Full SAP Calculation Printout

Property Reference	47 Sunnyfield	Issued on Date	08/09/2023
Assessment Reference	47 Sunnyfield	Prop Type Ref	47 Sunnyfield
Property			

SAP Rating	89 B	DER	9.05	TER	6.76
Environmental	90 B	% DER < TER			-33.88
CO_2 Emissions (t/year)	2.13	DFEE	32.89	TFEE	35.45
Compliance Check	See BREL	% DFEE < TFEE			7.21
% DPER < TPER	-40.96	DPER	50.10	TPER	35.54

Assessor Details	Mr. George Farr	Assessor ID	T355-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	120.4300 (1b)	x	2.5000 (2b)	=	301.0750 (1b)	-
First floor	90.5400 (1c)	x	2.5000 (2c)	=	226.3500 (1c)	-
Second floor	59.9500 (1d)	x	2.0900 (2d)	=	125.2955 (1d)	-
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	270.9200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	652.7205	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	5 * 10 =	50.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	50.0000 / (5) =	0.0766	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.2766	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2559	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3262	0.3198	0.3134	0.2814	0.2750	0.2431	0.2431	0.2367	0.2559	0.2750	0.2878	0.3006	(22b)
Effective ac	0.5532	0.5511	0.5491	0.5396	0.5378	0.5295	0.5295	0.5280	0.5327	0.5378	0.5414	0.5452	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
DOOR			4.9800	1.1000	5.4780			(26)
G (Uw = 1.00)			50.9900	0.9615	49.0288			(27)
FRONT RL			1.1200	0.8687	0.9730			(27a)
REAR RL			1.1200	0.8687	0.9730			(27a)
SIDE 1 RL			2.0800	0.8687	1.8069			(27a)
SIDE 2 RL			2.0800	0.8687	1.8069			(27a)

FR RL			1.5200	0.8687	1.3205		(27a)
GF			120.4300	0.1400	16.8602	110.0000	13247.3000 (28)
EW	227.8000	55.9700	171.8300	0.1500	25.7745	60.0000	10309.8000 (29a)
SW RIR X 0.72	35.5900		35.5900	0.0900	3.2031	9.0000	320.3100 (29a)
DW	9.6700		9.6700	0.2000	1.9340	9.0000	87.0300 (29a)
PR	52.7300	6.4000	46.3300	0.1100	5.0963	9.0000	416.9700 (30)
FR	55.1100	1.5200	53.5900	0.1100	5.8949	9.0000	482.3100 (30)
SC X 0.72	30.5900		30.5900	0.0900	2.7531	9.0000	275.3100 (30)
Total net area of external elements Aum(A, m2)			531.9200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		122.9033		(33)
IW			331.9000			9.0000	2987.1000 (32c)
IF			150.4800			18.0000	2708.6400 (32d)
IC			150.4800			9.0000	1354.3200 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 32189.0900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 118.8140 (35)
Thermal bridges (User defined value 0.020 * total exposed area) 10.6384 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 133.5417 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	119.1600	118.7150	118.2787	116.2297	115.8464	114.0618	114.0618	113.7313	114.7492	115.8464	116.6219	117.4327	(38)
Heat transfer coeff	252.7017	252.2566	251.8204	249.7714	249.3880	247.6034	247.6034	247.2729	248.2908	249.3880	250.1636	250.9743	(39)
Average = Sum(39)m / 12 =												249.7695	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9328	0.9311	0.9295	0.9219	0.9205	0.9139	0.9139	0.9127	0.9165	0.9205	0.9234	0.9264	(40)
HLP (average)												0.9219	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.0941 (42)
Hot water usage for mixer showers

76.0982	74.9546	73.2881	70.0997	67.7467	65.1226	63.6311	65.2849	67.0979	69.9153	73.1723	75.8066	(42a)

Hot water usage for baths

32.8479	32.3601	31.6731	30.4065	29.4580	28.4063	27.8382	28.5204	29.2632	30.3885	31.6813	32.7369	(42b)

