Project Name	Riverpark Gardens
Project Number	07-14-40410
Revision	-
SAP Assessor	Beverley Rosso
Assessor Reference	0

Design SAP Input Data Table

Description		Reference/Source		Comments
Fabric U-values (W/m^{2}K)	Roof (Flat)	Calculated	0.11	Spec given by Architect
	Roof (Terrace)	Calculated	0.11	Spec given by Architect
	External Wall (Ground)	Calculated	0.15	Spec given by Architect
	External Wall (Upper Floors)	Calculated	0.16	Spec given by Architect
	Exposed Wall (Unheated Corridor)	Calculated	0.18	Spec given by Architect
	Party Wall		0.00	Fully filled cavity with effective sealing at all exposed edges and in line with insulations layers in abutting elements
	Ground Floor	Calculated	0.11	Spec given by Architect
	Windows / Roof Light	Specification	1.40	
	Doors	Specification	1.00	
	y-value	Specification	CBA details	Based on Dense weight aggregate blocks with λ (thermal conductivity) not exceeding 1.33 W/mK.
	Thermal mass	Indicative	Medium	
Ventilation	Airtightness m3/(hr.m^2)	Specification	3.0	
	Mechanical Ventilation	Specification	MVHR	Assumed Nuaire MRXBOX95-WH1
Heating	Main Heating System	Specification	Combi	Assumed Baxi neta-tec 24GA
	Controls	Specification	Programmer, room thermostat, TRV's with delayed start thermostat and Weather compensator.	
	Water Heating	Specification	From Main heating system	
	Water Heating	Specification	FGHRS	Assumed Zenex GasSaver
	Secondary Heating System	Specification	N/A	
Renewables		Specification	Photovotaic panels	Assumed 6 kWp over development
Low energy lighting		Specification	100%	

Prepared By:	Beverley Rosso
Checked By:	Aymon Winter

REVISION	DESCRIPTION OF AMENDMENTS	DATE
-	first issue	28/11/2014

STROMA TECHNOLOGY

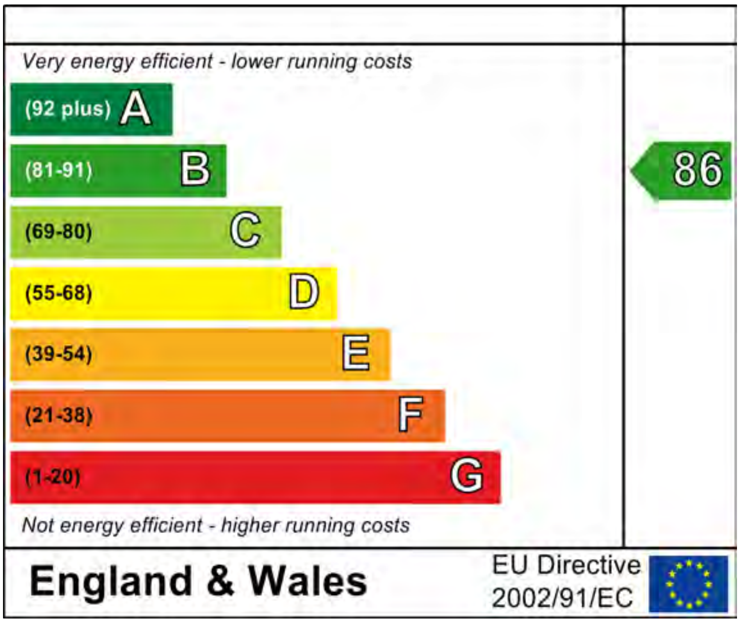
Predicted Energy Assessment

Dwelling type:	Mid floor Flat
Date of assessment:	29 October 2014
Produced by:	Aymon Winter
Total floor area:	67.3000030517578 m²

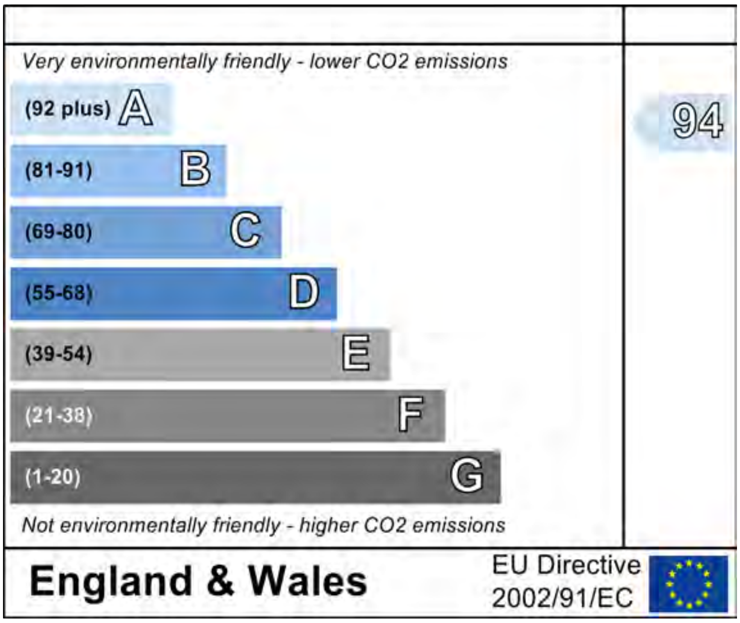
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about 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 (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) 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.

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.14
Printed on 28 November 2014 at 09:40:08

Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 67.3m²

Site Reference : Development at Riverpark Gardens **Plot Reference:** Unit 1 01

Address :

Client Details:

Name: Jamie

Address : Campbell, 43 Tanner Street, Greater London, London, SE13PL

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

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	17.24 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	8.83 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	42.87 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	33.44 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.34 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Database: (rev 367, product index 016684):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi)
Efficiency 89.0 % SEDBUK2009
Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Nominal cylinder loss: 0.00 kWh/day Permitted by DBSCG: 2.10 kWh/day	
Primary pipework insulated:	Yes	**OK**

6 Controls

Space heating controls	Programmer, room thermostat and TRVs	**OK**
Hot water controls:	Cylinderstat	**OK**
	Independent timer for DHW	**OK**
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.42	
Maximum	1.5	**OK**
MVHR efficiency:	91%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: East	7.56m²,
Windows facing: West	6.21m²,
Ventilation rate:	3.00
Blinds/curtains:	Light-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Doors U-value	1 W/m²K
Photovoltaic array	

SAP Input

Property Details: Unit 1 01

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	29 October 2014
Date of certificate:	28 November 2014
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/day:	True
PCDF Version:	367

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2014

Floor Location:	Floor area:	Storey height:
Floor 0	67.3 m²	2.7 m

Living area:	25.86 m² (fraction 0.384)
Front of dwelling faces:	South

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Main Door	Manufacturer	Solid			PVC-U
East window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
West Window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Main Door	mm	0.7	0	1	2.27	1
East window	16mm or more	0.7	0.63	1.4	7.56	1
West Window	16mm or more	0.7	0.63	1.4	6.21	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Main Door		external wall	South	0	0
East window		external wall	East	0	0
West Window		external wall	West	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
external wall	27.51	16.04	11.47	0.16	0	False	N/A
sheltered wall	20.98	0	20.98	0.18	0.4	False	N/A
Exposed Floor over corridor	3.96			0.16			N/A
Internal Elements							
Party Elements							
party wall	28.4						N/A
Party Ceiling	67.3						N/A
Party floor	63.34						N/A

Thermal bridges:

SAP Input

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.1086

Length	Psi-value		
7.12	0.401	E1	Steel lintel with perforated steel base plate
22.54	0.021	E4	Jamb
10.8	0.048	E16	Corner (normal)
2.7	-0.06	E17	Corner (inverted internal area greater than external area)
59.47	0.001	E7	Party floor between dwellings (in blocks of flats)
2.7	0.055	E18	Party wall between dwellings
5.64	0.32	E20	Exposed floor (normal)
8.1	0	P3	Intermediate floor between dwellings (in blocks of flats)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	3

Main heating system:

Main heating system:	Boiler systems with radiators or underfloor heating Gas boilers and oil boilers Fuel: mains gas Info Source: Boiler Database Database: (rev 367, product index 016684) Efficiency: Winter 87.3 % Summer: 89.9 Brand name: Baxi Model: Neta-tec Combi Model qualifier: 24 GA (Combi boiler) Systems with radiators Central heating pump : 2013 or later Design flow temperature: Design flow temperature >45°C Room-sealed Boiler interlock: Yes Delayed start

Main heating Control:

Main heating Control:	Programmer, room thermostat and TRVs Control code: 2106

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :mains gas Hot water cylinder Cylinder volume: 180 litres Cylinder insulation: Factory 75 mm Primary pipework insulation: True Cylinderstat: True Cylinder in heated space: True Flue Gas Heat Recovery System: Database (rev 367, product index 060001)

SAP Input

Brand name: Zenex
Model: GasSaver
Model qualifier: GS-1
Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 0.6 Tilt of collector: Horizontal Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name:	Aymon Winter	**Stroma Number:**	STRO014511
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.1.14

Property Address: Unit 1 01

Address :

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	67.3	(1a) x	2.7	(2a) =	181.71	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	67.3	(4)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	181.71	(5)

2. Ventilation rate:

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

			Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)

if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35

If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.15	(18)

Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used

Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.85	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.13	(21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly average wind speed from Table 7												
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 77.35 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside

if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft

if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(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)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.27	x	1	=	2.27			(26)
Windows Type 1			7.56	x1/[1/(1.4)+ 0.04]		=	10.02			(27)
Windows Type 2			6.21	x1/[1/(1.4)+ 0.04]		=	8.23			(27)
Floor			3.96	x	0.16	=	0.6336			(28)
Walls Type1	27.51	16.04	11.47	x	0.16	=	1.84			(29)
Walls Type2	20.98	0	20.98	x	0.17	=	3.52			(29)
Total area of elements, m²			52.45							(31)
Party wall			28.4	x	0	=	0			(32)
Party floor			63.34							(32a)
Party ceiling			67.3							(32b)

* *for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

** *include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 26.52 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 8074.6 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 5.7 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss (33) + (36) = 32.21 (37)

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

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

SAP WorkSheet: New dwelling design stage

(38)m=	16.54	16.35	16.16	15.2	15.01	14.05	14.05	13.86	14.44	15.01	15.39	15.77	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	48.75	48.56	48.37	47.42	47.22	46.27	46.27	46.08	46.65	47.22	47.61	47.99	

Average = Sum(39)$_{1…12}$ /12= 47.37 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	0.72	0.72	0.72	0.7	0.7	0.69	0.69	0.68	0.69	0.7	0.71	0.71	

Average = Sum(40)$_{1…12}$ /12= 0.7 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 2.18 (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)

if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 85.95 (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

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

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

(44)m=	94.54	91.1	87.67	84.23	80.79	77.35	77.35	80.79	84.23	87.67	91.1	94.54

Total = Sum(44)$_{1…12}$ = 1031.37 (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	140.2	122.62	126.54	110.32	105.85	91.34	84.64	97.13	98.29	114.54	125.03	135.78

Total = Sum(45)$_{1…12}$ = 1352.29 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	21.03	18.39	18.98	16.55	15.88	13.7	12.7	14.57	14.74	17.18	18.76	20.37	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 180 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 0 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

SAP WorkSheet: New dwelling design stage

Primary circuit loss (annual) from Table 3 | 0 | (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.95	19.82	21.95	21.24	21.95	21.24	21.95	21.95	21.24	21.95	21.24	21.95	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	162.15	142.44	148.48	131.55	127.8	112.58	106.59	119.07	119.53	136.49	146.27	157.73	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	23.67	18.01	15.1	11.51	10.77	9.35	8.68	9.92	10.03	12.21	17.35	24	(63) (G2)

Output from water heater

(64)m=	138.47	124.44	133.38	120.04	117.03	103.23	97.91	109.16	109.5	124.28	128.93	133.72	

Output from water heater (annual)$_{1...12}$ | 1440.09 | (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	52.1	45.73	47.56	41.99	40.68	35.68	33.63	37.78	37.99	43.57	46.88	50.63	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	130.73	130.73	130.73	130.73	130.73	130.73	130.73	130.73	130.73	130.73	130.73	130.73	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	42.76	37.98	30.88	23.38	17.48	14.76	15.94	20.72	27.82	35.32	41.22	43.94	(67)

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

(68)m=	284.95	287.9	280.45	264.59	244.57	225.75	213.17	210.22	217.67	233.53	253.56	272.38	(68)

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

(69)m=	50.25	50.25	50.25	50.25	50.25	50.25	50.25	50.25	50.25	50.25	50.25	50.25	(69)

Pumps and fans gains (Table 5a)

(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

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

(71)m=	-87.15	-87.15	-87.15	-87.15	-87.15	-87.15	-87.15	-87.15	-87.15	-87.15	-87.15	-87.15	(71)

Water heating gains (Table 5)

(72)m=	70.03	68.05	63.92	58.32	54.68	49.56	45.2	50.78	52.76	58.57	65.12	68.06	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	494.56	490.76	472.09	443.12	413.55	386.89	371.15	378.55	395.08	424.24	456.72	481.2	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
East	0.9x	1	x	7.56	x	19.64	x	0.63	x	0.7	=	45.38	(76)

East	0.9x	1	x	7.56	x	38.42	x	0.63	x	0.7	=	88.77	(76)
East	0.9x	1	x	7.56	x	63.27	x	0.63	x	0.7	=	146.19	(76)
East	0.9x	1	x	7.56	x	92.28	x	0.63	x	0.7	=	213.21	(76)
East	0.9x	1	x	7.56	x	113.09	x	0.63	x	0.7	=	261.29	(76)
East	0.9x	1	x	7.56	x	115.77	x	0.63	x	0.7	=	267.48	(76)
East	0.9x	1	x	7.56	x	110.22	x	0.63	x	0.7	=	254.65	(76)
East	0.9x	1	x	7.56	x	94.68	x	0.63	x	0.7	=	218.74	(76)
East	0.9x	1	x	7.56	x	73.59	x	0.63	x	0.7	=	170.02	(76)
East	0.9x	1	x	7.56	x	45.59	x	0.63	x	0.7	=	105.33	(76)
East	0.9x	1	x	7.56	x	24.49	x	0.63	x	0.7	=	56.58	(76)
East	0.9x	1	x	7.56	x	16.15	x	0.63	x	0.7	=	37.32	(76)
West	0.9x	0.77	x	6.21	x	19.64	x	0.63	x	0.7	=	37.27	(80)
West	0.9x	0.77	x	6.21	x	38.42	x	0.63	x	0.7	=	72.92	(80)
West	0.9x	0.77	x	6.21	x	63.27	x	0.63	x	0.7	=	120.08	(80)
West	0.9x	0.77	x	6.21	x	92.28	x	0.63	x	0.7	=	175.13	(80)
West	0.9x	0.77	x	6.21	x	113.09	x	0.63	x	0.7	=	214.63	(80)
West	0.9x	0.77	x	6.21	x	115.77	x	0.63	x	0.7	=	219.72	(80)
West	0.9x	0.77	x	6.21	x	110.22	x	0.63	x	0.7	=	209.18	(80)
West	0.9x	0.77	x	6.21	x	94.68	x	0.63	x	0.7	=	179.68	(80)
West	0.9x	0.77	x	6.21	x	73.59	x	0.63	x	0.7	=	139.66	(80)
West	0.9x	0.77	x	6.21	x	45.59	x	0.63	x	0.7	=	86.52	(80)
West	0.9x	0.77	x	6.21	x	24.49	x	0.63	x	0.7	=	46.48	(80)
West	0.9x	0.77	x	6.21	x	16.15	x	0.63	x	0.7	=	30.65	(80)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	82.65	161.68	266.27	388.34	475.93	487.2	463.83	398.42	309.69	191.85	103.06	67.97	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	577.22	652.44	738.36	831.46	889.48	874.08	834.98	776.98	704.76	616.1	559.78	549.17	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) | 21 | (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.98	0.94	0.86	0.68	0.49	0.34	0.24	0.27	0.46	0.76	0.94	0.98	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.62	20.75	20.9	20.98	21	21	21	21	21	20.97	20.8	20.59	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.32	20.32	20.32	20.34	20.34	20.35	20.35	20.35	20.35	20.34	20.33	20.33	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.97	0.93	0.83	0.64	0.46	0.3	0.21	0.23	0.41	0.72	0.93	0.98	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.98	20.11	20.24	20.33	20.34	20.35	20.35	20.35	20.35	20.32	20.17	19.97	(90)

fLA = Living area ÷ (4) = | 0.38 | (91)

SAP WorkSheet: New dwelling design stage

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	20.23	20.36	20.49	20.58	20.59	20.6	20.6	20.6	20.6	20.57	20.41	20.21	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	20.08	20.21	20.34	20.43	20.44	20.45	20.45	20.45	20.45	20.42	20.26	20.06	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.97	0.93	0.83	0.65	0.46	0.31	0.21	0.24	0.42	0.73	0.93	0.97	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	558.27	606.91	616.02	538.57	412.19	270.69	178.18	186.73	295.89	449.17	518.51	535.03	(95)
Monthly average external temperature from Table 8													
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	769.28	743.26	669.69	546.61	412.84	270.71	178.18	186.73	296.11	463.66	626.44	761.08	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	156.99	91.63	39.92	5.79	0.48	0	0	0	0	10.78	77.71	168.18	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 551.5 (98)

Space heating requirement in kWh/m²/year 8.19 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		92.9	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	156.99	91.63	39.92	5.79	0.48	0	0	0	0	10.78	77.71	168.18	
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206)													(211)
	168.99	98.63	42.98	6.23	0.52	0	0	0	0	11.61	83.65	181.04	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 593.65 (211)

Space heating fuel (secondary), kWh/month
= {[(98)m x (201)] + (214) m } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)

	138.47	124.44	133.38	120.04	117.03	103.23	97.91	109.16	109.5	124.28	128.93	133.72	
Efficiency of water heater												87.3	(216)
(217)m=	88.66	88.38	87.89	87.42	87.31	87.3	87.3	87.3	87.3	87.5	88.26	88.73	(217)

Fuel for water heating, kWh/month
(219)m = (64)m x 100 ÷ (217)m

(219)m=	156.18	140.79	151.77	137.32	134.04	118.24	112.15	125.03	125.43	142.04	146.08	150.71

Total = Sum(219a)$_{1...12}$ = 1639.78 (219)

SAP WorkSheet: New dwelling design stage

Annual totals		kWh/year	kWh/year	
Space heating fuel used, main system 1			593.65	
Water heating fuel used			1639.78	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		116.39		(230a)
central heating pump:		30		(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		191.39	(231)
Electricity for lighting			302.03	(232)
Electricity generated by PVs			-456.3	(233)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year		**Fuel Price** (Table 12)		**Fuel Cost** £/year	
Space heating - main system 1	(211)	x	3.48	x 0.01 =	20.6588490370886	(240)
Space heating - main system 2	(213)	x	0	x 0.01 =	0	(241)
Space heating - secondary	(215)	x	13.19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)		3.48	x 0.01 =	57.06	(247)
Pumps, fans and electric keep-hot	(231)		13.19	x 0.01 =	25.24	(249)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a						
Energy for lighting	(232)		13.19	x 0.01 =	39.84	(250)
Additional standing charges (Table 12)					120	(251)
	one of (233) to (235) x)		13.19	x 0.01 =	0	(252)
Appendix Q items: repeat lines (253) and (254) as needed						
Total energy cost	(245)...(247) + (250)…(254) =				262.81	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	0.98	(257)
SAP rating (Section 12)		86.29	(258)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year		**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211)	x	0.216	=	128.23	(261)
Space heating (secondary)	(215)	x	0.519	=	0	(263)
Water heating	(219)	x	0.216	=	354.19	(264)
Space and water heating	(261) + (262) + (263) + (264) =				482.42	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	0.519	=	99.33	(267)

Electricity for lighting	(232) x	0.519	=	156.76	(268)
Energy saving/generation technologies					
Item 1		0.519	=	-236.82	(269)
Total CO2, kg/year		sum of (265)…(271) =		501.69	(272)
CO2 emissions per m²		(272) ÷ (4) =		7.45	(273)
EI rating (section 14)				94	(274)

13a. Primary Energy

	Energy kWh/year	**Primary** factor		**P. Energy** kWh/year	
Space heating (main system 1)	(211) x	1.22	=	724.25	(261)
Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	1.22	=	2000.53	(264)
Space and water heating	(261) + (262) + (263) + (264) =			2724.78	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	587.55	(267)
Electricity for lighting	(232) x	0	=	927.24	(268)
Energy saving/generation technologies					
Item 1		3.07	=	-1400.83	(269)
‘Total Primary Energy		sum of (265)…(271) =		2838.74	(272)
Primary energy kWh/m²/year		(272) ÷ (4) =		42.18	(273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 November 2014

Property Details: Unit 1 01

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	South
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	Light-coloured curtain or roller blind
Ventilation rate during hot weather (ach):	3 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	179.89	**(P1)**
Transmission heat loss coefficient:	32.2	
Summer heat loss coefficient:	212.11	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
East (East window)	0	1
West (West Window)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
East (East window)	0.6	0.9	1	0.54	**(P8)**
West (West Window)	0.6	0.9	1	0.54	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
East (East window)	0.9 x	7.56	117.51	0.63	0.7	0.54	190.4	
West (West Window)	0.9 x	6.21	117.51	0.63	0.7	0.54	156.4	
						Total	346.8	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	383.89	368.15	375.55	
Total summer gains	752.02	714.94	680.65	**(P5)**
Summer gain/loss ratio	3.55	3.37	3.21	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	19.8	21.52	21.26	**(P7)**
Likelihood of high internal temperature	**Not significant**	**Slight**	**Slight**	

Assessment of likelihood of high internal temperature: Slight

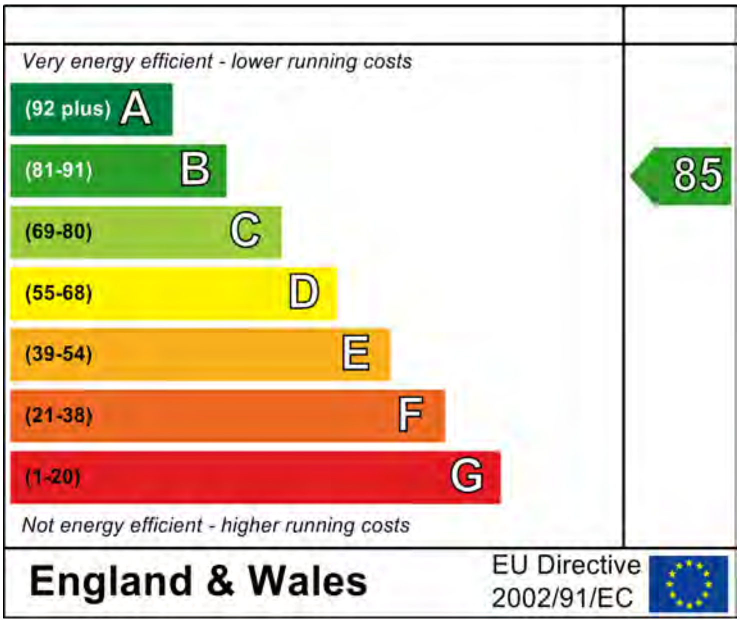
Predicted Energy Assessment

Dwelling type:	Mid floor Flat
Date of assessment:	29 October 2014
Produced by:	Aymon Winter
Total floor area:	71.8899993896484 m²

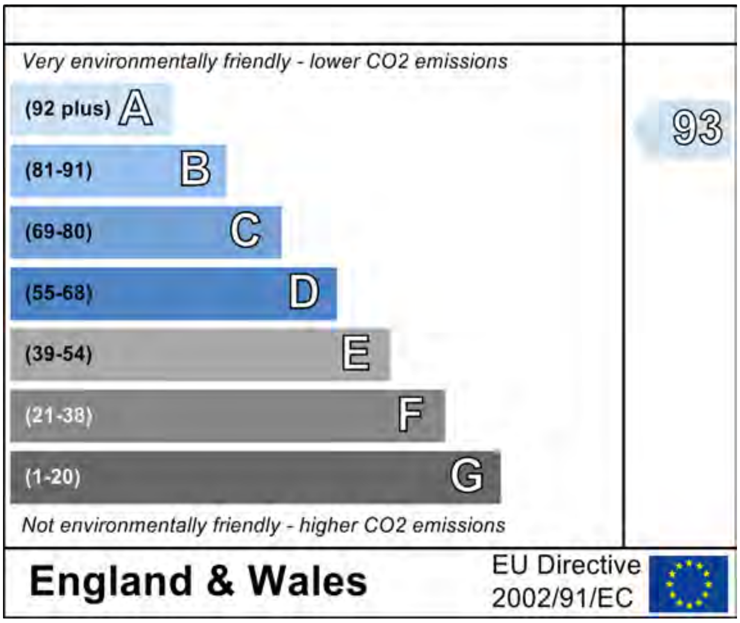
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about 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 (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) 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.

