(Note: The box numbering is based on that for SAP 2005. It will be rationalised in the final version).

1. Overall dwelling dimensions Area (m²) Average storey Volume (m³) height (m) Ground floor (1a)(2a) = (3a) Х (2b) (3b) First floor (1b)× = Second floor (3c) (1c)(2c) = × Third and other floors (1d)(2d) (3d) × = Total floor area TFA = (1a) + (1b) + (1c) + (1d) =(5)Dwelling volume (3a) + (3b) + (3c) + (3d) =(6)2. Ventilation rate main secondary other m³ per hour total heating heating Number of chimneys × 40 = (9a) Number of open flues × 20 = (9b) -Number of intermittent fans or passive vents (9c) × 10 = Number of flueless gas fires $\times 40$ (9d) = Air changes per hour Infiltration due to chimneys, flues and fans = (9a)+(9b)+(9c)+(9d) =(10) \div box(6) = If a pressurisation test has been carried out, proceed to box (19), otherwise continue from box (12) to (18) Number of storeys in the dwelling (n_s) (11)Additional infiltration (12) $[(11) - 1] \times 0.1 =$ Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (13)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal use 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 (14)If no draught lobby, enter 0.05, else enter 0 (15) Percentage of windows and doors draught stripped (16) Window infiltration $0.25 - [0.2 \times (16) \div 100] =$ (17)Infiltration rate (10) + (12) + (13) + (14) + (15) + (17) =(18)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (19)If based on air permeability value, then $[q_{50} \div 20]+(10)$ in box (19a), otherwise (19a) = (18) (19a) Air permeability value applies if a pressurisation test has been done, or a design or specified air permeability is being used Number of sides on which dwelling is sheltered (20)(Enter 2 in (20) for new dwellings where location is not shown) Shelter factor $(21) = 1 - [0.075 \times (20)] =$ (21) (21a) Infiltration rate adjusted to include shelter factor $(21a) = (19a) \times (21) =$ Infiltration rate modified for monthly wind speed Feb Mar Apr May Jun Jul Oct Dec Jan Sep Nov Auc Monthly average wind speed from Table 7 (22)1 $(22)_{m} =$ (22)₂ $(22)_3$ (22) (22)(22)(22)11 $(22)_{12}$ (22)Wind Factor $(22a)_m = (22)_m \div 4$ (22a)1 (22a)2 (22a)3 (22a)4 (22a)5 (22a)6 (22a)7 (22a)8 (22a)9 (22a)10 (22a)11 (22a)12 (22a)_m = (22a) Effective infiltration rate = $(22a)_m \times (22b)_m$

(22b)₁ (22b)₂ (22b)₃ (22b)₄ (22b)₅ (22b)₆ (22b)₇ (22b)₈ (22b)₉ (22b)₁₀ (22b)₁₁ (22b)₁₂ (22b)_m = (22b) Calculate effective air change rate for the applicable case:

If balanced whole house mechanical ventilation: air throughput in ach = 0.5	(23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	(23b)
a) If balanced mechanical ventilation with heat recovery (MVHR) $(24)_m = (22b)_m + (23a) \times [1 - (23b) \div 100] = (24)_m = (24)_1 (24)_2 (24)_3 (24)_4 (24)_5 (24)_6 (24)_7 (24)_8 (24)_9 (24)_{10} (24)_{11} (24)_{12}$	(24)
b) If balanced mechanical ventilation without heat recovery (MV) $(24a)_m = (22b)_m + (23a) = (24a)_m = (24a)_1 (24a)_2 (24a)_3 (24a)_4 (24a)_5 (24a)_6 (24a)_7 (24a)_8 (24a)_9 (24a)_{10} (24a)_{11} (24a)_{12}$	(24a)
c) If whole house extract ventilation or positive input ventilation from outside $if(22h) = 0.25$ then $(24h) = 0.5$, attention (24h) = 0.25 + (22h)	
$ (24b)_{m} < 0.25, then (24b) = 0.5; otherwise (24b) = 0.25 + (22b)_{m} $ $ (24b)_{m} = (24b)_{1} (24b)_{2} (24b)_{3} (24b)_{4} (24b)_{5} (24b)_{6} (24b)_{7} (24b)_{8} (24b)_{9} (24b)_{10} (24b)_{11} (24b)_{12} $	(24b)
d) If natural ventilation or whole house positive input ventilation from loft if $(22b)_m \stackrel{\circ}{\rightarrow} 1$, then $(24c)_m = (22b)_m$ otherwise $(24c)_m = 0.5 + [(22b)_m^2 \times 0.5]$	
$(24c)_{m} = (24c)_{1} (24c)_{2} (24c)_{3} (24c)_{4} (24c)_{5} (24c)_{6} (24c)_{7} (24c)_{8} (24c)_{9} (24c)_{10} (24c)_{11} (24c)_{12}$	(24c)
Effective air change rate - enter (24) or (24a) or (24b) or (24c) in box (25) (25) _m = $(25)_1 (25)_2 (25)_3 (25)_4 (25)_5 (25)_6 (25)_7 (25)_8 (25)_9 (25)_{10} (25)_{11} (25)_{12}$	(25)
$(25)m = (25)^{1} (25)^{2} (25)^{3} (25)^{4} (25)^{5} (25)^{6} (25)^{7} (25)^{8} (25)^{9} (25)^{10} (25)^{11} (25)^{12}$	(20)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The \mathbf{k} -value is the heat capacity per unit area, see Table 1c

Element	Gross area, m ²	Openings m ²	Net area A, m ²	U-value W/m²K		A × U W/K	κ-value kJ/ m²⋅K	$A \times \kappa$ kJ/K	
Door	arca, m] × [=		KJ/ III 'K	KJ/IK	(26)
Window				× * below	=				(27)
Roof window				× * below	=				(27a)
Basement floor				×	=				(28)
Ground floor) ×	=				(28a)
Exposed floor				×	=				(28b)
Basement wall		-	=	×]=				(29)
External wall		-	=	× []=				(29a)
Roof		-	=] × []=				(30)
Total net area of e	external elem	tents ΣA , m ²		(31)					
Party wall * for windows and paragraph 3.2	l roof window	rs, use effective	window U-value	× e calculated usir]= ng foi	rmula 1/[(1/L	J-value)+0.04] a	as given in	(31a)
Fabric heat loss, \	$N/K = \Sigma (A)$	× U) (26)	(30) + (31a)	=		(32)			
Party floor				7					(33a)
Party ceiling]					(33b)
Internal wall **									(33c)
Internal floor]					(33d)
Internal ceiling ** include the area	as on both si	des of internal v	valls and partitio] ns					(33e)
Heat capacity C _m	= $\Sigma(\kappa \times A)$		•	8)(30) + (31a) + (3	33a)(33e)	=		(33f)
Thermal mass part For design assess			the construction	= (33f) ÷ (5) are not known µ	preci	sely the indi	= cative values of	TMP in Tab	<mark>(33g)</mark> le 1d can

