

Property Reference	S17212			Issued on Date	17/10/2017					
Survey Reference	Original		p Type Ref							
Property	New Dwelling, Horseshoe	Lane, Chadlin	gton, OX7 3NB							
SAP Rating		82 B	DER	12.55	TER	15.95				
Environmental		87 B	% DER <ter< th=""><th></th><th>21.33</th><th></th></ter<>		21.33					
CO₂ Emissions (t/year		3.01	DFEE	61.71	TFEE	65.78				
General Requirement	s Compliance	% DFEE <tfee< th=""><th></th><th>6.18</th><th></th></tfee<>		6.18						
Surveyor Malo	lcolm Lisle, Tel: 01142521995 Surveyor ID 8227-0002									
Client	Windown Elsie, Fell 011-12321333									

SAP2012 - 9.92 input data (DesignData) -

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SAP2012 Input Data (House)
                                                                                                                                                        17/10/2017
  FullRefNo:
                                                                                                                                                   England
  Regs Region:
  SAP Region:
                                                                                                                                                    Thames Valley
  Postcode:
DwellingOrientation:
                                                                                                                                                    OX7 3NB
                                                                                                                                                    House, Detached
   Property Type:
  Storevs:
  Date Built:
Sheltered Sides:
Sunlight Shade:
                                                                                                                                                    2017
                                                                                                                                                   Average or unknown
Perimeter, Floor Area, Storey Height
51.6, 148.02, 2.23
47.2, 121.15, 3.84
102.66 m2, fraction: 38.1%
Precise calculation
  Measurements
  1st Storey:
2nd Storey:
Living Area:
Thermal Mass:
                                                                                                                                                  rrecise calculation
Nett Area, Gross Area, Kappa, Element, Construction, Type, ShelterFactor, UValueFinal 112.37, 119.72, 60, CavityWallPlasterOnDabsAACblock, Cavity, 0, 0.18, Gross 100.75, 136.15, 60, CavityWallPlasterOnDabsAACblock, Cavity, 0, 0.18, Gross 11.4, 12.2, 150, CavityWallPlasterOnDabsDenseBlock, Cavity, 0, 0.2, Gross Area, Kappa 430.57, 60
External Walls
Main Cottage
Lower Cottage
Retaining Wall
Internal Walls
  Internal - Insulating Block
External Roofs
                                                                                                                                                   430.37, 60
Nett Area, Gross Area, Kappa, Construction, Element, UValueFinal
93.18, 94.26, 9, Plasterboard, insulated slope, 0.17
50.74, 52.9, 9, Plasterboard, insulated at ceiling level, 0.18
64.53, 64.53, 9, Plasterboard, insulated flat roof, 0.14
                         Sloping Roof
Plane Roof
                                                                                                                                               50.74, 52.9, 9, Plasterboard, insulated at ceiling level, 0.18
64.53, 64.53, 9, Plasterboard, insulated flat roof, 0.14
Area, Kappa, Construction, Element
81.62, 18, Plasterboard ceiling, carpeted chipboard floor
Area, Kappa, Construction, Element, Type, ShelterFactor, UValueFinal
39.53, 75, Suspended concrete floor, carpeted, Ground Floor - Solid, 0, 0.13
148.02, 110, Slab on ground, screed over insulation, Ground Floor - Solid, 0, 0.12
Area, Kappa, Construction, Element
81.62, 18, Plasterboard ceiling, carpeted chipboard floor
Data Source, Type, Glazing, Glazing Gap, Argon Filled, Solar Trans, Frame Type, Frame Factor, U Value
Manufacturer, Window, Double Low-E Soft 0.05, , 0.45, 0.7,
Manufacturer, Window, Double Low-E Soft 0.05, , 0.63, 0.7,
Manufacturer, Roof Window, Double Low-E Soft 0.05, , 0.63, 0.7,
Manufacturer, Roof Window, Double Low-E Soft 0.05, , 0.63, 0.7,
Opening Type, Location, Orientation, Pitch, Curtain Type, Overhang Ratio, Wide Overhang, Width, Height, Count, Area, Curtain Closed
Window, Main Cottage, North, None, 0, 0, 0, 0, 1.20,
Window, Main Cottage, South, None, 0, 0, 0, 0, 1.24,
Solid Door, Main Cottage, South, None, 0, 0, 0, 0, 1.89,