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.14
Printed on 28 November 2014 at 09:39:57

Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 71.89m²

Site Reference : Development at Riverpark Gardens **Plot Reference:** Unit 1 03

Address :

Client Details:

Name: Jamie

Address : Campbell, 43 Tanner Street, Greater London, London, SE13PL

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

1a TER and DER

Fuel for main heating system: Mains gas		
Fuel factor: 1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	19.1 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	10.47 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.38 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	44.06 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.34 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system:	Database: (rev 367, product index 016684): Boiler systems with radiators or underfloor heating - mains gas Brand name: Baxi Model: Neta-tec Combi Model qualifier: 24 GA (Combi) Efficiency 89.0 % SEDBUK2009 Minimum 88.0 %	OK
Secondary heating system:	None	

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Nominal cylinder loss: 0.00 kWh/day		
	Permitted by DBSCG: 2.10 kWh/day		
Primary pipework insulated:	Yes		**OK**

6 Controls

Space heating controls	Programmer, room thermostat and TRVs		**OK**
Hot water controls:	Cylinderstat		**OK**
	Independent timer for DHW		**OK**
Boiler interlock:	Yes		**OK**

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.42	
Maximum	1.5	**OK**
MVHR efficiency:	91%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: East	5.56m²,
Windows facing: West	5.67m²,
Windows facing: South	2.16m²,
Ventilation rate:	3.00
Blinds/curtains:	Light-coloured curtain or roller blind
	Closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Doors U-value	1 W/m²K
Roofs U-value	0.11 W/m²K
Photovoltaic array	

SAP Input

Property Details: Unit 1 03

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	29 October 2014
Date of certificate:	28 November 2014
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/day:	True
PCDF Version:	367

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2014

Floor Location:	Floor area:	Storey height:
Floor 0	71.89 m²	2.7 m

Living area:	26.47 m² (fraction 0.368)
Front of dwelling faces:	North

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Main door	Manufacturer	Solid			PVC-U
east window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
West window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
south window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Main door	mm	0.7	0	1	2.15	1
east window	16mm or more	0.7	0.63	1.4	5.56	1
West window	16mm or more	0.7	0.63	1.4	5.67	1
south window	16mm or more	0.7	0.63	1.4	2.16	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Main door		External wall	North	0	0
east window		External wall	East	0	0
West window		External wall	West	0	0
south window		External wall	South	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External wall	66.32	15.54	50.78	0.16	0	False	N/A
sheltered wall	13.09	0	13.09	0.18	0.4	False	N/A
Roof Terrace	9.79	0	9.79	0.11	0		N/A
exposed floor	35.8			0.16			N/A
Internal Elements							
Party Elements							
party walls	17.47						N/A
party ceiling	61.87						N/A

SAP Input

party floor	35.86	N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0843

Length	Psi-value		
7.12	0.401	E1	Steel lintel with perforated steel base plate
21.85	0.021	E4	Jamb
30.02	0.001	E7	Party floor between dwellings (in blocks of flats)
2.7	0.055	E18	Party wall between dwellings
8.1	0.048	E16	Corner (normal)
18.12	0.32	E20	Exposed floor (normal)
10.69	0.08	E14	Flat roof
12.94	0	P3	Intermediate floor between dwellings (in blocks of flats)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	3

Main heating system:

Main heating system:

Boiler systems with radiators or underfloor heating
Gas boilers and oil boilers
Fuel: mains gas
Info Source: Boiler Database
Database: (rev 367, product index 016684) Efficiency: Winter 87.3 % Summer: 89.9
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi boiler)
Systems with radiators
Central heating pump : 2013 or later
Design flow temperature: Design flow temperature >45°C
Room-sealed
Boiler interlock: Yes
Delayed start

Main heating Control:

Main heating Control:

Programmer, room thermostat and TRVs
Control code: 2106

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating:

From main heating system
Water code: 901
Fuel :mains gas
Hot water cylinder
Cylinder volume: 180 litres
Cylinder insulation: Factory 75 mm
Primary pipework insulation: True

SAP Input

	Cylinderstat: True Cylinder in heated space: True Flue Gas Heat Recovery System: Database (rev 367, product index 060001) Brand name: Zenex Model: GasSaver Model qualifier: GS-1 Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 0.7 Tilt of collector: Horizontal Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name:	Aymon Winter	**Stroma Number:**	STRO014511
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.1.14

Property Address: Unit 1 03

Address :

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	71.89	(1a) x	2.7	(2a) =	194.1	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	71.89	(4)				
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =		194.1	(5)

2. Ventilation rate:

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

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.15	(18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used			
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.85	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.13	(21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly average wind speed from Table 7												
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

SAP WorkSheet: New dwelling design stage

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 77.35 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside

if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft

if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(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)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.15	x	1	=	2.15			(26)
Windows Type 1			5.56	x1/[1/(1.4)+ 0.04]		=	7.37			(27)
Windows Type 2			5.67	x1/[1/(1.4)+ 0.04]		=	7.52			(27)
Windows Type 3			2.16	x1/[1/(1.4)+ 0.04]		=	2.86			(27)
Floor			35.8	x	0.16	=	5.728			(28)
Walls Type1	66.32	15.54	50.78	x	0.16	=	8.12			(29)
Walls Type2	13.09	0	13.09	x	0.17	=	2.2			(29)
Roof	9.79	0	9.79	x	0.11	=	1.08			(30)
Total area of elements, m²			125							(31)
Party wall			17.47	x	0	=	0			(32)
Party floor			35.86							(32a)
Party ceiling			61.87							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 37.03 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 11757.41 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 10.53 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

SAP WorkSheet: New dwelling design stage

Total fabric heat loss (33) + (36) = 47.56 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	17.67	17.46	17.26	16.24	16.03	15.01	15.01	14.81	15.42	16.03	16.44	16.85	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	65.23	65.03	64.82	63.8	63.6	62.58	62.58	62.37	62.99	63.6	64.01	64.41	

Average = $Sum(39)_{1...12}$ /12= 63.75 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	0.91	0.9	0.9	0.89	0.88	0.87	0.87	0.87	0.88	0.88	0.89	0.9	

Average = $Sum(40)_{1...12}$ /12= 0.89 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 2.29 (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)

if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 88.61 (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(44)m=	97.48	93.93	90.39	86.84	83.3	79.75	79.75	83.3	86.84	90.39	93.93	97.48	

Total = $Sum(44)_{1...12}$ = 1063.37 (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	144.55	126.43	130.46	113.74	109.14	94.18	87.27	100.14	101.34	118.1	128.91	139.99	

Total = $Sum(45)_{1...12}$ = 1394.25 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	21.68	18.96	19.57	17.06	16.37	14.13	13.09	15.02	15.2	17.71	19.34	21	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 180 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 0 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

SAP WorkSheet: New dwelling design stage

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

Primary circuit loss (annual) from Table 3 | 0 | (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.95	19.82	21.95	21.24	21.95	21.24	21.95	21.95	21.24	21.95	21.24	21.95	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	166.5	146.25	152.41	134.98	131.08	115.41	109.21	122.09	122.58	140.04	150.15	161.94	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	30.95	25.36	21.12	14.02	11.52	9.63	8.95	10.21	10.32	15.01	24.07	31.13	(63) (G2)

Output from water heater

(64)m=	135.55	120.89	131.29	120.96	119.57	105.78	100.27	111.88	112.26	125.03	126.08	130.81	

Output from water heater (annual)$_{1...12}$ | 1440.37 | (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	53.55	46.99	48.86	43.13	41.77	36.62	34.5	38.78	39	44.75	48.17	52.03	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	137.47	137.47	137.47	137.47	137.47	137.47	137.47	137.47	137.47	137.47	137.47	137.47	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	45.67	40.56	32.99	24.97	18.67	15.76	17.03	22.14	29.71	37.72	44.03	46.94	(67)

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

(68)m=	301	304.12	296.25	279.49	258.34	238.46	225.18	222.06	229.93	246.68	267.84	287.72	(68)

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

(69)m=	51.04	51.04	51.04	51.04	51.04	51.04	51.04	51.04	51.04	51.04	51.04	51.04	(69)

Pumps and fans gains (Table 5a)

(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

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

(71)m=	-91.64	-91.64	-91.64	-91.64	-91.64	-91.64	-91.64	-91.64	-91.64	-91.64	-91.64	-91.64	(71)

Water heating gains (Table 5)

(72)m=	71.98	69.93	65.68	59.9	56.15	50.87	46.38	52.13	54.17	60.15	66.91	69.94	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	518.5	514.47	494.78	464.23	433.02	404.95	388.45	396.18	413.67	444.42	478.63	504.45	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

SAP WorkSheet: New dwelling design stage

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
East	0.9x	1	x	5.56	x	19.64	x	0.63	x	0.7	=	33.37	(76)
East	0.9x	1	x	5.56	x	38.42	x	0.63	x	0.7	=	65.28	(76)
East	0.9x	1	x	5.56	x	63.27	x	0.63	x	0.7	=	107.51	(76)
East	0.9x	1	x	5.56	x	92.28	x	0.63	x	0.7	=	156.8	(76)
East	0.9x	1	x	5.56	x	113.09	x	0.63	x	0.7	=	192.17	(76)
East	0.9x	1	x	5.56	x	115.77	x	0.63	x	0.7	=	196.72	(76)
East	0.9x	1	x	5.56	x	110.22	x	0.63	x	0.7	=	187.28	(76)
East	0.9x	1	x	5.56	x	94.68	x	0.63	x	0.7	=	160.87	(76)
East	0.9x	1	x	5.56	x	73.59	x	0.63	x	0.7	=	125.04	(76)
East	0.9x	1	x	5.56	x	45.59	x	0.63	x	0.7	=	77.47	(76)
East	0.9x	1	x	5.56	x	24.49	x	0.63	x	0.7	=	41.61	(76)
East	0.9x	1	x	5.56	x	16.15	x	0.63	x	0.7	=	27.44	(76)
South	0.9x	0.77	x	2.16	x	46.75	x	0.63	x	0.7	=	30.86	(78)
South	0.9x	0.77	x	2.16	x	76.57	x	0.63	x	0.7	=	50.54	(78)
South	0.9x	0.77	x	2.16	x	97.53	x	0.63	x	0.7	=	64.38	(78)
South	0.9x	0.77	x	2.16	x	110.23	x	0.63	x	0.7	=	72.77	(78)
South	0.9x	0.77	x	2.16	x	114.87	x	0.63	x	0.7	=	75.83	(78)
South	0.9x	0.77	x	2.16	x	110.55	x	0.63	x	0.7	=	72.98	(78)
South	0.9x	0.77	x	2.16	x	108.01	x	0.63	x	0.7	=	71.3	(78)
South	0.9x	0.77	x	2.16	x	104.89	x	0.63	x	0.7	=	69.24	(78)
South	0.9x	0.77	x	2.16	x	101.89	x	0.63	x	0.7	=	67.26	(78)
South	0.9x	0.77	x	2.16	x	82.59	x	0.63	x	0.7	=	54.52	(78)
South	0.9x	0.77	x	2.16	x	55.42	x	0.63	x	0.7	=	36.58	(78)
South	0.9x	0.77	x	2.16	x	40.4	x	0.63	x	0.7	=	26.67	(78)
West	0.9x	0.77	x	5.67	x	19.64	x	0.63	x	0.7	=	34.03	(80)
West	0.9x	0.77	x	5.67	x	38.42	x	0.63	x	0.7	=	66.58	(80)
West	0.9x	0.77	x	5.67	x	63.27	x	0.63	x	0.7	=	109.64	(80)
West	0.9x	0.77	x	5.67	x	92.28	x	0.63	x	0.7	=	159.91	(80)
West	0.9x	0.77	x	5.67	x	113.09	x	0.63	x	0.7	=	195.97	(80)
West	0.9x	0.77	x	5.67	x	115.77	x	0.63	x	0.7	=	200.61	(80)
West	0.9x	0.77	x	5.67	x	110.22	x	0.63	x	0.7	=	190.99	(80)
West	0.9x	0.77	x	5.67	x	94.68	x	0.63	x	0.7	=	164.06	(80)
West	0.9x	0.77	x	5.67	x	73.59	x	0.63	x	0.7	=	127.52	(80)
West	0.9x	0.77	x	5.67	x	45.59	x	0.63	x	0.7	=	79	(80)
West	0.9x	0.77	x	5.67	x	24.49	x	0.63	x	0.7	=	42.44	(80)
West	0.9x	0.77	x	5.67	x	16.15	x	0.63	x	0.7	=	27.99	(80)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	98.27	182.4	281.54	389.48	463.97	470.3	449.57	394.17	319.82	210.98	120.63	82.1	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	616.77	696.88	776.32	853.7	896.98	875.25	838.02	790.36	733.49	655.4	599.26	586.55	(84)

SAP WorkSheet: New dwelling design stage

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.99	0.97	0.93	0.81	0.64	0.46	0.33	0.36	0.58	0.87	0.97	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.34	20.49	20.7	20.89	20.98	21	21	21	20.99	20.87	20.58	20.31	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.16	20.16	20.17	20.18	20.18	20.19	20.19	20.2	20.19	20.18	20.18	20.17	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.98	0.96	0.91	0.78	0.59	0.4	0.27	0.3	0.52	0.83	0.96	0.99	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.58	19.72	19.92	20.1	20.17	20.19	20.19	20.2	20.18	20.09	19.82	19.55	(90)

fLA = Living area ÷ (4) = 0.37 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.86	20.01	20.21	20.39	20.47	20.49	20.49	20.49	20.48	20.38	20.1	19.83	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.71	19.86	20.06	20.24	20.32	20.34	20.34	20.34	20.33	20.23	19.95	19.68	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.98	0.96	0.91	0.78	0.6	0.41	0.28	0.31	0.53	0.83	0.96	0.98	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	604.27	668.54	704.26	667.09	537.81	358.34	233.97	245.72	388.82	544.48	573.8	577.19	(95)
Monthly average external temperature from Table 8													
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	1005.07	972.62	878.82	723.79	547.98	359.1	234.03	245.83	392.45	612.27	822.3	997.36	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	298.19	204.34	129.87	40.82	7.56	0	0	0	0	50.44	178.92	312.6	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 1222.75 (98)

Space heating requirement in kWh/m²/year 17.01 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		92.9	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year	
Space heating requirement (calculated above)	298.19	204.34	129.87	40.82	7.56	0	0	0	0	50.44	178.92	312.6		
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206)	320.98	219.96	139.8	43.94	8.14	0	0	0	0	54.29	192.6	336.49		(211)
Total (kWh/year) =Sum(211)$_{1...5,10...12}$=													1316.2	(211)
Space heating fuel (secondary), kWh/month = {[(98)m x (201)] + (214) m } x 100 ÷ (208)														
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
Total (kWh/year) =Sum(215)$_{1...5,10...12}$=													0	(215)

Water heating

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Output from water heater (calculated above)	135.55	120.89	131.29	120.96	119.57	105.78	100.27	111.88	112.26	125.03	126.08	130.81		
Efficiency of water heater													87.3	(216)
(217)m=	89.07	88.92	88.57	87.94	87.45	87.3	87.3	87.3	87.3	88.03	88.81	89.12		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m														
(219)m=	152.19	135.96	148.23	137.55	136.72	121.17	114.85	128.16	128.59	142.03	141.97	146.78		
Total = Sum(219a)$_{1...12}$ =													1634.2	(219)

Annual totals

		kWh/year	kWh/year	
Space heating fuel used, main system 1			1316.2	
Water heating fuel used			1634.2	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		124.32		(230a)
central heating pump:		30		(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		199.32	(231)
Electricity for lighting			322.61	(232)
Electricity generated by PVs			-532.34	(233)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year		**Fuel Price** (Table 12)		**Fuel Cost** £/year	
Space heating - main system 1	(211)	x	3.48	x 0.01 =	45.8038611204661	(240)
Space heating - main system 2	(213)	x	0	x 0.01 =	0	(241)
Space heating - secondary	(215)	x	13.19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)		3.48	x 0.01 =	56.87	(247)
Pumps, fans and electric keep-hot	(231)		13.19	x 0.01 =	26.29	(249)

(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a

Energy for lighting	(232)		13.19	x 0.01 =	42.55	(250)
Additional standing charges (Table 12)					120	(251)

SAP WorkSheet: New dwelling design stage

	one of (233) to (235) x)	13.19	x 0.01 =	0	(252)

Appendix Q items: repeat lines (253) and (254) as needed

Total energy cost	(245)...(247) + (250)…(254) =	291.52	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.05	(257)
SAP rating (Section 12)		85.39	(258)

12a. CO_2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year		**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211)	x	0.216	=	284.3	(261)
Space heating (secondary)	(215)	x	0.519	=	0	(263)
Water heating	(219)	x	0.216	=	352.99	(264)
Space and water heating	(261) + (262) + (263) + (264) =				637.29	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	0.519	=	103.45	(267)
Electricity for lighting	(232)	x	0.519	=	167.43	(268)
Energy saving/generation technologies Item 1			0.519	=	-276.29	(269)
Total CO2, kg/year			sum of (265)…(271) =		631.88	(272)
CO2 emissions per m²			(272) ÷ (4) =		8.79	(273)
EI rating (section 14)					93	(274)

13a. Primary Energy

	Energy kWh/year		**Primary** factor		**P. Energy** kWh/year	
Space heating (main system 1)	(211)	x	1.22	=	1605.77	(261)
Space heating (secondary)	(215)	x	3.07	=	0	(263)
Energy for water heating	(219)	x	1.22	=	1993.72	(264)
Space and water heating	(261) + (262) + (263) + (264) =				3599.49	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	3.07	=	611.92	(267)
Electricity for lighting	(232)	x	0	=	990.41	(268)
Energy saving/generation technologies Item 1			3.07	=	-1634.3	(269)
'Total Primary Energy			sum of (265)…(271) =		3567.53	(272)
Primary energy kWh/m²/year			(272) ÷ (4) =		49.62	(273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 November 2014

Property Details: Unit 1 03

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	North
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	Light-coloured curtain or roller blind
Ventilation rate during hot weather (ach):	3 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	192.16	**(P1)**
Transmission heat loss coefficient:	47.6	
Summer heat loss coefficient:	239.73	**(P2)**

Overhangs:

Orientation:	Ratio:	Z_overhangs:
East (east window)	0	1
West (West window)	0	1
South (south window)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
East (east window)	0.6	0.9	1	0.54	**(P8)**
West (West window)	0.6	0.9	1	0.54	**(P8)**
South (south window)	0.6	0.9	1	0.54	**(P8)**

Solar gains:

Orientation		Area	Flux	g_	FF	Shading	Gains	
East (east window)	0.9 x	5.56	117.51	0.63	0.7	0.54	140.03	
West (West window)	0.9 x	5.67	117.51	0.63	0.7	0.54	142.8	
South (south window)	0.9 x	2.16	112.21	0.63	0.7	0.54	51.95	
						Total	334.77	**(P3/P4)**

Internal gains:

	June	July	August	
Internal gains	401.95	385.45	393.18	
Total summer gains	756.02	720.22	693.25	**(P5)**
Summer gain/loss ratio	3.15	3	2.89	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	19.4	21.15	20.94	**(P7)**
Likelihood of high internal temperature	**Not significant**	**Slight**	**Slight**	

Assessment of likelihood of high internal temperature: Slight

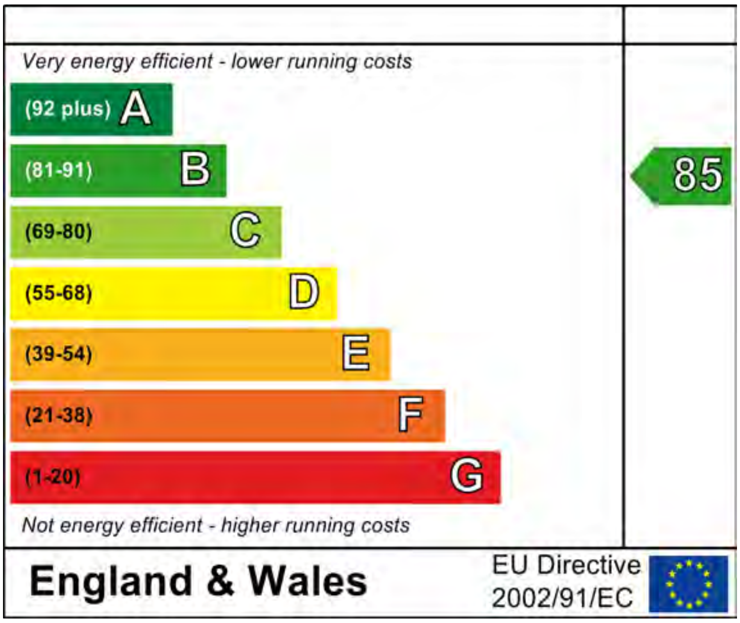
Predicted Energy Assessment

Dwelling type: Mid floor Flat
Date of assessment: 29 October 2014
Produced by: Aymon Winter
Total floor area: 50.2599983215332 m²

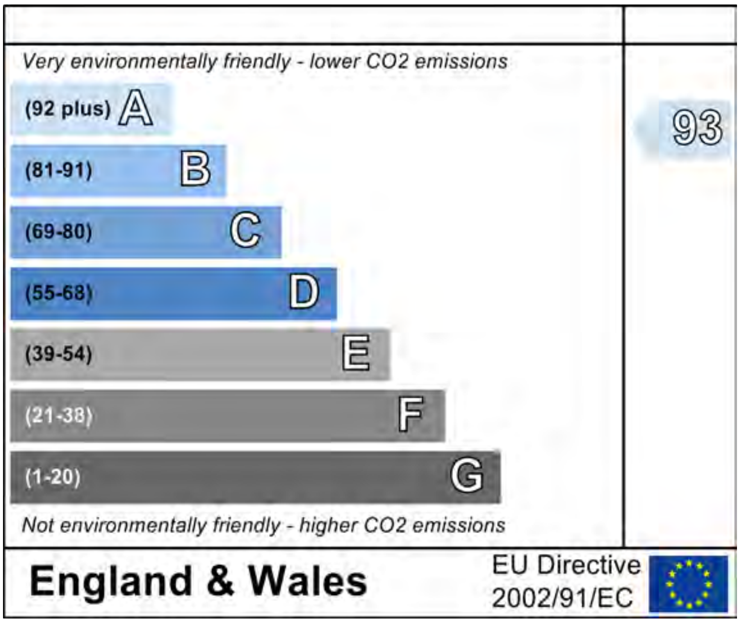
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about 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 (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) 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.