Hot water usage for other uses

46.3169	44.6327	42.9484	41.2642	39.5799	37.8957	37.8957	39.5799	41.2642	42.9484	44.6327	46.3169	(42c)

Average daily hot water use (litres/day) 142.7215 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	155.2631	151.9474	147.9097	141.7703	136.7846	131.4246	129.3650	133.3853	137.6252	143.2522	149.4862	154.8605	(44)
Energy conte	245.8988	216.3711	227.3317	194.0765	184.1383	161.6019	156.4557	165.1588	169.7056	194.3919	212.9705	242.4741	(45)
Energy content (annual)										Total = Sum(45)m =		2370.5750	
Distribution loss (46)m = 0.15 x (45)m	36.8848	32.4557	34.0998	29.1115	27.6208	24.2403	23.4684	24.7738	25.4558	29.1588	31.9456	36.3711	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	296.8577	262.3985	278.2906	243.3915	235.0972	210.9169	207.4146	216.1177	219.0207	245.3509	262.2856	293.4330	(62)
WWHRS	-67.8072	-59.9693	-62.7964	-51.9979	-48.4602	-41.4677	-38.8694	-41.3337	-42.9041	-50.5792	-57.3001	-66.5516	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	229.0505	202.4292	215.4942	191.3937	186.6371	169.4492	168.5453	174.7841	176.1166	194.7717	204.9855	226.8814	(64)
										Total per year (kWh/year) = Sum(64)m =		2340.5385	(64)
12Total per year (kWh/year)												2341	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	94.5011	83.4502	88.3275	76.8592	73.9657	66.0614	64.7613	67.6550	68.7559	77.3750	83.1415	93.3624	(65)

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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	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	221.1401	244.8337	221.1401	228.5114	221.1401	228.5114	221.1401	221.1401	228.5114	221.1401	228.5114	221.1401	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	434.2665	438.7729	427.4171	403.2419	372.7251	344.0436	324.8826	320.3763	331.7321	355.9073	386.4241	415.1055	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	(71)
Water heating gains (Table 5)													

	127.0176	124.1819	118.7198	106.7489	99.4163	91.7519	87.0447	90.9342	95.4943	103.9987	115.4743	125.4870 (72)
Total internal gains	854.8361	880.2003	839.6888	810.9141	765.6934	733.7189	702.4793	701.8625	725.1497	753.4580	802.8216	834.1446 (73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Southeast	17.0600	36.7938	0.5700	0.7000	0.7700	173.5642 (77)
Southwest	9.2300	36.7938	0.5700	0.7000	0.7700	93.9037 (79)
Northwest	24.7000	11.2829	0.5700	0.7000	0.7700	77.0594 (81)
Northeast	2.0800	16.3666	0.5700	0.7000	1.0000	12.2247 (82)
Southeast	1.1200	39.9751	0.5700	0.7000	1.0000	16.0777 (82)
Southwest	2.0800	39.9751	0.5700	0.7000	1.0000	29.8585 (82)
Northwest	2.6400	16.3666	0.5700	0.7000	1.0000	20.7741 (82)

