DER WorkSheet: New dwelling design stage

Type 5: After Energy Demand Reduction

User Details:

Assessor Name:
Stroma Number:
Software Name: Stroma FSAP 2012
Software Version: Version: 1.0.1.25

Property Address: L5 3BF West

Address : , NW1 1JD

1. Overall dwelling dimensions:

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground floor	86	(1a) x	3.15	(2a) =	270.9	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	86	(4)				
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n) =		270.9	(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		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.15	(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

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

0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18

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) = 64.6 (23c)

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

(24a)m=	0.37	0.36	0.36	0.34	0.34	0.32	0.32	0.32	0.33	0.34	0.35	0.35	(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=	0.37	0.36	0.36	0.34	0.34	0.32	0.32	0.32	0.33	0.34	0.35	0.35	(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			2.85	x1/[1/(1.3)+ 0.04]		=	3.52			(27)
Windows Type 2			6.67	x1/[1/(1.3)+ 0.04]		=	8.24			(27)
Windows Type 3			2.85	x1/[1/(1.3)+ 0.04]		=	3.52			(27)
Walls	64	23.77	40.23	x	0.11	=	4.43			(29)
Roof	86	0	86	x	0.1	=	8.6			(30)
Total area of elements, m²			150							(31)
Party wall			25	x	0	=	0			(32)
Party wall			32	x	0	=	0			(32)
Party floor			86							(32a)
Internal wall **			93							(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) = 42.4 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 24785.5 (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 7 (36)

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

Total fabric heat loss (33) + (36) = 49.4 (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

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(38)m=	32.92	32.59	32.25	30.57	30.24	28.56	28.56	28.23	29.23	30.24	30.91	31.58	(38)

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

(39)m=	82.32	81.98	81.65	79.97	79.64	77.96	77.96	77.63	78.63	79.64	80.31	80.98	

Average = Sum(39)$_{1…12}$ /12= 79.89 (39)

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

(40)m=	0.96	0.95	0.95	0.93	0.93	0.91	0.91	0.9	0.91	0.93	0.93	0.94

Average = Sum(40)$_{1…12}$ /12= 0.93 (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 2.57 (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 95.16 (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=	104.68	100.87	97.07	93.26	89.45	85.65	85.65	89.45	93.26	97.07	100.87	104.68

Total = Sum(44)$_{1…12}$ = 1141.97 (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=	155.24	135.77	140.11	122.15	117.2	101.14	93.72	107.54	108.83	126.83	138.44	150.34

Total = Sum(45)$_{1…12}$ = 1497.31 (45)

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

(46)m=	23.29	20.37	21.02	18.32	17.58	15.17	14.06	16.13	16.32	19.02	20.77	22.55	(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)

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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)

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=	210.52	185.7	195.38	175.64	172.48	154.63	149	162.82	162.32	182.11	191.94	205.62	(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=	210.52	185.7	195.38	175.64	172.48	154.63	149	162.82	162.32	182.11	191.94	205.62

Output from water heater (annual)$_{1\ldots12}$ 2148.15 (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=	95.84	85.09	90.81	83.41	83.19	76.42	75.38	79.98	78.98	86.39	88.83	94.21	(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=	128.35	128.35	128.35	128.35	128.35	128.35	128.35	128.35	128.35	128.35	128.35	128.35	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m=	20.64	18.33	14.91	11.29	8.44	7.12	7.7	10	13.43	17.05	19.9	21.21	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m=	231.52	233.93	227.87	214.98	198.71	183.42	173.21	170.8	176.86	189.75	206.02	221.31	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m=	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	35.83	(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=	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	-102.68	(71)
Water heating gains (Table 5)													
(72)m=	128.81	126.62	122.05	115.85	111.82	106.14	101.32	107.5	109.69	116.12	123.37	126.63	(72)
Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m													
(73)m=	442.48	440.38	426.34	403.62	380.47	358.19	343.73	349.81	361.49	384.42	410.79	430.65	(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)	
Southeast 0.9x	0.77	x	6.67	x	36.79	x	0.7	x	1.11	=	132.28	(77)
Southeast 0.9x	0.77	x	6.67	x	62.67	x	0.7	x	1.11	=	225.32	(77)