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.14
Printed on 28 November 2014 at 09:40:02

Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 50.26m²

Site Reference : Development at Riverpark Gardens **Plot Reference:** unit 102

Address :

Client Details:

Name: Jamie

Address : Campbell, 43 Tanner Street, Greater London, London, SE13PL

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

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	20.27 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.39 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.06 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	42.61 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.33 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Database: (rev 367, product index 016684):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi)
Efficiency 89.0 % SEDBUK2009
Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Nominal cylinder loss: 0.00 kWh/day Permitted by DBSCG: 2.10 kWh/day	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls	Programmer, room thermostat and TRVs	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock:	Yes	OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.42	
Maximum	1.5	OK
MVHR efficiency:	91%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Thames valley):	Medium	OK

Based on:

Overshading:	Average or unknown
Windows facing: East	9.86m²,
Ventilation rate:	2.00
Blinds/curtains:	Light-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Doors U-value	1 W/m²K
Photovoltaic array	

SAP Input

Property Details: unit 102

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	29 October 2014
Date of certificate:	28 November 2014
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/day:	True
PCDF Version:	367

Property description:

Dwelling type:	Flat	
Detachment:		
Year Completed:	2014	
Floor Location:	Floor area:	Storey height:
Floor 0	50.26 m²	2.7 m
Living area:	24.31 m² (fraction 0.484)	
Front of dwelling faces:	West	

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Main door	Manufacturer	Solid			PVC-U
East Windows	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Main door	mm	0.7	0	1	2.14	1
East Windows	16mm or more	0.7	0.63	1.4	9.86	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Main door		external wall	South	0	0
East Windows		external wall	East	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
external wall	27.51	12	15.51	0.16	0	False	N/A
sheltered wall	20.98	0	20.98	0.18	0.4	False	N/A
Exposed floor over common space	20.06			0.16			N/A
Internal Elements							
Party Elements							
party walls	28.4						N/A
party ceiling	50.27						N/A
party floor	30.21						N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.1188

Length	**Psi-value**		
5.32	0.401	E1	Steel lintel with perforated steel base plate

SAP Input

	13.09	0.021	E4	Jamb
	27.3	0.001	E7	Party floor between dwellings (in blocks of flats)
	2.7	0.048	E16	Corner (normal)
[Approved]	5.4	0.06	E18	Party wall between dwellings
	5.52	0.32	E20	Exposed floor (normal)
	6.47	0.32	E21	Exposed floor (inverted)
	8.1	0.055	E18	Party wall between dwellings
	16.99	0	P3	Intermediate floor between dwellings (in blocks of flats)
	4.05	0.24	P8	Exposed floor (inverted)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	3
Pressure test:	3

Main heating system:

Main heating system:	Boiler systems with radiators or underfloor heating Gas boilers and oil boilers Fuel: mains gas Info Source: Boiler Database Database: (rev 367, product index 016684) Efficiency: Winter 87.3 % Summer: 89.9 Brand name: Baxi Model: Neta-tec Combi Model qualifier: 24 GA (Combi boiler) Systems with radiators Central heating pump : 2013 or later Design flow temperature: Design flow temperature >45°C Room-sealed Boiler interlock: Yes Delayed start

Main heating Control:

Main heating Control:	Programmer, room thermostat and TRVs Control code: 2106

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :mains gas Hot water cylinder Cylinder volume: 180 litres Cylinder insulation: Factory 75 mm Primary pipework insulation: True Cylinderstat: True Cylinder in heated space: True Flue Gas Heat Recovery System: Database (rev 367, product index 060001) Brand name: Zenex

SAP Input

Model: GasSaver
Model qualifier: GS-1
Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 0.5 Tilt of collector: Horizontal Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name:	Aymon Winter	**Stroma Number:**	STRO014511
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.1.14

Property Address: unit 102

Address :

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	50.26	(1a) x	2.7	(2a) =	135.7	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	50.26	(4)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	135.7	(5)

2. Ventilation rate:

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

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0 ÷ (5) =	0	(8)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)			
Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.15	(18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used			
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.12	(21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly average wind speed from Table 7												
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

SAP WorkSheet: New dwelling design stage

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 77.35 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.26	0.26	0.26	0.24	0.24	0.22	0.22	0.22	0.23	0.24	0.24	0.25	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside

if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft

if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.26	0.26	0.26	0.24	0.24	0.22	0.22	0.22	0.23	0.24	0.24	0.25	(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)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.14	x	1	=	2.14			(26)
Windows			9.86	x1/[1/(1.4)+ 0.04]		=	13.07			(27)
Floor			20.06	x	0.16	=	3.2096			(28)
Walls Type1	27.51	12	15.51	x	0.16	=	2.48			(29)
Walls Type2	20.98	0	20.98	x	0.17	=	3.52			(29)
Total area of elements, m²			68.55							(31)
Party wall			28.4	x	0	=	0			(32)
Party floor			30.21							(32a)
Party ceiling			50.27							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 24.43 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 7843.5 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 8.14 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss (33) + (36) = 32.57 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	11.71	11.58	11.45	10.8	10.67	10.02	10.02	9.89	10.28	10.67	10.93	11.19	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	44.28	44.15	44.02	43.37	43.24	42.59	42.59	42.46	42.85	43.24	43.5	43.76

Average = $Sum(39)_{1…12}$ /12= 43.33 (39)

SAP WorkSheet: New dwelling design stage

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	0.88	0.88	0.88	0.86	0.86	0.85	0.85	0.84	0.85	0.86	0.87	0.87

Average = Sum(40)$_{1…12}$ /12= 0.86 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 1.7 (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)

if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 74.52 (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(44)m=	81.97	78.99	76.01	73.03	70.05	67.07	67.07	70.05	73.03	76.01	78.99	81.97

Total = Sum(44)$_{1…12}$ = 894.26 (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	121.56	106.32	109.71	95.65	91.78	79.2	73.39	84.22	85.22	99.32	108.41	117.73

Total = Sum(45)$_{1…12}$ = 1172.52 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	18.23	15.95	16.46	14.35	13.77	11.88	11.01	12.63	12.78	14.9	16.26	17.66	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 180 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 0 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

Primary circuit loss (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.95	19.82	21.95	21.24	21.95	21.24	21.95	21.95	21.24	21.95	21.24	21.95	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	143.51	126.14	131.66	116.89	113.73	100.44	95.34	106.16	106.46	121.26	129.65	139.68	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	23.58	18.43	15.63	10.98	9.58	8.11	7.52	8.63	8.74	11.8	17.58	23.85	(63) (G2)

Output from water heater

(64)m=	119.93	107.72	116.03	105.91	104.14	92.32	87.82	97.53	97.72	109.47	112.07	115.83	

Output from water heater (annual)$_{1...12}$ 1266.47 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	45.91	40.31	41.97	37.11	36	31.64	29.89	33.49	33.65	38.51	41.36	44.63	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	101.87	101.87	101.87	101.87	101.87	101.87	101.87	101.87	101.87	101.87	101.87	101.87	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	33.27	29.55	24.03	18.19	13.6	11.48	12.41	16.13	21.64	27.48	32.07	34.19	(67)

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

(68)m=	220.76	223.05	217.28	204.99	189.48	174.9	165.15	162.86	168.64	180.93	196.44	211.02	(68)

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

(69)m=	46.88	46.88	46.88	46.88	46.88	46.88	46.88	46.88	46.88	46.88	46.88	46.88	(69)

Pumps and fans gains (Table 5a)

(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

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

(71)m=	-67.91	-67.91	-67.91	-67.91	-67.91	-67.91	-67.91	-67.91	-67.91	-67.91	-67.91	-67.91	(71)

Water heating gains (Table 5)

(72)m=	61.7	59.98	56.41	51.55	48.39	43.95	40.17	45.01	46.73	51.76	57.44	59.99	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	399.57	396.42	381.55	358.57	335.31	314.16	301.57	307.84	320.85	344.01	369.79	389.04	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
East	0.9x	1	x	9.86	x	19.64	x	0.63	x	0.7	=	59.18	(76)
East	0.9x	1	x	9.86	x	38.42	x	0.63	x	0.7	=	115.77	(76)
East	0.9x	1	x	9.86	x	63.27	x	0.63	x	0.7	=	190.66	(76)
East	0.9x	1	x	9.86	x	92.28	x	0.63	x	0.7	=	278.07	(76)

East	0.9x	1	x	9.86	x	113.09	x	0.63	x	0.7	=	340.79	(76)
East	0.9x	1	x	9.86	x	115.77	x	0.63	x	0.7	=	348.86	(76)
East	0.9x	1	x	9.86	x	110.22	x	0.63	x	0.7	=	332.13	(76)
East	0.9x	1	x	9.86	x	94.68	x	0.63	x	0.7	=	285.29	(76)
East	0.9x	1	x	9.86	x	73.59	x	0.63	x	0.7	=	221.75	(76)
East	0.9x	1	x	9.86	x	45.59	x	0.63	x	0.7	=	137.38	(76)
East	0.9x	1	x	9.86	x	24.49	x	0.63	x	0.7	=	73.79	(76)
East	0.9x	1	x	9.86	x	16.15	x	0.63	x	0.7	=	48.67	(76)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	59.18	115.77	190.66	278.07	340.79	348.86	332.13	285.29	221.75	137.38	73.79	48.67	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	458.75	512.19	572.22	636.64	676.09	663.02	633.7	593.13	542.6	481.38	443.59	437.71	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.98	0.96	0.91	0.77	0.59	0.41	0.3	0.33	0.54	0.83	0.96	0.98	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.43	20.57	20.76	20.93	20.99	21	21	21	20.99	20.9	20.65	20.4	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.18	20.19	20.19	20.2	20.2	20.21	20.21	20.21	20.21	20.2	20.2	20.19	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.97	0.95	0.88	0.73	0.54	0.36	0.24	0.27	0.48	0.79	0.95	0.98	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.68	19.82	20	20.15	20.19	20.21	20.21	20.21	20.21	20.14	19.9	19.66	(90)

fLA = Living area ÷ (4) = 0.48 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	20.04	20.18	20.37	20.53	20.58	20.59	20.59	20.59	20.59	20.51	20.26	20.02	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.89	20.03	20.22	20.38	20.43	20.44	20.44	20.44	20.44	20.36	20.11	19.87	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.97	0.95	0.88	0.74	0.55	0.37	0.26	0.29	0.5	0.8	0.94	0.98	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	446.17	485.77	506.32	470.65	373.3	248.54	163.66	171.67	269.94	385.78	419.08	428.05	(95)
Monthly average external temperature from Table 8													
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	690.45	668	603.85	497.74	377.39	248.82	163.67	171.71	271.53	421.88	565.98	685.6	(97)

SAP WorkSheet: New dwelling design stage

Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m

(98)m=	181.74	122.46	72.56	19.5	3.04	0	0	0	0	26.86	105.77	191.61

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 723.55 (98)

Space heating requirement in kWh/m²/year 14.4 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system 0 (201)

Fraction of space heat from main system(s) (202) = 1 – (201) = 1 (202)

Fraction of total heating from main system 1 (204) = (202) × [1 – (203)] = 1 (204)

Efficiency of main space heating system 1 92.9 (206)

Efficiency of secondary/supplementary heating system, % 0 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)	181.74	122.46	72.56	19.5	3.04	0	0	0	0	26.86	105.77	191.61	
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206)	195.63	131.82	78.11	20.99	3.28	0	0	0	0	28.91	113.85	206.26	(211)

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 778.85 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] + (214) m } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)

	119.93	107.72	116.03	105.91	104.14	92.32	87.82	97.53	97.72	109.47	112.07	115.83

Efficiency of water heater 87.3 (216)

(217)m=	88.85	88.66	88.28	87.69	87.37	87.3	87.3	87.3	87.3	87.8	88.54	88.9	(217)

Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

(219)m=	134.98	121.49	131.43	120.77	119.19	105.76	100.59	111.71	111.94	124.68	126.57	130.29

Total = Sum(219a)$_{1...12}$ = 1439.39 (219)

Annual totals		**kWh/year**	**kWh/year**	
Space heating fuel used, main system 1			778.85	
Water heating fuel used			1439.39	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		86.92		(230a)
central heating pump:		30		(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		161.92	(231)
Electricity for lighting			235.01	(232)
Electricity generated by PVs			-380.25	(233)

10a. Fuel costs - individual heating systems:

		Fuel kWh/year	Fuel Price (Table 12)		Fuel Cost £/year	
Space heating - main system 1		(211) x	3.48	x 0.01 =	27.1038220539408	(240)
Space heating - main system 2		(213) x	0	x 0.01 =	0	(241)
Space heating - secondary		(215) x	13.19	x 0.01 =	0	(242)
Water heating cost (other fuel)		(219)	3.48	x 0.01 =	50.09	(247)
Pumps, fans and electric keep-hot		(231)	13.19	x 0.01 =	21.36	(249)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a						
Energy for lighting		(232)	13.19	x 0.01 =	31	(250)
Additional standing charges (Table 12)					120	(251)
		one of (233) to (235) x)	13.19	x 0.01 =	0	(252)
Appendix Q items: repeat lines (253) and (254) as needed						
Total energy cost	(245)...(247) + (250)…(254) =				249.55	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.1	(257)
SAP rating (Section 12)		84.65	(258)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	168.23	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	310.91	(264)
Space and water heating	(261) + (262) + (263) + (264) =			479.14	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	84.03	(267)
Electricity for lighting	(232) x	0.519	=	121.97	(268)
Energy saving/generation technologies					
Item 1		0.519	=	-197.35	(269)
Total CO2, kg/year		sum of (265)…(271) =		487.8	(272)
CO2 emissions per m²		(272) ÷ (4) =		9.71	(273)
EI rating (section 14)				93	(274)

13a. Primary Energy

	Energy kWh/year	Primary factor		P. Energy kWh/year	
Space heating (main system 1)	(211) x	1.22	=	950.19	(261)

SAP WorkSheet: New dwelling design stage

Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	1.22	=	1756.06	(264)
Space and water heating	(261) + (262) + (263) + (264) =			2706.25	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	497.09	(267)
Electricity for lighting	(232) x	0	=	721.49	(268)
Energy saving/generation technologies					
Item 1		3.07	=	-1167.36	(269)
‘Total Primary Energy	sum of (265)…(271) =			2757.47	(272)
Primary energy kWh/m²/year	(272) ÷ (4) =			54.86	(273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 November 2014

Property Details: unit 102

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	No
Number of storeys:	1
Front of dwelling faces:	West
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	Light-coloured curtain or roller blind
Ventilation rate during hot weather (ach):	2 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	89.56	**(P1)**
Transmission heat loss coefficient:	32.6	
Summer heat loss coefficient:	122.13	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
East (East Windows)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
East (East Windows)	0.6	0.9	1	0.54	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
East (East Windows)	0.9 x	9.86	117.51	0.63	0.7	0.54	248.32	
						Total	248.32	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	311.16	298.57	304.84	
Total summer gains	574.77	546.89	523.3	**(P5)**
Summer gain/loss ratio	4.71	4.48	4.28	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	20.96	22.63	22.33	**(P7)**
Likelihood of high internal temperature	**Slight**	**Medium**	**Medium**	

Assessment of likelihood of high internal temperature: Medium

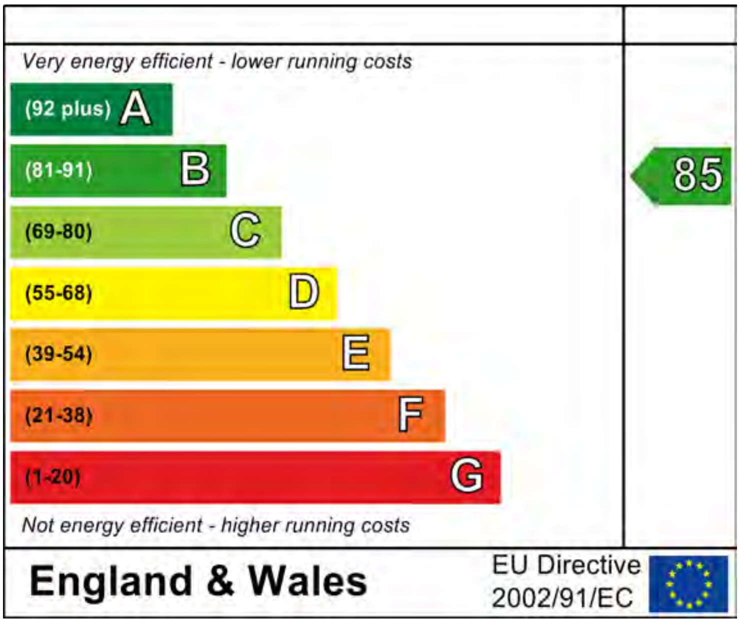
Predicted Energy Assessment

Dwelling type:	Mid floor Flat
Date of assessment:	29 October 2014
Produced by:	Aymon Winter
Total floor area:	101.26000213623 m²

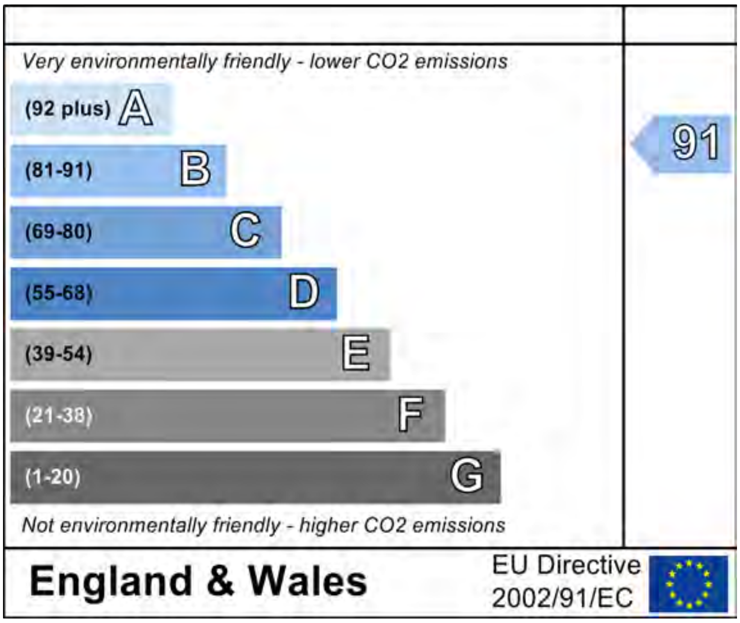
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about 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 (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) 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.