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

Thermal bridges : Σ (L× Ψ) calculated using Appendix K if details of thermal bridging are not known (34) = 0.15 ⁻ (31)	(34)
Total fabric heat loss	(32) + (34) =	(35)
Ventilation heat loss calculated monthly $(36)_m = 0.33 \times (36)_m$	25) _m × (6)	
	Aug Sep Oct Nov De	C
$(36)_m = (36)_1 (36)_2 (36)_3 (36)_4 (36)_5 (36)_6 (36)_7$	(36)8 (36)9 (36)10 (36)11 (36	<u>(36)</u>
Heat transfer coefficient, W/K $(37)_m = (35) + (36)_m$		average
$(37)_{m} = (37)_{1} (37)_{2} (37)_{3} (37)_{4} (37)_{5} (37)_{6} (37)_{7}$	$(37)_8$ $(37)_9$ $(37)_{10}$ $(37)_{11}$ $(37)_{11}$	7) ₁₂ Σ(37) _m /12 (37)
Heat loss parameter (HLP), W/m ² K $(38)_m = (37)_m \div (5)$		average
$(38)_{m} = (38)_{1} (38)_{2} (38)_{3} (38)_{4} (38)_{5} (38)_{6} (38)_{7}$	(38)8 (38)9 (38)10 (38)11 (38	$\frac{1}{3}_{12} \Sigma(38)_{\rm m} / 12 (38)$
Number of days in month		
	Aug Sep Oct Nov De	с
$(39)_{m} = (39)_{1} (39)_{2} (39)_{3} (39)_{4} (39)_{5} (39)_{6} (39)_{7}$	(39) ₈ (39) ₉ (39) ₁₀ (39) ₁₁ (39) ₁₂ (39)
4. Water heating energy requirements		kWh/year
Assumed occupancy, N		(39a)
if TFA > 13.9, N = 1 + $1.76 \times [1 - \exp(-0.000349 \times (TFA - 13.9))]$ if TFA ≤ 13.9 , N = 1	?)] + 0.0013 × (TFA -13.9)	
Annual average hot water usage in litres per day $V_{d,average} = (25 \times 10^{-1})^{-1}$	NI) + 26	(39b)
Reduce the annual average hot water usage by 5% if the dwelling is	h	
not more that 125 litres per person per day (all water use, hot and c		arget of
Hot water usage in litres per day for each month $V_{d,m}$ = factor from		Total
$(39c)_{m} = (39c)_{1} (39c)_{2} (39c)_{3} (39c)_{4} (39c)_{3} (39c)_{3} (39c)_{3}$		$(39c)_{12} = \Sigma(39c)_{m}$
Energy content of hot water used - calculated monthly = $4.190 \times V_d$ (ΔT_m is from Table 1b)	$_{\rm m}$ \times n $_{\rm m}$ \times Δ T $_{\rm m}$ / 3600 kWh/month	n Total
· · · · · · · · · · · · · · · · · · ·	(39d) ₈ (39d) ₉ (39d) ₁₀ (39d) ₁₁ (39	$P(d)_{12} = \Sigma(39d)_m$ (39d)
Distribution loss $(40)_m = 0.15 \times (39d)_m$		
If instantaneous water heating at point of use, enter "0" in box		
For community heating include distribution loss whether or no)) (10)
$(40)_m = (40)_1 (40)_2 (40)_3 (40)_4 (40)_5 (40)_6 (40)_7$	(40) ₈ (409 (40) ₁₀ (40) ₁₁ (40)) ₁₂ (40)
		(10)
Water storage loss:	(41)	(10)
a) If manufacturer's declared loss factor is known (kWh/day):	(41)	, , , , , , , , , , , , , , , , ,
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b	(41a	, , , , , , , , , , , , , , , , ,
a) If manufacturer's declared loss factor is known (kWh/day):		, , , , , , , , , , , , , , , , ,
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : 	(41a	, , , , , , , , , , , , , , , , ,
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : Cylinder volume (litres) including any solar storage within same 	(41a (42) cylinder (43)	, , , , , , , , , , , , , , , , ,
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : 	(41a (42) cylinder (43)	, , , , , , , , , , , , , , , , ,
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : Cylinder volume (litres) including any solar storage within same If community heating and no tank in dwelling, enter 110 litres in Otherwise if no stored hot water (this includes instantaneous compared to the stored hot water) 	(41a (42) (42) (43) <i>box (43)</i> <i>mbi boilers) enter '0' in box (43)</i>	, , , , , , , , , , , , , , , , ,
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : Cylinder volume (litres) including any solar storage within same <u>If community heating and no tank in dwelling, enter 110 litres in</u> Otherwise if no stored hot water (this includes instantaneous con Hot water storage loss factor from Table 2 (kWh/litre/day) 	(41a (42) cylinder (43) box (43) mbi boilers) enter '0' in box (43) (44))
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : Cylinder volume (litres) including any solar storage within same If community heating and no tank in dwelling, enter 110 litres in Otherwise if no stored hot water (this includes instantaneous compared to the stored hot water) 	(41a (42) cylinder (43) box (43) mbi boilers) enter '0' in box (43) (44)) ulation in box (44)
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : Cylinder volume (litres) including any solar storage within same If community heating and no tank in dwelling, enter 110 litres in Otherwise if no stored hot water (this includes instantaneous co Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating and no tank in dwelling, use cylinder loss in 	(41a (42) cylinder (42) box (43) mbi boilers) enter '0' in box (43) (44) from Table 2 for 50 mm factory ins) ulation in box (44))
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : Cylinder volume (litres) including any solar storage within same <i>If community heating and no tank in dwelling, enter 110 litres in</i> <i>Otherwise if no stored hot water (this includes instantaneous co</i> Hot water storage loss factor from Table 2 (kWh/litre/day) <i>If community heating and no tank in dwelling, use cylinder loss i</i> Volume factor from Table 2a Temperature factor from Table 2b 	(41a (42) cylinder (43) box (43) mbi boilers) enter '0' in box (43) (44) from Table 2 for 50 mm factory ins (44a) ulation in box (44))
 a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/day (41) × (41a) = b) If manufacturer's declared cylinder loss factor is not known : Cylinder volume (litres) including any solar storage within same <u>If community heating and no tank in dwelling, enter 110 litres in</u> Otherwise if no stored hot water (this includes instantaneous co Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating and no tank in dwelling, use cylinder loss in Volume factor from Table 2a 	(41a (42) cylinder (43) box (43) mbi boilers) enter '0' in box (43) (44) from Table 2 for 50 mm factory ins (44a (44b) ulation in box (44))

Water storage loss calculated for each month $(46a)_m = (46) \times (39)_m$	
$(46a)_{m} = \begin{bmatrix} (46a)_{1} & (46a)_{2} & (46a)_{3} & (46a)_{4} & (46a)_{5} & (46a)_{6} & (46a)_{7} & (46a)_{8} & (46a)_{9} & (46a)_{10} & (46a)_{11} & (46a)_{12} \end{bmatrix}$	(46a)
If dedicated solar storage is within cylinder, $(47)_m = (46a)_m \times [(43) - (H11)] \div (43)$, else $(47)_m = (46a)_m$	
where (H11) is from Appendix H	
$ (47)_{m} = \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(47)
Primary circuit loss (annual) from Table 3 (48)	
Primary circuit loss calculated for each month $(48a)_m = (48) \div 365 \times (39)_m$	
$ (48a)_{m} = (48a)_{1} (48a)_{2} (48a)_{3} (48a)_{4} (48a)_{5} (48a)_{6} (48a)_{7} (48a)_{8} (48a)_{9} (48a)_{10} (48a)_{11} (48a)_{12} $	(48a)
Combi loss (annual) from Table 3a (enter "0" if not a combi boiler) (49)	
Combi loss calculated for each month $(49a)_m = (49) \div 365 \times (39)_m$	
$(49a)_{m} = \underbrace{(49a)_{1}}_{(49a)_{2}} \underbrace{(49a)_{3}}_{(49a)_{3}} (49a)$	(49a)
Total heat required for water heating calculated for each month $(49b)_m = (39d)_m + (47)_m + (48a)_m + (49a)_m$	
$ (49b)_{m} = (49b)_{1} (49b)_{2} (49b)_{3} (49b)_{4} (49b)_{5} (49b)_{6} (49b)_{7} (49b)_{8} (49b)_{9} (49b)_{10} (49b)_{11} (49b)_{12} $	(49b)
Solar DHW input calculated using Appendix H (enter "0" if no solar collector)	
$(50)_{m} = (50)_{1} (50)_{2} (50)_{3} (50)_{4} (50)_{5} (50)_{6} (50)_{7} (50)_{8} (50)_{9} (50)_{10} (50)_{11} (50)_{12}$	(50)
Output from water heater, kWh/month $(51)_m = (49b)_m - (50)_m$	Total
$(51)_{m} = (51)_{1} (51)_{2} (51)_{3} (51)_{4} (51)_{5} (516 (51)_{7} (51)_{8} (51)_{9} (51)_{10} (51)_{11} (51)_{12}$	=Σ(51) _m (51)
if $(51)_m < 0$ then set to 0	
Heat gains from water heating, kWh/month $0.25 \times [(39d)_m + (49a)_m] + 0.8 \times [(40)_m + (47)_m + (48a)_m]$	
$(52)_{m} = (52)_{1} (52)_{2} (52)_{3} (52)_{4} (52)_{5} (52)_{6} (52)_{7} (52)_{8} (52)_{9} (52)_{10} (52)_{11} (52)_{12}$	(52)
include $(47)_m$ in calculation of $(52)_m$ only if cylinder is in the dwelling or hot water is from community heat	ing