Solar gains	423.4623	765.0769	1158.5960	1615.6376	1968.7443	2023.0799	1922.0319	1649.0466	1315.8558	876.1438	515.2882	357.1099 (83)
Total gains	1278.2984	1645.2772	1998.2848	2426.5517	2734.4377	2756.7987	2624.5113	2350.9091	2041.0056	1629.6018	1318.1099	1191.2545 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	35.3833	35.4457	35.5071	35.7984	35.8534	36.1118	36.1118	36.1601	36.0119	35.8534	35.7423	35.6268	
alpha	3.3589	3.3630	3.3671	3.3866	3.3902	3.4075	3.4075	3.4107	3.4008	3.3902	3.3828	3.3751	
util living area	0.9873	0.9709	0.9359	0.8484	0.7050	0.5342	0.4027	0.4620	0.7010	0.9116	0.9763	0.9899	(86)
MIT	19.2995	19.5676	19.9387	20.3831	20.6954	20.8484	20.8918	20.8816	20.7550	20.3040	19.7139	19.2533	(87)
Th 2	20.1397	20.1411	20.1425	20.1489	20.1501	20.1557	20.1557	20.1567	20.1535	20.1501	20.1477	20.1451	(88)
util rest of house	0.9852	0.9662	0.9255	0.8250	0.6634	0.4744	0.3300	0.3849	0.6437	0.8924	0.9717	0.9882	(89)
MIT 2	18.1075	18.4490	18.9171	19.4665	19.8280	19.9922	20.0297	20.0240	19.9046	19.3837	18.6424	18.0525	(90)
Living area fraction										fLA = Living area / (4) =		0.0701	(91)
MIT	18.1910	18.5274	18.9887	19.5307	19.8888	20.0522	20.0901	20.0841	19.9642	19.4482	18.7175	18.1366	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.0410	18.3774	18.8387	19.3807	19.7388	19.9022	19.9401	19.9341	19.8142	19.2982	18.5675	17.9866	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9777	0.9531	0.9055	0.8004	0.6414	0.4555	0.3109	0.3636	0.6181	0.8681	0.9597	0.9819	(94)
Useful gains	1249.7798	1568.0849	1809.5038	1942.1746	1753.7584	1255.7874	815.8910	854.8562	1261.4447	1414.6546	1265.0375	1169.6836	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	3472.3756	3399.7661	3107.1354	2617.7855	2004.7896	1312.8491	827.0311	873.8806	1418.7877	2169.2258	2868.7514	3460.0947	(97)
Space heating kWh	1653.6113	1230.8897	965.4379	486.4398	186.7672	0.0000	0.0000	0.0000	0.0000	561.4010	1154.6740	1704.0658	(98a)
Space heating requirement - total per year (kWh/year)												7943.2867	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1653.6113	1230.8897	965.4379	486.4398	186.7672	0.0000	0.0000	0.0000	0.0000	561.4010	1154.6740	1704.0658	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7943.2867	
Space heating per m2											(98c) / (4) =	29.3197	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1653.6113	1230.8897	965.4379	486.4398	186.7672	0.0000	0.0000	0.0000	0.0000	561.4010	1154.6740	1704.0658	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	1791.5615	1333.5750	1045.9782	527.0204	202.3480	0.0000	0.0000	0.0000	0.0000	608.2351	1251.0011	1846.2252	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating
Water heating requirement

	229.0505	202.4292	215.4942	191.3937	186.6371	169.4492	168.5453	174.7841	176.1166	194.7717	204.9855	226.8814 (64)

Efficiency of water heater 78.9000 (216)

(217)m	90.4314	90.1379	89.5255	88.0763	85.0779	78.9000	78.9000	78.9000	78.9000	88.4315	89.9957	90.4942 (217)

Fuel for water heating, kWh/month

	253.2863	224.5771	240.7071	217.3043	219.3720	214.7645	213.6189	221.5261	223.2150	220.2514	227.7726	250.7139 (219)

Space cooling fuel requirement

(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	56.8357	45.5957	41.0539	30.0778	23.2330	18.9815	21.1939	27.5486	35.7830	46.9492	53.0290	58.4153 (232)

Electricity generated by PVs (Appendix M) (negative quantity)

(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)

Electricity generated by wind turbines (Appendix M) (negative quantity)

(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)

Electricity generated by hydro-electric generators (Appendix M) (negative quantity)

(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)

Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)

(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)

Electricity generated by PVs (Appendix M) (negative quantity)

(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

Electricity generated by hydro-electric generators (Appendix M) (negative quantity)

(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)