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.14
Printed on 28 November 2014 at 09:39:51

Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 101.26m²

Site Reference : Development at Riverpark Gardens **Plot Reference:** Unit 201

Address :

Client Details:

Name: Jamie

Address : Campbell, 43 Tanner Street, Greater London, London, SE13PL

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

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	18.78 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	10.61 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	61.09 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	52.13 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.18 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	**OK**
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Database: (rev 367, product index 016684):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi)
Efficiency 89.0 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Nominal cylinder loss: 0.00 kWh/day		
	Permitted by DBSCG: 2.10 kWh/day		
Primary pipework insulated:	Yes		**OK**

6 Controls

Space heating controls	Programmer, room thermostat and TRVs	**OK**
Hot water controls:	Cylinderstat	**OK**
	Independent timer for DHW	**OK**
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.42	
Maximum	1.5	**OK**
MVHR efficiency:	91%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South	11.31m²,
Windows facing: East	9.55m²,
Windows facing: West	10.02m²,
Roof windows facing: South	0.89m²
Ventilation rate:	4.00
Blinds/curtains:	Light-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Doors U-value	1 W/m²K
Roofs U-value	0.11 W/m²K
Photovoltaic array	

SAP Input

Property Details: Unit 201

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	29 October 2014
Date of certificate:	28 November 2014
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/day:	True
PCDF Version:	367

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2014

Floor Location:	Floor area:	Storey height:
Floor 0	67.29 m²	2.7 m
Floor 1	33.97 m²	3.4 m

Living area:	34.2 m² (fraction 0.337)
Front of dwelling faces:	South

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Main door	Manufacturer	Solid			PVC-U
south window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
East window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
West window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
south roof light	Manufacturer	Roof Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Main door	mm	0.7	0	1	2.14	1
south window	16mm or more	0.7	0.63	1.4	11.31	1
East window	16mm or more	0.7	0.63	1.4	9.55	1
West window	16mm or more	0.7	0.63	1.4	10.02	1
south roof light	16mm or more	0.7	0.63	1.3	0.89	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Main door		Sheltered wall	South	0	0
south window		external wall	South	0	0
East window		external wall	East	0	0
West window		external wall	West	0	0
south roof light		Top Floor roof	South	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
external wall	167.03	30.88	136.15	0.16	0	False	N/A
Sheltered wall	16.18	2.14	14.04	0.18	0.43	False	N/A
Top Floor roof	33.97	0.89	33.08	0.11	0		N/A
terrace buildup	28.86	0	28.86	0.11	0		N/A

SAP Input

Internal Elements
Party Elements

party wall	11.49	N/A
Party Floor	67.3	N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0628

Length	Psi-value		
15.77	0.401	E1	Steel lintel with perforated steel base plate
33.12	0.021	E4	Jamb
1.8	0.027	E3	Sill
24.85	0.14	E6	Intermediate floor within a dwelling
37.45	0.08	E14	Flat roof
2.7	0.055	E18	Party wall between dwellings
24.3	0.048	E16	Corner (normal)
2.7	-0.06	E17	Corner (inverted internal area greater than external area)
43.53	0.001	E7	Party floor between dwellings (in blocks of flats)
4.26	0	P2	Intermediate floor within a dwelling
8.9	0.08	P5	Roof (insulation at rafter level)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	3

Main heating system:

Main heating system:

Boiler systems with radiators or underfloor heating
Gas boilers and oil boilers
Fuel: mains gas
Info Source: Boiler Database
Database: (rev 367, product index 016684) Efficiency: Winter 87.3 % Summer: 89.9
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi boiler)
Systems with radiators
Central heating pump : 2013 or later
Design flow temperature: Design flow temperature >45°C
Room-sealed
Boiler interlock: Yes
Delayed start

Main heating Control:

Main heating Control:

Programmer, room thermostat and TRVs
Control code: 2106

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From main heating system

SAP Input

Water code: 901
Fuel :mains gas
Hot water cylinder
Cylinder volume: 180 litres
Cylinder insulation: Factory 75 mm
Primary pipework insulation: True
Cylinderstat: True
Cylinder in heated space: True
Flue Gas Heat Recovery System:
  Database (rev 367, product index 060001)
  Brand name: Zenex
  Model: GasSaver
  Model qualifier: GS-1
Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 1 Tilt of collector: Horizontal Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name:	Aymon Winter	**Stroma Number:**	STRO014511
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.1.14

Property Address: Unit 201

Address :

1. Overall dwelling dimensions:

	Area(m²)			Av. Height(m)			Volume(m³)	
Ground floor	67.29	(1a)	x	2.7	(2a)	=	181.68	(3a)
First floor	33.97	(1b)	x	3.4	(2b)	=	115.5	(3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	101.26	(4)						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n)		=	297.18	(5)

2. Ventilation rate:

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

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)

if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35

If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.15	(18)

Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used

Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.85	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.13	(21)

Infiltration rate modified for monthly wind speed

Monthly average wind speed from Table 7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7

SAP WorkSheet: New dwelling design stage

Wind Factor (22a)m = (22)m ÷ 4

(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 77.35 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(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)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.14	x	1	=	2.14			(26)
Windows Type 1			11.31	x1/[1/(1.4)+ 0.04]		=	14.99			(27)
Windows Type 2			9.55	x1/[1/(1.4)+ 0.04]		=	12.66			(27)
Windows Type 3			10.02	x1/[1/(1.4)+ 0.04]		=	13.28			(27)
Rooflights			0.89	x1/[1/(1.3) + 0.04]		=	1.157			(27b)
Walls Type1	167.03	30.88	136.15	x	0.16	=	21.78			(29)
Walls Type2	16.18	2.14	14.04	x	0.17	=	2.35			(29)
Roof Type1	33.97	0.89	33.08	x	0.11	=	3.64			(30)
Roof Type2	28.86	0	28.86	x	0.11	=	3.17			(30)
Total area of elements, m²			246.04							(31)
Party wall			11.49	x	0	=	0			(32)
Party floor			67.3							(32a)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U)	(26)…(30) + (32) =	75.12	(33)
Heat capacity Cm = S(A x k)	((28)…(30) + (32) + (32a)…(32e) =	14426.66	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	Indicative Value: Medium	250	(35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K | 15.45 | (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss | (33) + (36) = | 90.57 | (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	27.05	26.74	26.42	24.86	24.55	22.99	22.99	22.67	23.61	24.55	25.17	25.8	(38)

Heat transfer coefficient, W/K | (39)m = (37) + (38)m

(39)m=	117.62	117.31	117	115.43	115.12	113.56	113.56	113.25	114.18	115.12	115.75	116.37	

Average = Sum(39)$_{1…12}$ /12= | 115.36 | (39)

Heat loss parameter (HLP), W/m²K | (40)m = (39)m ÷ (4)

(40)m=	1.16	1.16	1.16	1.14	1.14	1.12	1.12	1.12	1.13	1.14	1.14	1.15

Average = Sum(40)$_{1…12}$ /12= | 1.14 | (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N | 2.75 | (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)

if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 | 99.53 | (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(44)m=	109.49	105.51	101.52	97.54	93.56	89.58	89.58	93.56	97.54	101.52	105.51	109.49

Total = Sum(44)$_{1…12}$ = | 1194.4 | (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	162.37	142.01	146.54	127.76	122.58	105.78	98.02	112.48	113.82	132.65	144.8	157.24

Total = Sum(45)$_{1…12}$ = | 1566.05 | (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	24.35	21.3	21.98	19.16	18.39	15.87	14.7	16.87	17.07	19.9	21.72	23.59	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel | 180 | (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): | 0 | (48)

Temperature factor from Table 2b | 0 | (49)

Energy lost from water storage, kWh/year | (48) x (49) = | 0 | (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) | 0 | (51)

If community heating see section 4.3

Volume factor from Table 2a | 0 | (52)

Temperature factor from Table 2b | 0 | (53)

SAP WorkSheet: New dwelling design stage

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

Primary circuit loss (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.95	19.82	21.95	21.24	21.95	21.24	21.95	21.95	21.24	21.95	21.24	21.95	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	184.31	161.83	168.48	148.99	144.53	127.02	119.97	134.43	135.06	154.6	166.04	179.19	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	47.11	35.67	29.54	18.28	13.5	10.73	10	11.35	11.47	20.55	34.97	48.01	(63) (G2)

Output from water heater

(64)m=	137.21	126.16	138.94	130.71	131.03	116.28	109.96	123.08	123.6	134.05	131.07	131.18	

Output from water heater (annual)$_{1...12}$ 1533.27 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	59.47	52.17	54.21	47.79	46.25	40.48	38.08	42.89	43.16	49.59	53.46	57.77	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	165.05	165.05	165.05	165.05	165.05	165.05	165.05	165.05	165.05	165.05	165.05	165.05	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	57.58	51.14	41.59	31.49	23.54	19.87	21.47	27.91	37.46	47.56	55.51	59.18	(67)

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

(68)m=	385.6	389.6	379.51	358.05	330.95	305.48	288.47	284.47	294.55	316.02	343.11	368.58	(68)

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

(69)m=	54.26	54.26	54.26	54.26	54.26	54.26	54.26	54.26	54.26	54.26	54.26	54.26	(69)

Pumps and fans gains (Table 5a)

(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

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

(71)m=	-110.04	-110.04	-110.04	-110.04	-110.04	-110.04	-110.04	-110.04	-110.04	-110.04	-110.04	-110.04	(71)

Water heating gains (Table 5)

(72)m=	79.94	77.64	72.86	66.37	62.16	56.22	51.18	57.64	59.94	66.66	74.24	77.65	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	635.39	630.65	606.24	568.18	528.92	493.85	473.4	482.3	504.23	542.51	585.15	617.68	(73)

SAP WorkSheet: New dwelling design stage

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
East	0.9x	1	x	9.55	x	19.64	x	0.63	x	0.7	=	57.32	(76)
East	0.9x	1	x	9.55	x	38.42	x	0.63	x	0.7	=	112.13	(76)
East	0.9x	1	x	9.55	x	63.27	x	0.63	x	0.7	=	184.67	(76)
East	0.9x	1	x	9.55	x	92.28	x	0.63	x	0.7	=	269.33	(76)
East	0.9x	1	x	9.55	x	113.09	x	0.63	x	0.7	=	330.07	(76)
East	0.9x	1	x	9.55	x	115.77	x	0.63	x	0.7	=	337.89	(76)
East	0.9x	1	x	9.55	x	110.22	x	0.63	x	0.7	=	321.68	(76)
East	0.9x	1	x	9.55	x	94.68	x	0.63	x	0.7	=	276.32	(76)
East	0.9x	1	x	9.55	x	73.59	x	0.63	x	0.7	=	214.78	(76)
East	0.9x	1	x	9.55	x	45.59	x	0.63	x	0.7	=	133.06	(76)
East	0.9x	1	x	9.55	x	24.49	x	0.63	x	0.7	=	71.47	(76)
East	0.9x	1	x	9.55	x	16.15	x	0.63	x	0.7	=	47.14	(76)
South	0.9x	0.77	x	11.31	x	46.75	x	0.63	x	0.7	=	161.6	(78)
South	0.9x	0.77	x	11.31	x	76.57	x	0.63	x	0.7	=	264.66	(78)
South	0.9x	0.77	x	11.31	x	97.53	x	0.63	x	0.7	=	337.12	(78)
South	0.9x	0.77	x	11.31	x	110.23	x	0.63	x	0.7	=	381.02	(78)
South	0.9x	0.77	x	11.31	x	114.87	x	0.63	x	0.7	=	397.05	(78)
South	0.9x	0.77	x	11.31	x	110.55	x	0.63	x	0.7	=	382.11	(78)
South	0.9x	0.77	x	11.31	x	108.01	x	0.63	x	0.7	=	373.34	(78)
South	0.9x	0.77	x	11.31	x	104.89	x	0.63	x	0.7	=	362.57	(78)
South	0.9x	0.77	x	11.31	x	101.89	x	0.63	x	0.7	=	352.17	(78)
South	0.9x	0.77	x	11.31	x	82.59	x	0.63	x	0.7	=	285.46	(78)
South	0.9x	0.77	x	11.31	x	55.42	x	0.63	x	0.7	=	191.55	(78)
South	0.9x	0.77	x	11.31	x	40.4	x	0.63	x	0.7	=	139.64	(78)
West	0.9x	0.77	x	10.02	x	19.64	x	0.63	x	0.7	=	60.14	(80)
West	0.9x	0.77	x	10.02	x	38.42	x	0.63	x	0.7	=	117.65	(80)
West	0.9x	0.77	x	10.02	x	63.27	x	0.63	x	0.7	=	193.76	(80)
West	0.9x	0.77	x	10.02	x	92.28	x	0.63	x	0.7	=	282.58	(80)
West	0.9x	0.77	x	10.02	x	113.09	x	0.63	x	0.7	=	346.32	(80)
West	0.9x	0.77	x	10.02	x	115.77	x	0.63	x	0.7	=	354.52	(80)
West	0.9x	0.77	x	10.02	x	110.22	x	0.63	x	0.7	=	337.52	(80)
West	0.9x	0.77	x	10.02	x	94.68	x	0.63	x	0.7	=	289.92	(80)
West	0.9x	0.77	x	10.02	x	73.59	x	0.63	x	0.7	=	225.35	(80)
West	0.9x	0.77	x	10.02	x	45.59	x	0.63	x	0.7	=	139.61	(80)
West	0.9x	0.77	x	10.02	x	24.49	x	0.63	x	0.7	=	74.99	(80)
West	0.9x	0.77	x	10.02	x	16.15	x	0.63	x	0.7	=	49.46	(80)

Rooflights 0.9x	1	x	0.89	x	42.08	x	0.63	x	0.7	=	14.86	(82)
Rooflights 0.9x	1	x	0.89	x	77.73	x	0.63	x	0.7	=	27.46	(82)
Rooflights 0.9x	1	x	0.89	x	119.58	x	0.63	x	0.7	=	42.24	(82)
Rooflights 0.9x	1	x	0.89	x	165.6	x	0.63	x	0.7	=	58.5	(82)
Rooflights 0.9x	1	x	0.89	x	197.99	x	0.63	x	0.7	=	69.94	(82)
Rooflights 0.9x	1	x	0.89	x	201.14	x	0.63	x	0.7	=	71.05	(82)
Rooflights 0.9x	1	x	0.89	x	192.08	x	0.63	x	0.7	=	67.85	(82)
Rooflights 0.9x	1	x	0.89	x	167.82	x	0.63	x	0.7	=	59.28	(82)
Rooflights 0.9x	1	x	0.89	x	135.82	x	0.63	x	0.7	=	47.98	(82)
Rooflights 0.9x	1	x	0.89	x	89.76	x	0.63	x	0.7	=	31.71	(82)
Rooflights 0.9x	1	x	0.89	x	51.57	x	0.63	x	0.7	=	18.22	(82)
Rooflights 0.9x	1	x	0.89	x	35.21	x	0.63	x	0.7	=	12.44	(82)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	293.93	521.9	757.79	991.43	1143.38	1145.56	1100.39	988.09	840.27	589.82	356.23	248.67	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	929.31	1152.55	1364.03	1559.61	1672.3	1639.42	1573.79	1470.39	1344.49	1132.34	941.38	866.35	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.99	0.97	0.91	0.79	0.61	0.44	0.32	0.35	0.57	0.86	0.97	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.03	20.28	20.58	20.84	20.96	20.99	21	21	20.98	20.79	20.35	19.98	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	19.95	19.95	19.96	19.97	19.97	19.98	19.98	19.99	19.98	19.97	19.97	19.96	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.98	0.96	0.89	0.74	0.55	0.37	0.24	0.28	0.49	0.81	0.96	0.99	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.09	19.34	19.62	19.86	19.95	19.98	19.98	19.99	19.97	19.83	19.42	19.05	(90)

fLA = Living area ÷ (4) = 0.34 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.41	19.66	19.94	20.19	20.29	20.32	20.33	20.33	20.31	20.15	19.74	19.37	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.26	19.51	19.79	20.04	20.14	20.17	20.18	20.18	20.16	20	19.59	19.22	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

Utilisation factor for gains, hm:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(94)m=	0.98	0.95	0.88	0.75	0.56	0.38	0.26	0.29	0.51	0.82	0.96	0.98	(94)

Useful gains, hmGm , W = (94)m x (84)m

(95)m=	910.72	1095.2	1204.55	1162.62	944.71	629.93	405.83	427.27	680.49	923.83	900.69	853.34	(95)

Monthly average external temperature from Table 8

(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)

Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]

(97)m=	1759.6	1713.47	1555.19	1285.84	971.62	632.89	406.12	427.8	692	1082.26	1445.44	1747.57	(97)

Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m

(98)m=	631.57	415.47	260.88	88.72	20.02	0	0	0	0	117.87	392.22	665.31

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 2592.06 (98)

Space heating requirement in kWh/m²/year 25.6 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system 0 (201)

Fraction of space heat from main system(s) (202) = 1 – (201) = 1 (202)

Fraction of total heating from main system 1 (204) = (202) × [1 – (203)] = 1 (204)

Efficiency of main space heating system 1 92.9 (206)

Efficiency of secondary/supplementary heating system, % 0 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)	631.57	415.47	260.88	88.72	20.02	0	0	0	0	117.87	392.22	665.31	
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206) (211)	679.83	447.23	280.82	95.5	21.55	0	0	0	0	126.88	422.19	716.16	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 2790.16 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] + (214) m } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)

	137.21	126.16	138.94	130.71	131.03	116.28	109.96	123.08	123.6	134.05	131.07	131.18	

Efficiency of water heater 87.3 (216)

(217)m=	89.42	89.28	88.98	88.33	87.64	87.3	87.3	87.3	87.3	88.5	89.23	89.46	(217)

Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

(219)m=	153.43	141.31	156.15	147.98	149.52	133.2	125.96	140.99	141.58	151.47	146.89	146.63

Total = Sum(219a)$_{1...12}$ = 1735.09 (219)

Annual totals	**kWh/year**	**kWh/year**	
Space heating fuel used, main system 1		2790.16	
Water heating fuel used		1735.09	
Electricity for pumps, fans and electric keep-hot			
mechanical ventilation - balanced, extract or positive input from outside	190.34		(230a)
central heating pump:	30		(230c)
boiler with a fan-assisted flue	45		(230e)

Total electricity for the above, kWh/year		sum of (230a)…(230g) =		265.34	(231)
Electricity for lighting				406.75	(232)
Electricity generated by PVs				-760.49	(233)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year	**Fuel Price** (Table 12)		**Fuel Cost** £/year	
Space heating - main system 1	(211) x	3.48	x 0.01 =	97.0975601668805	(240)
Space heating - main system 2	(213) x	0	x 0.01 =	0	(241)
Space heating - secondary	(215) x	13.19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)	3.48	x 0.01 =	60.38	(247)
Pumps, fans and electric keep-hot	(231)	13.19	x 0.01 =	35	(249)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a					
Energy for lighting	(232)	13.19	x 0.01 =	53.65	(250)
Additional standing charges (Table 12)				120	(251)
	one of (233) to (235) x)	13.19	x 0.01 =	0	(252)
Appendix Q items: repeat lines (253) and (254) as needed					
Total energy cost	(245)...(247) + (250)…(254) =			366.13	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.05	(257)
SAP rating (Section 12)		85.33	(258)

12a. CO_2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	602.67	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	374.78	(264)
Space and water heating	(261) + (262) + (263) + (264) =			977.45	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	137.71	(267)
Electricity for lighting	(232) x	0.519	=	211.1	(268)
Energy saving/generation technologies					
Item 1		0.519	=	-394.7	(269)
Total CO2, kg/year		sum of (265)…(271) =		931.58	(272)
CO2 emissions per m²		(272) ÷ (4) =		9.2	(273)
EI rating (section 14)				91	(274)

13a. Primary Energy

SAP WorkSheet: New dwelling design stage

	Energy kWh/year		Primary factor		P. Energy kWh/year	
Space heating (main system 1)	(211)	x	1.22	=	3403.99	(261)
Space heating (secondary)	(215)	x	3.07	=	0	(263)
Energy for water heating	(219)	x	1.22	=	2116.81	(264)
Space and water heating	(261) + (262) + (263) + (264) =				5520.81	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	3.07	=	814.61	(267)
Electricity for lighting	(232)	x	0	=	1248.73	(268)
Energy saving/generation technologies						
Item 1			3.07	=	-2334.71	(269)
‘Total Primary Energy			sum of (265)…(271) =		5249.43	(272)
Primary energy kWh/m²/year			(272) ÷ (4) =		51.84	(273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 November 2014

Property Details: Unit 201

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	2
Front of dwelling faces:	South
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	Light-coloured curtain or roller blind
Ventilation rate during hot weather (ach):	4 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	392.28	**(P1)**
Transmission heat loss coefficient:	90.6	
Summer heat loss coefficient:	482.85	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
South (south window)	0	1
East (East window)	0	1
West (West window)	0	1
South (south roof light)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
South (south window)	0.6	0.9	1	0.54	**(P8)**
East (East window)	0.6	0.9	1	0.54	**(P8)**
West (West window)	0.6	0.9	1	0.54	**(P8)**
South (south roof light)	0.6	1	1	0.6	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
South (south window)	0.9 x	11.31	112.21	0.63	0.7	0.54	271.99	
East (East window)	0.9 x	9.55	117.51	0.63	0.7	0.54	240.52	
West (West window)	0.9 x	10.02	117.51	0.63	0.7	0.54	252.35	
	1 x	0.89	204.16	0.63	0.7	0.6	43.27	
						Total	808.13	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	490.85	470.4	479.3	
Total summer gains	1341.8	1278.52	1219.9	**(P5)**
Summer gain/loss ratio	2.78	2.65	2.53	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	19.03	20.8	20.58	**(P7)**
Likelihood of high internal temperature	**Not significant**	**Slight**	**Slight**	

SAP 2012 Overheating Assessment

Assessment of likelihood of high internal temperature: Slight

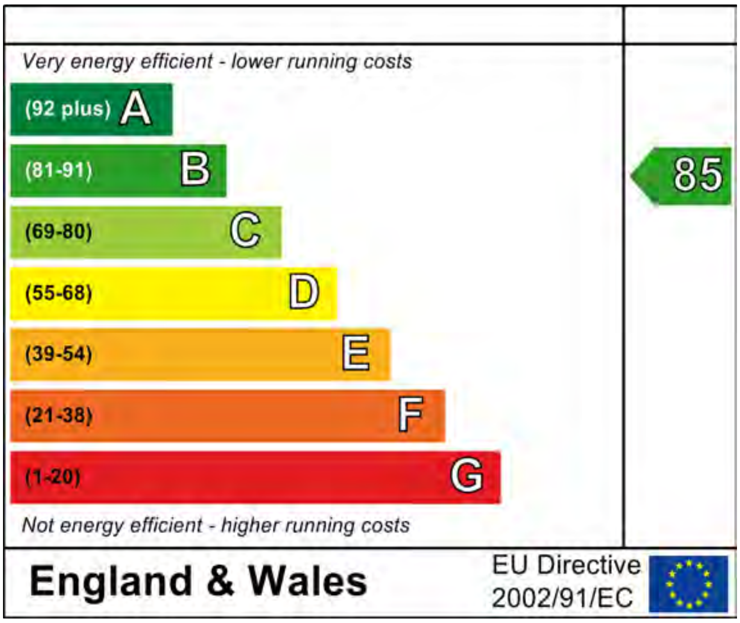
Predicted Energy Assessment

Dwelling type:	Top floor Flat
Date of assessment:	29 October 2014
Produced by:	Aymon Winter
Total floor area:	97.1800003051758 m²

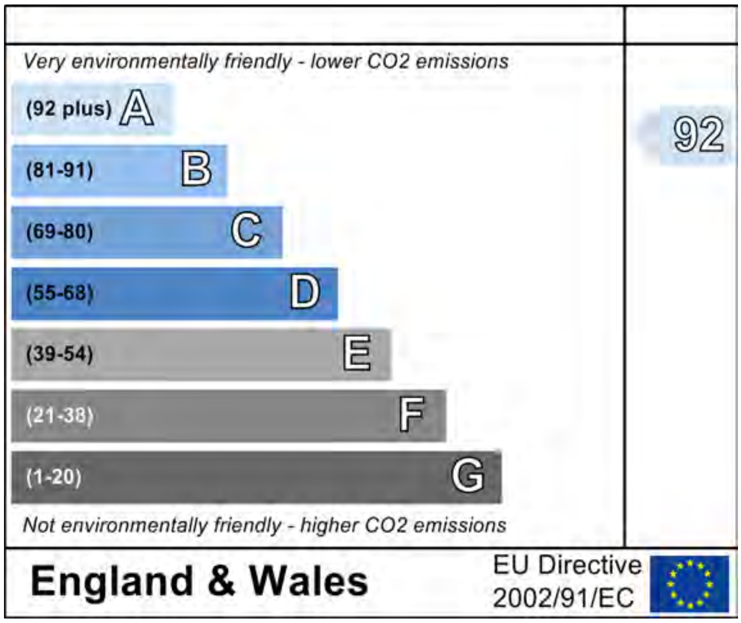
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about 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 (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) 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.