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

Metabolic gains (Table 5) $(53a)_m = (53a)_1 (53a)_2 (53a)_3 (53a)_4 (53a)_5 (53a)_6 (53a)_7 (53a)_8 (53a)_9 (53a)_{10} (53a)_{11}$	Watts (53a) ₁₂	(53a)
Lighting gains (calculated in Appendix L, equation L8 or L8a), also see Table 5		(501)
$(53b)_{m} = \frac{(53b)_{1}}{(53b)_{2}} \frac{(53b)_{3}}{(53b)_{4}} \frac{(53b)_{5}}{(53b)_{6}} \frac{(53b)_{7}}{(53b)_{8}} \frac{(53b)_{9}}{(53b)_{9}} \frac{(53b)_{10}}{(53b)_{11}}$ Appliances gains (calculated in Appendix L, equation L11 or L11a), also see Table 5	(53D) ₁₂	(53b)
$(53c)_{m} = [(53c)_{1} \ (53c)_{2} \ (53c)_{3} \ (53c)_{4} \ (53c)_{5} \ (53c)_{6} \ (53c)_{7} \ (53c)_{8} \ (53c)_{9} \ (53c)_{10} \ (53c)_{11}$	(53c) ₁₂	(53c)
Cooking gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 $(53d)_m = (53d)_1 (53d)_2 (53d)_3 (53d)_4 (53d)_5 (53d)_6 (53d)_7 (53d)_8 (53d)_9 (53d)_{10} (53d)_{11}$	(53d) ₁₂	(53d)
Pumps and fans gains (Table 5a)		
$(53e)_{m} = (53e)_{1} (53e)_{2} (53e)_{3} (53e)_{4} (53e)_{5} (53e)_{6} (53e)_{7} (53e)_{8} (53e)_{9} (53e)_{10} (53e)_{11}$	(53e) ₁₂	(53e)
Losses e.g. evaporation (negative values) (Table 5)		
$(53f)_{m} = \underbrace{(53f)_{1}}_{(53f)_{2}} \underbrace{(53f)_{3}}_{(53f)_{4}} \underbrace{(53f)_{5}}_{(53f)_{5}} \underbrace{(53f)_{6}}_{(53f)_{7}} \underbrace{(53f)_{8}}_{(53f)_{8}} \underbrace{(53f)_{9}}_{(53f)_{10}} \underbrace{(53f)_{11}}_{(53f)_{11}} \underbrace{(53f)_{11}} \underbrace{(53f)_{11}}_{(53f)_{11}} (5$	(53f) ₁₂	(53f)
Water heating gains (Table 5)		
	(54)12	(54)
Total internal gains = $(53a)_m + (53b)_m + (53c)_m + (53d)_m + (53e)_m + (53f)_m + (54)_m$		
$(55)_{m} = (55)_{1} (55)_{2} (55)_{3} (55)_{4} (55)_{5} (55)_{6} (55)_{7} (55)_{8} (55)_{9} (55)_{10} (55)_{11}$	(55)12	(55)

6. Solar gains

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation. Rows (56) to (64) are used 12 times, one for each month.

	Access factor	Area	Solar flux		g⊥ Specific	FF Specific		Gains
	Table 6d	m²	W/m ²		data or Table 6b	data or Table 6c		(W)
North	×	×		$\times 0.9 \times$		×	=	(56)
Northeast	×	×		$\times 0.9 \times$		×	=	(57)
East	×	×		$\times 0.9 \times$		×	=	(58)
Southeast	×	×		$\times 0.9 \times$		×	=	(59)
South	×	×		$\times 0.9 \times$		×	=	(60)
Southwest	×	×		$\times 0.9 \times$		×	=	(61)
West	×	×		$\times 0.9 \times$		×	=	(62)
Northwest	×	×		$\times 0.9 \times$		×	_ = _	(63)
Rooflights	1.0 ×	×		$\times 0.9 \times$		×	=	(64)
Solar gains, war $(65)_m = (65)_1$	tts, calculated for (65) ₂ (65) ₃	each month ((65) ₄ (65)			(65),9 (65) ₁₀ (65) ₁₁	(65) ₁₂	(65)
					(03)9 (03/10 [(03/11	(03)12	(03)
$(66)_{m} = (66)_{1}$	hternal and sola (66) ₂ (66) ₃	$\frac{(66)_{\text{m}} = (55)}{(66)_4}$			(66)9 (66) ₁₀ (66) ₁₁	(66) ₁₂	(66)
$(00)_{\rm m} = (00)_{\rm 1}$		(00)4 (00)	5 (00)6 (00)	7 (00)8	(00)9 ((00)12	(00)
	al temperature (. 0	•					
Temperature du	uring heating peri-	ods in the livin	g area from Tab	ole 9, T _{h1} ((°C)			21 (68)
Utilisation factor	r for gains for livir	ng area, $\eta_{1,m}$	(see Table 9a)					
(69) _m = (69) ₁	(69) ₂ (69) ₃	(69) ₄ (69)		, , , ,		(69) ₁₀ (69) ₁₁	(69) ₁₂	(69)
Mean internal te	emperature in livi	ng area T ₁ (fo	llow steps 3 to 6	in Table 9	9b)			
(70) _m = (70) ₁	(70) ₂ (70) ₃	(70) ₄ (70)) ₅ (70) ₆ (70) ₇ (70) ₈	(70)9	(70) ₁₀ (70) ₁₁	(70) ₁₂	(70)
Temperature du	uring heating peri-	ods in rest of o	dwelling from Ta	ble 9, T _{h2}	(°C)			
$(71)_{m} = (71)_{1}$	(71) ₂ (71) ₃	(71) ₄ (71))5 (71)6 (71) ₇ (71) ₈	(71)9	(71) ₁₀ (71) ₁₁	(71) ₁₂	(71)
	r for gains for res			,				
(72) _m = (72) ₁	(72) ₂ (72) ₃	(72) ₄ (72)) ₅ (72) ₆ (72) ₇ (72) ₈	(72)9	(72)10 (72)11	(72) ₁₂	(72)
	emperature in the	rest of dwellin	ng T ₂ (follow ste	ps 3 to 6 ii	n Table 9b)		<u></u>	
$(73)_{m} = (73)_{1}$	(73) ₂ (73) ₃	(73) ₄ (73)) ₅ (73) ₆ (73) ₇ (73) ₈	(73)9	(73) ₁₀ (73) ₁₁	(73) ₁₂	(73)
Living area frac	tion				$f_{LA} =$	Living area ÷ ((5) =	(74)
Mean internal te	emperature (for th	ne whole dwel	ling) = $f_{LA} \times T_1$	+ (1 – f _{LA})	×T ₂			
$(75)_{m} = (75)_{1}$	(75) ₂ (75) ₃	(75)4 (75)) ₅ (75) ₆ (75)7 (75)8	(75)9	(75)10 (75)11	(75) 12	(75)
Apply adjustme	nt to the mean in	ternal tempera	ture from Table	4e, where	e appropriate	e		
	n internal tempe							
(76) _m = (76) ₁	(76) ₂ (76) ₃	(76) ₄ (76))5 (76) 6 (76)7 (76) 8	(76)9	(76) ₁₀ (76) ₁₁	(76) 12	(76)
8. Space heati	ng requirement							
	an internal tempe	erature obtain	ed at step 11 of	Table 9b,	so that T _{i.m} :	=(76) _m and re-c	alculate	
the utilisation fa	ctor for gains usi	ng Table 9a						
Utilisation factor	r for gains, η_m :							
$(77)_{m} = (77)_{1}$	(77) ₂ (77) ₃	(77) ₄ (77)) ₅ (77) ₆ (77) ₇ (77) ₈	(77)9	(77)10 (77)11	(77) 12	(77)
Useful gains, η	_m G _m , W	$= (77)_{\rm m} \times (6)_{\rm m}$	6) _m					
(78) _m = (78) ₁	(78) ₂ (78) ₃	(78) ₄ (78))5 (78) 6 (78) ₇ (78) ₈	(78)9	(78)10 (78)11	(78) 12	(78)
Monthly average	e external tempe	rature from Ta	ble 8					
(78a) _m = (78a)				a)7 (78a)	8 (78a)9 ((78a) ₁₀ (78a) ₁₁	(78a) ₁₂	(78a)
	for mean internal)m × [(76)m·		·	
$(79)_{m} = (79)_{1}$	(79) ₂ (79) ₃	(79) ₄ (79))5 (79) 6 (79) ₇ (79) ₈	(79)9	(79) ₁₀ (79) ₁₁	(79) ₁₂	(79)