(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

Annual totals kWh/year

Space heating fuel - main system 1	8605.9444 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	78.9000
Water heating fuel used	2727.1092 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	41.0000 (231)
Electricity for lighting (calculated in Appendix L)	458.6967 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	11832.7503 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	8605.9444	0.2100	1807.2483	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2727.1092	0.2100	572.6929	(264)
Space and water heating			2379.9413	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	458.6967	0.1443	66.2041	(268)
Total CO2, kg/year			2451.8326	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.0500	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	8605.9444	1.1300	9724.7172	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2727.1092	1.1300	3081.6334	(278)
Space and water heating			12806.3506	(279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248	(281)
Energy for lighting	458.6967	1.5338	703.5643	(282)
Total Primary energy kWh/year			13571.9397	(286)
Dwelling Primary energy Rate (DPER)			50.1000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	120.4300 (1b)	x	2.5000 (2b)	=	301.0750 (1b)	-
First floor	90.5400 (1c)	x	2.5000 (2c)	=	226.3500 (1c)	-
Second floor	59.9500 (1d)	x	2.0900 (2d)	=	125.2955 (1d)	-
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	270.9200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	652.7205	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0613	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3113	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2879	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3671	0.3599	0.3527	0.3167	0.3095	0.2735	0.2735	0.2663	0.2879	0.3095	0.3239	0.3383	(22b)
Effective ac	0.5674	0.5648	0.5622	0.5502	0.5479	0.5374	0.5374	0.5355	0.5415	0.5479	0.5525	0.5572	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
TER Opaque door			4.9800	1.0000	4.9800			(26)
TER Opening Type (Uw = 1.20)			50.9900	1.1450	58.3855			(27)
FRONT RL			1.1200	1.8519	2.0741			(27a)
REAR RL			1.1200	1.8519	2.0741			(27a)
SIDE 1 RL			2.0800	1.8519	3.8519			(27a)
SIDE 2 RL			2.0800	1.8519	3.8519			(27a)
FR RL			1.5200	2.0221	3.0735			(27a)
GF			120.4300	0.1300	15.6559			(28)
EW	227.8000	55.9700	171.8300	0.1800	30.9294			(29a)
SW RIR X 0.72	35.5900		35.5900	0.1800	6.4062			(29a)
DW	9.6700		9.6700	0.1800	1.7406			(29a)
PR	52.7300	6.4000	46.3300	0.1100	5.0963			(30)
FR	55.1100	1.5200	53.5900	0.1100	5.8949			(30)
SC X 0.72	30.5900		30.5900	0.1100	3.3649			(30)
Total net area of external elements Aum(A, m2)			531.9200					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		147.3791			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 118.8140 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	14.0900	0.0500	0.7045	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.7045	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		148.0836	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	122.2141	121.6504	121.0980	118.5030	118.0175	115.7573	115.7573	115.3388	116.6279	118.0175	118.9996	120.0265	(38)
Heat transfer coeff	270.2977	269.7340	269.1815	266.5865	266.1010	263.8409	263.8409	263.4223	264.7115	266.1010	267.0832	268.1101	(39)
Average = Sum(39)m / 12 =												266.5842	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9977	0.9956	0.9936	0.9840	0.9822	0.9739	0.9739	0.9723	0.9771	0.9822	0.9858	0.9896	(40)
HLP (average)												0.9840	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												3.0941	(42)
Hot water usage for mixer showers													
	76.0982	74.9546	73.2881	70.0997	67.7467	65.1226	63.6311	65.2849	67.0979	69.9153	73.1723	75.8066	(42a)
Hot water usage for baths													
	32.8479	32.3601	31.6731	30.4065	29.4580	28.4063	27.8382	28.5204	29.2632	30.3885	31.6813	32.7369	(42b)
Hot water usage for other uses													
	46.3169	44.6327	42.9484	41.2642	39.5799	37.8957	37.8957	39.5799	41.2642	42.9484	44.6327	46.3169	(42c)
Average daily hot water use (litres/day)												142.7215	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	155.2631	151.9474	147.9097	141.7703	136.7846	131.4246	129.3650	133.3853	137.6252	143.2522	149.4862	154.8605	(44)
Energy conte	245.8988	216.3711	227.3317	194.0765	184.1383	161.6019	156.4557	165.1588	169.7056	194.3919	212.9705	242.4741	(45)
Energy content (annual)										Total = Sum(45)m =		2370.5750	
Distribution loss (46)m = 0.15 x (45)m													
	36.8848	32.4557	34.0998	29.1115	27.6208	24.2403	23.4684	24.7738	25.4558	29.1588	31.9456	36.3711	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	296.8577	262.3985	278.2906	243.3915	235.0972	210.9169	207.4146	216.1177	219.0207	245.3509	262.2856	293.4330	(62)
WWHRS	-34.7889	-30.7676	-32.2181	-26.6778	-24.8628	-21.2753	-19.9422	-21.2065	-22.0122	-25.9500	-29.3982	-34.1447	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	262.0688	231.6309	246.0725	216.7137	210.2345	189.6417	187.4725	194.9112	197.0085	219.4009	232.8874	259.2883	(64)
										Total per year (kWh/year) = Sum(64)m =		2647.3309	(64)
12Total per year (kWh/year)												2647	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	94.5011	83.4502	88.3275	76.8592	73.9657	66.0614	64.7613	67.6550	68.7559	77.3750	83.1415	93.3624	(65)

