Energy Performance Certificate

HM Government

3 Crest Buildings, 37, Wharf Road, LONDON, N1 7GY

Dwelling type:	Ground-floor flat	**Reference number:**	8128-7730-6289-4020-8992
Date of assessment:	10 October 2018	**Type of assessment:**	SAP, new dwelling
Date of certificate:	11 October 2018	**Total floor area:**	51 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient

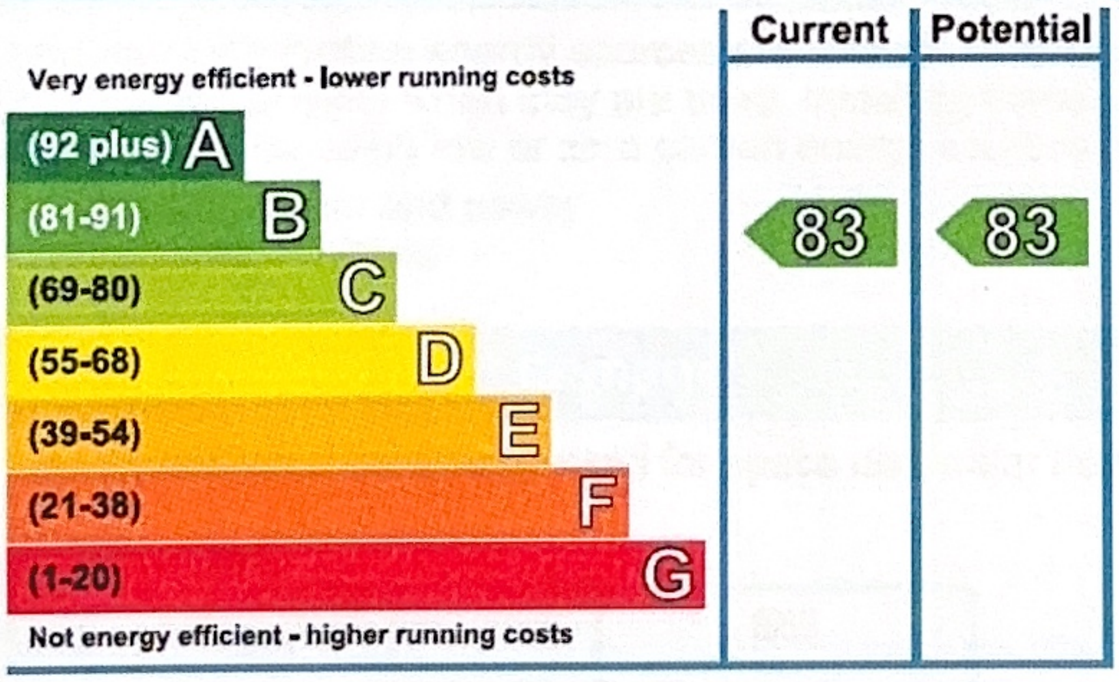
Estimated energy costs of dwelling for 3 years:	**£ 774**

Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£ 117 over 3 years	£ 117 over 3 years	Not applicable
Heating	£ 426 over 3 years	£ 426 over 3 years	
Hot Water	£ 231 over 3 years	£ 231 over 3 years	
Totals	**£ 774**	**£ 774**	

These figures show how much the average household would spend in this property for heating, lighting and hot water and is not based on energy used by individual households. This excludes energy use for running appliances like TVs, computers and cookers, and electricity generated by microgeneration.

Energy Efficiency Rating



The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

The EPC rating shown here is based on standard assumptions about occupancy and energy use and may not reflect how energy is consumed by individual occupants.

Summary of this home's energy performance related features

Element	Description	Energy Efficiency
Walls	Average thermal transmittance 0.17 W/m²K	★★★★★
Roof	(other premises above)	—
Floor	Average thermal transmittance 0.13 W/m²K	★★★★★
Windows	High performance glazing	★★★★★
Main heating	Community scheme	★★★★★
Main heating controls	Charging system linked to use of community heating, programmer and at least two room thermostats	★★★★☆
Secondary heating	None	—
Hot water	Community scheme	★★★★★
Lighting	Low energy lighting in all fixed outlets	★★★★★
Air tightness	Air permeability 4.6 m³/h.m² (as tested)	★★★★☆

Thermal transmittance is a measure of the rate of heat loss through a building element; the lower the value the better the energy performance.
Air permeability is a measure of the air tightness of a building; the lower the value the better the air tightness.

Current primary energy use per square metre of floor area: 52 kWh/m² per year

Low and zero carbon energy sources

Low and zero carbon energy sources are sources of energy that release either very little or no carbon dioxide into the atmosphere when they are used. Installing these sources may help reduce energy bills as well as cutting carbon. The following low or zero carbon energy sources are provided for this home:

- Combined heat and power
- Solar photovoltaics

Your home's heat demand

This table shows the energy used for space and water heating by an average household in this property.

Heat demand

Space heating (kWh per year)	883
Water heating (kWh per year)	1,835

If you built your own home and, as part of its construction, you installed a renewable heating system, you could receive Renewable Heat Incentive (RHI) payments. The estimated energy required for space and water heating will form the basis of the payments. For more information, search for the domestic RHI on the www.gov.uk website.

Recommendations

None.

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by Stroma Certification. You can obtain contact details of the Accreditation Scheme at www.stroma.com.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at www.epcregister.com. The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at www.opendatacommunities.org.