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.14
Printed on 28 November 2014 at 09:39:45

Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 97.18m²

Site Reference : Development at Riverpark Gardens **Plot Reference:** Unit 202

Address :

Client Details:

Name: Jamie

Address : Campbell, 43 Tanner Street, Greater London, London, SE13PL

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

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	18.66 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	10.42 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	58.91 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	49.48 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.18 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	**OK**
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	**OK**
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	**OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:	Database: (rev 367, product index 016684): Boiler systems with radiators or underfloor heating - mains gas Brand name: Baxi Model: Neta-tec Combi Model qualifier: 24 GA (Combi) Efficiency 89.0 % SEDBUK2009 Minimum 88.0 %	**OK**
Secondary heating system:	None	

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Nominal cylinder loss: 0.00 kWh/day Permitted by DBSCG: 2.10 kWh/day	
Primary pipework insulated:	Yes	**OK**

6 Controls

Space heating controls	Programmer, room thermostat and TRVs	**OK**
Hot water controls:	Cylinderstat	**OK**
	Independent timer for DHW	**OK**
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.42	
Maximum	1.5	**OK**
MVHR efficiency:	91%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South	17.72m²,
Windows facing: South	9.97m²,
Windows facing: West	4.01m²,
Roof windows facing: South	0.89m²
Ventilation rate:	2.50
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Doors U-value	1 W/m²K
Roofs U-value	0.11 W/m²K
Photovoltaic array	

SAP Input

Property Details: Unit 202

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	29 October 2014
Date of certificate:	28 November 2014
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/day:	True
PCDF Version:	367

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2014

Floor Location:	Floor area:	Storey height:
Floor 0	56.32 m²	2.7 m
Floor 1	40.86 m²	3.37 m

Living area:	40.86 m² (fraction 0.448)
Front of dwelling faces:	West

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Main door	Manufacturer	Solid			PVC-U
South window	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
East window	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
West window	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
south roof light	Manufacturer	Roof Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Main door	mm	0.7	0	1	2.35	1
South window		0.7	0.63	1.4	17.72	1
East window	16mm or more	0.7	0.63	1.4	9.97	1
West window		0.7	0.63	1.4	4.01	1
south roof light	16mm or more	0.7	0.63	1.3	0.89	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Main door		sheltered wall	West	0	0
South window		External wall	South	0	0
East window		External wall	South	0	0
West window		External wall	West	0	0
south roof light		Sloping roof	South	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
External wall	125.08	31.7	93.38	0.16	0	False	N/A
sheltered wall	20.98	2.35	18.63	0.18	0.43	False	N/A
Sloping roof	40.6	0.89	39.71	0.11	0		N/A
terrace roof	28.54	0	28.54	0.11	0		N/A

SAP Input

exposed floor	13.08	0.16	N/A

<u>Internal Elements</u>

<u>Party Elements</u>

Party walls	28.96	N/A
Party floor	56.32	N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0883

Length	Psi-value		
16.13	0.401	E1	Steel lintel with perforated steel base plate
1.8	0.027	E3	Sill
24.62	0.021	E4	Jamb
13.45	0	E20	Exposed floor (normal)
19.99	0.14	E6	Intermediate floor within a dwelling
0	0.001	E7	Party floor between dwellings (in blocks of flats)
47.9	0.08	E14	Flat roof
16.09	0.048	E16	Corner (normal)
10.8	0.055	E18	Party wall between dwellings
8.67	0.32	E21	Exposed floor (inverted)
7.33	0.32	E20	Exposed floor (normal)
6.47	0	P2	Intermediate floor within a dwelling
10.73	0	P3	Intermediate floor between dwellings (in blocks of flats)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	3
Pressure test:	3

Main heating system:

Main heating system:

Boiler systems with radiators or underfloor heating
Gas boilers and oil boilers
Fuel: mains gas
Info Source: Boiler Database
Database: (rev 367, product index 016684) Efficiency: Winter 87.3 % Summer: 89.9
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi boiler)
Systems with radiators
Central heating pump : 2013 or later
Design flow temperature: Design flow temperature >45°C
Room-sealed
Boiler interlock: Yes
Delayed start

Main heating Control:

Main heating Control:

Programmer, room thermostat and TRVs
Control code: 2106

Secondary heating system:

Secondary heating system: None

SAP Input

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :mains gas Hot water cylinder Cylinder volume: 180 litres Cylinder insulation: Factory 75 mm Primary pipework insulation: True Cylinderstat: True Cylinder in heated space: True Flue Gas Heat Recovery System: Database (rev 367, product index 060001) Brand name: Zenex Model: GasSaver Model qualifier: GS-1 Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 0.9 Tilt of collector: Horizontal Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name:	Aymon Winter	**Stroma Number:**	STRO014511
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.1.14

Property Address: Unit 202

Address :

1. Overall dwelling dimensions:

	Area(m²)			Av. Height(m)			Volume(m³)	
Ground floor	56.32	(1a)	x	2.7	(2a)	=	152.06	(3a)
First floor	40.86	(1b)	x	3.37	(2b)	=	137.7	(3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	97.18	(4)						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n)		=	289.76	(5)

2. Ventilation rate:

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

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)

if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35

If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.15	(18)

Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used

Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.12	(21)

Infiltration rate modified for monthly wind speed

Monthly average wind speed from Table 7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7

SAP WorkSheet: New dwelling design stage

Wind Factor (22a)m = (22)m ÷ 4

(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14

Calculate effective air change rate for the applicable case

If mechanical ventilation:	0.5	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a)	0.5	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	77.35	(23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.26	0.26	0.26	0.24	0.24	0.22	0.22	0.22	0.23	0.24	0.24	0.25	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.26	0.26	0.26	0.24	0.24	0.22	0.22	0.22	0.23	0.24	0.24	0.25	(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)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.35	x	1	=	2.35			(26)
Windows Type 1			17.72	x1/[1/(1.4)+ 0.04]		=	23.49			(27)
Windows Type 2			9.97	x1/[1/(1.4)+ 0.04]		=	13.22			(27)
Windows Type 3			4.01	x1/[1/(1.4)+ 0.04]		=	5.32			(27)
Rooflights			0.89	x1/[1/(1.3) + 0.04]		=	1.157			(27b)
Floor			13.08	x	0.16	=	2.0928			(28)
Walls Type1	125.08	31.7	93.38	x	0.16	=	14.94			(29)
Walls Type2	20.98	2.35	18.63	x	0.17	=	3.11			(29)
Roof Type1	40.6	0.89	39.71	x	0.11	=	4.37			(30)
Roof Type2	28.54	0	28.54	x	0.11	=	3.14			(30)
Total area of elements, m²			228.28							(31)
Party wall			28.96	x	0	=	0			(32)
Party floor			56.32							(32a)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*
*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U)	(26)…(30) + (32) =	73.13	(33)
Heat capacity Cm = S(A x k)	((28)…(30) + (32) + (32a)…(32e) =	15206.35	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	Indicative Value: Medium	250	(35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K | 20.15 | (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss (33) + (36) = | 93.28 | (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	25	24.72	24.45	23.06	22.78	21.39	21.39	21.11	21.95	22.78	23.33	23.89	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	118.28	118	117.73	116.34	116.06	114.67	114.67	114.39	115.23	116.06	116.62	117.17

Average = $Sum(39)_{1...12}$ /12= | 116.27 | (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	1.22	1.21	1.21	1.2	1.19	1.18	1.18	1.18	1.19	1.19	1.2	1.21

Average = $Sum(40)_{1...12}$ /12= | 1.2 | (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N | 2.71 | (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)

if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 | 98.61 | (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(44)m=	108.47	104.52	100.58	96.63	92.69	88.75	88.75	92.69	96.63	100.58	104.52	108.47

Total = $Sum(44)_{1...12}$ = | 1183.27 | (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	160.85	140.68	145.17	126.56	121.44	104.8	97.11	111.43	112.76	131.42	143.45	155.78

Total = $Sum(45)_{1...12}$ = | 1551.46 | (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	24.13	21.1	21.78	18.98	18.22	15.72	14.57	16.71	16.91	19.71	21.52	23.37	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel | 180 | (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): | 0 | (48)

Temperature factor from Table 2b | 0 | (49)

Energy lost from water storage, kWh/year (48) x (49) = | 0 | (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) | 0 | (51)

If community heating see section 4.3

Volume factor from Table 2a | 0 | (52)

Temperature factor from Table 2b | 0 | (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = | 0 | (54)

Enter (50) or (54) in (55) | 0 | (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

Primary circuit loss (annual) from Table 3 | 0 | (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.95	19.82	21.95	21.24	21.95	21.24	21.95	21.95	21.24	21.95	21.24	21.95	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	182.8	160.51	167.12	147.8	143.39	126.03	119.05	133.38	134	153.36	164.69	177.72	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	44.27	32.66	27.5	17.77	13.56	10.64	9.92	11.25	11.37	18.52	32.35	45.5	(63) (G2)

Output from water heater

(64)m=	138.53	127.85	139.61	130.04	129.83	115.39	109.14	122.13	122.63	134.84	132.34	132.22	

Output from water heater (annual)$_{1...12}$ | 1534.55 | (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	58.97	51.73	53.76	47.39	45.87	40.15	37.77	42.54	42.8	49.18	53.01	57.28	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	162.71	162.71	162.71	162.71	162.71	162.71	162.71	162.71	162.71	162.71	162.71	162.71	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	56.1	49.82	40.52	30.68	22.93	19.36	20.92	27.19	36.49	46.34	54.08	57.65	(67)

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

(68)m=	375.65	379.55	369.73	348.81	322.42	297.61	281.03	277.13	286.96	307.87	334.27	359.08	(68)

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

(69)m=	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	53.98	(69)

Pumps and fans gains (Table 5a)

(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

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

(71)m=	-108.47	-108.47	-108.47	-108.47	-108.47	-108.47	-108.47	-108.47	-108.47	-108.47	-108.47	-108.47	(71)

Water heating gains (Table 5)

(72)m=	79.26	76.98	72.25	65.82	61.65	55.77	50.77	57.17	59.45	66.1	73.62	76.99	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	622.23	617.58	593.72	556.53	518.21	483.95	463.94	472.72	494.12	531.53	573.19	604.94	(73)

SAP WorkSheet: New dwelling design stage

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
South	0.9x	0.77	x	17.72	x	46.75	x	0.63	x	0.7	=	253.18	(78)
South	0.9x	0.77	x	9.97	x	46.75	x	0.63	x	0.7	=	142.45	(78)
South	0.9x	0.77	x	17.72	x	76.57	x	0.63	x	0.7	=	414.65	(78)
South	0.9x	0.77	x	9.97	x	76.57	x	0.63	x	0.7	=	233.3	(78)
South	0.9x	0.77	x	17.72	x	97.53	x	0.63	x	0.7	=	528.19	(78)
South	0.9x	0.77	x	9.97	x	97.53	x	0.63	x	0.7	=	297.18	(78)
South	0.9x	0.77	x	17.72	x	110.23	x	0.63	x	0.7	=	596.97	(78)
South	0.9x	0.77	x	9.97	x	110.23	x	0.63	x	0.7	=	335.88	(78)
South	0.9x	0.77	x	17.72	x	114.87	x	0.63	x	0.7	=	622.08	(78)
South	0.9x	0.77	x	9.97	x	114.87	x	0.63	x	0.7	=	350.01	(78)
South	0.9x	0.77	x	17.72	x	110.55	x	0.63	x	0.7	=	598.67	(78)
South	0.9x	0.77	x	9.97	x	110.55	x	0.63	x	0.7	=	336.83	(78)
South	0.9x	0.77	x	17.72	x	108.01	x	0.63	x	0.7	=	584.93	(78)
South	0.9x	0.77	x	9.97	x	108.01	x	0.63	x	0.7	=	329.11	(78)
South	0.9x	0.77	x	17.72	x	104.89	x	0.63	x	0.7	=	568.05	(78)
South	0.9x	0.77	x	9.97	x	104.89	x	0.63	x	0.7	=	319.61	(78)
South	0.9x	0.77	x	17.72	x	101.89	x	0.63	x	0.7	=	551.76	(78)
South	0.9x	0.77	x	9.97	x	101.89	x	0.63	x	0.7	=	310.44	(78)
South	0.9x	0.77	x	17.72	x	82.59	x	0.63	x	0.7	=	447.24	(78)
South	0.9x	0.77	x	9.97	x	82.59	x	0.63	x	0.7	=	251.64	(78)
South	0.9x	0.77	x	17.72	x	55.42	x	0.63	x	0.7	=	300.11	(78)
South	0.9x	0.77	x	9.97	x	55.42	x	0.63	x	0.7	=	168.85	(78)
South	0.9x	0.77	x	17.72	x	40.4	x	0.63	x	0.7	=	218.77	(78)
South	0.9x	0.77	x	9.97	x	40.4	x	0.63	x	0.7	=	123.09	(78)
West	0.9x	0.77	x	4.01	x	19.64	x	0.63	x	0.7	=	24.07	(80)
West	0.9x	0.77	x	4.01	x	38.42	x	0.63	x	0.7	=	47.08	(80)
West	0.9x	0.77	x	4.01	x	63.27	x	0.63	x	0.7	=	77.54	(80)
West	0.9x	0.77	x	4.01	x	92.28	x	0.63	x	0.7	=	113.09	(80)
West	0.9x	0.77	x	4.01	x	113.09	x	0.63	x	0.7	=	138.6	(80)
West	0.9x	0.77	x	4.01	x	115.77	x	0.63	x	0.7	=	141.88	(80)
West	0.9x	0.77	x	4.01	x	110.22	x	0.63	x	0.7	=	135.07	(80)
West	0.9x	0.77	x	4.01	x	94.68	x	0.63	x	0.7	=	116.03	(80)
West	0.9x	0.77	x	4.01	x	73.59	x	0.63	x	0.7	=	90.18	(80)
West	0.9x	0.77	x	4.01	x	45.59	x	0.63	x	0.7	=	55.87	(80)
West	0.9x	0.77	x	4.01	x	24.49	x	0.63	x	0.7	=	30.01	(80)
West	0.9x	0.77	x	4.01	x	16.15	x	0.63	x	0.7	=	19.79	(80)

SAP WorkSheet: New dwelling design stage

Rooflights 0.9x	1	x	0.89	x	32.08	x	0.63	x	0.7	=	11.33	(82)
Rooflights 0.9x	1	x	0.89	x	63.31	x	0.63	x	0.7	=	22.36	(82)
Rooflights 0.9x	1	x	0.89	x	106.14	x	0.63	x	0.7	=	37.49	(82)
Rooflights 0.9x	1	x	0.89	x	158.54	x	0.63	x	0.7	=	56	(82)
Rooflights 0.9x	1	x	0.89	x	198.12	x	0.63	x	0.7	=	69.98	(82)
Rooflights 0.9x	1	x	0.89	x	204.62	x	0.63	x	0.7	=	72.28	(82)
Rooflights 0.9x	1	x	0.89	x	194.06	x	0.63	x	0.7	=	68.55	(82)
Rooflights 0.9x	1	x	0.89	x	164.05	x	0.63	x	0.7	=	57.95	(82)
Rooflights 0.9x	1	x	0.89	x	124.6	x	0.63	x	0.7	=	44.01	(82)
Rooflights 0.9x	1	x	0.89	x	75.57	x	0.63	x	0.7	=	26.69	(82)
Rooflights 0.9x	1	x	0.89	x	40.09	x	0.63	x	0.7	=	14.16	(82)
Rooflights 0.9x	1	x	0.89	x	26.33	x	0.63	x	0.7	=	9.3	(82)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	431.04	717.4	940.41	1101.94	1180.67	1149.66	1117.67	1061.64	996.4	781.44	513.14	370.96	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	1053.26	1334.97	1534.13	1658.48	1698.88	1633.62	1581.61	1534.35	1490.52	1312.97	1086.32	975.9	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.98	0.94	0.87	0.76	0.61	0.44	0.32	0.34	0.52	0.79	0.95	0.98	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.1	20.38	20.64	20.85	20.96	20.99	21	21	20.98	20.84	20.43	20.03	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	19.91	19.91	19.91	19.92	19.92	19.94	19.94	19.94	19.93	19.92	19.92	19.92	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.97	0.92	0.84	0.71	0.55	0.37	0.24	0.26	0.45	0.74	0.93	0.98	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.12	19.39	19.63	19.82	19.9	19.93	19.94	19.94	19.92	19.82	19.46	19.07	(90)

fLA = Living area ÷ (4) = 0.42 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.53	19.81	20.06	20.25	20.34	20.38	20.38	20.38	20.37	20.25	19.87	19.47	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.38	19.66	19.91	20.1	20.19	20.23	20.23	20.23	20.22	20.1	19.72	19.32	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.97	0.92	0.84	0.72	0.56	0.39	0.26	0.29	0.47	0.75	0.93	0.97	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	1017.23	1224.77	1288.37	1189.25	955.42	641.37	416.14	437.9	695.56	985.03	1007.98	950.69	(95)

Monthly average external temperature from Table 8

(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)

Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]

(97)m=	1783.7	1741.49	1578.47	1303.4	985.77	645.42	416.57	438.55	705.13	1102.49	1471.43	1772.04	(97)

Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m

(98)m=	570.25	347.24	215.83	82.19	22.58	0	0	0	0	87.39	333.69	611.08

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 2270.25 (98)

Space heating requirement in kWh/m²/year 23.36 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		92.9	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)	570.25	347.24	215.83	82.19	22.58	0	0	0	0	87.39	333.69	611.08	
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206)	613.83	373.78	232.33	88.47	24.3	0	0	0	0	94.07	359.19	657.78	(211)

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 2443.75 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] + (214) m } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)

	138.53	127.85	139.61	130.04	129.83	115.39	109.14	122.13	122.63	134.84	132.34	132.22	
Efficiency of water heater													87.3 (216)
(217)m=	89.38	89.19	88.86	88.29	87.68	87.3	87.3	87.3	87.3	88.3	89.15	89.43	(217)

Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

(219)m=	154.99	143.35	157.12	147.29	148.08	132.18	125.01	139.89	140.47	152.7	148.45	147.86

Total = Sum(219a)$_{1...12}$ = 1737.39 (219)

Annual totals	**kWh/year**	**kWh/year**	
Space heating fuel used, main system 1		2443.75	
Water heating fuel used		1737.39	
Electricity for pumps, fans and electric keep-hot			
mechanical ventilation - balanced, extract or positive input from outside	185.59		(230a)
central heating pump:	30		(230c)
boiler with a fan-assisted flue	45		(230e)

SAP WorkSheet: New dwelling design stage

Total electricity for the above, kWh/year	sum of (230a)…(230g) =	260.59	(231)
Electricity for lighting		396.26	(232)
Electricity generated by PVs		-684.44	(233)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year	**Fuel Price** (Table 12)		**Fuel Cost** £/year	
Space heating - main system 1	(211) x	3.48	x 0.01 =	85.0426324728754	(240)
Space heating - main system 2	(213) x	0	x 0.01 =	0	(241)
Space heating - secondary	(215) x	13.19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)	3.48	x 0.01 =	60.46	(247)
Pumps, fans and electric keep-hot	(231)	13.19	x 0.01 =	34.37	(249)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a					
Energy for lighting	(232)	13.19	x 0.01 =	52.27	(250)
Additional standing charges (Table 12)				120	(251)
	one of (233) to (235) x)	13.19	x 0.01 =	0	(252)
Appendix Q items: repeat lines (253) and (254) as needed					
Total energy cost	(245)...(247) + (250)…(254) =			352.14	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.04	(257)
SAP rating (Section 12)		85.49	(258)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	527.85	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	375.28	(264)
Space and water heating	(261) + (262) + (263) + (264) =			903.13	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	135.25	(267)
Electricity for lighting	(232) x	0.519	=	205.66	(268)
Energy saving/generation technologies					
Item 1		0.519	=	-355.23	(269)
Total CO2, kg/year		sum of (265)…(271) =		888.81	(272)
CO2 emissions per m²		(272) ÷ (4) =		9.15	(273)
EI rating (section 14)				92	(274)

13a. Primary Energy

SAP WorkSheet: New dwelling design stage

	Energy kWh/year		Primary factor		P. Energy kWh/year	
Space heating (main system 1)	(211)	x	1.22	=	2981.38	(261)
Space heating (secondary)	(215)	x	3.07	=	0	(263)
Energy for water heating	(219)	x	1.22	=	2119.62	(264)
Space and water heating	(261) + (262) + (263) + (264) =				5101	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	3.07	=	800.02	(267)
Electricity for lighting	(232)	x	0	=	1216.53	(268)
Energy saving/generation technologies Item 1			3.07	=	-2101.24	(269)
'Total Primary Energy			sum of (265)…(271) =		5016.3	(272)
Primary energy kWh/m²/year			(272) ÷ (4) =		51.62	(273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 November 2014