Window, Lower Cottage, North, None, 0, 0, 0, 0, 1.89,
Window, Lower Cottage, North, None, 0, 0, 0, 0, 1.89,
Window, Lower Cottage, West, None, 0, 0, 0, 0, 1.76,
Window, Lower Cottage, West, None, 0, 0, 0, 0, 1.76,
Window, Lower Cottage, West, None, 0, 0, 0, 0, 15.50,
Window, Lower Cottage, West, None, 0, 0, 0, 0, 15.50,
Window, Lower Cottage, West, None, 0, 0, 0, 0, 15.50,
Window, Lower Cottage, West, None, 0, 0, 0, 0, 18,
Roof Window, Plane Roof, West, 40, None, , 0, 0, 0, 1.08,
Roof Window, Plane Roof, West, 40, None, , 0, 0, 0, 1.108,
Roof Window, Plane Roof, West, 40, None, , 0, 0, 0, 2.16,
None
                         Flat Roof
 Internal Ceilings
Internal Ceiling
Heat Loss Floors
                        Upper Ground Floor
Lower Ground Floor
 Internal Floors
Internal Floor
Description
Lower Cottage Windows
                         Main Cottage Windows
                         Solid Door
Rooflights
Glazed Doors
  Openings
                         Windows
                         Windows
Windows
                          Front Door
                         Windows
                         Glazed Doors
                         Workshop Window
 Rooflights
Rooflights
Rooflights
Conservatory:
Draught Proofing:
Draught Lobby:
Thermal Bridges
Bridging:
                                                                                                                                                    100
                         Bridging:
                                                                                                                                                    Calculate Bridges
                                                                                                                                                 Junction with, Bridge Type, Source Type, Imported, Length, Psi, Adjusted, Result, Reference External wall, El Steel lintel with perforated steel base plate, Independently assessed, No, 26.3, 0.05, External wall, E2 Other lintels (including other steel lintels), No, 0, 0, 0, 0.00, External wall, E3 Sill, Table K1 - Approved, No, 18.3, 0.04, 0.04, 0.73, External wall, E4 Jamb, Table K1 - Approved, No, 56.8, 0.05, 0.05, 2.84, External wall, E5 Ground floor (normal), Table K1 - Approved, No, 77.7, 0.16, 0.16, 12.43, External wall, E19 Ground floor (inverted), No, 0, 0, 0, 0.00, External wall, E20 Exposed floor (normal), No, 0, 0, 0, 0, 0.00, External wall, E21 Exposed floor (inverted), No, 0, 0, 0, 0.00, External wall, E22 Basement floor, No, 0, 0, 0, 0, 0, 0.00, External wall, E6 Intermediate floor within a dwelling, Table K1 - Approved, No, 21.1, 0.07, 0.07, 1.48, External wall, E7 Party floor between dwellings (in blocks of flats), No, 0, 0, 0, 0, 0, 0, 0, 0, External wall, E8 Balcony within a dwelling, wall insulation continuous, No, 0, 0, 0, 0, 0.00, External wall, E9 Balcony between dwellings, wall insulation continuous, No, 0, 0, 0, 0, 0.00, External wall, E9 Balcony within or between dwellings balcony support penetrates wall insulation, No External wall, E10 Eaves (insulation at ceiling level), Table K1 - Approved, No, 20.4, 0.06, 0.06, 1.22, External wall, E10 Eaves (insulation at rafter level), Table K1 - Approved, No, 30.9, 0.04, 0.04, 1.24, External wall, E12 Gable (insulation at rafter level), Table K1 - Approved, No, 9.55, 0.24, 0.04, 1.24, External wall, E13 Gable (insulation at rafter level), Table K1 - Approved, No, 14.8, 0.04, 0.04, 0.59, External wall, E14 Flat roof, Table K1 - Default, No, 24.2, 0.08, 0.08, 1.94,
                         List of Bridges
                                                                                                                                                    Junction with, Bridge Type, Source Type, Imported, Length, Psi, Adjusted, Result, Reference
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     sessed, No, 26.3, 0.05, 0.05, 1.32,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       No, 0, 0, 0, 0.00,
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Regs Region: England Elmhurst Energy Systems SAP2012 Calculator (Design System) version 4.04r08



SAP2012 - 9.92 input data (DesignData) -

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External wall, E15 Flat roof with parapet, , No, 0, 0, 0, 0.00, External wall, E16 Corner (normal), Table K1 - Approved, No, 29.1, 0.09, 0.09, 2.62, External wall, E17 Corner (inverted - internal area greater than external area), Table K1 - Approved, No, 18.2, -0.09, -0.09, -
        23.