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. Any personal data it contains will be processed in accordance with the General Data Protection Regulation and all applicable laws and regulations relating to the processing of personal data and privacy. For further information about this and how data about the property are used, please visit www.epcregister.com. To opt out of having information about your building made publicly available, please visit www.epcregister.com/optout.

Assessor's accreditation number:	STRO000148
Assessor's name:	Jonathan Ponting
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Related party disclosure:	No related party

There is more information in the guidance document *Energy Performance Certificates for the marketing, sale and let of dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document, advises on how to identify the authenticity of a certificate and how to make a complaint.

About the impact of buildings on the environment

One of the biggest contributors to global warming is carbon dioxide. The energy we use for heating, lighting and power in homes produces over a quarter of the UK's carbon dioxide emissions.

The average household causes about 6 tonnes of carbon dioxide every year. Based on this assessment, your home currently produces approximately 0.5 tonnes of carbon dioxide every year. You could reduce emissions by switching to renewable energy sources.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions based on standardised assumptions about occupancy and energy use. The higher the rating the less impact it has on the environment.

Current rating 92

G (1-20)	F (21-38)	E (39-54)	D (55-68)	C (69-80)	B (81-91)	A (92 plus)

Higher CO_2 emissions — **Lower CO_2 emissions**

Potential rating 92

SAP WorkSheet: New dwelling as built

User Details:

Assessor Name:	Jonathan Ponting	**Stroma Number:**	STRO000148
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.4.16

Property Address: ab Plot D3

Address : 3 Crest Buildings, 37, Wharf Road, LONDON, N1 7GY

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	51.29	(1a) x	3.15	(2a) =	161.56	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	51.29	(4)				
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =		161.56	(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	4.6399998664856 (17)
If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.23 (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) =	0.18 (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 as built

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

0.23	0.22	0.22	0.2	0.19	0.17	0.17	0.17	0.18	0.19	0.2	0.21

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=	0.34	0.34	0.33	0.31	0.31	0.28	0.28	0.28	0.29	0.31	0.32	0.32	(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=	0.34	0.34	0.33	0.31	0.31	0.28	0.28	0.28	0.29	0.31	0.32	0.32	(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	
Windows Type 1			3.17	x 1/[1/(1.45)+ 0.04] =	4.34			(27)
Windows Type 2			6.31	x 1/[1/(1.45)+ 0.04] =	8.65			(27)
Windows Type 3			3.17	x 1/[1/(1.45)+ 0.04] =	4.34			(27)
Floor			51.29	x 0.13 =	6.6677			(28)
Walls Type1	57.87	12.65	45.22	x 0.18 =	8.14			(29)
Walls Type2	19.59	0	19.59	x 0.15 =	3.04			(29)
Total area of elements, m²			128.75					(31)
Party wall			32.04	x 0 =	0			(32)
Party ceiling			51.29					(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) = 35.18 (33)

Heat capacity Cm = S(A x k) ((28)...(30) + (32) + (32a)...(32e) = 5394.78 (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 6.33 (36)

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

Total fabric heat loss (33) + (36) = 41.51 (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=	18.26	18.02	17.78	16.58	16.34	15.14	15.14	14.91	15.62	16.34	16.82	17.3	(38)

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

(39)m=	59.77	59.53	59.29	58.09	57.85	56.65	56.65	56.41	57.13	57.85	58.33	58.81	

Average = Sum(39)$_{1\ldots12}$ /12= 58.08 (39)

SAP WorkSheet: New dwelling as built

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

(40)m=	1.17	1.16	1.16	1.13	1.13	1.1	1.1	1.1	1.11	1.13	1.14	1.15

Average = Sum(40)$_{1..12}$ /12= 1.13 (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 1.73 (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 75.24 (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=	82.77	79.76	76.75	73.74	70.73	67.72	67.72	70.73	73.74	76.75	79.76	82.77

Total = Sum(44)$_{1..12}$ = 902.92 (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=	122.74	107.35	110.78	96.58	92.67	79.97	74.1	85.03	86.05	100.28	109.46	118.87

Total = Sum(45)$_{1..12}$ = 1183.86 (45)

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

(46)m=	18.41	16.1	16.62	14.49	13.9	11.99	11.11	12.75	12.91	15.04	16.42	17.83

(46)

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (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) = 110 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

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

(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01

(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=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01

(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=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26

(59)

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

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	178.02	157.28	166.05	150.07	147.94	133.46	129.38	140.31	139.54	155.56	162.96	174.15	(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)

Output from water heater

(64)m=	178.02	157.28	166.05	150.07	147.94	133.46	129.38	140.31	139.54	155.56	162.96	174.15	

Output from water heater (annual)$_{1...12}$ 1834.7 (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=	85.03	75.64	81.05	74.91	75.03	69.38	68.86	72.49	71.41	77.56	79.19	83.75	(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=	103.69	103.69	103.69	103.69	103.69	103.69	103.69	103.69	103.69	103.69	103.69	103.69	(66)

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

(67)m=	33.56	29.81	24.24	18.35	13.72	11.58	12.52	16.27	21.83	27.72	32.36	34.49	(67)

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

(68)m=	224.75	227.08	221.21	208.7	192.9	178.06	168.14	165.81	171.69	184.2	199.99	214.84	(68)

