Air source heat pump with flow temperature <= 35°C Index : 104634 Mitsubishi Electric Ecodan 6.0 kW PUZ-WM60VAA Underfloor, pipes in screed above insulation Pump in heated space: No Boiler has load or weather compensator: Yes Boiler Interlock: No Design flow temperature : Unknown Central heating pump 2013 or later Not MCS Approved Installer Standard tariff
Main heating controls:	2207 Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	No
Secondary heating system:	None
Water heating:	MicroCHP or Heat Pump Manufacturer's declared cylinder loss factor (kWh/day) 1.86

Project Information

Building type Semi-detached house

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Date

Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type D ASHP

Cylinder volume : 150.00
Insulation type : Factory
Insulation thickness : -1.00
Cylinder heater : n/a
Cylinder in heated space: Yes
Insulated primary: Yes
Cylinder thermostat: Yes
Separate timer for domestic hot water: Yes
Solar panel: no

Water use <= 125 litres/person/day: Yes

Low energy lights: 100.0% of fixed lighting outlets
Total fixed lighting outlets: 30
Electricity tariff: Standard tariff
Photovoltaics 1: Peak kW: 0.00
Photovoltaics 2: Peak kW: 0.00
Photovoltaics 3: Peak kW: 0.00
Conservatory: No
Fixed air conditioning: No
Smoke Control Area: Not specified
Additional allowable electricity generation : 0.00kg/m²/year

Predicted Energy Assessment

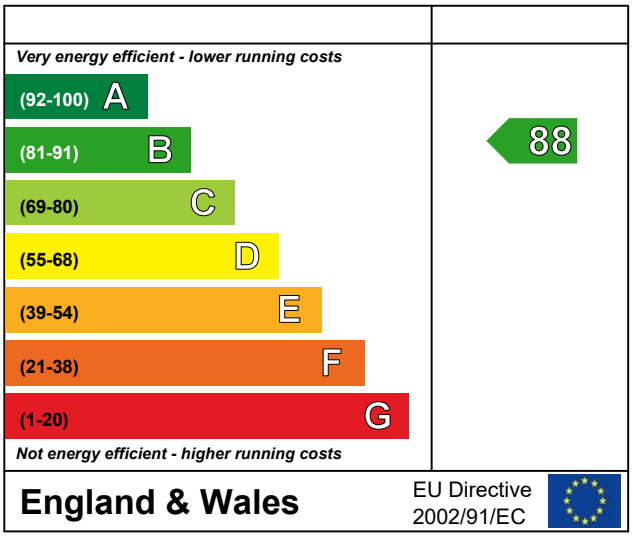
Type D
Oaklands Drive
Almondsbury
BS32 4AB

Dwelling type: Semi-detached house
Date of assessment: 2 June 2022
Produced by Complete Energy Consultancy Ltd
Total floor area: 71 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

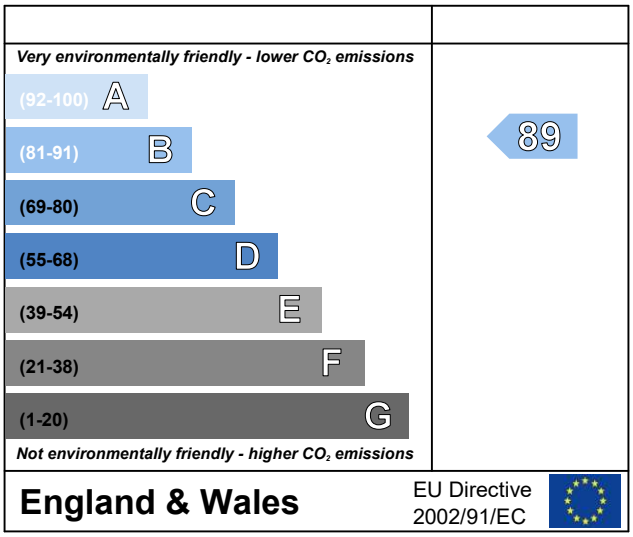
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Project Information