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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	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	154.7063	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	219.0288	242.4962	219.0288	226.3298	219.0288	226.3298	219.0288	219.0288	226.3298	219.0288	226.3298	219.0288	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	434.2665	438.7729	427.4171	403.2419	372.7251	344.0436	324.8826	320.3763	331.7321	355.9073	386.4241	415.1055	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	38.4706	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	-123.7650	(71)
Water heating gains (Table 5)													
	127.0176	124.1819	118.7198	106.7489	99.4163	91.7519	87.0447	90.9342	95.4943	103.9987	115.4743	125.4870	(72)
Total internal gains													
	852.7248	877.8628	837.5776	808.7325	763.5821	731.5372	700.3681	699.7512	722.9681	751.3467	800.6400	832.0333	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	17.0600	36.7938	0.6300	0.7000	0.7700	191.8341	(77)
Southwest	9.2300	36.7938	0.6300	0.7000	0.7700	103.7883	(79)
Northwest	24.7000	11.2829	0.6300	0.7000	0.7700	85.1709	(81)
Northeast	2.0800	16.3666	0.6300	0.7000	1.0000	13.5115	(82)
Southeast	1.1200	39.9751	0.6300	0.7000	1.0000	17.7701	(82)
Southwest	2.0800	39.9751	0.6300	0.7000	1.0000	33.0016	(82)
Northwest	2.6400	16.3666	0.6300	0.7000	1.0000	22.9609	(82)