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

(69)m=	47.1	47.1	47.1	47.1	47.1	47.1	47.1	47.1	47.1	47.1	47.1	47.1	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

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

(71)m=	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	(71)

Water heating gains (Table 5)

(72)m=	114.29	112.55	108.94	104.04	100.85	96.37	92.55	97.44	99.17	104.25	109.99	112.56	(72)

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

(73)m=	454.26	451.11	436.05	412.74	389.13	367.67	354.87	361.17	374.35	397.83	424	443.55	(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)	
Northeast 0.9x	0.77	x	3.17	x	11.28	x	0.58	x	0.8	=	11.5	(75)
Northeast 0.9x	0.77	x	6.31	x	11.28	x	0.58	x	0.8	=	22.89	(75)
Northeast 0.9x	0.77	x	3.17	x	22.97	x	0.58	x	0.8	=	23.41	(75)
Northeast 0.9x	0.77	x	6.31	x	22.97	x	0.58	x	0.8	=	46.6	(75)
Northeast 0.9x	0.77	x	3.17	x	41.38	x	0.58	x	0.8	=	42.18	(75)

SAP WorkSheet: New dwelling as built

Northeast 0.9x	0.77	x	6.31	x	41.38	x	0.58	x	0.8	=	83.96	(75)
Northeast 0.9x	0.77	x	3.17	x	67.96	x	0.58	x	0.8	=	69.27	(75)
Northeast 0.9x	0.77	x	6.31	x	67.96	x	0.58	x	0.8	=	137.88	(75)
Northeast 0.9x	0.77	x	3.17	x	91.35	x	0.58	x	0.8	=	93.11	(75)
Northeast 0.9x	0.77	x	6.31	x	91.35	x	0.58	x	0.8	=	185.34	(75)
Northeast 0.9x	0.77	x	3.17	x	97.38	x	0.58	x	0.8	=	99.27	(75)
Northeast 0.9x	0.77	x	6.31	x	97.38	x	0.58	x	0.8	=	197.59	(75)
Northeast 0.9x	0.77	x	3.17	x	91.1	x	0.58	x	0.8	=	92.86	(75)
Northeast 0.9x	0.77	x	6.31	x	91.1	x	0.58	x	0.8	=	184.84	(75)
Northeast 0.9x	0.77	x	3.17	x	72.63	x	0.58	x	0.8	=	74.03	(75)
Northeast 0.9x	0.77	x	6.31	x	72.63	x	0.58	x	0.8	=	147.36	(75)
Northeast 0.9x	0.77	x	3.17	x	50.42	x	0.58	x	0.8	=	51.39	(75)
Northeast 0.9x	0.77	x	6.31	x	50.42	x	0.58	x	0.8	=	102.3	(75)
Northeast 0.9x	0.77	x	3.17	x	28.07	x	0.58	x	0.8	=	28.61	(75)
Northeast 0.9x	0.77	x	6.31	x	28.07	x	0.58	x	0.8	=	56.95	(75)
Northeast 0.9x	0.77	x	3.17	x	14.2	x	0.58	x	0.8	=	14.47	(75)
Northeast 0.9x	0.77	x	6.31	x	14.2	x	0.58	x	0.8	=	28.81	(75)
Northeast 0.9x	0.77	x	3.17	x	9.21	x	0.58	x	0.8	=	9.39	(75)
Northeast 0.9x	0.77	x	6.31	x	9.21	x	0.58	x	0.8	=	18.7	(75)
Southeast 0.9x	0.77	x	3.17	x	36.79	x	0.58	x	0.8	=	37.5	(77)
Southeast 0.9x	0.77	x	3.17	x	62.67	x	0.58	x	0.8	=	63.88	(77)
Southeast 0.9x	0.77	x	3.17	x	85.75	x	0.58	x	0.8	=	87.41	(77)
Southeast 0.9x	0.77	x	3.17	x	106.25	x	0.58	x	0.8	=	108.3	(77)
Southeast 0.9x	0.77	x	3.17	x	119.01	x	0.58	x	0.8	=	121.31	(77)
Southeast 0.9x	0.77	x	3.17	x	118.15	x	0.58	x	0.8	=	120.43	(77)
Southeast 0.9x	0.77	x	3.17	x	113.91	x	0.58	x	0.8	=	116.11	(77)
Southeast 0.9x	0.77	x	3.17	x	104.39	x	0.58	x	0.8	=	106.41	(77)
Southeast 0.9x	0.77	x	3.17	x	92.85	x	0.58	x	0.8	=	94.65	(77)
Southeast 0.9x	0.77	x	3.17	x	69.27	x	0.58	x	0.8	=	70.61	(77)
Southeast 0.9x	0.77	x	3.17	x	44.07	x	0.58	x	0.8	=	44.92	(77)
Southeast 0.9x	0.77	x	3.17	x	31.49	x	0.58	x	0.8	=	32.1	(77)

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

(83)m=	71.9	133.89	213.54	315.46	399.76	417.29	393.81	327.8	248.34	156.16	88.2	60.18

(83)

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

(84)m=	526.16	585	649.6	728.2	788.89	784.96	748.68	688.97	622.7	554	512.19	503.73

(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	0.93	0.82	0.65	0.46	0.33	0.38	0.61	0.87	0.96	0.98

(86)