Building type Semi-detached house

Reference
Date
Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m^2)	**Av. Storey height (m)**	**Volume (m^3)**	
Ground floor (1)	35.50	2.35	83.42	(3a)
First floor	35.50	2.65	94.08	(3b)
	71.00			**(4)**
			177.50	**(5)**

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.23	**(8)**
Pressure test, result q50	7.00		(17)
Air permeability		0.58	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.49	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.62	0.61	0.60	0.54	0.53	0.46	0.46	0.45	0.49	0.53	0.55	0.57

6.42 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.69	0.69	0.68	0.64	0.64	0.61	0.61	0.60	0.62	0.64	0.65	0.67

(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			35.50	0.10	3.55	9.00	319.50	(30)
Walls Brick and block cavity wall, full fill			66.80	0.19	12.69	60.00	4008.00	(29)
Ground floors			35.50	0.14	4.97	110.00	3905.00	(28)
Party wall			35.00	0.00	0.00	70.00	2450.00	

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.27 (42)

Annual average hot water usage in litres per day Vd,average 88.12 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
96.93	93.40	89.88	86.35	82.83	79.30	79.30	82.83	86.35	89.88	93.40	96.93	(44)
Energy content of hot water used												
143.74	125.72	129.73	113.10	108.52	93.65	86.78	99.58	100.77	117.44	128.19	139.21	

Energy content (annual) 1386.41 (45)

Distribution loss

21.56	18.86	19.46	16.97	16.28	14.05	13.02	14.94	15.12	17.62	19.23	20.88	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)

Net storage loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)

Primary loss

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)

Combi loss calculated for each month

24.23	21.84	24.12	23.26	23.98	23.14	23.88	23.94	23.21	24.06	23.37	24.21	(61)

Total heat required for water heating calculated for each month

167.97	147.56	153.84	136.36	132.50	116.79	110.65	123.52	123.98	141.50	151.56	163.41	(62)

Output from water heater for each month, kWh/month

167.97	147.56	153.84	136.36	132.50	116.79	110.65	123.52	123.98	141.50	151.56	163.41	(64)

1669.65 (64)

Heat gains from water heating, kWh/month

53.85	47.26	49.16	43.42	42.08	36.92	34.82	39.10	39.31	45.06	48.47	52.34	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	136.21	(66)
Lighting gains												
46.49	41.29	33.58	25.42	19.00	16.04	17.34	22.53	30.24	38.40	44.82	47.78	(67)
Appliances gains												
297.94	301.03	293.24	276.65	255.72	236.04	222.89	219.80	227.59	244.18	265.12	284.79	(68)
Cooking gains												
50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	50.89	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	(71)
Water heating gains												
72.38	70.33	66.08	60.31	56.56	51.28	46.80	52.55	54.59	60.57	67.31	70.35	(72)
Total internal gains												
516.10	511.95	492.20	461.68	430.57	402.66	386.33	394.18	411.73	442.44	476.55	502.22	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
50.77	51.01	51.24	52.34	52.56	53.57	53.57	53.76	53.17	52.56	52.13	51.69	
alpha												
4.38	4.40	4.42	4.49	4.50	4.57	4.57	4.58	4.54	4.50	4.48	4.45	
Utilisation factor for gains for living area												
0.99	0.98	0.96	0.91	0.79	0.60	0.45	0.50	0.75	0.94	0.98	0.99	(86)
Mean internal temperature in living area T1												
19.72	19.90	20.19	20.56	20.83	20.96	20.99	20.99	20.90	20.55	20.08	19.70	(87)
Temperature during heating periods in rest of dwelling Th2												
19.79	19.79	19.80	19.82	19.82	19.84	19.84	19.85	19.84	19.82	19.82	19.81	(88)
Utilisation factor for gains for rest of dwelling												
0.99	0.98	0.95	0.88	0.72	0.51	0.34	0.38	0.66	0.91	0.98	0.99	(89)
Mean internal temperature in the rest of dwelling T2												
18.13	18.39	18.80	19.33	19.67	19.82	19.84	19.84	19.76	19.33	18.67	18.12	(90)