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Southeast	0.9x	0.77	x	6.67	x	85.75	x	0.7	x	1.11	=	308.29	(77)
Southeast	0.9x	0.77	x	6.67	x	106.25	x	0.7	x	1.11	=	381.99	(77)
Southeast	0.9x	0.77	x	6.67	x	119.01	x	0.7	x	1.11	=	427.86	(77)
Southeast	0.9x	0.77	x	6.67	x	118.15	x	0.7	x	1.11	=	424.76	(77)
Southeast	0.9x	0.77	x	6.67	x	113.91	x	0.7	x	1.11	=	409.52	(77)
Southeast	0.9x	0.77	x	6.67	x	104.39	x	0.7	x	1.11	=	375.3	(77)
Southeast	0.9x	0.77	x	6.67	x	92.85	x	0.7	x	1.11	=	333.81	(77)
Southeast	0.9x	0.77	x	6.67	x	69.27	x	0.7	x	1.11	=	249.03	(77)
Southeast	0.9x	0.77	x	6.67	x	44.07	x	0.7	x	1.11	=	158.44	(77)
Southeast	0.9x	0.77	x	6.67	x	31.49	x	0.7	x	1.11	=	113.2	(77)
Southwest	0.9x	0.77	x	2.85	x	36.79		0.7	x	1.11	=	169.56	(79)
Southwest	0.9x	0.77	x	2.85	x	62.67		0.7	x	1.11	=	288.83	(79)
Southwest	0.9x	0.77	x	2.85	x	85.75		0.7	x	1.11	=	395.19	(79)
Southwest	0.9x	0.77	x	2.85	x	106.25		0.7	x	1.11	=	489.66	(79)
Southwest	0.9x	0.77	x	2.85	x	119.01		0.7	x	1.11	=	548.45	(79)
Southwest	0.9x	0.77	x	2.85	x	118.15		0.7	x	1.11	=	544.49	(79)
Southwest	0.9x	0.77	x	2.85	x	113.91		0.7	x	1.11	=	524.95	(79)
Southwest	0.9x	0.77	x	2.85	x	104.39		0.7	x	1.11	=	481.08	(79)
Southwest	0.9x	0.77	x	2.85	x	92.85		0.7	x	1.11	=	427.9	(79)
Southwest	0.9x	0.77	x	2.85	x	69.27		0.7	x	1.11	=	319.22	(79)
Southwest	0.9x	0.77	x	2.85	x	44.07		0.7	x	1.11	=	203.1	(79)
Southwest	0.9x	0.77	x	2.85	x	31.49		0.7	x	1.11	=	145.11	(79)
Northwest	0.9x	0.77	x	2.85	x	11.28	x	0.7	x	1.11	=	52	(81)
Northwest	0.9x	0.77	x	2.85	x	22.97	x	0.7	x	1.11	=	105.84	(81)
Northwest	0.9x	0.77	x	2.85	x	41.38	x	0.7	x	1.11	=	190.69	(81)
Northwest	0.9x	0.77	x	2.85	x	67.96	x	0.7	x	1.11	=	313.17	(81)
Northwest	0.9x	0.77	x	2.85	x	91.35	x	0.7	x	1.11	=	420.96	(81)
Northwest	0.9x	0.77	x	2.85	x	97.38	x	0.7	x	1.11	=	448.79	(81)
Northwest	0.9x	0.77	x	2.85	x	91.1	x	0.7	x	1.11	=	419.84	(81)
Northwest	0.9x	0.77	x	2.85	x	72.63	x	0.7	x	1.11	=	334.7	(81)
Northwest	0.9x	0.77	x	2.85	x	50.42	x	0.7	x	1.11	=	232.36	(81)
Northwest	0.9x	0.77	x	2.85	x	28.07	x	0.7	x	1.11	=	129.35	(81)
Northwest	0.9x	0.77	x	2.85	x	14.2	x	0.7	x	1.11	=	65.43	(81)
Northwest	0.9x	0.77	x	2.85	x	9.21	x	0.7	x	1.11	=	42.46	(81)