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

(87)m=	20.12	20.28	20.53	20.81	20.95	20.99	21	21	20.97	20.78	20.42	20.1

(87)

SAP WorkSheet: New dwelling as built

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

(88)m=	19.95	19.95	19.96	19.97	19.98	20	20	20	19.99	19.98	19.97	19.96	(88)

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

(89)m=	0.97	0.96	0.91	0.78	0.59	0.39	0.26	0.29	0.53	0.83	0.95	0.98	(89)

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

(90)m=	18.82	19.05	19.4	19.77	19.94	19.99	20	20	19.97	19.75	19.26	18.8	(90)

fLA = Living area ÷ (4) = 0.47 (91)

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

(92)m=	19.43	19.63	19.93	20.26	20.41	20.46	20.47	20.47	20.44	20.23	19.8	19.41	(92)

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

(93)m=	19.43	19.63	19.93	20.26	20.41	20.46	20.47	20.47	20.44	20.23	19.8	19.41	(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	0.91	0.79	0.61	0.42	0.29	0.33	0.57	0.84	0.95	0.97	(94)

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

(95)m=	510.65	556.6	588.31	576.62	484.18	329.84	218.74	228.94	352.61	464.58	484.97	491.13	(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=	904.06	876.55	795.96	659.66	503.93	332.05	219	229.44	362.23	557.21	740.82	894.23	(97)

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

(98)m=	292.7	215	154.5	59.79	14.7	0	0	0	0	68.92	184.21	299.91	

Total per year (kWh/year) = Sum(98)$_{1..5,9..12}$ = 1289.73 (98)

Space heating requirement in kWh/m²/year 25.15 (99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme.

Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301)

Fraction of space heat from community system 1 – (301) = 1 (302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community CHP 0.56 (303a)

Fraction of community heat from heat source 2 0.44 (303b)

Fraction of total space heat from Community CHP (302) x (303a) = 0.56 (304a)

Fraction of total space heat from community heat source 2 (302) x (303b) = 0.44 (304b)

Factor for control and charging method (Table 4c(3)) for community heating system 1 (305)

Distribution loss factor (Table 12c) for community heating system 1.05 (306)

Space heating **kWh/year**

Annual space heating requirement 1289.73

SAP WorkSheet: New dwelling as built

Space heat from Community CHP	(98) x (304a) x (305) x (306) =	758.36	(307a)
Space heat from heat source 2	(98) x (304b) x (305) x (306) =	595.85	(307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)

Water heating

Annual water heating requirement		1834.7	
If DHW from community scheme:			
Water heat from Community CHP	(64) x (303a) x (305) x (306) =	1078.81	(310a)
Water heat from heat source 2	(64) x (303b) x (305) x (306) =	847.63	(310b)
Electricity used for heat distribution	0.01 × [(307a)...(307e) + (310a)...(310e)] =	32.81	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f):			
mechanical ventilation - balanced, extract or positive input from outside		108.41	(330a)
warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	108.41	(331)
Energy for lighting (calculated in Appendix L)		237.08	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-187.99	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity)		0	(334)

10b. Fuel costs – Community heating scheme

	Fuel kWh/year		Fuel Price (Table 12)		Fuel Cost £/year	
Space heating from CHP	(307a)	x	2.97	x 0.01 =	22.52	(340a)
Space heating from heat source 2	(307b)	x	4.24	x 0.01 =	25.26	(340b)
Water heating from CHP	(310a)	x	2.97	x 0.01 =	32.04	(342a)
Water heating from heat source 2	(310b)	x	4.24	x 0.01 =	35.94	(342b)
			Fuel Price			
Pumps and fans	(331)		13.19	x 0.01 =	14.3	(349)
Energy for lighting	(332)		13.19	x 0.01 =	31.27	(350)
Additional standing charges (Table 12)					120	(351)
Energy saving/generation technologies						
Total energy cost	= (340a)...(342e) + (345)...(354) =				281.34	(355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12)		0.42	(356)
Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0] =	1.23	(357)
SAP rating (section12)		82.88	(358)

SAP WorkSheet: New dwelling as built

12b. CO2 Emissions – Community heating scheme

Electrical efficiency of CHP unit					34	(361)
Heat efficiency of CHP unit					53.4	(362)
		Energy kWh/year		**Emission factor kg CO2/kWh**	**Emissions kg CO2/year**	
Space heating from CHP)	(307a) × 100 ÷ (362) =	1420.15	x	0.22	306.75	(363)
less credit emissions for electricity	–(307a) × (361) ÷ (362) =	482.85	x	0.52	-250.6	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	2020.24	x	0.22	436.37	(365)
less credit emissions for electricity	–(310a) × (361) ÷ (362) =	686.88	x	0.52	-356.49	(366)
Efficiency of heat source 2 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel				96	(367b)
CO2 associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x			0.22	= 324.78	(368)
Electrical energy for heat distribution	[(313) x			0.52	= 17.03	(372)
Total CO2 associated with community systems	(363)...(366) + (368)...(372)				= 477.84	(373)
CO2 associated with space heating (secondary)	(309) x			0	= 0	(374)
CO2 associated with water from immersion heater or instantaneous heater	(312) x			0.22	= 0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =				477.84	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x			0.52	= 56.26	(378)
CO2 associated with electricity for lighting	(332))) x			0.52	= 123.05	(379)
Energy saving/generation technologies (333) to (334) as applicable Item 1				0.52	x 0.01 = -97.57	(380)
Total CO2, kg/year	sum of (376)...(382) =				559.59	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				10.91	(384)
EI rating (section 14)					92.21	(385)