Living area fraction (15.00 / 71.00) 0.21 (91)

Mean internal temperature (for the whole dwelling)

18.47	18.71	19.10	19.59	19.92	20.06	20.08	20.08	20.00	19.59	18.97	18.45	(92)

Apply adjustment to the mean internal temperature, where appropriate

18.47	18.71	19.10	19.59	19.92	20.06	20.08	20.08	20.00	19.59	18.97	18.45	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.98	0.97	0.94	0.87	0.73	0.53	0.36	0.41	0.68	0.90	0.97	0.99	(94)
Useful gains												
611.87	683.93	740.72	761.86	685.42	488.34	318.71	334.44	503.96	597.86	587.80	583.60	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
1375.73	1335.00	1212.17	1006.94	770.71	502.75	320.69	337.90	547.36	843.11	1122.52	1359.55	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
568.31	437.52	350.76	176.46	63.46	-	-	-	-	182.47	385.00	577.31	

Total space heating requirement per year (kWh/year) (October to May) 2741.28 (98)

Space heating requirement per m² (kWh/m²/year) 38.61 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
568.31	437.52	350.76	176.46	63.46	-	-	-	-	182.47	385.00	577.31	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
611.74	470.96	377.57	189.94	68.31	-	-	-	-	196.41	414.42	621.43	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
167.97	147.56	153.84	136.36	132.50	116.79	110.65	123.52	123.98	141.50	151.56	163.41	(64)
Efficiency of water heater												86.60 (216)
89.13	89.04	88.87	88.43	87.64	86.60	86.60	86.60	86.60	88.43	88.94	89.15	(217)
Water heating fuel												
188.47	165.71	173.12	154.20	151.19	134.86	127.78	142.64	143.16	160.01	170.40	183.30	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	2950.78	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	1894.84	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	328.41	(232)
Energy saving/generation technologies		
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	5249.02	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	2950.781	3.480	102.69	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Water heating cost	1894.84	3.480	65.94	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	328.407	13.190	43.32	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			341.84	(255)

11a. SAP rating

	0.42	**(256)**
	1.24	**(257)**
SAP value	82.73	
	83	(258)
SAP band	**B**	

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	2950.78	0.216	637.37	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	1894.84	0.216	409.28	(264)
Space and water heating			1046.65	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	328.41	0.519	170.44	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1256.02	(272)

	kg/m²/year	
CO2 emissions per m²	**17.69**	(273)
EI value	85.49	(273a)
EI rating	**85**	(274)
EI band	**B**	

Calculation of stars for heating and DHW

Main heating energy efficiency	(3.48 / 0.8990) x (1 + (0.29 x 0.00)) = 3.8710, stars = 4
Main heating environmental impact	(0.2160 / 0.8990) x (1 + (0.29 x 0.00)) = 0.2403, stars = 4
Water heating energy efficiency	3.48 / 0.8800 = 3.9544, stars = 4
Water heating environmental impact	0.2160 / 0.8800 = 0.2454, stars = 4

Project Information

Building type Semi-detached house

Reference

Date

Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area (m^2)	Av. Storey height (m)	Volume (m^3)	
Ground floor (1)	35.50	2.35	83.42	(3a)
First floor	35.50	2.65	94.08	(3b)
	71.00			**(4)**
			177.50	**(5)**

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

2. Ventilation rate

	main + seondary + other heating		m^3 per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

		Air changes per hour	
		0.23	**(8)**
Pressure test, result q50	5.00		(17)
Air permeability		0.58	(18)
		2.00	**(19)**
		0.85	**(20)**
Infiltration rate incorporating shelter factor		0.49	(21)