                                                 External wall, E18 Party wall between dwellings, , No, 0, 0, 0, 0.00,
         41.
Pressure Test:
                                                   True
Designed q50:
AsBuilt q50:
Property Tested:
Mechanical Ventilation
                                                  None
Chimneys MHS:
Chimneys SHS:
Chimneys Other:
Chimneys Total:
Open Flues MHS:
Open Flues SHS:
Open Flues Other:
Open Flues Total:
Intermittent Fans:
Passive Vents:
Flueless Gas Fires:
Cooling System
Light Fittings:
LEL Fittings:
LEL Fittings:
Percentage of LEL Fittir
External Lights Fitted:
External LELs Fitted:
Electricity Tariff:
Main Heating 1
                  of LEL Fittings:
                                                  Standard
        Description
Percentage
Sedbuk ID
                                                  Band A Gas Boiler
                                                  100
16396
        Fuel Type
                                                  Mains gas
        MHS
                                                   Mains gas BGB Post 98 Regular condens. with auto ign.
         SAP Code
                                                  102
Split Efficiences
        Boiler Efficiency Type
Efficiency Winter
Efficiency Summer
                                                  79.6
        Controls by PCDF
MHS Controls
Boiler Interlock
                                                   CBI Time and temperature zone control
                                                   Yes
        Compensator
        Delayed Start Stat
Ctrl SAP Code
Flue Type
                                                  2110
Balanced
        Fan Assisted Flue
                                                   Yes
        Pumped
Heat Pump Age
Heat Emitter
Flow Temperature
                                                  Pump in heated space
2013 or later
                                                  Underfloor
Normal (> 45°C)
        Under Floor Heating
                                                   Yes - Pipes in thin screed
Main Heating 2
Heating Systems Interaction
Smoke Control Area
                                                  Each system heats separate parts of dwelling 
Unknown
Community Heating
Secondary Heating
                                                  None
        SHS
                                                  RPP - Wood Pellets (in Bags) RPP Wood pellet Stove 635
         SAP Code
        Hetas Approved System
                                                  True
        Efficiency
                                                  65
Water Heating
        Type
WHS
                                                  MainHeating1
HWP From main heating 1
        Low Water Usage
                                                  Yes
        Low Water Usage Yes
SAP Code 901
Showers in Property Non-e
Hot Water Cylinder
Cylinder Type HotWe
Cylinder Insulation Type Foam
Cylinder Volume 300.C
Cylinder Stat Yes
Pipeworks Insulated Fully
Cylinder in Heated Space Yes
                                                  Non-electric only
                                                  HotWaterCylinder
                                                   300.00
                                                  Yes
Fully insulated primary pipework
Cylinder in Heated Space Yes
Separate Time Control Yes
Flue Gas Heat Recovery System None
Waste Water Heat Recovery none
PV Unit
Type
PVUnit 1