13b. Primary Energy – Community heating scheme

Electrical efficiency of CHP unit					34	(361)
Heat efficiency of CHP unit					53.4	(362)
		Energy kWh/year		**Primary factor**	**P.Energy kWh/year**	
Space heating from CHP)	(307a) × 100 ÷ (362) =	1420.15	x	1.22	1732.58	(363)
less credit emissions for electricity	–(307a) × (361) ÷ (362) =	482.85	x	3.07	-1482.35	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	2020.24	x	1.22	2464.69	(365)
less credit emissions for electricity	–(310a) × (361) ÷ (362) =	686.88	x	3.07	-2108.72	(366)
Efficiency of heat source 2 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel				96	(367b)
Energy associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x			1.22	= 1834.43	(368)
Electrical energy for heat distribution	[(313) x				= 100.72	(372)
Total Energy associated with community systems	(363)...(366) + (368)...(372)				= 2541.34	(373)
if it is negative set (373) to zero (unless specified otherwise, see C7 in Appendix C)					2541.34	(373)

SAP WorkSheet: New dwelling as built

Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or instantaneous heater	(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			2541.34	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps and fans within dwelling	(331)) x	3.07	=	332.82	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	727.85	(379)
Energy saving/generation technologies Item 1		3.07	x 0.01 =	-577.12	(380)
Total Primary Energy, kWh/year	sum of (376)...(382) =			3024.89	(383)

SAP Input

Property Details: ab Plot D3

Address:	3 Crest Buildings, 37, Wharf Road, LONDON, N1 7GY
Located in:	England
Region:	Thames valley
UPRN:	2482870678
Date of assessment:	10 October 2018
Date of certificate:	11 October 2018
Assessment type:	New dwelling as built
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:	433

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2018

Floor Location:	**Floor area:**	**Storey height:**
Floor 0	51.29 m²	3.15 m
Living area:	24 m² (fraction 0.468)	
Front of dwelling faces:	North West	

Opening types:

Name:	**Source:**	**Type:**	**Glazing:**	**Argon:**	**Frame:**
Window 1	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	
Window 2	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	
Window 3	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Window 1	16mm or more	0.8	0.58	1.45	3.17	1
Window 2	16mm or more	0.8	0.58	1.45	6.31	1
Window 3	16mm or more	0.8	0.58	1.45	3.17	1

Name:	**Type-Name:**	**Location:**	**Orient:**	**Width:**	**Height:**
Window 1		External Walls	North East	1.36	2.33
Window 2		External Walls	North East	2.71	2.33
Window 3		External Walls	South East	1.36	2.33

Overshading: Average or unknown

Opaque Elements:

Type:	**Gross area:**	**Openings:**	**Net area:**	**U-value:**	**Ru value:**	**Curtain wall:**	**Kappa:**
External Elements							
External Walls	57.8655	12.65	45.22	0.18	0	False	N/A
Ext Walls To Corridor	19.593	0	19.59	0.18	0.9	False	N/A
Exposed Floor	51.29			0.13			N/A
Internal Elements							
Party Elements							
Party Walls	32.0355						N/A
Party Ceiling	51.29						N/A

Thermal bridges:

SAP Input

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0492

	Length	Psi-value		
	5.43	0.2	E1	Steel lintel with perforated steel base plate
[Approved]	5.43	0.04	E3	Sill
[Approved]	13.98	0.05	E4	Jamb
[Approved]	16.87	0.07	E7	Party floor between dwellings (in blocks of flats)
[Approved]	6.3	0.06	E18	Party wall between dwellings
	22.63	0.1	E5	
	0	0	E20	
[Approved]	0	0.07	E6	
[Approved]	5.89	0	E14	
[Approved]	11.2	0.09	E16	
[Approved]	5.6	-0.09	E17	
	11.2	0	E25	
	7.87	0	P2	Intermediate floor within a dwelling
	7.87	0	P3	Intermediate floor between dwellings (in blocks of flats)
	0	0.16	P1	
	0	0.24	P4	

Ventilation:

Pressure test: Yes (As built)

Ventilation: Balanced with heat recovery
Number of wet rooms: Kitchen + 2
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: 4.64 (Assessed dwelling is tested)

Main heating system:

Main heating system: Community heating schemes
Heat source: Community CHP
heat from CHP, heat fraction 0.56, efficiency 53.4
Heat source: Community boilers
heat from boilers – mains gas, heat fraction 0.44, efficiency 96
Piping>=1991, pre-insulated, low temp, variable flow

Main heating Control:

Main heating Control: Charging system linked to use of community heating, programmer and at least two room thermostats
Control code: 2312

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From main heating system
Water code: 901
Fuel :heat from CHP
No hot water cylinder
Solar panel: False

Others:

Electricity tariff: Standard Tariff
In Smoke Control Area: Unknown
Conservatory: No conservatory
Low energy lights: 100%

SAP Input

Terrain type:	Dense urban
EPC language:	English
Wind turbine:	No
Photovoltaics:	Photovoltaic 1 Installed Peak power: 0.2854 Tilt of collector: 30° Overshading: Modest Collector Orientation: South East
Assess Zero Carbon Home:	No