Infiltration rate modified for monthly wind speed

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18

13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.62	0.61	0.60	0.54	0.53	0.46	0.46	0.45	0.49	0.53	0.55	0.57

6.42 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.69	0.69	0.68	0.64	0.64	0.61	0.61	0.60	0.62	0.64	0.65	0.67	(25)

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg			**1.610**	**1.15 (1.20)**	1.84			(27)
Solid door dg			**1.890**	**1.20**	2.27			(26)
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg			**5.040**	**1.20**	6.05			(26)
Pitched roofs insulated between joists			35.50	0.10	3.55	9.00	319.50	(30)
Walls Brick and block cavity wall, full fill			66.80	0.19	12.69	60.00	4008.00	(29)
Ground floors			35.50	0.14	4.97	110.00	3905.00	(28)
Party wall			35.00	0.00	0.00	70.00	2450.00	

4. Water heating energy requirements **kWh/year**

Assumed occupancy, N 2.27 (42)

Annual average hot water usage in litres per day Vd,average 88.12 (43)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
96.93	93.40	89.88	86.35	82.83	79.30	79.30	82.83	86.35	89.88	93.40	96.93	(44)
Energy content of hot water used												
143.74	125.72	129.73	113.10	108.52	93.65	86.78	99.58	100.77	117.44	128.19	139.21	

Energy content (annual) 1386.41 (45)

Distribution loss												
21.56	18.86	19.46	16.97	16.28	14.05	13.02	14.94	15.12	17.62	19.23	20.88	(46)

store loss determined from EN 13203-2 tests, taken from boiler data record

0.00 (50)

Hot water cylinder loss factor (kWh/day) 0.0000 (51)

Volume factor 0.0000 (52)

Temperature factor 0.0000 (53)

Energy lost from store (kWh/day) 0.00 (55)

Total storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net storage loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary loss												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss calculated for each month												
24.23	21.84	24.12	23.26	23.98	23.14	23.88	23.94	23.21	24.06	23.37	24.21	(61)
Total heat required for water heating calculated for each month												
167.97	147.56	153.84	136.36	132.50	116.79	110.65	123.52	123.98	141.50	151.56	163.41	(62)
Output from water heater for each month, kWh/month												
167.97	147.56	153.84	136.36	132.50	116.79	110.65	123.52	123.98	141.50	151.56	163.41	(64)

1669.65 (64)

Heat gains from water heating, kWh/month												
53.85	47.26	49.16	43.42	42.08	36.92	34.82	39.10	39.31	45.06	48.47	52.34	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	113.51	(66)
Lighting gains												
18.60	16.52	13.43	10.17	7.60	6.42	6.93	9.01	12.10	15.36	17.93	19.11	(67)
Appliances gains												
199.62	201.69	196.47	185.36	171.33	158.15	149.34	147.27	152.49	163.60	177.63	190.81	(68)
Cooking gains												
34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	34.35	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	-90.81	(71)
Water heating gains												
72.38	70.33	66.08	60.31	56.56	51.28	46.80	52.55	54.59	60.57	67.31	70.35	(72)
Total internal gains												
350.65	348.59	336.04	315.89	295.54	275.90	263.13	268.88	279.23	299.58	322.92	340.32	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 1.610 11.28	0.63 x 0.70	0.77	5.5516
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Window - Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest) dg	0.9 x 1.610 36.79	0.63 x 0.70	0.77	18.1039
Solid door dg	0.9 x 1.890 0.00	0.00 x 0.70	0.77	0.0000
Full glazed door - Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast) dg	0.9 x 5.040 11.28	0.63 x 0.70	0.77	17.3790

Lighting calculations

	Area	g	FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)