                                                   One Dwelling Cells Peak = 4, Orientation = East, Elevation = 45^{\circ}, Overshading = Modest, , Connected to Dwelling = No
Wind Turbine
Terrain Type:
Small Scale Hydro
                                                  None
Urban
Special Features
                                                  None
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SAP2012 - 9.92 input data (DesignData) -

REGULATIONS COMPLIANCE REPORT - Approve	d Document L1A, 2013 Edition, England	
DWELLING AS DESIGNED		
Detached House, total floor area 269 m^2		
This report covers items included within It is not a complete report of regulation		
la TER and DER Fuel for main heating:Mains gas Fuel factor:1.00 (mains gas) Target Carbon Dioxide Emission Rate (TE Dwelling Carbon Dioxide Emission Rate (DER) 12.55 kgCO□/m²OK	
1b TFEE and DFEE Target Fabric Energy Efficiency (TFEE) 6 Dwelling Fabric Energy Efficiency (DFEE	5.8 kWh/m²/yr)61.7 kWh/m²/yrOK	
2 Fabric U-values Element Average External wall 0.18 (max. 0.30) Floor 0.12 (max. 0.25) Roof 0.16 (max. 0.20)	Highest 0.20 (max. 0.70) OK 0.13 (max. 0.70) OK 0.18 (max. 0.35) OK 1.60 (max. 3.30) OK	
2a Thermal bridging	thermal transmittances for each junction	
3 Air permeability Air permeability at 50 pascals:	5.00 (design value) 10.0	OK
4 Heating efficiency Main heating system: Data from database Ideal Logic System 15	Boiler system with radiators or underfloor - Main	s gas
Efficiency: 89.3% SEDBUK2009 Minimum: 88.0%	OK	
Secondary heating system:	Room heaters - Wood Pellets (in Bags)	
Wood pellet Stove Efficiency: 65% Minimum: 65%	OK	
5 Cylinder insulation Hot water storage Permitted by DBSCG 2.86	Nominal cylinder loss: 2.55 kWh/day OK Yes	OK
6 Controls Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat Independent timer for DHW	OK OK
Boiler interlock	Yes	OK
7 Low energy lights Percentage of fixed lights with low-ene Minimum	rgy fittings:100% 75%	OK
8 Mechanical ventilation Not applicable		
9 Summertime temperature Overheating risk (Thames Valley): Based on: Overshading: Windows facing North: Windows facing East: Windows facing South: Windows facing West: Air change rate:	Not significant Average 2.52 m², No overhang 2.82 m², No overhang 3.14 m², No overhang 33.18 m², No overhang 8.00 ach None	ок
10 Key features Floor U-value Secondary heating (wood pellets (bags))	0.12 W/m²K	





CALCULATIO	ON OF D	WELLIN	G EMISSI	ONS FOR	REGULAT	TIONS C	OMPLIAN	ICE 09	Jan 2014				
SAP 2012 WORKSHE					9.92, Janua								
CALCULATION OF I			OR REGULATIO			Jan 2014 							
. Overall dwell													
								Area	Store	ey height		Volume	
round floor irst floor								(m2) 148.0200 121.1500		(m) 2.2300 (3.8400 ((m3) 330.0846 465.2160	
otal floor area welling volume	1 TFA = (1a	a) + (1b) + (1	c) + (1d) + (1e)	(1n)	2	69.1700			(1c) A (a) + (3b) + (3c)			795.3006	(4)

. Ventilation r	ate				main	s	econdary		other	tota	.1 r	m3 per hour	
umber of chimne					heating 0	+	heating 0	+	0 =		0 * 40 =	0.0000	
umber of open f umber of intern umber of passiv	nittent far	ns			0	+	0	+	0 =		0 * 20 = 5 * 10 = 0 * 10 =	0.0000 50.0000 0.0000	(7a)
umber of fluele		res									0 * 40 =	0.0000	
nfiltration due	to chimne	eys, flues	and fans	= (6a)+(6b)+(7a)+(7b)+	(7c) =				50.0000		es per hour 0.0629 Yes	(8)
ressure test easured/design nfiltration rat	:e											5.0000 0.3129	(18)
umber of sides helter factor	sheltered								(20) = 1 -	[0 075 x	(19)1 =	0.8500	(19)
nfiltration rat	e adjusted	d to inclu	de shelter :	factor						1) = (18) x		0.2659	
ind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000	(22)