Space heating requirement for month (kWh) = $0.024 \times [(79)_m - (78)_m] \times (39)_m$														
(81)m =	(81) 1	(81)2	(81)3	(81)4	(81)5	0	0	0	0	(81)10	(81)11	(81) ₁₂	= Σ(81) _{15,912}	(81)

For range cooker boilers where efficiency is obtained from the Boiler Efficiency Database or manufacturer's declared value, multiply the results in box (81)_m by $(1 - \Phi_{case}/\Phi_{water})$ where Φ_{case} is the heat emission from the case of the range cooker at full load (in kW); and Φ_{water} is the heat transferred to water at full load (in kW). Φ_{case} and Φ_{water} are obtained from the database record for the range cooker boiler or manufacturer's declared value.

8c. Space cooling requirement when there is a fixed cooling system

Calculated for June, July and Aug	ust. See Table	10b						_
Jan Feb Mar	Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec	
Heat loss rate L _m (calculated usin	g 25°C interna	I temperature ar	d externa	l tempera	ature fro	om Table	e 10)	_
$(c70)_{m} = 0 0 0$	0 0	(c70) ₆ (c70)	7 (c70) ₈	0	0	0	0	(c70)
Utilisation factor for loss η_m								_
$(c71)_{m} = 0 0 0$	0 0	(c71) ₆ (c71	7 (c71) ₈	0	0	0	0	(c71)
Useful loss, $\eta_m L_m$ (Watts) = (C	$70)_{\rm m} \times (c71)_{\rm m}$							_
$(c72)_{m} = 0 0 0$	0 0	(c72) ₆ (c72)	7 (c72) ₈	0	0	0	0	(c72)
Gains (solar gains calculated for	applicable wea	ther region, see	Table 10)		-			
$(c73)_{m} = 0 0 0$	0 0	(c73) ₆ (c73)	7 (C73)8	0	0	0	0	(c73)
Space cooling requirement for me	onth, whole dw	elling, continuou	s (kWh) =	= 0.024	× [<mark>(73)</mark> n	n – (72)	m]×(39)	m
$(c74)_{m} = 0 0 0$	0 0	(c74) ₆ (c74	7 (c74)8	0	0	0	0	=Σ(c74) ₆₈ (c74)
Cooled fraction				f _C =	cooled	area ÷	(5)	(c75)
Intermittency factor (Table 10b)								
(c76) _m 0 0 0	0 0	(c76) ₆ (c76)	7 (C76)8	0	0	0	0	=Σ(c76) ₆₈ (c76)
Space cooling requirement for mo	$nth = (c74)_m \times$	(c75) × (c76) _m						
(c81) _m 0 0 0	0 0	(c81) ₆ (c81)	7 (C81) ₈	0	0	0	0	=Σ(c81) ₆₈ (c81)

