NHER Rating Worksheet : Design - Draft

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Client

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Address Unit 9 Ex Makepeace Mansions Unit 9 Holly Lodge Estate, Camden, Greater London, NW1

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1. Overall dwelling dimensions

	Area (m^2)		Average storey height (m)		Volume (m^3)	
Ground Floor	42.24	(1a) ×	2.60	=	109.82	(1)
Total floor area (1a)+(2a)+(3a)+(4a)+(4b)+(4d)+(4f)+(4h) =	42.24	(5)				
Dwelling volume			(1)+(2)+(3)+(4)+(4c)+(4e)+(4g)+(4i) =		109.82	(6)

2. Ventilation rate

			m^3 per hour	
Number of chimneys	0	× 40 =	0	(7)
Number of open flues	0	× 20 =	0	(8)
Number of intermittent fans or passive vents	2	× 10 =	20	(9)
Number of flueless gas fires	0	× 40 =	0	(9a)

			Air changes per hour	
Infiltration due to chimneys, flues and fans = (7)+(8)+(9)+(9a) =	20	÷ box (6) =	0.18	(10)

If a pressurisation test has been carried out, proceed to box (19)

Number of storeys in the dwelling	1	(11)		
Additional infiltration		[(11) - 1] × 0.1 =	N/A	(12)
Structural infiltration: *0.25 for steel or timber frame or 0.35 for masonry construction*			N/A	(13)
If suspended wooden floor, *enter 0.2 (unsealed) or 0.1 (sealed)*, else enter 0			N/A	(14)
If no draught lobby, enter 0.05, else enter 0			N/A	(15)
Percentage of windows and doors draught stripped	N/A	(16)		
Enter 100 in box (16) for new dwellings which are to comply with Building Regulations				
Window infiltration		0.25 - [0.2 × (16) ÷ 100] =	N/A	(17)
Infiltration rate		(10)+(12)+(13)+(14)+(15)+(17) =	N/A	(18)

If based on air permeability value, then [q_{50} ÷ 20] + (10) in box (19), otherwise (19) = (18) 0.68 (19)

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

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Number of sides on which sheltered *(Enter 2 in box (20) for new dwellings where location is not shown)*		2	(20)
Shelter factor	1 - [0.075 × (20)] =	0.85	(21)
Adjusted infiltration rate	(19) × (21) =	0.52	(22)
Calculate effective air change rate for the applicable case			
If balanced whole house mechanical ventilation system	air throughput (ach) =	N/A	(22a)
If balanced with heat recovery	efficiency in % allowing for in-use factor =	N/A	(22b)
a) If balanced whole house mechanical ventilation with heat recovery	(22) + (22a) × [1 – (22b) / 100] =	N/A	(23)
b) If balanced whole house mechanical ventilation without heat recovery	(22) + (22a) =	N/A	(23a)
c) If whole house extract ventilation or positive input ventilation from outside ***if (22) < 0.25, then (23b) = 0.5; otherwise (23b) = 0.25 + (22)***		N/A	(23b)
d) If natural ventilation or whole house positive input ventilation from loft ***if (22) ≥ 1, then (24) = (22); otherwise (24) = 0.5 + [(22)² × 0.5]***		0.64	(24)
Effective air change rate - enter (23) or (23a) or (23b) or (24) in box (25)		0.64	(25)

3. Heat losses and heat loss parameter

ELEMENT	Area (m²)		U - value		AXU (W/K)	
Windows *	10.93	×	4.03	=	44.02	(27)
Walls	29.92	×	1.58	=	47.27	(29)
Walls	20.77	×	1.30	=	27.00	(29)
Total area of elements ΣA, m²	61.62	(32)				

* *for windows and rooflights, use effective window U-value calculated as given in paragraph 3.2*

Fabric heat loss, W/K	(26)+(27)+(27a)+(27b)+(28)+(29)+(29a)+(30)+(30a)+(31) =	118.29	(33)
Thermal bridges - Σ (lxΨ) calculated using Appendix K *if details of thermal bridging are not known calculate y× (32) [see Appendix K] and enter in box (34)*		9.24	(34)
Total fabric heat loss	(33)+(34) =	127.53	(35)
Ventilation heat loss	(25) × 0.33 × (6) =	23.06	(36)
Heat loss coefficient, W/K	(35)+(36) =	150.59	(37)
Heat loss parameter (HLP), W/m²K	(37) ÷ (5) =	3.57	(38)