ind factor dj infilt rate	1.2750	1.2500	1.2250 0.3258	1.1000	1.0750 0.2859	0.9500	0.9500 0.2526	0.9250	1.0000	1.0750 0.2859	1.1250	1.1750 0.3125	
ffective ac	0.5575	0.5553	0.5531	0.5428	0.5409	0.5319	0.5319	0.5303	0.5354	0.5409	0.5448		
. Heat losses a													
lement				Gross m2	Openings m2		etArea m2	U-value W/m2K	A x 1	K k	value J/m2K	A x K kJ/K	
ower Cottage Wi ain Cottage Wir olid Door						6	5.4000 5.2600 8900	1.3616 1.5038 1.4700	48.199 9.413 2.778	5			(27) (27) (26)
ooflights (Uw = oper Ground Flo						3	3.2400 9.5300	1.5038	4.872 5.138	2	.0000	2964.7500	(27a)
ower Ground Flo ain Cottage	oor			119.7200	7.3500	112	3.0200 2.3700	0.1200 0.1800	17.762 20.226	6 60	.0000	16282.2000 6742.2000	(29a)
ower Cottage etaining Wall			1	136.1500	35.4000 0.8000	11	.7500	0.1800	18.135	0 150	.0000	6045.0000 1710.0000	(29a)
loping Roof lane Roof lat Roof				94.2600 52.9000 64.5300	1.0800 2.1600	50	3.1800).7400 !.5300	0.1700 0.1800 0.1400	15.840 9.133 9.034	2 9	.0000	838.6200 456.6600 580.7700	(30)
otal net area o abric heat loss			Aum(A, m2)	04.5500			.3100	30) + (32)			.0000	300.7700	(31)
nternal - Insul nternal Floor	ating Bloo					81	.5700 .6200	30, (32)	102.011	60 18	.0000	25834.2000 1469.1600	(32c) (32d)
nternal Ceiling eat capacity Cm		× k)				81	.6200	(28)	(30) + (32)		.0000 .(32e) =	1469.1600	
hermal mass par hermal bridges	ameter (Ti	MP = Cm /)			, .,,	,			239.2270 28.3710	(35) (36)
otal fabric hea entilation heat		culated ma	nthlv (20)-	= 0 33 4 /	25)m v (5)					(33)	+ (36) =	191.1856	(37)
	Jan	Feb	Mar 145.1514	Apr	May 141.9496	Jun 139.6004	Jul 139.6004	Aug 139.1654	Sep 140.5053	Oct 141.9496	Nov 142.9704	Dec 144.0377	(38)
eat transfer co	eff 337.4971	336.9112	336.3370		333.1352	330.7860	330.7860	330.3510	331.6909	333.1352	334.1561		(39)
vorage - Sum(35	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	333.63/4 Dec	(33)
LP LP (average)	1.2538	1.2517	1.2495	1.2395	1.2376	1.2289	1.2289	1.2273	1.2323	1.2376	1.2414	1.2454 1.2395	
ys in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)
Water heating	energy re	equirement:	s (kWh/year)										
ssumed occupano	Э	se (litres										3.0919 107.6315	





Description		DWELLIN	IG EMISSI	ONS FOR	R REGULA	TIONS CO	OMPLIAN	ICE 09	Jan 2014	,			
121-2946 14.092 10-7161 10-0076 10-1076 10-0		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
March Section 26,3364 23,0360 23,7570 25,7274 19.8306 17.1300 15.8396 17.1300 12.6428 13.4628 21.1206 27.4470 30.0000 10.000	118.3946 Energy conte 175.5758 Energy content (annual)	153.5597	158.4599							143.4437	156.5800	170.0358	(45)
Stock Part Stock Part Stock Part Stock Part Par	26.3364			20.7224	19.8836	17.1580	15.8994	18.2448	18.4628	21.5166	23.4870	25.5054	(46)
Values factor from Table 3 Values from Values fro	Store volume b) If manufacturer dec												
41,7306 81,5338 42,7206 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 41,3506 42,7200 42,3506 42,7200 41,3506 42,7200 42,3506 42,7200 41,3506 42,7200 42,3506 42,7200 41,3506 42,7200 42,3506 42,7200 41,3506 42,7200 42,3506 42,7200 41,3506 42,7200 42,4	Volume factor from Tak Temperature factor from Enter (49) or (54) in (5	ble 2a om Table 2b	om Table 2 (kWh/litre/d	ay)							0.7368 0.5400	(52) (53)
Company Comp	42.7290			41.3506	42.7290	41.3506	42.7290	42.7290	41.3506	42.7290	41.3506	42.7290	(56)
221.0872 221.0840 224.0512 221.010 191.080 171.0870 171.0870 187.023 181.0870 209.0512 222.0242 226.0227 (220.000 20.0000 20.000 20.000 20.000 20.000 20.000 20.000 20.0	42.7290 Primary loss 23.2624	38.5939 21.0112	42.7290 23.2624	22.5120	23.2624								