9a. Energy requirements - individual heating systems, including micro-CHP	
Note: when space and water heating is provided by community heating use the alternative worksheet 9b	
Space heating:	
Fraction of heat from secondary/supplementary system (Table 11) (82)	
Fraction of heat from main system(s)1 - (82) =(82a)	
(From database or Table 4a or 4b, adjusted where appropriate by the amount shown in the 'efficiency adjustment' column of Table	4c)
Efficiency of main heating system 1 (expressed in %), for gas and oil boilers see 9.2.2 (83)	,
If there is a second main system complete (83a) and (83b)	
Efficiency of main heating system 2 (expressed in %) , for gas and oil boilers see 9.2.2(83a)Fraction of main heating from system 2(83b)	
Efficiency of secondary/supplementary heating system, % (use value from Table 4a or Appendix E) (84) Cooling System Energy Efficiency Ratio (see Table 10c) (84a)	
Cooling System Energy Efficiency Ratio (see Table 10c) (84a)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Space heating fuel requirement (main heating system 1), kWh/month	
$(85)_{m} = (82a) \times [1 - (83b)] \times (81)_{m} \times 100 \div (83)$ kWh/year	
$(85)_{m} = (85)_{1} (85)_{2} (85)_{3} (85)_{4} (85)_{5} 0 0 0 0 (85)_{10} (85)_{11} (85)_{12} = \Sigma(85)_{15,912} (85)_{1$	
Space heating fuel requirement (main heating system 2), kWh/month	
$(85)_{m} = (82a) \times (83b) \times (81)_{m} \times 100 \div (83a)$	
$(85a)_{m} = (85a)_{1} (85a)_{2} (85a)_{3} (85a)_{4} (85a)_{5} 0 0 0 0 (85a)_{10} (85a)_{11} (85a)_{12} = \Sigma(85a)_{15,912} (85a)_{15,912} = \Sigma(85a)_{15,912} (85a)_{15,912} = \Sigma(85a)_{15,912} (85a)_{15,912} = \Sigma(85a)_{15,912} = \Sigma(8$)
Space heating fuel requirement (secondary), kWh/month $(85b)_m = [(82) \times (81)_m \times 100 \div (84)]$	
$ (85b)_{m} (85b)_{1} (85b)_{2} (85b)_{3} (85b)_{4} (85b)_{5} 0 0 0 0 (85b)_{10} (85b)_{11} (85b)_{12} = \Sigma(85b)_{15,912} (85b)_{10} (85b)_{$)
	·
Water heating	
Efficiency of water heater, % (for gas and oil boilers see section 9.2.2) adjusted where appropriate by the amount shown in the 'efficiency adjustment' column of Table 4c	
$(86)_{m} = (86)_{1} (86)_{2} (86)_{3} (86)_{4} (86)_{5} (86)_{6} (86)_{7} (86)_{8} (86)_{9} (86)_{10} (86)_{11} (86)_{12} (86)_{12} (86)_{13} (86)_{14} (8$	
Energy required for water heating, kWh/month	
$(86a)_{\rm m} = (51)_{\rm m} \times 100 \div (86)_{\rm m}$	
$(86a)_{m} = (86a)_{1} (86a)_{2} (86a)_{3} (86a)_{4} (86a)_{5} (86a)_{6} (86a)_{7} (86a)_{8} (86a)_{9} (86a)_{10} (86a)_{11} (86a)_{12} = \Sigma(86a)_{m} (86a)_{m} (86a)_{10} (86a)$	
Space cooling fuel requirement, kWh/month $(86b)_m = [(c81) \div (84a)]$	
$(86b)_{m} = \boxed{0} 0 0 0 (86b)_{6} (86b)_{7} (86b)_{8} 0 0 0 = \Sigma(86b)_{68} (86b)_{68} (86b)_{6$	
Electricity for pumps and fans (Table 4f):	
central heating pump (87a) oil boiler pump (87b)	
boiler with a fan-assisted flue (87c)	
warm air heating system fans (87d)	
mechanical ventilation - balanced, extract or positive input from outside (87e)	
pump for solar water heating (87f)	
Total electricity for the above, kWh/year $(87a) + (87b) + (87c) + (87d) + (87e) + (87f) = $ (87)	
Other energy	
Maintaining electric keep-hot facility for gas combi boiler (87g)	
Energy for lighting (calculated in Appendix L) (87h)	
Energy saving/generation technologies (Appendices M ,N and Q)	
Electricity generated by PVs (Appendix M) (negative quantity) [87i]	
Electricity generated by wind turbine (Appendix M) (negative quantity) (87j)	
Electricity consumed or net electricity generated by µCHP (App N) (negative if net generation) (87k) Appendix Q items: Fuel	
<item 1="" description=""> (enter kWh/year as negative quantity if energy saved or generated) (87m)</item>	
<item 2="" description=""> (enter kWh/year as negative quantity if energy saved or generated) (87n)</item>	
(continue this list if additional items)	

9b. Energy requirements - Community heating schem			
This part should used when space and water heating is plenter "0" in (83*), and "1.0" in (84*)	rovided by community heating. If boilers or he	eat pumps or	nly,
Fraction of space heat from secondary/supplementary syst Fraction of space heat from community system Efficiency of secondary/supplementary heating system, % Factor for control and charging method (Table 4c(3)) Fraction of heat from CHP/power station/geothermal (from operational records or the plant design specification	$1 - (82^*) =$ (use value from Table 4a or Appendix E)		(82*) (82a*) (82b*) (82c*) (83*)
Fraction of heat from boilers or heat pump	1 - (83*) =		(84*)
Distribution loss factor (Table 12c)			(85*)
Space heating from CHP or recovered/geothermal heat	$[(81) \times (82a^*) \times (83^*) \times (85^*)] \div (82c^*)$	kWh/ye	ear (86*)
Space heating from boilers or heat pump	$[(81) \times (82a^*) \times (84^*) \times (85^*)] \div (82c^*)$	=	(86a*)
Space heating from secondary/supplementary system	$[(81) \times (82^*) \times 100] \div (82b^*)$	=	(87*)
If DHW from community scheme: Water heated by CHP or recovered/geothermal heat	[(51) × (83*) × (85*)] ÷ (82c*)	=	(87a*)
Water heated by boilers or heat pump	$[(51) \times (84^*) \times (85^*)] \div (82c^*)$	=	(87b*)
If DHW by immersion or instantaneous heater: Efficiency of water heater Water heated by immersion or instantaneous heater	[(51) × 100] ÷ (87a*)	=	(87c*) (87d*)
Electrical energy for heat distribution	$0.01 \times [(86^*) + (86a^*) + (87a^*) + (87b^*)]$	=	(87e*)
Cooling System Energy Efficiency Ratio			(87f*)
Space cooling	(c81) ÷ (87f*)	=	(87g*)
Electricity for pumps and fans: from Table 4f for dwellings w	with mechanical ventilation, otherwise 0		(88*)
Energy for lighting (calculated in Appendix L) Energy saving/generation technologies (Appendices M Electricity generated by PVs (Appendix M) (negative quant Electricity generated by wind turbine (Appendix M) (negative	ity) /e quantity)		(88h*) (88i*) (88j*)
Appendix Q items: <item 1="" description=""> (enter kWh/year as negative quant</item>	Fuel		(88m*)
<item 2="" description=""> (enter kWh/year as negative quant (continue this list if additional items)</item>			(88n*)

10a. Fuel costs - individual heating syste	ms
--	----

Total Tubi boosto marriada noating officinio						
	Fuel kWh/year		Fuel price (Table 12)		Fuel cost £/year	
Space heating - main system 1	(85)	×		× 0.01 =	Liyear	(88)
Space heating - main system 2	(85a)	×		× 0.01 =		(88a)
Space heating - secondary	(85b)	×		× 0.01 =		(89)
Water heating (electric off-peak tariff)						
On-peak fraction (Table 13, or Appendix F for electric	: CPSU)		[(90)	
Off-peak fraction	1	.0 - <mark>(90</mark>) =		(90a)	
			Fuel price			_
On-peak cost	(51) × (90)	×		× 0.01 =		(91)
Off-peak cost	(51) × (90a)	×		× 0.01 =		(91a)
Water heating cost (other fuel)	(86a)	×		× 0.01 =		(91b)
Space cooling	(86b)	×		× 0.01 =		(91c)
Pump and fan energy cost	[(87) + (87g)]	×		× 0.01 =		(92)
Energy for lighting	(87h)	×		× 0.01 =		(93)

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Additional standing charges (Table 12) Energy saving/generation technologies (8)	7i) to (87n) as applicable	- renea	t lines as need	ed	(94)	
Cost of energy produced or saved, £/year	one of (87i) to (8			X 0.01 =	(95)	
Cost of energy used, £/year	one of (87i) to (8			× 0.01 =	(96)	
	91)+(91a)+(91b)+(91c)+	-(92)+(9	3)+(94)+(95)+	(96) =	(97)	
11a. SAP rating - individual heating system	S					
Energy cost deflator (Table 12):				0	.51 (98)	
Energy cost factor (ECF)	[(97)) × (98)] ÷ [(5) + 45.0)] =	(99)	
SAP rating (Section 12)					(100)	
10b. Fuel costs - Community heating scheme			Fucharia		Factoria	
Space heating	Fuel required kWh/year		Fuel price (Table 12)	=	Fuel cost £/year	
Space heating (CHP or recovered/geothermal)	(86*)	×		× 0.01 =	(89*)	
Space heating (community boilers or heat pump) (86a*)	×		× 0.01 =	(90*)	
Space heating (secondary)	(87*)	×		× 0.01 =	(90a*)	
Water heating						
Water heated by CHP or recovered/geothermal I	neat (87a	*) ×		× 0.01 =	(91*)	
Water heated by boilers or heat pump	(87b	*) ×		× 0.01 =	(92*)	
Water heated by immersion heater or instantane	ous water heater; if he	eated by	/ community sy	vstem, go to box	(93d*)	
On-peak fraction (Table 13) (enter 1.0 for ar	n instantaneous water he	eater)			(93*)	
Off-peak fraction	1.	0 - <mark>(93</mark>	(*) =		(93a*)	
On-peak cost , or cost for an instantaneous w	ratar haatar (87h*) 🗸 (0)2*) 🗸	Fuel price	× 0.01 =	(93b*)	
Off-peak cost	$(87b^*) \times (95)^*$			× 0.01 =	(93c*)	
Space cooling	(87d*)	×		× 0.01 =	(93d**)	
Pumps and fans	(88*)	×		× 0.01 =	(94*)	
Energy for lighting	(88h*)	×		× 0.01 =	(94a*)	
Additional standing charges (Table 12)				0.01	(94b*)	
0 0	Bi*) to (88n*) as applicat	ole, repe	eat lines as nee	eded		
Cost of energy produced or saved, £/year	one of (88i*) to (88n*)	×		× 0.01 =	(95*)	
Cost of energy consumed, £/year	one of (88i*) to (88n*)	×		× 0.01 =	(96*)	
Total energy cost		(89*)	(92*) + (93b*).	(96*) =	(97*)	
11b. SAP rating - Community heating schem	ne					
Energy cost deflator (Table 12)					0.51 (98*)	
Energy cost factor (ECF)		[(97	(*) × (98*)] ÷	[<mark>(5)</mark> + 45] =	(99*)	
SAP rating (Section 12)					(100*)	