Heating system responsiveness 1.00

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau											
50.77	51.01	51.24	52.34	52.56	53.57	53.57	53.76	53.17	52.56	52.13	51.69
alpha											
4.38	4.40	4.42	4.49	4.50	4.57	4.57	4.58	4.54	4.50	4.48	4.45
Utilisation factor for gains for living area											
1.00	0.99	0.98	0.95	0.85	0.68	0.52	0.58	0.84	0.97	0.99	1.00 (86)
Mean internal temperature in living area T1											
19.52	19.70	20.01	20.43	20.76	20.94	20.99	20.98	20.84	20.40	19.89	19.50 (87)
Temperature during heating periods in rest of dwelling Th2											
19.79	19.79	19.80	19.82	19.82	19.84	19.84	19.85	19.84	19.82	19.82	19.81 (88)
Utilisation factor for gains for rest of dwelling											
1.00	0.99	0.98	0.93	0.80	0.58	0.39	0.45	0.76	0.96	0.99	1.00 (89)
Mean internal temperature in the rest of dwelling T2											
17.83	18.11	18.56	19.16	19.60	19.81	19.84	19.84	19.71	19.13	18.40	17.82 (90)

Living area fraction (15.00 / 71.00) 0.21 (91)

Mean internal temperature (for the whole dwelling)

18.19	18.45	18.86	19.43	19.84	20.05	20.08	20.08	19.95	19.40	18.72	18.18 (92)

Apply adjustment to the mean internal temperature, where appropriate

18.19	18.45	18.86	19.43	19.84	20.05	20.08	20.08	19.95	19.40	18.72	18.18 (93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains											
0.99	0.99	0.97	0.92	0.80	0.60	0.42	0.48	0.77	0.95	0.99	1.00 (94)
Useful gains											
454.46	534.65	611.20	670.15	641.00	477.58	316.85	330.90	469.90	494.41	447.42	428.18 (95)
Monthly average external temperature											
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20 (96)
Heat loss rate for mean internal temperature											
1348.76	1309.34	1189.81	991.53	763.73	501.21	320.42	337.39	542.20	825.67	1098.80	1333.34 (97)
Fraction of month for heating											
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space heating requirement for each month, kWh/month											
665.36	520.59	430.49	231.39	91.31	-	-	-	-	246.45	468.99	673.44

Total space heating requirement per year (kWh/year) (October to May) 3328.02 (98)

Space heating requirement per m² (kWh/m²/year) 46.87 (99)

8c. Space cooling requirement - not applicable

9a. Energy requirements

kWh/year

No secondary heating system selected

Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main heating system	92.90%	(206)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
665.36	520.59	430.49	231.39	91.31	-	-	-	-	246.45	468.99	673.44	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
716.21	560.38	463.39	249.08	98.29	-	-	-	-	265.29	504.84	724.91	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
167.97	147.56	153.84	136.36	132.50	116.79	110.65	123.52	123.98	141.50	151.56	163.41	(64)
Efficiency of water heater												86.60 (216)
89.21	89.15	89.01	88.65	87.92	86.60	86.60	86.60	86.60	88.67	89.07	89.24	(217)
Water heating fuel												
188.28	165.52	172.84	153.83	150.72	134.86	127.78	142.64	143.16	159.58	170.16	183.12	(219)

Annual totals	kWh/year	
Space heating fuel used, main system 1	3582.37	(211)
Space heating fuel (secondary)	0.00	(215)
Water heating fuel	1892.48	(219)
Electricity for pumps, fans and electric keep-hot		
central heating pump	30.00	(230c)
boiler with a fan-assisted flue	45.00	(230e)
Total electricity for the above, kWh/year	75.00	(231)
Electricity for lighting (100.00% fixed LEL)	328.41	(232)
Energy saving/generation technologies		
Appendix Q -		
Energy saved or generated ():	0.000	(236a)
Energy used ():	0.000	(237a)
Total delivered energy for all uses	5878.26	(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	3582.37	0.216	773.79	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	1892.48	0.216	408.78	(264)
Space and water heating			1182.57	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	328.41	0.519	170.44	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1391.94	(272)
			kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)			**19.60**	(273)