4. Water heating energy requirement

	kWh/year	
Energy content of hot water used from Table 1 column (b)	1325.73	(39)
Distribution loss from Table 1 column (c) *If instantaneous water heating at point of use, enter "0" in boxes (40) to (45)* *For community heating use Table 1 (c) whether or not hot water tank is present*	233.95	(40)
Water storage loss:		

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a) If manufacturer's declared loss factor is known (kWh/day):		N/A	(41)
Temperature factor from Table 2b		N/A	(41a)
Energy lost from water storage, kWh/year	(41)×(41a)×365 =	N/A	(42)
b) If manufacturer's declared cylinder loss factor is not known:			
Cylinder volume (litres) including any solar storage within same cylinder *If community heating and no tank in dwelling, enter 110 litres in box (43)* *Otherwise, if no stored hot water (this includes instantaneous combi boilers), enter '0' in box (43)*		150.00	(43)
Hot water storage loss factor from Table 2 (kWh/litre/day) *If community heating and no tank in dwelling, use cylinder loss from Table 2 for 50 mm factory insulation in box (44)*		0.01	(44)
Volume factor from Table 2a		0.93	(44a)
Temperature factor from Table 2b		0.60	(44b)
Energy lost from water storage, kWh/year	(43)×(44)×(44a)×(44b)×365 =	261.39	(45)
Enter (42) or (45) in box (46)		261.39	(46)
If cylinder contains dedicated solar storage, box (47) = (46) × [(43) - (H11)] / (43), else (47) = (46)		261.39	(47)
Primary circuit loss from Table 3		360.00	(48)
Combi loss from Table 3a (enter "0" if no combi boiler)		0.00	(49)
Solar DHW input calculated using Appendix H (enter "0" if no solar collector)		0.00	(50)
Output from water heater, kWh/year	(39)+(40)+(47)+(48)+(49)-(50) =	2181.08	(51)
Heat gains from water heating *include (47) in calculation of (52) only if cylinder is in the dwelling or hot water is from community heating*	0.25 × [(39)+(49)]+0.8×[(40)+(47)+(48)] =	1015.71	(52)

5. Internal gains

		Watts	
Lights, appliances, cooking and metabolic (Table 5)		388.80	(53)
Reduction of internal gains due to low energy lighting (calculated in Appendix L)		30.13	(53a)
Additional gains from Table 5a		0.00	(53b)
Water heating	(52) ÷ 8.76 =	115.95	(54)
Total internal gains	(53) + (53b) + (54) - (53a) =	474.62	(55)

6. Solar gains

	Access factor Table 6d		Area m²		Flux Table 6a		g Table 6b		FF Table 6c		Gains (W)	
East	0.77	×	1.56	×	48.48	x 0.9 x	0.85	×	0.70	=	31.18	(59)
South	0.77	×	9.37	×	72.72	x 0.9 x	0.85	×	0.70	=	280.99	(62)

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Total solar gains:	[(56) + ... + (64)] =	312.18	(65)

Note: for new dwellings where overshading is not known, the solar access factor is '0.77'

Total gains, W	(55) + (65) =	786.80	(66)
Gain/loss ratio (GLR)	(66) ÷ (37) =	5.22	(67)
Utilisation factor (Table 7, using GLR in box (67))		0.97	(68)
Useful gains, W	(66) × (68) =	761.70	(69)
Gains Zone 1, G1		457.02	(NHER)
Gains Zone 2, G2		304.68	(NHER)

7. Mean internal temperature

			° C	
Living area fraction (0 to 1.0)	living room area ÷ (5) =		0.54	(75)
Interzone heat coefficient			98.58	(NHER)
Mean external temperature			5.16	(NHER)

	Zone1	Zone2	
Specific loss	81.60	68.98	(NHER)
Demand temperature	21.00	18.88	(NHER)
Mean internal temperature	18.64	16.19	(NHER)

8. Degree days

	Zone1	Zone2	
Base temperature	13.44	8.26	(NHER)
Degree-days	1490.05	518.32	(NHER)

9. Space heating requirements

	Zone1	Zone2	
Space heating requirement (useful), kWh/year	4369.62	353.29	(NHER)
Total space heating requirement (useful), kWh/year		4722.91	(81)

For range cooker boilers where efficiency is obtained from the Boiler Efficiency Database or manufacturer's declared value, multiply the result in box (81) by (1 - Φ_{case}/Φ_{water}) where Φ_{case} is the heat emission from the case of the range cooker at fullload (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.