DER WorkSheet: New dwelling as built

User Details:

Assessor Name:	Jonathan Ponting	**Stroma Number:**	STRO000148
Software Name:	Stroma FSAP 2012	**Software Version:**	Version: 1.0.4.16

Property Address: ab Plot D3

Address : 3 Crest Buildings, 37, Wharf Road, LONDON, N1 7GY

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	51.29	(1a) x	3.15	(2a) =	161.56	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	51.29	(4)				
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =		161.56	(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		4.6399998664856 (17)
If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16)		0.23 (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) =	0.18 (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

DER WorkSheet: New dwelling as built

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

0.23	0.22	0.22	0.2	0.19	0.17	0.17	0.17	0.18	0.19	0.2	0.21

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=

0.34	0.34	0.33	0.31	0.31	0.28	0.28	0.28	0.29	0.31	0.32	0.32

(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=

0.34	0.34	0.33	0.31	0.31	0.28	0.28	0.28	0.29	0.31	0.32	0.32

(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	
Windows Type 1			3.17	x1/[1/(1.45)+ 0.04] =	4.34			(27)
Windows Type 2			6.31	x1/[1/(1.45)+ 0.04] =	8.65			(27)
Windows Type 3			3.17	x1/[1/(1.45)+ 0.04] =	4.34			(27)
Floor			51.29	x 0.13 =	6.6677			(28)
Walls Type1	57.87	12.65	45.22	x 0.18 =	8.14			(29)
Walls Type2	19.59	0	19.59	x 0.15 =	3.04			(29)
Total area of elements, m²			128.75					(31)
Party wall			32.04	x 0 =	0			(32)
Party ceiling			51.29					(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) = 35.18 (33)

Heat capacity Cm = S(A x k) ((28)...(30) + (32) + (32a)...(32e) = 5394.78 (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 6.33 (36)

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

Total fabric heat loss (33) + (36) = 41.51 (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=	18.26	18.02	17.78	16.58	16.34	15.14	15.14	14.91	15.62	16.34	16.82	17.3	(38)

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

(39)m=	59.77	59.53	59.29	58.09	57.85	56.65	56.65	56.41	57.13	57.85	58.33	58.81	

Average = Sum(39)$_{1..12}$ /12= 58.08 (39)

DER WorkSheet: New dwelling as built

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

(40)m=	1.17	1.16	1.16	1.13	1.13	1.1	1.1	1.1	1.11	1.13	1.14	1.15

Average = Sum(40)$_{1..12}$ /12= 1.13 (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 1.73 (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 75.24 (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=	82.77	79.76	76.75	73.74	70.73	67.72	67.72	70.73	73.74	76.75	79.76	82.77

Total = Sum(44)$_{1..12}$ = 902.92 (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=	122.74	107.35	110.78	96.58	92.67	79.97	74.1	85.03	86.05	100.28	109.46	118.87

Total = Sum(45)$_{1..12}$ = 1183.86 (45)

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

(46)m=	18.41	16.1	16.62	14.49	13.9	11.99	11.11	12.75	12.91	15.04	16.42	17.83

Water storage loss:

Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (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) = 110 (50)

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see section 4.3

Volume factor from Table 2a 1.03 (52)

Temperature factor from Table 2b 0.6 (53)

Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54)

Enter (50) or (54) in (55) 1.03 (55)

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

(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01

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=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01

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=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26

DER WorkSheet: New dwelling as built

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

(61)m=	0	0	0	0	0	0	0	0	0	0	0	0	(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=	178.02	157.28	166.05	150.07	147.94	133.46	129.38	140.31	139.54	155.56	162.96	174.15	(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)

Output from water heater

(64)m=	178.02	157.28	166.05	150.07	147.94	133.46	129.38	140.31	139.54	155.56	162.96	174.15	
											Output from water heater (annual)$_{1\ldots12}$	1834.7	(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=	85.03	75.64	81.05	74.91	75.03	69.38	68.86	72.49	71.41	77.56	79.19	83.75	(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=	86.41	86.41	86.41	86.41	86.41	86.41	86.41	86.41	86.41	86.41	86.41	86.41	(66)

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

(67)m=	13.42	11.92	9.7	7.34	5.49	4.63	5.01	6.51	8.73	11.09	12.94	13.8	(67)

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

(68)m=	150.58	152.15	148.21	139.83	129.24	119.3	112.65	111.09	115.03	123.41	133.99	143.94	(68)

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

(69)m=	31.64	31.64	31.64	31.64	31.64	31.64	31.64	31.64	31.64	31.64	31.64	31.64	(69)

Pumps and fans gains (Table 5a)

(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	(70)

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

(71)m=	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	-69.12	(71)

Water heating gains (Table 5)

(72)m=	114.29	112.55	108.94	104.04	100.85	96.37	92.55	97.44	99.17	104.25	109.99	112.56	(72)

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

(73)m=	327.22	325.55	315.77	300.13	284.51	269.22	259.14	263.96	271.86	287.68	305.85	319.22	(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)	
Northeast 0.9x	0.77	x	3.17	x	11.28	x	0.58	x	0.8	=	11.5	(75)
Northeast 0.9x	0.77	x	6.31	x	11.28	x	0.58	x	0.8	=	22.89	(75)
Northeast 0.9x	0.77	x	3.17	x	22.97	x	0.58	x	0.8	=	23.41	(75)
Northeast 0.9x	0.77	x	6.31	x	22.97	x	0.58	x	0.8	=	46.6	(75)
Northeast 0.9x	0.77	x	3.17	x	41.38	x	0.58	x	0.8	=	42.18	(75)