Project Information

Building type Semi-detached house

Reference
Date
Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England
assessed by program JPA Designer version 6.05.063, printed on 02/06/2022 at 07:00:52

New dwelling as designed

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1 TER and DER

Fuel for main heating system: Gas (mains) (fuel factor = 1.00)

Target Carbon Dioxide Emission Rate	TER = 20.39	
Dwelling Carbon Dioxide Emission Rate	DER = 19.60	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 60.1	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 51.8	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

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2b Fabric U-values

Element	Average	Highest	
Wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

---

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

---

4 Heating efficiency

Main heating system:
Boiler and radiators, mains gas
Worcester 2000
Source of efficiency: from boiler database
Worcester 2000 GC2000iW 30 C NG
Efficiency: 89.0% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system:
None -

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	Time and temperature zone control	OK
Hot water controls	No cylinder	
Boiler Interlock	Yes	OK
Hot water controls	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%

Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): OK

Not significant OK

Based on:

Thermal mass parameter :	250.00
Overshading :	Average or unknown (20-60 % sky blocked)

Orientation : SouthWest

Ventilation rate :	8.00

Blinds/curtains :

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Pitched roofs insulated between joists U-value 0.10 W/m²K

Project Information

Building type Semi-detached house

Reference
Date
Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type D baseline

Type D
Oaklands Drive
Almondsbury
BS32 4AB

Located in:	England		
Region:	Severn Valley		
Postcode:	BS32 4AB		
UPRN:			
Date of assessment:	2022-06-01		
Date of certificate:	2022-06-02		
Assessment type:	New dwelling as designed		
Tenure:	Unknown		
Transaction type:	New dwelling		
Related party disclosure:	No related party		
PCDF revision number:	495		
Property description			
Dwelling type:	Semi-detached house		
Ground floor (1)	area = 35.50m²	storey height = 2.35m	
First floor	area = 35.50m²	storey height = 2.65m	
Living area:	15.00 (fraction 0.211)		
Front of dwelling faces:	SouthWest		
Doors			
Solid door	area = 1.89	U = 1.20	
Full glazed door	area = 5.04	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Windows			
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (NorthEast)
Overshading:	Average or unknown (20-60 % sky blocked)		

Project Information

Building type Semi-detached house

Reference
Date
Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data   Printed on 2 Jun 2022 at 07:00 AM

Type D baseline

Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 1.61	U = 1.20	- Double-glazed, argon filled, low-E, En=0.1, soft coat (SouthWest)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements

Roofs	area = 35.50	U = 0.10, k = 9.0	
Walls	area = 66.80	U = 0.19, k = 60.0	Brick and block cavity wall, full fill
Ground floors	area = 35.50	U = 0.14, k = 110.0	

Thermal bridges:	Htb = 14.00		
E10 Eaves (insulation at ceiling level) [A]	0.060	0.060	14.100
E12 Gable (insulation at ceiling level) [A]	0.240	0.240	23.900
E16 Corner (normal) [A]	0.090	0.090	27.400
E17 Corner (inverted – internal area greater than external area) [A]	-0.090	-0.090	5.000
E2 Other lintels (including other steel lintels) [A] Openings lintels	0.300	0.300	21.850
E3 Sill [A] Openings sills	0.040	0.040	21.850
E4 Jamb [A] Openings jambs	0.050	0.050	43.500
E5 Ground floor (normal) [A]	0.160	0.160	38.900
E6 Intermediate floor within a dwelling [A]	0.070	0.070	38.900