9b. Energy requirements - Community heating scheme

This page should be used when space and water heating is provided by community heating only, with or without CHP or heat recovered from power stations If CHP, recovered heat, or second boiler type is not involved enter "0" in box (83*), and "1.0" in box (84*)

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Overall system efficiency of the heating plant or boilers *(100% minus the amount shown in the 'efficiency adjustment' column of Table 4c(3)where appropriate)*		100.00	(82*)
Fraction of heat from CHP unit or fraction of heat recovered from power station or boilers Type 2 *(from operational records or the plant design specification)*		N/A	(83*)
Fraction of heat from boilers Type 1	1 - (83*) =	1.00	(84*)
Distribution loss factor for boilers Type 1 (Table 12c)		1.05	(85a*)
		kWh/year	
Space heating from CHP, recovered/geothermal heat or boilers Type 2	[(81) × (83*) ×100] ÷ (82*) × (85*) =	N/A	(86*)
Space heating from boilers Type 1	[(81) × (84*) × 100] ÷ (82*) × (85*) =	4959.06	(87*)
Water heated by CHP or recovered heat or boilers Type 2	[(51) × (83*) × 100] ÷ (82*) × (85*) =	0.00	(87a*)
Water heated by boilers Type 1 (or other system)	[(51) × (84*) × 100] ÷ (82*) × (85*) =	N/A	(87b*)
Water heating from DHW only community heating			
Overall system efficiency of the DHW only heating plant		100.00	(82*)
Fraction of water heating from CHP unit		0.00	(83*)
Fraction of heat from boilers or heat pump	1 - (83*) =	1.00	(84*)
Distribution loss factor for DHW only community heating (Table 12c)		1.05	(85*)
Water heated by CHP	[(51) × (83*) × 100] ÷ (82*) × (85*) =	N/A	(87a*)
Water heated by boiler or heat pump	[(51) × (84*) × 100] ÷ (82*) × (85*) =	2290.13	(87b*)
Electricity for pumps,fans lights and appliances:		1847.65	(NHER)
Cooking:			
Cooking fuel requirement (Electricity), kWh/year		302.30	(NHER)
Cooking fuel requirement (Other fuel), kWh/year		531.08	(NHER)

10b. Fuel costs - Community heating scheme

	Fuel required kWh/year	×	**Fuel price** (Table 12)	=	**Fuel cost** £/year	
Space heating						
Space heating (CHP or from power stations or boilers Type 2) *For CHP price from Table 12 is irrespective of fuel used by CHP*	(86*)	×	0.00	× 0.01 =	0.00	(89*)
Space heating (community boilers Type 1)	(87*)	×	1.90	× 0.01 =	93.97	(90*)
Water heating from DHW only community heating			**Fuel price**			
Water heated by CHP	(87a*)	×	N/A	× 0.01 =	N/A	(91*)
Water heated by boilers or heat pump	(87b*)	×	1.90	× 0.01 =	43.40	(92*)