DER WorkSheet: New dwelling as built

Northeast 0.9x	0.77	x	6.31	x	41.38	x	0.58	x	0.8	=	83.96	(75)
Northeast 0.9x	0.77	x	3.17	x	67.96	x	0.58	x	0.8	=	69.27	(75)
Northeast 0.9x	0.77	x	6.31	x	67.96	x	0.58	x	0.8	=	137.88	(75)
Northeast 0.9x	0.77	x	3.17	x	91.35	x	0.58	x	0.8	=	93.11	(75)
Northeast 0.9x	0.77	x	6.31	x	91.35	x	0.58	x	0.8	=	185.34	(75)
Northeast 0.9x	0.77	x	3.17	x	97.38	x	0.58	x	0.8	=	99.27	(75)
Northeast 0.9x	0.77	x	6.31	x	97.38	x	0.58	x	0.8	=	197.59	(75)
Northeast 0.9x	0.77	x	3.17	x	91.1	x	0.58	x	0.8	=	92.86	(75)
Northeast 0.9x	0.77	x	6.31	x	91.1	x	0.58	x	0.8	=	184.84	(75)
Northeast 0.9x	0.77	x	3.17	x	72.63	x	0.58	x	0.8	=	74.03	(75)
Northeast 0.9x	0.77	x	6.31	x	72.63	x	0.58	x	0.8	=	147.36	(75)
Northeast 0.9x	0.77	x	3.17	x	50.42	x	0.58	x	0.8	=	51.39	(75)
Northeast 0.9x	0.77	x	6.31	x	50.42	x	0.58	x	0.8	=	102.3	(75)
Northeast 0.9x	0.77	x	3.17	x	28.07	x	0.58	x	0.8	=	28.61	(75)
Northeast 0.9x	0.77	x	6.31	x	28.07	x	0.58	x	0.8	=	56.95	(75)
Northeast 0.9x	0.77	x	3.17	x	14.2	x	0.58	x	0.8	=	14.47	(75)
Northeast 0.9x	0.77	x	6.31	x	14.2	x	0.58	x	0.8	=	28.81	(75)
Northeast 0.9x	0.77	x	3.17	x	9.21	x	0.58	x	0.8	=	9.39	(75)
Northeast 0.9x	0.77	x	6.31	x	9.21	x	0.58	x	0.8	=	18.7	(75)
Southeast 0.9x	0.77	x	3.17	x	36.79	x	0.58	x	0.8	=	37.5	(77)
Southeast 0.9x	0.77	x	3.17	x	62.67	x	0.58	x	0.8	=	63.88	(77)
Southeast 0.9x	0.77	x	3.17	x	85.75	x	0.58	x	0.8	=	87.41	(77)
Southeast 0.9x	0.77	x	3.17	x	106.25	x	0.58	x	0.8	=	108.3	(77)
Southeast 0.9x	0.77	x	3.17	x	119.01	x	0.58	x	0.8	=	121.31	(77)
Southeast 0.9x	0.77	x	3.17	x	118.15	x	0.58	x	0.8	=	120.43	(77)
Southeast 0.9x	0.77	x	3.17	x	113.91	x	0.58	x	0.8	=	116.11	(77)
Southeast 0.9x	0.77	x	3.17	x	104.39	x	0.58	x	0.8	=	106.41	(77)
Southeast 0.9x	0.77	x	3.17	x	92.85	x	0.58	x	0.8	=	94.65	(77)
Southeast 0.9x	0.77	x	3.17	x	69.27	x	0.58	x	0.8	=	70.61	(77)
Southeast 0.9x	0.77	x	3.17	x	44.07	x	0.58	x	0.8	=	44.92	(77)
Southeast 0.9x	0.77	x	3.17	x	31.49	x	0.58	x	0.8	=	32.1	(77)

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

(83)m=	71.9	133.89	213.54	315.46	399.76	417.29	393.81	327.8	248.34	156.16	88.2	60.18	(83)

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

(84)m=	399.12	459.44	529.32	615.58	684.27	686.51	652.95	591.76	520.2	443.84	394.04	379.4	(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	0.99	0.96	0.89	0.72	0.52	0.38	0.44	0.7	0.93	0.99	1	(86)

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

(87)m=	19.9	20.08	20.36	20.71	20.92	20.99	21	21	20.95	20.66	20.23	19.88	(87)

DER WorkSheet: New dwelling as built

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

(88)m=	19.95	19.95	19.96	19.97	19.98	20	20	20	19.99	19.98	19.97	19.96

(88)

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

(89)m=	0.99	0.98	0.95	0.85	0.66	0.44	0.29	0.34	0.62	0.91	0.98	0.99

(89)

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

(90)m=	18.51	18.76	19.17	19.66	19.91	19.99	20	20	19.95	19.6	18.99	18.49

(90)

fLA = Living area ÷ (4) = 0.47 (91)

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

(92)m=	19.16	19.38	19.73	20.15	20.38	20.46	20.47	20.47	20.42	20.1	19.57	19.14

(92)