Property Details: Unit 202

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	No
Number of storeys:	2
Front of dwelling faces:	West
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	Dark-coloured curtain or roller blind
Ventilation rate during hot weather (ach):	2.5 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	239.05	**(P1)**
Transmission heat loss coefficient:	93.3	
Summer heat loss coefficient:	332.33	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
South (South window)	0	1
South (East window)	0	1
West (West window)	0	1
South (south roof light)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
South (South window)	0.85	0.9	1	0.76	**(P8)**
South (East window)	0.85	0.9	1	0.76	**(P8)**
West (West window)	0.85	0.9	1	0.76	**(P8)**
South (south roof light)	0.6	1	1	0.6	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
South (South window)	0.9 x	17.72	112.21	0.63	0.7	0.76	603.7	
South (East window)	0.9 x	9.97	112.21	0.63	0.7	0.76	339.67	
West (West window)	0.9 x	4.01	117.51	0.63	0.7	0.76	143.07	
	1 x	0.89	207.69	0.63	0.7	0.6	44.02	
						Total	1130.46	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	480.95	460.94	469.72	
Total summer gains	1657.61	1591.4	1564.47	**(P5)**
Summer gain/loss ratio	4.99	4.79	4.71	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	21.24	22.94	22.76	**(P7)**
Likelihood of high internal temperature	**Slight**	**Medium**	**Medium**	

SAP 2012 Overheating Assessment

Assessment of likelihood of high internal temperature: Medium

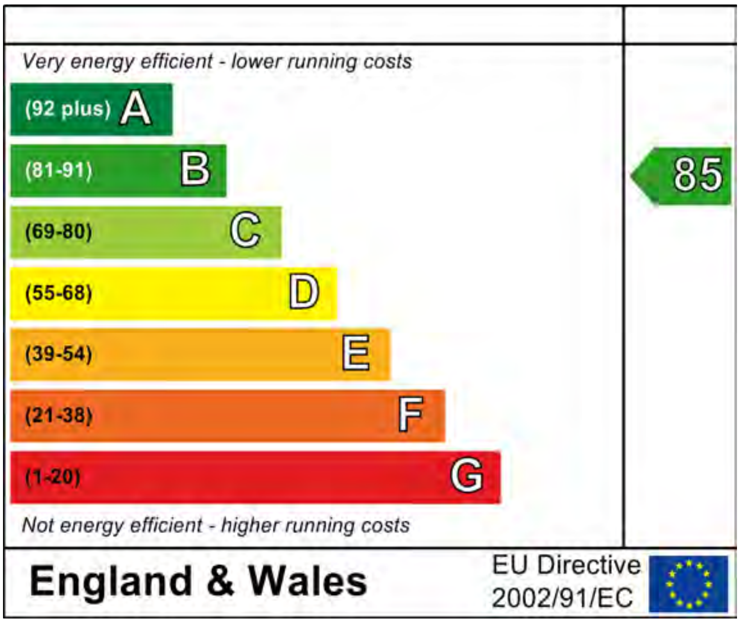
Predicted Energy Assessment

Dwelling type:	Ground floor Flat
Date of assessment:	29 October 2014
Produced by:	Aymon Winter
Total floor area:	102.709999084473 m²

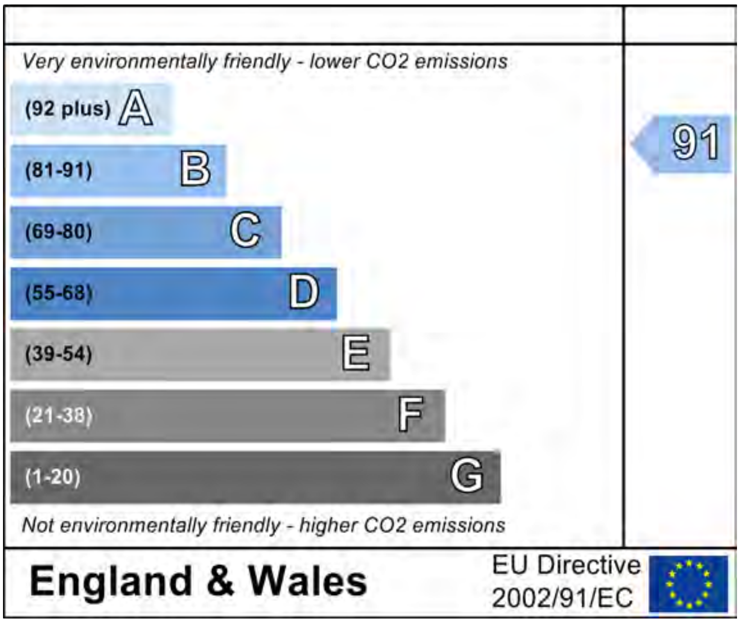
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about 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 (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) 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.

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.14
Printed on 28 November 2014 at 09:39:40

Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 102.71m²

Site Reference : Development at Riverpark Gardens **Plot Reference:** unit 203

Address :

Client Details:

Name: Jamie

Address : Campbell, 43 Tanner Street, Greater London, London, SE13PL

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

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	18.69 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	10.98 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	60.76 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	54.65 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.38 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Database: (rev 367, product index 016684):
Boiler systems with radiators or underfloor heating - mains gas
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi)
Efficiency 89.0 % SEDBUK2009
Minimum 88.0 % **OK**

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Nominal cylinder loss: 0.00 kWh/day Permitted by DBSCG: 2.10 kWh/day	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls	Programmer, room thermostat and TRVs	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock:	Yes	OK

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.42	
Maximum	1.5	OK
MVHR efficiency:	91%	
Minimum	70%	OK

9 Summertime temperature

Overheating risk (Thames valley):	Medium	OK

Based on:

Overshading:	Average or unknown
Windows facing: West	11.49m²,
Windows facing: South	19.72m²,
Windows facing: East	9.55m²,
Roof windows facing: South	0.89m²
Ventilation rate:	4.00
Blinds/curtains:	Closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Doors U-value	1 W/m²K
Roofs U-value	0.11 W/m²K
Photovoltaic array	

SAP Input

Property Details: unit 203

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	29 October 2014
Date of certificate:	28 November 2014
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/day:	True
PCDF Version:	367

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2014

Floor Location:	Floor area:	Storey height:
Floor 0	61.85 m²	2.7 m
Floor 1	40.86 m²	3.37 m

Living area:	40.86 m² (fraction 0.398)
Front of dwelling faces:	North

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Main Door	Manufacturer	Solid			PVC-U
West Windows	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
south window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
East window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
South roof light	Manufacturer	Roof Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Main Door	mm	0.7	0	1	2.14	1
West Windows	16mm or more	0.7	0.63	1.4	11.49	1
south window	16mm or more	0.7	0.63	1.4	19.72	1
East window	16mm or more	0.7	0.63	1.4	9.55	1
South roof light	16mm or more	0.7	0.63	1.4	0.89	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Main Door		sheltered wall	North	0	0
West Windows		External walls	West	0	0
south window		External walls	South	0	0
East window		External walls	East	0	0
South roof light		sloping roof	South	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
External walls	157.77	40.76	117.01	0.16	0	False	N/A
sheltered wall	12.84	2.14	10.7	0.18	0.4	False	N/A
sloping roof	42.31	0.89	41.42	0.11	0		N/A
terrace roof	20.17	0	20.17	0.11	0		N/A

SAP Input

Internal Elements
Party Elements

Party walls	17.72	N/A
party floor	32.95	N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0895

Length	Psi-value		
20.23	0.401	E1	Steel lintel with perforated steel base plate
37.48	0.021	E4	Jamb
1.8	0.027	E3	Sill
22.81	0.14	E6	Intermediate floor within a dwelling
18.62	0.001	E7	Party floor between dwellings (in blocks of flats)
21.49	0.048	E16	Corner (normal)
62.91	0.08	E14	Flat roof
7.77	0.32	E21	Exposed floor (inverted)
2.7	0.055	E18	Party wall between dwellings
6.56	0	P2	Intermediate floor within a dwelling

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	3

Main heating system:

Main heating system:

Boiler systems with radiators or underfloor heating
Gas boilers and oil boilers
Fuel: mains gas
Info Source: Boiler Database
Database: (rev 367, product index 016684) Efficiency: Winter 87.3 % Summer: 89.9
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi boiler)
Systems with radiators
Central heating pump : 2013 or later
Design flow temperature: Design flow temperature >45°C
Room-sealed
Boiler interlock: Yes
Delayed start

Main heating Control:

Main heating Control:

Programmer, room thermostat and TRVs
Control code: 2106

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating:

From main heating system
Water code: 901

SAP Input

Fuel :mains gas
Hot water cylinder
Cylinder volume: 180 litres
Cylinder insulation: Factory 75 mm
Primary pipework insulation: True
Cylinderstat: True
Cylinder in heated space: True
Flue Gas Heat Recovery System:
  Database (rev 367, product index 060001)
  Brand name: Zenex
  Model: GasSaver
  Model qualifier: GS-1
Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 1 Tilt of collector: Horizontal Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name:	Aymon Winter	**Stroma Number:**	STRO014511
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.1.14

Property Address: unit 203

Address :

1. Overall dwelling dimensions:

	Area(m²)			Av. Height(m)			Volume(m³)	
Ground floor	61.85	(1a)	x	2.7	(2a)	=	166.99	(3a)
First floor	40.86	(1b)	x	3.37	(2b)	=	137.7	(3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	102.71	(4)						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n)		=	304.69	(5)

2. Ventilation rate:

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

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)

if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35

If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.15	(18)

Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used

Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.85	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.13	(21)

Infiltration rate modified for monthly wind speed

Monthly average wind speed from Table 7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7

SAP WorkSheet: New dwelling design stage

Wind Factor (22a)m = (22)m ÷ 4

(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 77.35 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside

if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft

if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(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)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.14	x	1	=	2.14			(26)
Windows Type 1			11.49	x1/[1/(1.4)+ 0.04]		=	15.23			(27)
Windows Type 2			19.72	x1/[1/(1.4)+ 0.04]		=	26.14			(27)
Windows Type 3			9.55	x1/[1/(1.4)+ 0.04]		=	12.66			(27)
Rooflights			0.89	x1/[1/(1.4) + 0.04]		=	1.246			(27b)
Walls Type1	157.77	40.76	117.01	x	0.16	=	18.72			(29)
Walls Type2	12.84	2.14	10.7	x	0.17	=	1.8			(29)
Roof Type1	42.31	0.89	41.42	x	0.11	=	4.56			(30)
Roof Type2	20.17	0	20.17	x	0.11	=	2.22			(30)
Total area of elements, m²			233.09							(31)
Party wall			17.72	x	0	=	0			(32)
Party floor			32.95							(32a)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 84.65 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 12908.41 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K — 20.86 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss — (33) + (36) = 105.51 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	27.73	27.41	27.09	25.49	25.17	23.57	23.57	23.25	24.21	25.17	25.81	26.45	(38)

Heat transfer coefficient, W/K — (39)m = (37) + (38)m

(39)m=	133.24	132.92	132.6	131	130.68	129.08	129.08	128.76	129.72	130.68	131.32	131.96

Average = Sum(39)$_{1…12}$ /12= 130.92 (39)

Heat loss parameter (HLP), W/m²K — (40)m = (39)m ÷ (4)

(40)m=	1.3	1.29	1.29	1.28	1.27	1.26	1.26	1.25	1.26	1.27	1.28	1.28

Average = Sum(40)$_{1…12}$ /12= 1.27 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N — 2.76 (42)

if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)

if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 — 99.83 (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(44)m=	109.81	105.82	101.82	97.83	93.84	89.84	89.84	93.84	97.83	101.82	105.82	109.81

Total = Sum(44)$_{1…12}$ = 1197.92 (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	162.84	142.42	146.97	128.13	122.95	106.09	98.31	112.81	114.16	133.04	145.23	157.71

Total = Sum(45)$_{1…12}$ = 1570.67 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	24.43	21.36	22.05	19.22	18.44	15.91	14.75	16.92	17.12	19.96	21.78	23.66	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel — 180 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): — 0 (48)

Temperature factor from Table 2b — 0 (49)

Energy lost from water storage, kWh/year — (48) x (49) = 0 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) — 0 (51)

If community heating see section 4.3

Volume factor from Table 2a — 0 (52)

Temperature factor from Table 2b — 0 (53)

SAP WorkSheet: New dwelling design stage

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

Primary circuit loss (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.95	19.82	21.95	21.24	21.95	21.24	21.95	21.95	21.24	21.95	21.24	21.95	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	184.79	162.25	168.92	149.37	144.89	127.33	120.26	134.76	135.4	154.99	166.46	179.65	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	50.52	37.08	30.13	18.69	13.73	10.76	10.03	11.38	11.5	21.04	36.78	51.82	(63) (G2)

Output from water heater

(64)m=	134.27	125.17	138.78	130.68	131.17	116.57	110.22	123.38	123.9	133.95	129.68	127.83	

Output from water heater (annual)$_{1...12}$ 1525.61 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	59.63	52.31	54.35	47.91	46.37	40.59	38.17	43	43.27	49.72	53.6	57.92	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	165.79	165.79	165.79	165.79	165.79	165.79	165.79	165.79	165.79	165.79	165.79	165.79	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	58.09	51.59	41.96	31.77	23.75	20.05	21.66	28.16	37.79	47.99	56.01	59.7	(67)

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

(68)m=	389.01	393.05	382.87	361.22	333.88	308.19	291.02	286.99	297.16	318.82	346.15	371.84	(68)

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

(69)m=	54.34	54.34	54.34	54.34	54.34	54.34	54.34	54.34	54.34	54.34	54.34	54.34	(69)

Pumps and fans gains (Table 5a)

(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

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

(71)m=	-110.53	-110.53	-110.53	-110.53	-110.53	-110.53	-110.53	-110.53	-110.53	-110.53	-110.53	-110.53	(71)

Water heating gains (Table 5)

(72)m=	80.15	77.84	73.06	66.55	62.32	56.37	51.31	57.79	60.09	66.83	74.44	77.85	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	639.86	635.09	610.5	572.14	532.55	497.21	476.6	485.54	507.65	546.24	589.21	622.01	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
East	0.9x	1	x	9.55	x	19.64	x	0.63	x	0.7	=	57.32	(76)
East	0.9x	1	x	9.55	x	38.42	x	0.63	x	0.7	=	112.13	(76)
East	0.9x	1	x	9.55	x	63.27	x	0.63	x	0.7	=	184.67	(76)
East	0.9x	1	x	9.55	x	92.28	x	0.63	x	0.7	=	269.33	(76)
East	0.9x	1	x	9.55	x	113.09	x	0.63	x	0.7	=	330.07	(76)
East	0.9x	1	x	9.55	x	115.77	x	0.63	x	0.7	=	337.89	(76)
East	0.9x	1	x	9.55	x	110.22	x	0.63	x	0.7	=	321.68	(76)
East	0.9x	1	x	9.55	x	94.68	x	0.63	x	0.7	=	276.32	(76)
East	0.9x	1	x	9.55	x	73.59	x	0.63	x	0.7	=	214.78	(76)
East	0.9x	1	x	9.55	x	45.59	x	0.63	x	0.7	=	133.06	(76)
East	0.9x	1	x	9.55	x	24.49	x	0.63	x	0.7	=	71.47	(76)
East	0.9x	1	x	9.55	x	16.15	x	0.63	x	0.7	=	47.14	(76)
South	0.9x	0.77	x	19.72	x	46.75	x	0.63	x	0.7	=	281.76	(78)
South	0.9x	0.77	x	19.72	x	76.57	x	0.63	x	0.7	=	461.45	(78)
South	0.9x	0.77	x	19.72	x	97.53	x	0.63	x	0.7	=	587.81	(78)
South	0.9x	0.77	x	19.72	x	110.23	x	0.63	x	0.7	=	664.35	(78)
South	0.9x	0.77	x	19.72	x	114.87	x	0.63	x	0.7	=	692.29	(78)
South	0.9x	0.77	x	19.72	x	110.55	x	0.63	x	0.7	=	666.24	(78)
South	0.9x	0.77	x	19.72	x	108.01	x	0.63	x	0.7	=	650.95	(78)
South	0.9x	0.77	x	19.72	x	104.89	x	0.63	x	0.7	=	632.17	(78)
South	0.9x	0.77	x	19.72	x	101.89	x	0.63	x	0.7	=	614.03	(78)
South	0.9x	0.77	x	19.72	x	82.59	x	0.63	x	0.7	=	497.72	(78)
South	0.9x	0.77	x	19.72	x	55.42	x	0.63	x	0.7	=	333.98	(78)
South	0.9x	0.77	x	19.72	x	40.4	x	0.63	x	0.7	=	243.47	(78)
West	0.9x	0.77	x	11.49	x	19.64	x	0.63	x	0.7	=	68.97	(80)
West	0.9x	0.77	x	11.49	x	38.42	x	0.63	x	0.7	=	134.91	(80)
West	0.9x	0.77	x	11.49	x	63.27	x	0.63	x	0.7	=	222.18	(80)
West	0.9x	0.77	x	11.49	x	92.28	x	0.63	x	0.7	=	324.04	(80)
West	0.9x	0.77	x	11.49	x	113.09	x	0.63	x	0.7	=	397.12	(80)
West	0.9x	0.77	x	11.49	x	115.77	x	0.63	x	0.7	=	406.53	(80)
West	0.9x	0.77	x	11.49	x	110.22	x	0.63	x	0.7	=	387.03	(80)
West	0.9x	0.77	x	11.49	x	94.68	x	0.63	x	0.7	=	332.45	(80)
West	0.9x	0.77	x	11.49	x	73.59	x	0.63	x	0.7	=	258.41	(80)
West	0.9x	0.77	x	11.49	x	45.59	x	0.63	x	0.7	=	160.09	(80)
West	0.9x	0.77	x	11.49	x	24.49	x	0.63	x	0.7	=	85.99	(80)
West	0.9x	0.77	x	11.49	x	16.15	x	0.63	x	0.7	=	56.71	(80)

Rooflights 0.9x	1	x	0.89	x	32.08	x	0.63	x	0.7	=	11.33	(82)
Rooflights 0.9x	1	x	0.89	x	63.31	x	0.63	x	0.7	=	22.36	(82)
Rooflights 0.9x	1	x	0.89	x	106.14	x	0.63	x	0.7	=	37.49	(82)
Rooflights 0.9x	1	x	0.89	x	158.54	x	0.63	x	0.7	=	56	(82)
Rooflights 0.9x	1	x	0.89	x	198.12	x	0.63	x	0.7	=	69.98	(82)
Rooflights 0.9x	1	x	0.89	x	204.62	x	0.63	x	0.7	=	72.28	(82)
Rooflights 0.9x	1	x	0.89	x	194.06	x	0.63	x	0.7	=	68.55	(82)
Rooflights 0.9x	1	x	0.89	x	164.05	x	0.63	x	0.7	=	57.95	(82)
Rooflights 0.9x	1	x	0.89	x	124.6	x	0.63	x	0.7	=	44.01	(82)
Rooflights 0.9x	1	x	0.89	x	75.57	x	0.63	x	0.7	=	26.69	(82)
Rooflights 0.9x	1	x	0.89	x	40.09	x	0.63	x	0.7	=	14.16	(82)
Rooflights 0.9x	1	x	0.89	x	26.33	x	0.63	x	0.7	=	9.3	(82)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	419.38	730.86	1032.15	1313.72	1489.47	1482.93	1428.22	1298.89	1131.23	817.55	505.61	356.62	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	1059.24	1365.95	1642.65	1885.86	2022.03	1980.15	1904.82	1784.43	1638.88	1363.8	1094.82	978.63	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.98	0.95	0.88	0.74	0.58	0.41	0.3	0.33	0.53	0.82	0.96	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	19.94	20.25	20.57	20.84	20.96	20.99	21	21	20.98	20.79	20.31	19.88	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	19.84	19.85	19.85	19.86	19.86	19.87	19.87	19.88	19.87	19.86	19.86	19.85	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.98	0.94	0.85	0.7	0.51	0.34	0.22	0.25	0.45	0.77	0.95	0.98	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	18.92	19.21	19.52	19.75	19.84	19.87	19.87	19.88	19.86	19.72	19.29	18.87	(90)

fLA = Living area ÷ (4) = 0.4 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.33	19.63	19.94	20.18	20.28	20.32	20.32	20.32	20.3	20.14	19.69	19.27	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.18	19.48	19.79	20.03	20.13	20.17	20.17	20.17	20.15	19.99	19.54	19.12	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

Utilisation factor for gains, hm:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(94)m=	0.97	0.93	0.85	0.7	0.53	0.36	0.24	0.27	0.47	0.78	0.94	0.98	(94)

Useful gains, hmGm , W = (94)m x (84)m

(95)m=	1030.2	1271.09	1393.72	1326.89	1071.03	714.71	460.59	484.99	771.99	1059.42	1031.36	958.54	(95)

Monthly average external temperature from Table 8

(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)

Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]

(97)m=	1982.34	1937.46	1761.74	1458.36	1102.07	718.69	461.04	485.78	785.42	1227.58	1634.03	1969.09	(97)

Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m

(98)m=	708.39	447.8	273.81	94.66	23.09	0	0	0	0	125.11	433.92	751.85

Total per year (kWh/year) = $Sum(98)_{1...5,9...12}$ = 2858.64 (98)

Space heating requirement in kWh/m²/year 27.83 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		92.9	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year	
Space heating requirement (calculated above)	708.39	447.8	273.81	94.66	23.09	0	0	0	0	125.11	433.92	751.85		
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206)	762.53	482.02	294.73	101.9	24.86	0	0	0	0	134.67	467.08	809.31		(211)
Total (kWh/year) = $Sum(211)_{1...5,10...12}$=													3077.12	(211)
Space heating fuel (secondary), kWh/month = {[(98)m x (201)] + (214) m } x 100 ÷ (208)														
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
Total (kWh/year) = $Sum(215)_{1...5,10...12}$=													0	(215)

Water heating

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year	
Output from water heater (calculated above)	134.27	125.17	138.78	130.68	131.17	116.57	110.22	123.38	123.9	133.95	129.68	127.83		
Efficiency of water heater													87.3	(216)
(217)m=	89.48	89.32	89.01	88.37	87.68	87.3	87.3	87.3	87.3	88.54	89.29	89.51		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m														
(219)m=	150.07	140.13	155.92	147.87	149.6	133.53	126.26	141.33	141.93	151.29	145.24	142.81		
Total = $Sum(219a)_{1...12}$ =													1725.98	(219)

Annual totals	kWh/year	kWh/year	
Space heating fuel used, main system 1		3077.12	
Water heating fuel used		1725.98	
Electricity for pumps, fans and electric keep-hot			
mechanical ventilation - balanced, extract or positive input from outside	195.16		(230a)
central heating pump:	30		(230c)
boiler with a fan-assisted flue	45		(230e)