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

(83)m=	353.84	619.99	894.17	1184.81	1397.28	1418.04	1354.3	1191.07	994.08	697.59	426.96	300.78	(83)

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

(84)m=	796.32	1060.37	1320.51	1588.43	1777.75	1776.24	1698.03	1540.88	1355.56	1082.01	837.75	731.43	(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

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(86)m=	0.98	0.93	0.8	0.6	0.42	0.28	0.2	0.23	0.4	0.72	0.95	0.99	(86)

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

(87)m=	20.33	20.62	20.86	20.98	21	21	21	21	21	20.95	20.63	20.28	(87)

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

(88)m=	20.12	20.12	20.13	20.14	20.15	20.16	20.16	20.17	20.16	20.15	20.14	20.13	(88)

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

(89)m=	0.98	0.91	0.77	0.56	0.38	0.24	0.16	0.19	0.35	0.68	0.93	0.98	(89)

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

(90)m=	19.25	19.66	19.97	20.12	20.14	20.16	20.16	20.17	20.15	20.1	19.7	19.18	(90)

fLA = Living area ÷ (4) = 0.34 (91)

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

(92)m=	19.61	19.98	20.27	20.41	20.43	20.44	20.44	20.45	20.44	20.38	20.01	19.55	(92)

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

(93)m=	19.61	19.98	20.27	20.41	20.43	20.44	20.44	20.45	20.44	20.38	20.01	19.55	(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	0.91	0.78	0.57	0.39	0.26	0.18	0.2	0.37	0.69	0.93	0.98	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	775.33	966.12	1027.4	905.25	693.83	455.56	299.72	314.12	497.72	745.3	779.37	718.04	(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=	1260.66	1236.66	1124.48	920.41	695.34	455.64	299.73	314.13	498.45	779.1	1036.98	1243.24	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	361.09	181.8	72.23	10.92	1.13	0	0	0	0	25.14	185.48	390.75	

Total per year (kWh/year) = $\text{Sum}(98)_{1...5,9...12}$ = 1228.53 (98)

Space heating requirement in kWh/m²/year 14.29 (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 boilers		1	(303a)
Fraction of total space heat from Community boilers	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system		1	(305)
Distribution loss factor (Table 12c) for community heating system		1.2	(306)

Space heating	**kWh/year**
Annual space heating requirement	1228.53

DER WorkSheet: New dwelling design stage

Space heat from Community boilers	(98) x (304a) x (305) x (306) =	1474.24	(307a)
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		2148.15	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x (305) x (306) =	2577.77	(310a)
Electricity used for heat distribution	0.01 × [(307a)…(307e) + (310a)…(310e)] =	40.52	(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		328.52	(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) =	328.52	(331)
Energy for lighting (calculated in Appendix L)		364.52	(332)

12b. CO2 Emissions – Community heating scheme

		Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%)	If there is CHP using two fuels repeat (363) to (366) for the second fuel				89	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x		0	=	983.41	(367)
Electrical energy for heat distribution	[(313) x		0.52	=	21.03	(372)
Total CO2 associated with community systems	(363)…(366) + (368)...(372)			=	1004.44	(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) =				1004.44	(376)
CO2 associated with electricity for pumps and fans within dwelling	(331)) x		0.52	=	170.5	(378)
CO2 associated with electricity for lighting	(332))) x		0.52	=	189.18	(379)

Total CO2, kg/year	sum of (376)…(382) =	1364.12	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =	15.86	(384)
EI rating (section 14)		86.05	(385)