Energy kWhyarEmission Labor kg CoJkWh kg CoJkWhEmission kg CoJkWh kg CoJkWh kg CoJkWh kg CoJkWhEmission kg CoJkWh kg CoJkWh kg CoJkWhEmission kg CoJkWh kg CoJkWhEmission kg CoJkWh kg CoJkWhEmission kg CoJkWhI (101) kg CoJkWhI (101) kg CoJkWhI (101) kg CoJkWhI (102) kg CoJkWhI (102) kg CoJkWhI (103) kg CoJkWhI (104) kg CoJkWhI (105) kg CoJkWhI (105) kg CoJkWhI (106) kg CoJkWhI (107) kg CoJkWhI (107) kg CoJkWhI (101) kg CoJkWhI (101) kg CoJkWhI (101) kg CoJkWh<	12a. CO ₂ Emissions for individual heating			
Individual system: Space heating (main system 1) (8) \times = (101) Space heating (main system 2) (85a) \times = (102) Energy for water heating (101) (85b) \times = (103) Community Scheme: Efficiency of community boliers % (104) use actual efficiency if known, or value in Table 4 Space heating (187) \times 100 + (104) \times = (105) Water heating (187) \times 100 + (104) \times = (105) Water heating (187) \times 100 + (104) \times = (105) Water heating (187) \times 100 + (104) \times = (106) Electrical energy for heat distribution (107) \times = (106) Electrical energy and valuer heating (101) + (101a) + (102) + (103) or (106c) + (106c)] = (107) Space and water heating (101) + (101a) + (102) + (103) or (106c) + (106) + (106) Energy consumed (107) or (108) \times = (109) Energy consumed one of (87) to (37n) \times = (100) Energy consumed one of (87) to (37n) \times = (111) Electrical efficiency of CHP unit (e.g. 30%) from operational records or the CHP design specification (107) Heat efficiency of CHP unit (e.g. 30%) from operational records or the CHP design specification (101) Heat efficiency of CHP unit (e.g. 30%) from operational records or the CHP design specification (102) CO- emission factor for the CHP unit from power station are performed and many energy for (102) + (103) + (103) + (104) + (104) + (104) + (105) + (106) + (106) + (106) + (106) + (106) + (107) + (106) + (106) + (107) + (106) + (106) + (107) + (106) + (106) + (107) + (106) + (106) + (107)				
Space heating (main system 2)(B5a) \times $=$ (101a)Space heating (secondary)(B5b) \times $=$ (102)Energy for water heating(B6) \times $=$ (103)Community systeme:IIIO and the second	Individual system:	Kwiiiyeai	ky CO2/kwii	ky CO2/year
Space heating (secondary)(85b)×==(102)Energy for water heating(86)×=(103)Community scheme:[104)use actual efficiency if known, or value in Table 4aSpace heating(87') × 100 + (104)×=(105)Water heating(87') × 100 + (104)×=(106)Electrical energy for heat distribution(87') × 100 + (104)×=(106)Community space and water heating(1' negative, enter '0')(105) + (106) + (106e)=(106)Space heating (secondary)(87')×=(106)=(106)Space and water heating(1' negative, enter '0')(105) + (106) + (106) =(106)=(106)Space cooling(87') or (88')=(108)=(108)Energy for lighting(87') to (87') as apticable, repeat lines as needed=(109)Energy for lighting(87') to (87') as apticable, repeat lines as needed=(110)Energy for lighting(107) + (108) + (108) + (108) + (109) + (110) + (111) =(112)Dwelling CO: Emission Rate(112) + (107) + (108) + (108) + (109) + (101) / 10 (106'))Electrical energy of CHP unit (e.g. 30%) from operational records or the CHP design specification(101')Heat efficiency of CHP unit (e.g. 30%) from operational records or the CHP design specification(101')CO: emission factor for heat from power stations or geothermal source(106')CO: emission factor for heat from power stations or geothermal source(102') <t< td=""><td>Space heating (main system 1)</td><td>(85)</td><td>× :</td><td>= (101)</td></t<>	Space heating (main system 1)	(85)	× :	= (101)
Energy for water heating(86)×=(103)Community scheme: Efficiency of community boliers %(104) use actual efficiency if known, or value in Table 4a Space heating(87) × 100 + (104)×=(105)Water heating((87b) × 100 + (104))×=(106)(106)(106)(106)Efficiency of community space and water heating(if negative, enter '0')×=(106)Space heating (secondary)(87)×=(106)Space and water heating((101) + (102) + (103)) or(106b) + (106c) =(107)Space and water heating((101) + (101) + (102) + (103)) or(106b) + (106c) =(107)Space cooling(87) or (88')×=(108)Energy for dipting(87) or (88')×=(109)Energy tor dipting(87) or (87) or (88')×=(109)Energy consumedone of (87) to (87n)×=(111)Total CO2, kglyear(107) + (108) + (109) + (110) + (111) =(112)Dwelling CO2: Emission fale(112) + (108) + (109) + (100) + (100 + (110) + (112) =(113)2b: CO2: Emission fale(107) + (108) + (109) + (100) + (101) + (106) =(102)CO2: emission factor for the CHP fuel from Table 12)(104')(102')CO2: emission factor for the CHP fuel from Table 12)(104')(102')CO2: emission factor for heat(102') + (101') × 100 =(105')Heat the overeral form power stations reler tor for waste heat or gentermal form Table 12 in (107')(106)	Space heating (main system 2)	(85a)	× :	= (101a)
Community scheme: Efficiency of community bollers % [104] use actual efficiency if known, or value in Table 4a Space heating [(877) × 100 + (104)] × = [105) Water heating [(877) × 100 + (104)] × = [106] Electrical energy for heat distribution (876') × 100 + (104)] × = [106a] Community space and water heating (if negative, enter '0') [(105) + (106) + (106a)] = [1066] Space heating (secondary) (87') × = [106] Space heating (secondary) (87') × = [106] Electricity for pumps and fans within dwelling (87) or (88') × = [108] Electricity for pumps and fans within dwelling (87) or (88') × = [108] Energy rooting (88h) × = [109] Energy saving/generation technologies (87) to (87n) as applicable, repeat lines as needed Energy rooting (87n) or (88'n) × = [110] Energy consumed one of (87) to (87n) × = [111] Total CO ₂ , kg/year (107) + (108) + (108a) + (109) + (110) + (111) = [112] Dwelling CO ₂ Emission Rate (112) + (5) = [113] 12b. CO ₂ Emission for community heating schemes with CHP or heat recovered from power stations or geothermal source (for community schemes that recover heat from power ations role to C4 in Appendix C and omit (107) to (106') Electrical efficiency of CHP unit (e.g. 30%) from operational records or the CHP design specification [101'] Heat efficiency of CHP unit (e.g. 30%) from operational records or the CHP design specification [101'] Heat efficiency of CHP unit (e.g. 30%) from operational records or the CHP design specification [101'] CO ₂ emission factor for heat from operational records or the CHP design specification [101'] Heat efficiency of CHP unit (e.g. 30%) from operational records or the CHP design specification [102'] CO ₂ emission factor for heat if known, otherwise (102') + (101'] CO ₂ emission factor for heat if known, otherwise (102') + (101'] CO ₂ emission factor for heat if (107') can be negative: with heat recovered from power station or geothermal enter emission factor for wase heat or geothermal tormality the ator is instantanoous heater [87b'] × [97	Space heating (secondary)	(85b)	×	= (102)