Pump,fan,lights and appliances energy cost

On-peak fraction	1.00

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Off-peak fraction						0.00		
				Fuel price				
On-peak cost	1847.65	×	1.00	×	7.96	× 0.01 =	147.15	(NHER)
Off-peak cost	1847.65	×	0.00	×	-1.00	× 0.01 =	0.00	(NHER)
Cooking								
Cooking cost (Electricity)			302.30	×	7.96	× 0.01 =	24.08	(NHER)
Cooking cost (Other fuel)			531.08	×	1.87	× 0.01 =	9.92	(NHER)
Additional standing charges							61.64	(94*)
Renewable and energy-saving technologies (Appendix M)								
PV								
Energy produced or saved, kWh/year			N/A (95*)					
Cost of energy produced or saved, £/year			(95*)	×	N/A	× 0.01 =	N/A	(95a*)
Wind								
Energy produced or saved, kWh/year			N/A (95b1*)					
Cost of energy produced or saved, £/year			(95b1*)	×	N/A	× 0.01 =	N/A	(95b*)
Special features (Appendix Q)								
Energy produced or saved, kWh/year			N/A (s1*)					
Cost of energy produced or saved, £/year			(s1*)	×	N/A	× 0.01 =	N/A	(s1a*)
Energy consumed by the technology, kWh/year			N/A (s2*)					
Cost of energy consumed, £/year			(s2*)	×	N/A	×0.01 =	N/A	(s2a*)
Total heating	(89*)+(90*)+(91*)+(92*)+(94*)+(94a*)+(94b*)-(95a*)-(95b*)-(s1a*)+(s2a*) =						380.15	(97*)
11b. NHER rating - Community heating scheme								
NHER rating							9.70	
12a. Total CO_2 for individual heating systems (including micro-CHP) and community heating without CHP								
Community scheme:								
Efficiency of community boilers %	*use actual efficiency if known, or value in Table 4a*						75.00	(104)
Energy for space heating	(87*) × 100 ÷ (104) =		6612.07	×	0.194	=	1282.74	(105)
DHW only community scheme:								
Efficiency of community boilers %	*use actual efficiency if known, or value in Table 4a*						90.00	(104)
Energy for water heating	[(87b*) × 100 ÷ (104)] =		2544.59	×	0.194	=	493.65	(106)
Space and water heating					[(101) + (102) + (106)] =		1776.39	(107)
Electricity for pumps,fans,lights and appliances			1847.65	×	0.422	=	779.71	(NHER)

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Cooking

Energy for cooking (Electricity)		302.30	×	0.42	=	127.57	(NHER)
Energy for cooking (Other fuel)		531.08	×	0.19	=	103.03	(NHER)
Energy produced or saved in dwelling (Appendices M and N)							
PV energy produced or saved	(95) or (95*)		×	N/A	=	N/A	(110)
Wind energy produced or saved	(95b1) or (95b1*)		×	N/A	=	N/A	(110b)
Micro-CHP energy produced or saved	(95c1) or (95c1*)		×	N/A	=	N/A	(110c)
Micro-CHP energy consumed	(96) or (96*)		×	N/A	=	0.00	(111)
Energy produced or saved in dwelling (Appendix Q)	(s1) or (s1*)		×	N/A	=	0.00	(s1a)
Energy consumed by the technology (Appendix Q)	(s2) or (s2*)		×	N/A	=	0.00	(s2a)
Total CO_2 kg/year	(107) + (108) + (109) - (110) + (111) - (s1a) + (s2a)				=	2785.70	(112)
Total CO2 (kg/m2/year)				(112) ÷ (5)	=	65.95	(113)

DHW only community scheme (uses section 12a calculations):

Efficiency of community boilers %	*use actual efficiency if known, or value in Table 4a*					90.00	(104)
Energy for water heating	[(87b*) × 100 ÷ (104)] =	2544.59	×	0.194	=	493.65	(106)

13a. Primary energy, for individual heating systems (including micro-CHP) and community heating without CHP

Community scheme:

Efficiency of community boilers % 75.00 (104)
use actual efficiency if known, or value in Table 4a

Energy for space heating	(87*) × 100 ÷ (104) =	6612.07	×	1.150	=	7603.88	

DHW only community scheme:

Efficiency of community boilers %	*use actual efficiency if known, or value in Table 4a*					90.00	
Energy for water heating	[(87b*) × 100 ÷ (104)] =	2290.13	×	N/A	=	N/A	
Space and water heating				[(101) + (102) + (106)]	=	10530.16	
Primary energy for pumps,fans,lights and appliances		1847.65	×	2.80	=	5173.43	(NHER)

Cooking

Primary energy for cooking (Electricity)		302.30	×	2.80	=	846.43	(NHER)
Primary energy for cooking (Other fuel)		531.08	×	1.15	=	610.74	(NHER)
Energy produced or saved in dwelling (Appendices M and N)							
PV energy produced or saved	(95) or (95*)		×	N/A	=	N/A	
Wind energy produced or saved	(95b1) or (95b1*)		×	N/A	=	N/A	
Micro-CHP energy produced or saved	(95c1) or (95c1*)		×	N/A	=	N/A	

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Micro-CHP energy consumed	(96) or (96*)	×	N/A	=	0.00
Energy produced or saved in dwelling (Appendix Q)	(s1) or (s1*)	×	N/A	=	0.00
Energy consumed by the above technology (Appendix Q)	(s2) or (s2*)	×	N/A	=	0.00
Primary energy kWh/year					17160.76
Primary energy kWh/m²/year					406.27

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