Solar gains	468.0373	845.6113	1280.5535	1785.7047	2175.9806	2236.0356	2124.3511	1822.6304	1454.3670	968.3695	569.5291	394.7005	(83)
Total gains	1320.7621	1723.4742	2118.1311	2594.4372	2939.5627	2967.5729	2824.7191	2522.3817	2177.3351	1719.7162	1370.1691	1226.7338	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	33.0799	33.1490	33.2170	33.5404	33.6016	33.8894	33.8894	33.9433	33.7780	33.6016	33.4780	33.3498	
alpha	3.2053	3.2099	3.2145	3.2360	3.2401	3.2593	3.2593	3.2629	3.2519	3.2401	3.2319	3.2233	
util living area	0.9862	0.9683	0.9306	0.8395	0.6947	0.5261	0.3973	0.4565	0.6938	0.9065	0.9745	0.9890	(86)
MIT	18.7204	19.1007	19.6268	20.2529	20.6914	20.9089	20.9724	20.9569	20.7743	20.1378	19.3060	18.6577	(87)
Th 2	20.0852	20.0870	20.0887	20.0967	20.0982	20.1052	20.1052	20.1065	20.1025	20.0982	20.0952	20.0920	(88)
util rest of house	0.9838	0.9631	0.9192	0.8144	0.6511	0.4639	0.3216	0.3762	0.6338	0.8859	0.9694	0.9871	(89)
MIT 2	17.3825	17.8661	18.5283	19.2989	19.8045	20.0355	20.0900	20.0812	19.9109	19.1791	18.1360	17.3066	(90)
Living area fraction										fLA = Living area / (4) =		0.0701	(91)
MIT	17.4762	17.9526	18.6053	19.3658	19.8667	20.0967	20.1519	20.1426	19.9715	19.2463	18.2180	17.4013	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.4762	17.9526	18.6053	19.3658	19.8667	20.0967	20.1519	20.1426	19.9715	19.2463	18.2180	17.4013	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9734	0.9458	0.8953	0.7909	0.6390	0.4633	0.3256	0.3795	0.6242	0.8613	0.9540	0.9783	(94)
Useful gains	1285.6504	1630.0236	1896.4028	2051.9511	1878.3592	1374.8062	919.7967	957.3438	1359.0850	1481.1668	1307.1878	1200.0898	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	3561.5065	3520.7411	3258.5322	2790.0443	2173.1701	1450.2644	937.1320	985.8746	1554.2428	2300.7935	2969.4398	3539.4131	(97)
Space heating kWh	1693.2369	1270.5622	1013.4242	531.4272	219.3393	0.0000	0.0000	0.0000	0.0000	609.8023	1196.8214	1740.4565	(98a)
Space heating requirement - total per year (kWh/year)												8275.0700	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1693.2369	1270.5622	1013.4242	531.4272	219.3393	0.0000	0.0000	0.0000	0.0000	609.8023	1196.8214	1740.4565	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8275.0700	
Space heating per m2											(98c) / (4) =	30.5443	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)
Fraction of space heat from main system(s) 1.0000 (202)
Efficiency of main space heating system 1 (in %) 92.4000 (206)
Efficiency of main space heating system 2 (in %) 0.0000 (207)
Efficiency of secondary/supplementary heating system, % 0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1693.2369	1270.5622	1013.4242	531.4272	219.3393	0.0000	0.0000	0.0000	0.0000	609.8023	1196.8214	1740.4565	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	1832.5075	1375.0673	1096.7795	575.1376	237.3802	0.0000	0.0000	0.0000	0.0000	659.9592	1295.2613	1883.6110	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	262.0688	231.6309	246.0725	216.7137	210.2345	189.6417	187.4725	194.9112	197.0085	219.4009	232.8874	259.2883	(64)
Efficiency of water heater												80.3000	(216)
(217)m	87.6420	87.4558	87.0780	86.2250	84.4724	80.3000	80.3000	80.3000	80.3000	86.4502	87.3757	87.6824	(217)
Fuel for water heating, kWh/month	299.0220	264.8549	282.5888	251.3350	248.8793	236.1665	233.4651	242.7288	245.3406	253.7887	266.5357	295.7131	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	45.5099	36.5097	32.8729	24.0841	18.6033	15.1990	16.9705	22.0589	28.6524	37.5935	42.4617	46.7747	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-99.5025	-134.0660	-184.1660	-197.4165	-204.8196	-188.0247	-185.2975	-178.5118	-165.8794	-148.1409	-106.9763	-86.7359	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-76.8307	-158.7048	-310.3666	-459.1715	-600.7781	-601.6748	-594.9550	-506.9494	-375.6442	-225.0327	-101.8922	-61.0172	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												8955.7035	(211)

Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	80.3000
Water heating fuel used	3120.4185 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	367.2907 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-5952.5545 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	6576.8582 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	8955.7035	0.2100	1880.6977	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3120.4185	0.2100	655.2879	(264)
Space and water heating			2535.9856	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	367.2907	0.1443	53.0114	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1879.5371	0.1356	-254.9137	
PV Unit electricity exported	-4073.0174	0.1263	-514.5558	
Total			-769.4695	(269)
Total CO2, kg/year			1831.4568	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			6.7600	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	8955.7035	1.1300	10119.9450	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3120.4185	1.1300	3526.0730	(278)
Space and water heating			13646.0179	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	367.2907	1.5338	563.3627	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1879.5371	1.5013	-2821.7632	
PV Unit electricity exported	-4073.0174	0.4637	-1888.8485	
Total			-4710.6117	(283)
Total Primary energy kWh/year			9628.8697	(286)
Target Primary Energy Rate (TPER)			35.5400	(287)