Efficiency of community boliers %[104] use actual efficiency if known, or value in Table 4Space heating[87] × 100 + (104)] ×=[105]Water heating[87b] × 100 + (104)] ×=[106]Electrical energy for heat distribution(87c) ×=[106a]Community space and water heating(if negative, enter '0')[105) + (106) + (106a)] =[106b]Space heating (secondary)(87') ×=[106b]Space and water heating(101) + (101a) + (102) + (103)] or[106b) + (106c)] =[107)Space cooling(87) or (88') ×=[108]Electricity for pumps and fans within dwelling(87) or (88') ×=[109]Energy for lighting(871) to (87n) as applicable, repeat lines as needed[107][108]Energy produced or savedone of (87) to (87n) ×=[110]Energy produced or savedone of (87) to (87n) ×=[111]Total CO2, kglyear(107) + (108) + (108a) + (109) + (110) + (111) =[112]Dwelling CO2 Emission Rate(107) + (108) + (108a) + (109) + (110) + (111) =[112]CO2, emission factor for community heating schemes with CHP or heat recovered from power stations or geothermal source(102')(103')CO2, emission factor for deal filt mom and records or the CHP design specification[101'](102')CO2, emission factor for deal filt mom and records or the CHP design specification[101'](102')CO2, emission factor for heat if mown, otherwise(102') + (101') × 100 =[105']CO2 emission factor for heat<	Energy for water heating	(86)	×	= (103)
Space heating $((87) \times 100 + (104)]$ \times $=$ (105) Water heating $((87b)^* \times 100 + (104)]$ \times $=$ (106) Electrical energy for heat distribution $(87c)^* \times =$ $=$ $(106a)$ Community space and water heating $((1 negative, enter ''')^* (105) + (106) + (106a) =$ $(106b)$ Space net water heating $((101) + (101a) + (102) + (103))^* (1(106b) + (106c)) =$ $(107)^*$ Space and water heating $((101) + (101a) + (102) + (103))^* (1(106b) + (106c)) =$ $(107)^*$ Space cooling $(86b) \times =$ $=$ (108) Energy straing/generation technologies (87) to $(88n)^* \times =$ $=$ $(108)^*$ Energy straing/generation technologies (87) to $(87n) \times (88n)^* \times =$ $=$ $(109)^*$ Energy straing/generation technologies (87) to $(87n) \times (88n)^* \times =$ $=$ $(100)^*$ Energy straing/generation technologies (87) to $(87n) \times (88n)^* \times =$ $=$ $(100)^*$ Energy straing/generation technologies (87) to $(87n) \times (88n)^* \times =$ $=$ $(100)^*$ Energy straing/generation technologies (87) to $(87n) \times =$ $=$ $(110)^*$ Energy produced or savedone of (87) to $(87n) \times =$ $=$ $(110)^*$ Energy straing/generation technologies (87) to $(87n) \times =$ $=$ $(110)^*$ Energy produced or savedone of (87) to $(87n) \times =$ $=$ $(110)^*$ Energy produced or savedone of (87) to $(87n) \times =$ $=$ $(111)^*$ Total COo, kqlyear $(107)^*$ to $(87n)^*$ to $(87n)^*$ to $(87n)^*$	5			
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CO2 emission factor for electricity generated by CHP (from Table 12)(104*)CO2 emitted by CHP per kWh of generated electricity $(103^*) \div (101^*) \times 100 =$ (105*)Heat to Power ratioenter if known, otherwise $(102^*) \div (101^*)$ (106*)CO2 emission factor for heat $[(105^*) - (104^*)] \div (106^*) =$ (107*)Note: with CHP the value in (107*) can be negative;with heat recovered from power station or geothermal enter emission factor for waste heat or geothermal from Table 12 in (107*)Energy Emission factorWater heated by CHP or recovered/geothermal heat: $(87a^*) \times (107^*) =$ (108*))Efficiency of community boilers/heat pump %(109*) $=$ (110*)If water heated by boilers/heat pump %(109*) $=$ (110*)If water heated by other or recovered/geothermal heat(86*) $\times (107^*) =$ (112*)Space heating from CHP or recovered/geothermal heat(86*) $\times (107^*) =$ (112*)Space heating from boilers/heat pump(86a*) $\times 100 \div (109^*) \times $ $=$ (113*)Electrical energy for heat distribution(87e*) $\times $ $=$ (113*)	Heat efficiency of CHP unit (e.g. 50%) from	operational records or the CHP design	specification	(102*)
CO2 emitted by CHP per kWh of generated electricity $(103^{\circ}) \div (101^{\circ}) \times 100 =$ (105°) Heat to Power ratio enter if known, otherwise $(102^{\circ}) \div (101^{\circ})$ $(103^{\circ}) \div (101^{\circ}) \times 100 =$ (105°) CO2 emission factor for heat $[(105^{\circ}) - (104^{\circ})] \div (106^{\circ}) =$ (107°) Note: with CHP the value in (107°) can be negative; $[(105^{\circ}) - (104^{\circ})] \div (106^{\circ}) =$ (107°) Wate: with cheat recovered from power station or geothermal enter emission factor for waste heat or geothermal from Table 12 in (107°) Emergy Emission factor kWh/yearEmission factor kg CO2/kWhWater heated by CHP or recovered/geothermal heat: $(87a^{\circ}) \times (107^{\circ}) =$ (108°) Efficiency of community boilers/heat pump % (109°) (109°) use actual efficiency if known (see Appendix C2), or value in Table 4aWater heated by boilers/heat pump: $(87b^{\circ}) \times 100 \div (109^{\circ}) \times 100^{\circ} =$ (110°) If water heated by immersion heater or instantaneous heater $(87b^{\circ}) \times (107^{\circ}) =$ (110°) Space heating from CHP or recovered/geothermal heat $(86^{\circ}) \times (107^{\circ}) =$ (112°) Space heating from boilers/heat pump $(86a^{\circ}) \times 100 \div (109^{\circ}) \times 100^{\circ} =$ (113°) Electrical energy for heat distribution $(87e^{\circ}) \times 100^{\circ} =$ (113°)	CO2 emission factor for the CHP fuel from Ta	able 12	(103*)