Project Information

Building type Semi-detached house

Reference

Date

Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type D baseline

Thermal mass:	User defined - 250.00
Pressure test:	Yes (q50 - 5.00) : measured in this dwelling : No
Ventilation:	Natural ventilation with intermittent extract fans
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	4
Number of passive stacks:	0
Number of sides sheltered:	2.00
Measured/design q50:	5.00
Main heating system:	Central heating systems with radiators or underfloor heating Gas boilers (including LPG) 1998 or later
	Condensing combi with automatic ignition
	Index : 18687
	Eff 86.60% / 89.90% Worcester 2000 GC2000iW 30 C NG
	Radiators
	Pump in heated space: Yes
	Boiler has load or weather compensator: Yes
	Boiler Interlock: Yes
	Design flow temperature : Unknown
	Central heating pump 2013 or later
	Gas (mains)
Main heating controls:	Time and temperature zone control
Boiler has load compensator:	No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
Boiler interlock:	Yes
Secondary heating system:	None
Water heating:	Combination boiler Combination boiler type : Instantaneous
	Solar panel: no

Project Information

Building type Semi-detached house

Reference

Date

Project Type D
Oaklands Drive
Almondsbury
BS32 4AB

SAP 2012 input data Printed on 2 Jun 2022 at 07:00 AM

Type D baseline

Water use <= 125 litres/person/day:	Yes
Low energy lights:	100.0% of fixed lighting outlets
Total fixed lighting outlets:	30
Electricity tariff:	Standard tariff
Photovoltaics 1:	Peak kW: 0.00
Photovoltaics 2:	Peak kW: 0.00
Photovoltaics 3:	Peak kW: 0.00
Conservatory:	No
Fixed air conditioning:	No
Smoke Control Area:	Not specified

Additional allowable electricity generation : 0.00kg/m²/year

Predicted Energy Assessment

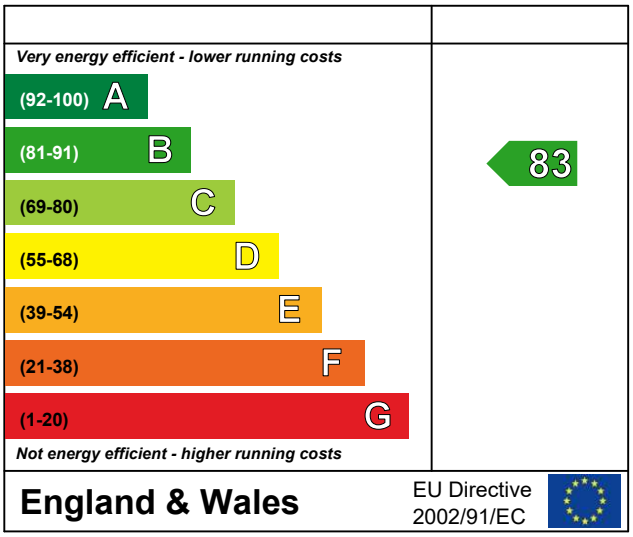
Type D
Oaklands Drive
Almondsbury
BS32 4AB

Dwelling type: Semi-detached house
Date of assessment: 2 June 2022
Produced by Complete Energy Consultancy Ltd
Total floor area: 71 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

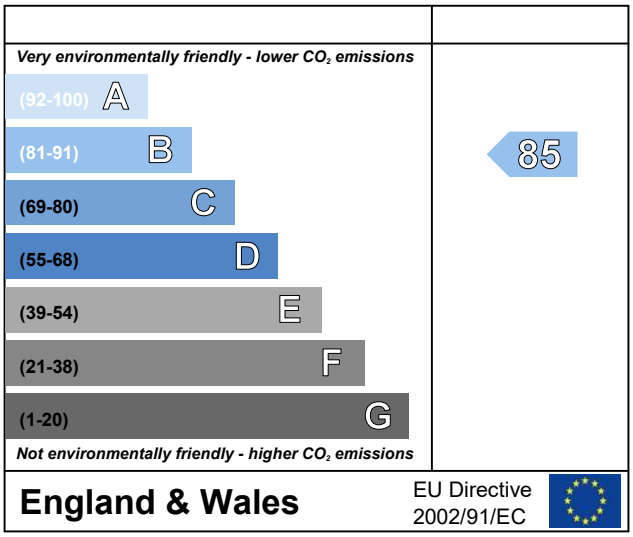
Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.

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 (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.