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

(93)m=	19.16	19.38	19.73	20.15	20.38	20.46	20.47	20.47	20.42	20.1	19.57	19.14

(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=	0.99	0.98	0.95	0.86	0.69	0.48	0.33	0.39	0.66	0.91	0.98	0.99

(94)

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

(95)m=	394.97	449.92	502.75	529.2	469.74	327.84	218.47	228.36	342.23	404.41	385.78	376.25

(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=	888.06	861.77	784.2	653.51	502.2	331.82	218.97	229.37	361	549.3	727.32	878.56

(97)

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

(98)m=	366.86	276.77	209.39	89.51	24.15	0	0	0	0	107.8	245.91	373.72

Total per year (kWh/year) = Sum(98)$_{1..5,9..12}$ = 1694.11 (98)

Space heating requirement in kWh/m²/year 33.03 (99)

9b. Energy requirements – Community heating scheme

This part is used for space heating, space cooling or water heating provided by a community scheme.

Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 0 (301)

Fraction of space heat from community system 1 – (301) = 1 (302)

The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.

Fraction of heat from Community CHP 0.56 (303a)

Fraction of community heat from heat source 2 0.44 (303b)

Fraction of total space heat from Community CHP (302) x (303a) = 0.56 (304a)

Fraction of total space heat from community heat source 2 (302) x (303b) = 0.44 (304b)

Factor for control and charging method (Table 4c(3)) for community heating system 1 (305)

Distribution loss factor (Table 12c) for community heating system 1.05 (306)

Space heating

	kWh/year
Annual space heating requirement	1694.11

DER WorkSheet: New dwelling as built

Space heat from Community CHP	(98) x (304a) x (305) x (306) =	996.14	(307a)
Space heat from heat source 2	(98) x (304b) x (305) x (306) =	782.68	(307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)

Water heating

Annual water heating requirement		1834.7	
If DHW from community scheme:			
Water heat from Community CHP	(64) x (303a) x (305) x (306) =	1078.81	(310a)
Water heat from heat source 2	(64) x (303b) x (305) x (306) =	847.63	(310b)
Electricity used for heat distribution	0.01 × [(307a)...(307e) + (310a)...(310e)] =	37.05	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f):			
mechanical ventilation - balanced, extract or positive input from outside		108.41	(330a)
warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	108.41	(331)
Energy for lighting (calculated in Appendix L)		237.08	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-187.99	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity)		0	(334)

12b. CO2 Emissions – Community heating scheme

Electrical efficiency of CHP unit						34	(361)
Heat efficiency of CHP unit						53.4	(362)
		Energy kWh/year		**Emission factor kg CO2/kWh**		**Emissions kg CO2/year**	
Space heating from CHP)	(307a) × 100 ÷ (362) =	1865.42	x	0.22		402.93	(363)
less credit emissions for electricity	–(307a) × (361) ÷ (362) =	634.24	x	0.52		-329.17	(364)
Water heated by CHP	(310a) × 100 ÷ (362) =	2020.24	x	0.22		436.37	(365)
less credit emissions for electricity	–(310a) × (361) ÷ (362) =	686.88	x	0.52		-356.49	(366)
Efficiency of heat source 2 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel					96	(367b)
CO2 associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x			0.22	=	366.82	(368)
Electrical energy for heat distribution	[(313) x			0.52	=	19.23	(372)
Total CO2 associated with community systems	(363)...(366) + (368)...(372)				=	539.69	(373)
CO2 associated with space heating (secondary)	(309) x			0	=	0	(374)
CO2 associated with water from immersion heater or instantaneous heater	(312) x			0.22	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =					539.69	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x			0.52	=	56.26	(378)

DER WorkSheet: New dwelling as built

CO_2 associated with electricity for lighting	(332))) x	0.52	=	123.05	(379)
Energy saving/generation technologies (333) to (334) as applicable Item 1		0.52	x 0.01 =	-97.57	(380)
Total CO_2, kg/year	sum of (376)...(382) =			621.43	(383)
Dwelling CO_2 Emission Rate	(383) ÷ (4) =			12.12	(384)
EI rating (section 14)				91.35	(385)

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.16
Printed on 11 October 2018 at 16:04:30

Project Information:

Assessed By: Jonathan Ponting (STRO000148) **Building Type:** Flat

Dwelling Details:

NEW DWELLING AS BUILT Total Floor Area: 51.29m²
Site Reference : A.WR.N1 **Plot Reference:** ab Plot D3
Address : 3 Crest Buildings, 37, Wharf Road, LONDON, N1 7GY

Client Details:

Name:
Address :

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 (c), Mains gas (c)
Fuel factor: 1.00 (mains gas (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)	23.16 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	12.12 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	67.5 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	56.1 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	0.13 (max. 0.25)	0.13 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	1.45 (max. 2.00)	1.45 (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	4.64 (measured in this dwelling)	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system: Community heating schemes - CommCHP

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and at least two room thermostats	**OK**
Hot water controls:	No cylinder	
	No cylinder	

Regulations Compliance Report

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:	0.44	
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: North East	3.17m²	
Windows facing: North East	6.31m²	
Windows facing: South East	3.17m²	
Ventilation rate:	3.00	
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours	
10 Key features		
Party Walls U-value	0 W/m²K	
Community heating, heat from CHP		
Photovoltaic array		