Heat to Power ratioenter if known, otherwise $(102^*) \div (101^*)$ (106^*)CO2 emission factor for heat $[(105^*) - (104^*)] \div (106^*) =$ (107^*)Note: with CHP the value in (107*) can be negative; with heat recovered from power station or geothermal enter emission factor for waste heat or geothermal from Table 12 in (107*) Energy KWh/yearTable 12 in (107*) Emission factor KWh/yearWater heated by CHP or recovered/geothermal heat: $(87a^*) \times (107^*) =$ (108*)Efficiency of community boilers/heat pump % (109^*) (109^*) use actual efficiency if known (see Appendix C2), or value in Table 4a Water heated by boilers/heat pump: $(87b^*) \times 100 \div (109^*) \times $ $=$ If water heated by immersion heater or instantaneous heater $(87b^*) \times (107^*) =$ (110*)Space heating from CHP or recovered/geothermal heat $(86^*) \times (107^*) =$ (112*)Space heating from boilers/heat pump $(86a^*) \times 100 \div (109^*) \times $ $=$ (113*)Electrical energy for heat distribution $(87e^*) \times $ $=$ (113*)	CO ₂ emission factor for electricity generated	by CHP (from Table 12)	(104*)
CO2 emission factor for heat $[(105^*) - (104^*)] \div (106^*) =$ (107^*) Note: with CHP the value in (107*) can be negative; with heat recovered from power station or geothermal enter emission factor for waste heat or geothermal from Table 12 in (107*) Energy KWh/yearTable 12 in (107*) Emissions (kg CO2/kWhWater heated by CHP or recovered/geothermal heat: $(87a^*) \times (107^*) =$ (108^*) Efficiency of community boilers/heat pump % (109^*) (109*) use actual efficiency if known (see Appendix C2), or value in Table 4a $(87b^*) \times 100 \div (109^*) \times $ $=$ Water heated by boilers/heat pump: $(87b^*) \times 100 \div (109^*) \times $ $=$ (110^*) If water heated by immersion heater or instantaneous heater $(87b^*) \times (107^*) =$ (112^*) Space heating from CHP or recovered/geothermal heat $(86a^*) \times (107^*) =$ (112^*) Space heating from boilers/heat pump $(86a^*) \times 100 \div (109^*) \times $ $=$ (113^*) Electrical energy for heat distribution $(87e^*) \times $ $=$ $(113a^*)$	CO2 emitted by CHP per kWh of generated e	ectricity (10	03*) ÷ (101*) × 100 =	(105*)
CO2 emission factor for heat $[(105^*) - (104^*)] \div (106^*) =$ (107^*) Note: with CHP the value in (107*) can be negative; with heat recovered from power station or geothermal enter emission factor for waste heat or geothermal from Table 12 in (107*) Energy KWh/yearTable 12 in (107*) Emissions (kg CO2/kWhWater heated by CHP or recovered/geothermal heat: $(87a^*) \times (107^*) =$ (108^*) Efficiency of community boilers/heat pump % (109^*) (109*) use actual efficiency if known (see Appendix C2), or value in Table 4a $(87b^*) \times 100 \div (109^*) \times $ $=$ Water heated by boilers/heat pump: $(87b^*) \times 100 \div (109^*) \times $ $=$ (110^*) If water heated by immersion heater or instantaneous heater $(87b^*) \times (107^*) =$ (112^*) Space heating from CHP or recovered/geothermal heat $(86a^*) \times (107^*) =$ (112^*) Space heating from boilers/heat pump $(86a^*) \times 100 \div (109^*) \times $ $=$ (113^*) Electrical energy for heat distribution $(87e^*) \times $ $=$ $(113a^*)$	Heat to Power ratio enter if known, otherwis	se (102*) ÷ (101*)		(106*)
Note: with CHP the value in (107*) can be negative; with heat recovered from power station or geothermal enter emission factor for waste heat or geothermal from Table 12 in (107*) Energy KWh/yearWater heated by CHP or recovered/geothermal heat: $(87a^*) \times (107^*) = $ Efficiency of community boilers/heat pump % (109^*) (109^*) use actual efficiency if known (see Appendix C2), or value in Table 4aWater heated by boilers/heat pump: $(87b^*) \times 100 \div (109^*) \times $ If water heated by boilers/heat pump: $(87b^*) \times 100 \div (109^*) \times $ If water heated by immersion heater or instantaneous heater $(87b^*) \times (107^*) = $ Space heating from CHP or recovered/geothermal heat $(86a^*) \times 100 \div (109^*) \times $ Electrical energy for heat distribution $(87e^*) \times $ If using from boilers/heat pump $(113a^*)$			*) - (104*)] ÷ (106*) =	
Water heated by CHP or recovered/geothermal heat: $(87a^*)$ \times (107^*) $=$ (108^*) Efficiency of community boilers/heat pump % (109^*) (109^*) $xe actual efficiency if known (see Appendix C2), or value in Table 4aWater heated by boilers/heat pump:(87b^*) \times 100 \div (109^*)\times=(110^*)If water heated by immersion heater or instantaneous heater(87b^*)\times=(111^*)Space heating from CHP or recovered/geothermal heat(86^*)\times(107^*)=(112^*)Space heating from boilers/heat pump(86a^*) \times 100 \div (109^*)\times=(113^*)Electrical energy for heat distribution(87e^*)\times=(113a^*)$		eothermal enter emission factor for wa Energ	gy Emission facto	r Emissions
Efficiency of community boilers/heat pump %(109*)use actual efficiency if known (see Appendix C2), or value in Table 4aWater heated by boilers/heat pump: $(87b^*) \times 100 \div (109^*)$ If water heated by immersion heater or instantaneous heater $(87b^*)$ Space heating from CHP or recovered/geothermal heat $(86^*) \times (107^*) =$ Space heating from boilers/heat pump $(86a^*) \times 100 \div (109^*)$ Kater heated by immersion heater or instantaneous heater $(87b^*) \times 100 \div (107^*) =$ Space heating from boilers/heat pump $(86a^*) \times 100 \div (109^*)$ Kater heater or instantaneous $(87e^*) \times 100 \div (113^*)$ Kater heater or instantaneous $(87e^*) \times 100 \div (113^*)$,	0	
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Space heating from CHP or recovered/geothermal heat (86^*) \times (107^*) = (112^*) Space heating from boilers/heat pump $(86a^*) \times 100 \div (109^*)$ \times = (113^*) Electrical energy for heat distribution $(87e^*)$ \times = $(113a^*)$	use actual efficiency if known (see Appe Water heated by boilers/heat pump:	ndix C2), or value in Table 4a (87b*) × 100 ÷ (109*)		
Space heating from boilers/heat pump $(86a^*) \times 100 \div (109^*)$ \times $=$ (113^*) Electrical energy for heat distribution $(87e^*)$ \times $=$ $(113a^*)$			·	
Electrical energy for heat distribution $(87e^*) \times $ = (113a^*)				
-1000 + 0 annotated with housen the other overlap optimation and the state of			[*] (110 [*])(113a [*]) =	(1134)

If negative, enter "0" in (114*)

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Space heating (secondary)	(87*)	×	=	(114a*)
Space and water heating	((114*) + (114a*) =		(115*)
Space cooling	(87d*)	×	=	(115a*)
Electricity for pumps and fans within dwelling	(88*)	×	=	(115b*)
Energy for lighting	(88h*)	×] =	(116*)
Energy saving/generation technologies	(88i*) to (88n*) as applicable, repeat line		1	
Energy produced or saved	one of (88i*) to (88n*)	×	=	(117*)
Energy consumed	one of (88i*) to (88n*)	×	=	(118*)
Total CO ₂ , kg/year		(115*) ++ (118	*) =	(119*)
Dwelling CO ₂ Emission Rate		(119*) ÷ (5)) =	(120*)