Total electricity for the above, kWh/year	sum of (230a)…(230g) =	270.16	(231)
Electricity for lighting		410.35	(232)
Electricity generated by PVs		-760.49	(233)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year	**Fuel Price** (Table 12)		**Fuel Cost** £/year	
Space heating - main system 1	(211) x	3.48	x 0.01 =	107.083675119187	(240)
Space heating - main system 2	(213) x	0	x 0.01 =	0	(241)
Space heating - secondary	(215) x	13.19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)	3.48	x 0.01 =	60.06	(247)
Pumps, fans and electric keep-hot	(231)	13.19	x 0.01 =	35.63	(249)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a					
Energy for lighting	(232)	13.19	x 0.01 =	54.13	(250)
Additional standing charges (Table 12)				120	(251)
	one of (233) to (235) x)	13.19	x 0.01 =	0	(252)
Appendix Q items: repeat lines (253) and (254) as needed					
Total energy cost	(245)...(247) + (250)…(254) =			376.91	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.07	(257)
SAP rating (Section 12)		85.05	(258)

12a. CO_2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	664.66	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	372.81	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1037.47	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	140.21	(267)
Electricity for lighting	(232) x	0.519	=	212.97	(268)
Energy saving/generation technologies					
Item 1		0.519	=	-394.7	(269)
Total CO2, kg/year		sum of (265)…(271) =		995.96	(272)
CO2 emissions per m²		(272) ÷ (4) =		9.7	(273)
EI rating (section 14)				91	(274)

13a. Primary Energy

SAP WorkSheet: New dwelling design stage

	Energy kWh/year	Primary factor		P. Energy kWh/year	
Space heating (main system 1)	(211) x	1.22	=	3754.08	(261)
Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	1.22	=	2105.69	(264)
Space and water heating	(261) + (262) + (263) + (264) =			5859.77	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	829.38	(267)
Electricity for lighting	(232) x	0	=	1259.78	(268)
Energy saving/generation technologies					
Item 1		3.07	=	-2334.71	(269)
‘Total Primary Energy		sum of (265)…(271) =		5614.22	(272)
Primary energy kWh/m²/year		(272) ÷ (4) =		54.66	(273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 November 2014

Property Details: unit 203

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	2
Front of dwelling faces:	North
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	
Ventilation rate during hot weather (ach):	4 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	402.2	**(P1)**
Transmission heat loss coefficient:	105.5	
Summer heat loss coefficient:	507.71	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
West (West Windows)	0	1
South (south window)	0	1
East (East window)	0	1
South (South roof light)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
West (West Windows)	1	0.9	1	0.9	**(P8)**
South (south window)	1	0.9	1	0.9	**(P8)**
East (East window)	1	0.9	1	0.9	**(P8)**
South (South roof light)	0.6	1	1	0.6	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
West (West Windows)	0.9 x	11.49	117.51	0.63	0.7	0.9	482.29	
South (south window)	0.9 x	19.72	112.21	0.63	0.7	0.9	790.4	
East (East window)	0.9 x	9.55	117.51	0.63	0.7	0.9	400.86	
	1 x	0.89	207.69	0.63	0.7	0.6	44.02	
						Total	1717.57	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	494.21	473.6	482.54	
Total summer gains	2297.91	2191.17	2077.46	**(P5)**
Summer gain/loss ratio	4.53	4.32	4.09	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	20.78	22.47	22.14	**(P7)**
Likelihood of high internal temperature	**Slight**	**Medium**	**Medium**	

SAP 2012 Overheating Assessment

Assessment of likelihood of high internal temperature: Medium

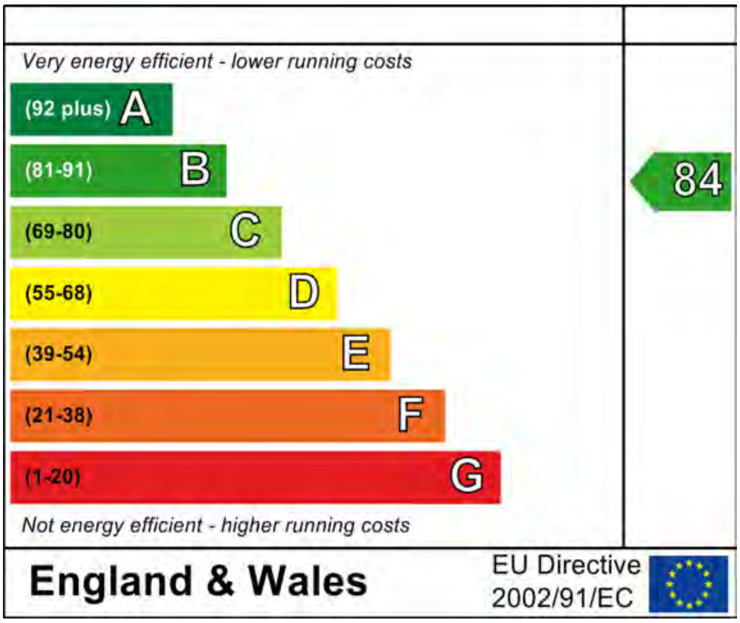
Predicted Energy Assessment

Dwelling type:	Ground floor Flat
Date of assessment:	28 October 2014
Produced by:	Aymon Winter
Total floor area:	63.6599998474121 m²

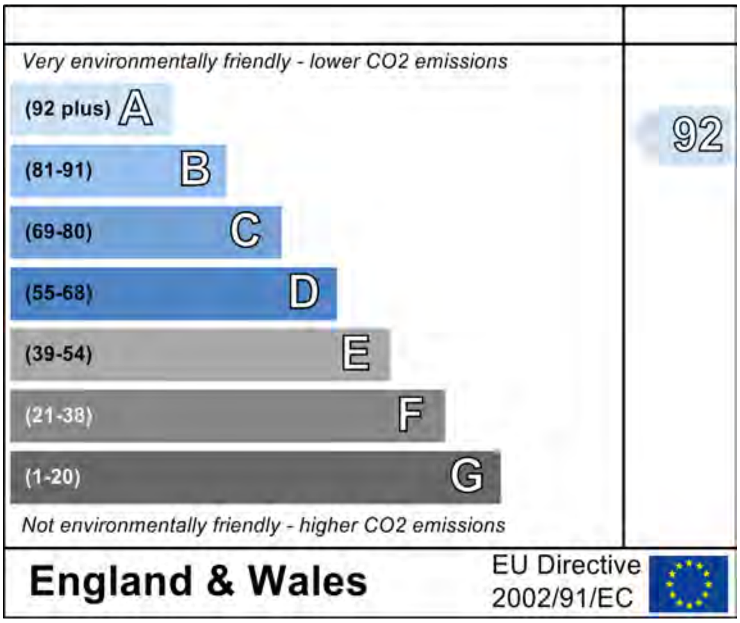
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about 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 (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) 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.

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.14
Printed on 28 November 2014 at 09:40:24

Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 63.66m²

Site Reference : Development at Riverpark Gardens **Plot Reference:** Unit G 01

Address :

Client Details:

Name: Jamie

Address : Campbell, 43 Tanner Street, Greater London, London, SE13PL

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

1a TER and DER

Fuel for main heating system: Mains gas		
Fuel factor: 1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	21.42 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	12.37 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	63.04 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	49.79 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.34 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system:	Database: (rev 367, product index 016684): Boiler systems with radiators or underfloor heating - mains gas Brand name: Baxi Model: Neta-tec Combi Model qualifier: 24 GA (Combi) Efficiency 89.0 % SEDBUK2009 Minimum 88.0 %	OK
Secondary heating system:	None	

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Nominal cylinder loss: 0.00 kWh/day Permitted by DBSCG: 2.10 kWh/day	
Primary pipework insulated:	Yes	**OK**

6 Controls

Space heating controls	Programmer, room thermostat and TRVs	**OK**
Hot water controls:	Cylinderstat	**OK**
	Independent timer for DHW	**OK**
Boiler interlock:	Yes	**OK**

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.42	
Maximum	1.5	**OK**
MVHR efficiency:	91%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: West	6m²,
Windows facing: West	7.56m²,
Ventilation rate:	3.00
Blinds/curtains:	Closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Doors U-value	1 W/m²K
Floors U-value	0.11 W/m²K
Photovoltaic array	

SAP Input

Property Details: Unit G 01

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	28 October 2014
Date of certificate:	28 November 2014
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/day:	True
PCDF Version:	367

Property description:

Dwelling type:	Flat	
Detachment:		
Year Completed:	2014	
Floor Location:	Floor area:	Storey height:
Floor 0	63.66 m²	2.7 m
Living area:	25.86 m² (fraction 0.406)	
Front of dwelling faces:	South	

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Main door	Manufacturer	Solid			PVC-U
West windows	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
East windows	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Main door	mm	0.7	0	1	2.27	1
West windows	16mm or more	0.7	0.63	1.4	6.0021	1
East windows	16mm or more	0.7	0.63	1.4	7.56	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Main door		wall to lobby	South	0	0
West windows		Ground floor External wall	West	0	0
East windows		Ground floor External wall	West	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Wall to Corridor	19.66	0	19.66	0.18	0.43	False	N/A
External Wall	66.49	0	66.49	0.15	0	False	N/A
Ground floor	63.66			0.11			N/A
Internal Elements							
Party Elements							
party ceiling	62.95						N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.055

Length	**Psi-value**		
7.12	0.401	E1	Steel lintel with perforated steel base plate

SAP Input

22.23	0.021	E4	Jamb
31.9	0.164	E5	Ground floor (normal)
31.9	0.001	E7	Party floor between dwellings (in blocks of flats)
10.8	0.048	E16	Corner (normal)

Ventilation:

Pressure test: Yes (As designed)
Ventilation: Balanced with heat recovery
Number of wet rooms: Kitchen + 1
Ductwork: Insulation, rigid
Approved Installation Scheme: True
Number of chimneys: 0
Number of open flues: 0
Number of fans: 0
Number of passive stacks: 0
Number of sides sheltered: 2
Pressure test: 3

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
Gas boilers and oil boilers
Fuel: mains gas
Info Source: Boiler Database
Database: (rev 367, product index 016684) Efficiency: Winter 87.3 % Summer: 89.9
Brand name: Baxi
Model: Neta-tec Combi
Model qualifier: 24 GA
(Combi boiler)
Systems with radiators
Central heating pump : 2013 or later
Design flow temperature: Design flow temperature >45°C
Room-sealed
Boiler interlock: Yes
Delayed start

Main heating Control:

Main heating Control: Programmer, room thermostat and TRVs
Control code: 2106

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From main heating system
Water code: 901
Fuel :mains gas
Hot water cylinder
Cylinder volume: 180 litres
Cylinder insulation: Factory 75 mm
Primary pipework insulation: True
Cylinderstat: True
Cylinder in heated space: True
Flue Gas Heat Recovery System:
Database (rev 367, product index 060001)
Brand name: Zenex
Model: GasSaver
Model qualifier: GS-1
Solar panel: False

Others:

Electricity tariff: Standard Tariff
In Smoke Control Area: Unknown

SAP Input

Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 0.6 Tilt of collector: Horizontal Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name: Aymon Winter
Stroma Number: STRO014511
Software Name: Stroma FSAP 2012
Software Version: Version: 1.0.1.14

Property Address: Unit G 01

Address :

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	63.66	(1a) x	2.7	(2a) =	171.88	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	63.66	(4)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	171.88	(5)

2. Ventilation rate:

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

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)

if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35

If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.15	(18)

Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used

Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.85	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.13	(21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly average wind speed from Table 7												
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 77.35 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.28	0.27	0.27	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.26	0.26	(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)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.27	x	1	=	2.27			(26)
Windows Type 1			6.0021	x1/[1/(1.4)+ 0.04]		=	7.96			(27)
Windows Type 2			7.56	x1/[1/(1.4)+ 0.04]		=	10.02			(27)
Floor			63.66	x	0.11	=	7.0026			(28)
Walls Type1	19.66	0	19.66	x	0.17	=	3.28			(29)
Walls Type2	66.49	0	66.49	x	0.15	=	9.97			(29)
Total area of elements, m²			165.64							(31)
Party ceiling			62.95							(32b)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 40.51 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 18012.7 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 9.1 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss (33) + (36) = 49.61 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m=	15.64	15.46	15.28	14.38	14.2	13.29	13.29	13.11	13.66	14.2	14.56	14.92	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	65.26	65.08	64.9	63.99	63.81	62.91	62.91	62.73	63.27	63.81	64.17	64.54	

Average = Sum(39)$_{1…12}$ /12= 63.95 (39)

SAP WorkSheet: New dwelling design stage

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	1.03	1.02	1.02	1.01	1	0.99	0.99	0.99	0.99	1	1.01	1.01

Average = Sum(40)1…12 /12= 1 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 2.08 (42)
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)
if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 83.67 (43)

Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)													
(44)m=	92.04	88.69	85.34	82	78.65	75.3	75.3	78.65	82	85.34	88.69	92.04	
										Total = Sum(44)1…12 =		1004.06	(44)
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)													
(45)m=	136.49	119.38	123.18	107.4	103.05	88.92	82.4	94.56	95.68	111.51	121.72	132.18	
										Total = Sum(45)1…12 =		1316.48	(45)
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)													
(46)m=	20.47	17.91	18.48	16.11	15.46	13.34	12.36	14.18	14.35	16.73	18.26	19.83	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 180 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 0 (50)

b) If manufacturer's declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

Primary circuit loss (annual) from Table 3 0 (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.95	19.82	21.95	21.24	21.95	21.24	21.95	21.95	21.24	21.95	21.24	21.95	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	158.44	139.2	145.13	128.63	124.99	110.16	104.35	116.5	116.92	133.46	142.96	154.13	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	31.65	26.07	22.37	14.37	11.22	9.11	8.45	9.67	9.78	15.78	25.23	31.8	(63) (G2)

Output from water heater

(64)m=	126.78	113.13	122.76	114.26	113.77	101.05	95.9	106.83	107.14	117.68	117.73	122.33	

Output from water heater (annual)$_{1...12}$ 1359.37 (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	50.87	44.65	46.45	41.02	39.75	34.88	32.88	36.93	37.12	42.56	45.78	49.44	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	124.98	124.98	124.98	124.98	124.98	124.98	124.98	124.98	124.98	124.98	124.98	124.98	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

(67)m=	40.65	36.11	29.37	22.23	16.62	14.03	15.16	19.71	26.45	33.58	39.2	41.78	(67)

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

(68)m=	271.75	274.57	267.47	252.34	233.24	215.29	203.3	200.48	207.59	222.72	241.81	259.76	(68)

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

(69)m=	49.58	49.58	49.58	49.58	49.58	49.58	49.58	49.58	49.58	49.58	49.58	49.58	(69)

Pumps and fans gains (Table 5a)

(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)

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

(71)m=	-83.32	-83.32	-83.32	-83.32	-83.32	-83.32	-83.32	-83.32	-83.32	-83.32	-83.32	-83.32	(71)

Water heating gains (Table 5)

(72)m=	68.37	66.44	62.43	56.97	53.43	48.44	44.2	49.63	51.56	57.21	63.59	66.45	(72)

Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m=	475.02	471.36	453.5	425.78	397.53	372	356.9	364.06	379.84	407.75	438.84	462.24	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
West	0.9x	0.77	x	6	x	19.64	x	0.63	x	0.7	=	36.03	(80)
West	0.9x	0.77	x	7.56	x	19.64	x	0.63	x	0.7	=	45.38	(80)
West	0.9x	0.77	x	6	x	38.42	x	0.63	x	0.7	=	70.48	(80)
West	0.9x	0.77	x	7.56	x	38.42	x	0.63	x	0.7	=	88.77	(80)

West	0.9x	0.77	x	6	x	63.27	x	0.63	x	0.7	=	116.06	(80)
West	0.9x	0.77	x	7.56	x	63.27	x	0.63	x	0.7	=	146.19	(80)
West	0.9x	0.77	x	6	x	92.28	x	0.63	x	0.7	=	169.27	(80)
West	0.9x	0.77	x	7.56	x	92.28	x	0.63	x	0.7	=	213.21	(80)
West	0.9x	0.77	x	6	x	113.09	x	0.63	x	0.7	=	207.45	(80)
West	0.9x	0.77	x	7.56	x	113.09	x	0.63	x	0.7	=	261.29	(80)
West	0.9x	0.77	x	6	x	115.77	x	0.63	x	0.7	=	212.36	(80)
West	0.9x	0.77	x	7.56	x	115.77	x	0.63	x	0.7	=	267.48	(80)
West	0.9x	0.77	x	6	x	110.22	x	0.63	x	0.7	=	202.18	(80)
West	0.9x	0.77	x	7.56	x	110.22	x	0.63	x	0.7	=	254.65	(80)
West	0.9x	0.77	x	6	x	94.68	x	0.63	x	0.7	=	173.67	(80)
West	0.9x	0.77	x	7.56	x	94.68	x	0.63	x	0.7	=	218.74	(80)
West	0.9x	0.77	x	6	x	73.59	x	0.63	x	0.7	=	134.99	(80)
West	0.9x	0.77	x	7.56	x	73.59	x	0.63	x	0.7	=	170.02	(80)
West	0.9x	0.77	x	6	x	45.59	x	0.63	x	0.7	=	83.63	(80)
West	0.9x	0.77	x	7.56	x	45.59	x	0.63	x	0.7	=	105.33	(80)
West	0.9x	0.77	x	6	x	24.49	x	0.63	x	0.7	=	44.92	(80)
West	0.9x	0.77	x	7.56	x	24.49	x	0.63	x	0.7	=	56.58	(80)
West	0.9x	0.77	x	6	x	16.15	x	0.63	x	0.7	=	29.63	(80)
West	0.9x	0.77	x	7.56	x	16.15	x	0.63	x	0.7	=	37.32	(80)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	81.4	159.24	262.25	382.48	468.74	479.84	456.83	392.41	305.01	188.96	101.5	66.94	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	556.42	630.61	715.75	808.26	866.27	851.84	813.73	756.47	684.85	596.71	540.34	529.18	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.99	0.98	0.94	0.83	0.66	0.47	0.34	0.38	0.62	0.89	0.98	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.18	20.35	20.59	20.84	20.96	21	21	21	20.98	20.8	20.45	20.15	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.06	20.06	20.07	20.08	20.08	20.09	20.09	20.1	20.09	20.08	20.08	20.07	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.98	0.97	0.92	0.79	0.6	0.4	0.27	0.31	0.54	0.85	0.97	0.99	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.34	19.5	19.73	19.97	20.06	20.09	20.09	20.1	20.08	19.94	19.61	19.31	(90)

fLA = Living area ÷ (4) = 0.41 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.68	19.84	20.08	20.32	20.43	20.46	20.46	20.46	20.45	20.29	19.95	19.65	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.53	19.69	19.93	20.17	20.28	20.31	20.31	20.31	20.3	20.14	19.8	19.5	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.98	0.96	0.92	0.8	0.61	0.42	0.29	0.32	0.56	0.86	0.96	0.99	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	546.21	608.21	656.45	643.74	531.27	357.58	233.33	245.14	384.66	511.47	520.74	521.43	(95)
Monthly average external temperature from Table 8													
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	993.95	962.6	871.63	721.33	547.31	359.12	233.47	245.41	391.97	608.61	814.89	987.66	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	333.12	238.15	160.09	55.86	11.93	0	0	0	0	72.27	211.79	346.87	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 1430.08 (98)

Space heating requirement in kWh/m²/year 22.46 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		92.9	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	333.12	238.15	160.09	55.86	11.93	0	0	0	0	72.27	211.79	346.87	
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206)													(211)
	358.58	256.35	172.33	60.13	12.84	0	0	0	0	77.79	227.97	373.38	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 1539.38 (211)

Space heating fuel (secondary), kWh/month
= {[(98)m x (201)] + (214) m } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)													
	126.78	113.13	122.76	114.26	113.77	101.05	95.9	106.83	107.14	117.68	117.73	122.33	
Efficiency of water heater												87.3	(216)
(217)m=	89.17	89.05	88.75	88.14	87.54	87.3	87.3	87.3	87.3	88.27	88.95	89.21	(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m													
(219)m=	142.19	127.04	138.32	129.64	129.96	115.75	109.85	122.37	122.73	133.31	132.35	137.13	

Total = Sum(219a)$_{1...12}$ = 1540.66 (219)

Annual totals	**kWh/year**	**kWh/year**
Space heating fuel used, main system 1		1539.38

SAP WorkSheet: New dwelling design stage

Water heating fuel used			1540.66	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		110.09		(230a)
central heating pump:		30		(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		185.09	(231)
Electricity for lighting			287.18	(232)
Electricity generated by PVs			-456.3	(233)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year	**Fuel Price** (Table 12)		**Fuel Cost** £/year	
Space heating - main system 1	(211) x	3.48	x 0.01 =	53.5704254929559	(240)
Space heating - main system 2	(213) x	0	x 0.01 =	0	(241)
Space heating - secondary	(215) x	13.19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)	3.48	x 0.01 =	53.61	(247)
Pumps, fans and electric keep-hot	(231)	13.19	x 0.01 =	24.41	(249)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a					
Energy for lighting	(232)	13.19	x 0.01 =	37.88	(250)
Additional standing charges (Table 12)				120	(251)
	one of (233) to (235) x)	13.19	x 0.01 =	0	(252)
Appendix Q items: repeat lines (253) and (254) as needed					
Total energy cost	(245)...(247) + (250)…(254) =			289.48	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.12	(257)
SAP rating (Section 12)		84.39	(258)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	332.51	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	332.78	(264)
Space and water heating	(261) + (262) + (263) + (264) =			665.29	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	96.06	(267)
Electricity for lighting	(232) x	0.519	=	149.05	(268)
Energy saving/generation technologies					

SAP WorkSheet: New dwelling design stage

Item 1		0.519	=	-236.82	(269)
Total CO2, kg/year	sum of (265)…(271) =			673.58	(272)
CO2 emissions per m²	(272) ÷ (4) =			10.58	(273)
EI rating (section 14)				92	(274)

13a. Primary Energy

	Energy kWh/year	**Primary** factor		**P. Energy** kWh/year	
Space heating (main system 1)	(211) x	1.22	=	1878.04	(261)
Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	1.22	=	1879.6	(264)
Space and water heating	(261) + (262) + (263) + (264) =			3757.65	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	568.23	(267)
Electricity for lighting	(232) x	0	=	881.65	(268)
Energy saving/generation technologies					
Item 1		3.07	=	-1400.83	(269)
'Total Primary Energy	sum of (265)…(271) =			3806.7	(272)
Primary energy kWh/m²/year	(272) ÷ (4) =			59.8	(273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 November 2014

Property Details: Unit G 01

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	South
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	
Ventilation rate during hot weather (ach):	3 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	170.16	**(P1)**
Transmission heat loss coefficient:	49.6	
Summer heat loss coefficient:	219.78	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
West (West windows)	0	1
West (East windows)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
West (West windows)	1	0.9	1	0.9	**(P8)**
West (East windows)	1	0.9	1	0.9	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
West (West windows)	0.9 x	6	117.51	0.63	0.7	0.9	251.94	
West (East windows)	0.9 x	7.56	117.51	0.63	0.7	0.9	317.33	
						Total	569.27	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	369	353.9	361.06	
Total summer gains	973.29	923.17	861.88	**(P5)**
Summer gain/loss ratio	4.43	4.2	3.92	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	20.68	22.35	21.97	**(P7)**
Likelihood of high internal temperature	**Slight**	**Medium**	**Slight**	

Assessment of likelihood of high internal temperature: Medium

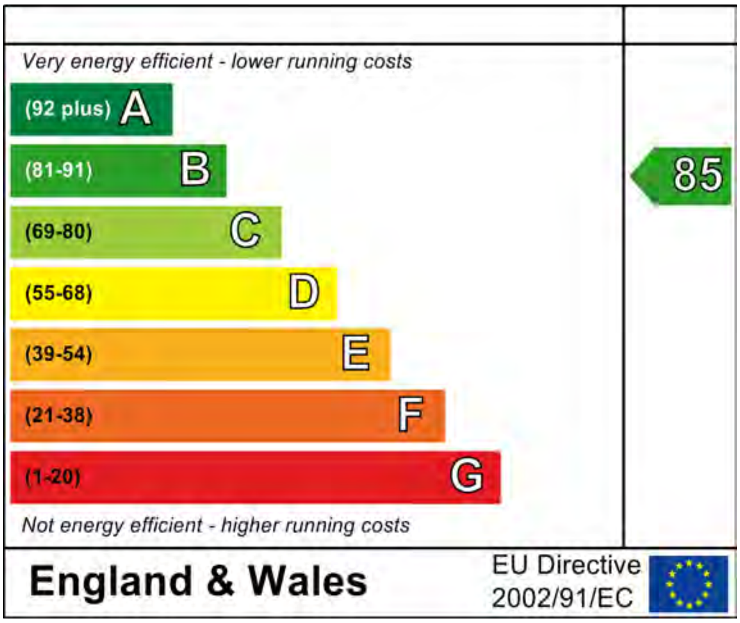
Predicted Energy Assessment

Dwelling type:	Ground floor Flat
Date of assessment:	28 October 2014
Produced by:	Aymon Winter
Total floor area:	67.870002746582 m²

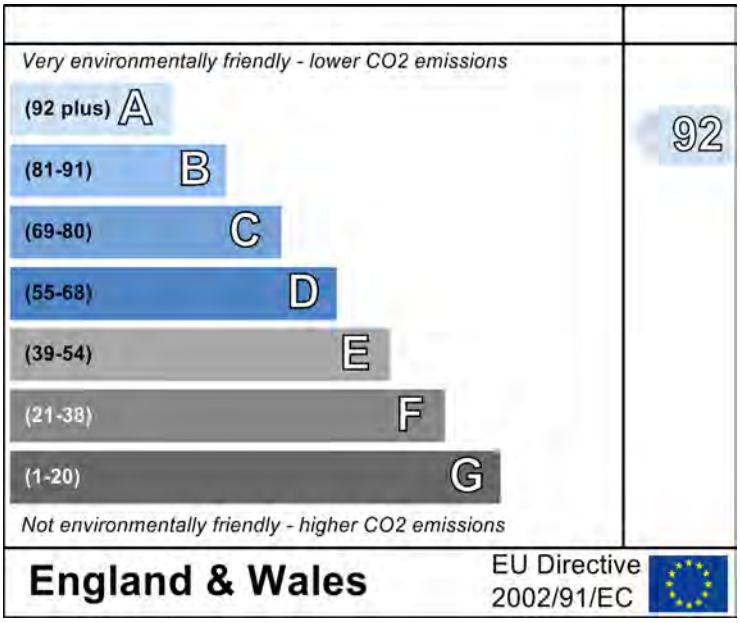
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about 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 (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) 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.

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.14
Printed on 28 November 2014 at 09:40:17

Project Information:

Assessed By: Aymon Winter (STRO014511) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 67.87m²

Site Reference : Development at Riverpark Gardens **Plot Reference:** Unit G 02

Address :

Client Details:

Name: Jamie

Address : Campbell, 43 Tanner Street, Greater London, London, SE13PL

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

1a TER and DER

Fuel for main heating system: Mains gas
Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)	20.34 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.15 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	58.84 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	47.36 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.35 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system:	Database: (rev 367, product index 016684): Boiler systems with radiators or underfloor heating - mains gas Brand name: Baxi Model: Neta-tec Combi Model qualifier: 24 GA (Combi) Efficiency 89.0 % SEDBUK2009 Minimum 88.0 %	OK
Secondary heating system:	None	

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Nominal cylinder loss: 0.00 kWh/day		
	Permitted by DBSCG: 2.10 kWh/day		
Primary pipework insulated:	Yes		**OK**

6 Controls

Space heating controls	Programmer, room thermostat and TRVs		**OK**
Hot water controls:	Cylinderstat		**OK**
	Independent timer for DHW		**OK**
Boiler interlock:	Yes		**OK**

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.42	
Maximum	1.5	**OK**
MVHR efficiency:	91%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South	1.98m²,
Windows facing: East	13.42m²,
Ventilation rate:	3.00
Blinds/curtains:	Light-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Doors U-value	1 W/m²K
Floors U-value	0.11 W/m²K
Photovoltaic array	

SAP Input

Property Details: Unit G 02

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	28 October 2014
Date of certificate:	28 November 2014
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Water use <= 125 litres/person/day:	True
PCDF Version:	367

Property description:

Dwelling type:	Flat	
Detachment:		
Year Completed:	2014	
Floor Location:	Floor area:	Storey height:
Floor 0	67.87 m²	2.7 m
Living area:	28.45 m² (fraction 0.419)	
Front of dwelling faces:	West	

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
main door	Manufacturer	Solid			PVC-U
south window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
East Window	SAP 2012	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
main door	mm	0.7	0	1	2.44	1
south window	16mm or more	0.7	0.63	1.4	1.98	1
East Window	16mm or more	0.7	0.63	1.4	13.42	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
main door		sheltered wall	West	0	0
south window		external wall	South	0	0
East Window		external wall	East	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
external wall	50.52	15.4	35.12	0.15	0	False	N/A
sheltered to storage	18.66	0	18.66	0.15	0.54	False	N/A
wall to corridor	23.3	0	23.3	0.18	0.43	False	N/A
ground floor	67.87			0.11			N/A
Internal Elements							
internal walls	64.21						N/A
Party Elements							
Party ceiling	67.87						N/A

Thermal bridges:

SAP Input

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0607

Length	Psi-value		
8.1	0.401	E1	Steel lintel with perforated steel base plate
22.04	0.021	E4	Jamb
34.25	0.164	E5	Ground floor (normal)
34.25	0.001	E7	Party floor between dwellings (in blocks of flats)
10.8	0.048	E16	Corner (normal)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	3
Pressure test:	3

Main heating system:

Main heating system:	Boiler systems with radiators or underfloor heating Gas boilers and oil boilers Fuel: mains gas Info Source: Boiler Database Database: (rev 367, product index 016684) Efficiency: Winter 87.3 % Summer: 89.9 Brand name: Baxi Model: Neta-tec Combi Model qualifier: 24 GA (Combi boiler) Systems with radiators Central heating pump : 2013 or later Design flow temperature: Design flow temperature >45°C Room-sealed Boiler interlock: Yes Delayed start

Main heating Control:

Main heating Control:	Programmer, room thermostat and TRVs Control code: 2106

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :mains gas Hot water cylinder Cylinder volume: 180 litres Cylinder insulation: Factory 75 mm Primary pipework insulation: True Cylinderstat: True Cylinder in heated space: True Flue Gas Heat Recovery System: Database (rev 367, product index 060001) Brand name: Zenex Model: GasSaver Model qualifier: GS-1

SAP Input

	Solar panel: False
Others:	
Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 0.7 Tilt of collector: Horizontal Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name:	Aymon Winter	**Stroma Number:**	STRO014511
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.1.14

Property Address: Unit G 02

Address :

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	67.87	(1a) x	2.7	(2a) =	183.25	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	67.87	(4)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =	183.25	(5)

2. Ventilation rate:

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

Air changes per hour

Infiltration due to chimneys, flues and fans =	(6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		3	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.15	(18)

Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used

Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.78	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.12	(21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly average wind speed from Table 7												
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18

SAP WorkSheet: New dwelling design stage

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 77.35 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0.26	0.26	0.26	0.24	0.24	0.22	0.22	0.22	0.23	0.24	0.24	0.25	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24c)

d) If natural ventilation or whole house positive input ventilation from loft
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.26	0.26	0.26	0.24	0.24	0.22	0.22	0.22	0.23	0.24	0.24	0.25	(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)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.44	x	1	=	2.44			(26)
Windows Type 1			1.98	x1/[1/(1.4)+ 0.04]		=	2.62			(27)
Windows Type 2			13.42	x1/[1/(1.4)+ 0.04]		=	17.79			(27)
Floor			67.87	x	0.11	=	7.4657			(28)
Walls Type1	50.52	15.4	35.12	x	0.15	=	5.27			(29)
Walls Type2	18.66	0	18.66	x	0.14	=	2.59			(29)
Walls Type3	23.3	0	23.3	x	0.17	=	3.89			(29)
Total area of elements, m²			162.79							(31)
Party ceiling			67.87							(32b)
Internal wall **			64.21							(32c)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 42.07 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 19947.1 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 9.88 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss (33) + (36) = 51.95 (37)

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

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

(38)m=	15.81	15.64	15.46	14.58	14.41	13.53	13.53	13.35	13.88	14.41	14.76	15.11	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	67.76	67.59	67.41	66.53	66.36	65.48	65.48	65.3	65.83	66.36	66.71	67.06	

Average = Sum(39)$_{1\ldots12}$ /12= 66.49 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	1	1	0.99	0.98	0.98	0.96	0.96	0.96	0.97	0.98	0.98	0.99

Average = Sum(40)$_{1\ldots12}$ /12= 0.98 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 2.19 (42)
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)
if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 86.29 (43)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)												
(44)m=	94.92	91.47	88.02	84.57	81.11	77.66	77.66	81.11	84.57	88.02	91.47	94.92

Total = Sum(44)$_{1\ldots12}$ = 1035.5 (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	140.76	123.11	127.04	110.76	106.28	91.71	84.98	97.52	98.68	115	125.53	136.32

Total = Sum(45)$_{1\ldots12}$ = 1357.7 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	21.11	18.47	19.06	16.61	15.94	13.76	12.75	14.63	14.8	17.25	18.83	20.45	(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 180 (47)

If community heating and no tank in dwelling, enter 110 litres in (47)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter ‘0’ in (47)

Water storage loss:

a) If manufacturer’s declared loss factor is known (kWh/day): 0 (48)

Temperature factor from Table 2b 0 (49)

Energy lost from water storage, kWh/year (48) x (49) = 0 (50)

b) If manufacturer’s declared cylinder loss factor is not known:

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

If community heating see section 4.3

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54)

Enter (50) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

Primary circuit loss (annual) from Table 3 | 0 | (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.95	19.82	21.95	21.24	21.95	21.24	21.95	21.95	21.24	21.95	21.24	21.95	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	162.71	142.94	148.99	132	128.22	112.95	106.93	119.46	119.92	136.95	146.77	158.27	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	31.94	25.98	21.79	14.16	11.37	9.39	8.71	9.96	10.07	15.47	25.27	32.2	(63) (G2)

Output from water heater

(64)m=	130.77	116.96	127.2	117.84	116.85	103.56	98.21	109.51	109.85	121.47	121.5	126.07	

Output from water heater (annual)$_{1...12}$ | 1399.78 | (64)

Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	52.29	45.89	47.73	42.14	40.82	35.8	33.74	37.91	38.12	43.73	47.05	50.81	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m=	131.6	131.6	131.6	131.6	131.6	131.6	131.6	131.6	131.6	131.6	131.6	131.6	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m=	42.85	38.05	30.95	23.43	17.51	14.79	15.98	20.77	27.87	35.39	41.31	44.04	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m=	286.98	289.96	282.45	266.48	246.31	227.36	214.69	211.72	219.22	235.2	255.36	274.32	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m=	50.35	50.35	50.35	50.35	50.35	50.35	50.35	50.35	50.35	50.35	50.35	50.35	(69)
Pumps and fans gains (Table 5a)													
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	(70)
Losses e.g. evaporation (negative values) (Table 5)													
(71)m=	-87.73	-87.73	-87.73	-87.73	-87.73	-87.73	-87.73	-87.73	-87.73	-87.73	-87.73	-87.73	(71)
Water heating gains (Table 5)													
(72)m=	70.28	68.29	64.15	58.52	54.87	49.73	45.35	50.96	52.95	58.77	65.35	68.3	(72)
Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m													
(73)m=	497.33	493.52	474.77	445.65	415.91	389.09	373.24	380.66	397.26	426.58	459.24	483.87	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
East	0.9x	1	x	13.42	x	19.64	x	0.63	x	0.7	=	80.55	(76)

East	0.9x	1	x	13.42	x	38.42	x	0.63	x	0.7	=	157.58	(76)
East	0.9x	1	x	13.42	x	63.27	x	0.63	x	0.7	=	259.5	(76)
East	0.9x	1	x	13.42	x	92.28	x	0.63	x	0.7	=	378.47	(76)
East	0.9x	1	x	13.42	x	113.09	x	0.63	x	0.7	=	463.83	(76)
East	0.9x	1	x	13.42	x	115.77	x	0.63	x	0.7	=	474.81	(76)
East	0.9x	1	x	13.42	x	110.22	x	0.63	x	0.7	=	452.04	(76)
East	0.9x	1	x	13.42	x	94.68	x	0.63	x	0.7	=	388.3	(76)
East	0.9x	1	x	13.42	x	73.59	x	0.63	x	0.7	=	301.81	(76)
East	0.9x	1	x	13.42	x	45.59	x	0.63	x	0.7	=	186.98	(76)
East	0.9x	1	x	13.42	x	24.49	x	0.63	x	0.7	=	100.44	(76)
East	0.9x	1	x	13.42	x	16.15	x	0.63	x	0.7	=	66.24	(76)
South	0.9x	0.77	x	1.98	x	46.75	x	0.63	x	0.7	=	28.29	(78)
South	0.9x	0.77	x	1.98	x	76.57	x	0.63	x	0.7	=	46.33	(78)
South	0.9x	0.77	x	1.98	x	97.53	x	0.63	x	0.7	=	59.02	(78)
South	0.9x	0.77	x	1.98	x	110.23	x	0.63	x	0.7	=	66.7	(78)
South	0.9x	0.77	x	1.98	x	114.87	x	0.63	x	0.7	=	69.51	(78)
South	0.9x	0.77	x	1.98	x	110.55	x	0.63	x	0.7	=	66.89	(78)
South	0.9x	0.77	x	1.98	x	108.01	x	0.63	x	0.7	=	65.36	(78)
South	0.9x	0.77	x	1.98	x	104.89	x	0.63	x	0.7	=	63.47	(78)
South	0.9x	0.77	x	1.98	x	101.89	x	0.63	x	0.7	=	61.65	(78)
South	0.9x	0.77	x	1.98	x	82.59	x	0.63	x	0.7	=	49.97	(78)
South	0.9x	0.77	x	1.98	x	55.42	x	0.63	x	0.7	=	33.53	(78)
South	0.9x	0.77	x	1.98	x	40.4	x	0.63	x	0.7	=	24.45	(78)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	108.84	203.91	318.52	445.18	533.34	541.71	517.4	451.77	363.47	236.95	133.97	90.69	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	606.17	697.43	793.29	890.82	949.25	930.79	890.64	832.43	760.73	663.53	593.21	574.56	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) | 21 | (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.99	0.97	0.92	0.8	0.63	0.45	0.32	0.36	0.58	0.87	0.97	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	20.24	20.41	20.65	20.87	20.97	21	21	21	20.99	20.84	20.5	20.2	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.08	20.09	20.09	20.1	20.1	20.11	20.11	20.11	20.11	20.1	20.1	20.09	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.98	0.96	0.9	0.77	0.58	0.39	0.26	0.29	0.51	0.83	0.96	0.99	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	19.41	19.58	19.81	20.01	20.09	20.11	20.11	20.11	20.1	19.99	19.67	19.38	(90)

fLA = Living area ÷ (4) = | 0.42 | (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.76	19.93	20.16	20.37	20.46	20.48	20.48	20.49	20.47	20.34	20.02	19.73	(92)

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.61	19.78	20.01	20.22	20.31	20.33	20.33	20.34	20.32	20.19	19.87	19.58	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.98	0.96	0.9	0.77	0.59	0.4	0.27	0.31	0.53	0.83	0.96	0.98	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	593.62	667.79	715.43	687.43	558.41	374.21	244.43	256.81	404.26	552.93	568.19	565.22	(95)
Monthly average external temperature from Table 8													
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	1037.32	1005.65	910.73	753.33	571.18	375.37	244.53	257.01	409.65	636.58	851.83	1031.15	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	330.11	227.05	145.3	47.45	9.5	0	0	0	0	62.24	204.23	346.66	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 1372.53 (98)

Space heating requirement in kWh/m²/year 20.22 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		92.9	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	330.11	227.05	145.3	47.45	9.5	0	0	0	0	62.24	204.23	346.66	
(211)m = {[(98)m x (204)] + (210)m } x 100 ÷ (206)													(211)
	355.34	244.4	156.41	51.07	10.23	0	0	0	0	67	219.83	373.15	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 1477.43 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] + (214) m } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)

	130.77	116.96	127.2	117.84	116.85	103.56	98.21	109.51	109.85	121.47	121.5	126.07	
Efficiency of water heater												87.3	(216)
(217)m=	89.15	89	88.67	88.03	87.49	87.3	87.3	87.3	87.3	88.16	88.91	89.19	(217)

Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

(219)m=	146.69	131.41	143.46	133.86	133.56	118.62	112.5	125.44	125.83	137.78	136.65	141.34

Total = Sum(219a)$_{1...12}$ = 1587.15 (219)

SAP WorkSheet: New dwelling design stage

Annual totals		kWh/year	kWh/year	
Space heating fuel used, main system 1			1477.43	
Water heating fuel used			1587.15	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		117.37		(230a)
central heating pump:		30		(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		192.37	(231)
Electricity for lighting			302.66	(232)
Electricity generated by PVs			-532.34	(233)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year	**Fuel Price** (Table 12)		**Fuel Cost** £/year	
Space heating - main system 1	(211) x	3.48	x 0.01 =	51.4145595102571	(240)
Space heating - main system 2	(213) x	0	x 0.01 =	0	(241)
Space heating - secondary	(215) x	13.19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)	3.48	x 0.01 =	55.23	(247)
Pumps, fans and electric keep-hot	(231)	13.19	x 0.01 =	25.37	(249)

(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a

Energy for lighting	(232)	13.19	x 0.01 =	39.92	(250)
Additional standing charges (Table 12)				120	(251)
	one of (233) to (235) x)	13.19	x 0.01 =	0	(252)

Appendix Q items: repeat lines (253) and (254) as needed

Total energy cost	(245)...(247) + (250)…(254) =	291.94	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.42	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.09	(257)
SAP rating (Section 12)		84.85	(258)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year	**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	319.12	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	342.82	(264)
Space and water heating	(261) + (262) + (263) + (264) =			661.95	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	99.84	(267)

Electricity for lighting	(232) x	0.519	=	157.08	(268)
Energy saving/generation technologies					
Item 1		0.519	=	-276.29	(269)
Total CO2, kg/year		sum of (265)…(271) =		642.59	(272)
CO2 emissions per m²		(272) ÷ (4) =		9.47	(273)
EI rating (section 14)				92	(274)

13a. Primary Energy

	Energy kWh/year	**Primary** factor		**P. Energy** kWh/year	
Space heating (main system 1)	(211) x	1.22	=	1802.46	(261)
Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	1.22	=	1936.32	(264)
Space and water heating	(261) + (262) + (263) + (264) =			3738.79	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	590.58	(267)
Electricity for lighting	(232) x	0	=	929.18	(268)
Energy saving/generation technologies					
Item 1		3.07	=	-1634.3	(269)
'Total Primary Energy		sum of (265)…(271) =		3624.25	(272)
Primary energy kWh/m²/year		(272) ÷ (4) =		53.4	(273)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 November 2014

Property Details: Unit G 02

Dwelling type:	Flat
Located in:	England
Region:	Thames valley
Cross ventilation possible:	Yes
Number of storeys:	1
Front of dwelling faces:	West
Overshading:	Average or unknown
Overhangs:	None
Thermal mass parameter:	Indicative Value Medium
Night ventilation:	False
Blinds, curtains, shutters:	Light-coloured curtain or roller blind
Ventilation rate during hot weather (ach):	3 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient:	181.42	**(P1)**
Transmission heat loss coefficient:	52	
Summer heat loss coefficient:	233.37	**(P2)**

Overhangs:

Orientation:	**Ratio:**	**Z_overhangs:**
South (south window)	0	1
East (East Window)	0	1

Solar shading:

Orientation:	**Z blinds:**	**Solar access:**	**Overhangs:**	**Z summer:**	
South (south window)	0.6	0.9	1	0.54	**(P8)**
East (East Window)	0.6	0.9	1	0.54	**(P8)**

Solar gains:

Orientation		**Area**	**Flux**	**g_**	**FF**	**Shading**	**Gains**	
South (south window)	0.9 x	1.98	112.21	0.63	0.7	0.54	47.62	
East (East Window)	0.9 x	13.42	117.51	0.63	0.7	0.54	337.98	
						Total	385.6	**(P3/P4)**

Internal gains:

	June	**July**	**August**	
Internal gains	386.09	370.24	377.66	
Total summer gains	794.22	755.84	721.98	**(P5)**
Summer gain/loss ratio	3.4	3.24	3.09	**(P6)**
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	0.25	0.25	0.25	
Threshold temperature	19.65	21.39	21.14	**(P7)**
Likelihood of high internal temperature	**Not significant**	**Slight**	**Slight**	

Assessment of likelihood of high internal temperature: Slight