National Property	241.5672	213.1648	224.4512	202.0118	198.5488			0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Seek gains from water heating, NBM/morth 111.1720 98.7427 103.4810 97.0247 96.8684 89.1238 88.0369 93.2359 92.0159 100.4881 103.1330 109.3300 (65)		213.1648	224.4512	202.0118	198.5488	178.2496	171.9877	187.6237	186.9476	209.4351	220.4426	236.0271	(64)
### Description 1.0				97.0247	96.8684	89.1238	88.0369						
March Marc													
Mart													
39,8248 35,3721 28.7665 21.7781 16.2794 13.7437 14.806 19.3034 25.9089 32.8973 33.906 40.9317 (67) appliances gains (calculated in Appendix I, equation L150 or L151, also see Table 5. coxing gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I, equation L150 or L150, also see Table 5. socking gains (calculated in Appendix I) also see Table 5. socking gains (calculated in Appendix I) also see Table 5. socking gains (calculated in Appendix I) also see Table 5. socking gains (calculated in Appendix I) also see Table 5. socking gains (calculated in Appendix I) also see Table 5. socking gains (calculated I) also see Table 5.	Jan (66)m 154.5925	Feb 154.5925	154.5925	154.5925	154.5925	154.5925	154.5925						(66)
432.7918 437.2829 425.9656 601.8726 371.694 342.8753 323.7794 319.2884 330.6056 334.697 385.1118 413.6959 (68)	39.8248	35.3721	28.7665	21.7781	16.2794	13.7437	14.8506	19.3034	25.9089	32.8973	38.3960	40.9317	(67)
The control of the co	432.7918	437.2829	425.9656	401.8726	371.4594	342.8753	323.7794	319.2884	330.6056	354.6987	385.1118	413.6959	(68)
Doses e.g. evaporation (negative values) (Table 5)	38.4593	38.4593	38.4593	38.4593	38.4593	38.4593	38.4593						
149,4248	osses e.g. evaporation	(negative v	values) (Tab	le 5)									
Feb	149.4248		141.7755	134.7565	130.1995	123.7830	118.3291	125.3170	127.7998	135.0647	143.2680	146.9489	(72)
March		691.9712	668.8854	630.7849	590.3160	552.7798	529.3369	536.2865	556.6921	595.0385	639.1536	673.9543	(73)
Area Solar flux Table 6s Specific data Specific data FF Access Gains Table 6s W/m2 Table 6s Specific data Specific d	6. Solar gains												
Wim2				rea	Solar flux		g						
South 0.9000 46,7521 0.4500 0.7000 0.7700 0.7700 142.2550 (80) Nest 33.1800 19.6403 0.4500 0.7000 0.7700 142.2550 (80) North 1.2000 10.6334 0.6300 0.7000 0.7700 16.2650 (76) North 2.2800 19.6403 0.6300 0.7000 0.7700 16.2650 (76) North 2.2400 46,7521 0.6300 0.7000 0.7700 16.9265 (76) North 2.2400 46,7521 0.6300 0.7000 0.7700 1.0000 11.3366 (82) Nest 2.1600 26.4634 0.6300 0.7000 1.0000 1.0000 12.4336 (82) Notal gains 241.1730 460.1608 737,9355 1058.7091 1290.6958 1320.2946 1257.2328 1082.9637 851.3358 539.9819 298.4095 199.9222 (83) Notal gains 935.5923 1152.1320 1406.8210 1689.4941 1881.0119 1873.0744 1786.5697 1619.2502 1408.0279 1135.0204 937.5631 873.8765 (84) 7. Mean internal temperature (heating season) 8. Mar Apr May Jun Jul Aug Sep Oct Nov Dec Nov					W/m2	or	Table 6b	or Tab	le 6c	Table	6d		
North 1.2000 10.6334 0.6300 0.7000 0.7700 3.8996 (74) East 2.8200 19.6603 0.6300 0.7000 0.7700 32.055 (76) South 2.2400 46.7521 0.6300 0.7000 0.7700 32.055 (76) South 2.2400 26.4634 0.6300 0.7000 1.0000 11.3436 (82) Mest 2.1600 26.2379 0.6300 0.7000 1.0000 11.3436 (82) Mest 2.1600 26.2379 0.6300 0.7000 1.0000 22.4939 (82) Mest 2.1600 20.0000 0.7000 1.0000 22.4939 (82) Mest 2.1600 20.901 20.8790 20.6895 20.3187 19.9532 19.6743 (87) Mest 2.1600 20.9970 0.9991 0.9965 0.9942 0.9353 0.7931 0.5843 0.6629 0.9224 0.9936 0.9992 0.9998 (89) Mest 2.1600 20.9970 0.9991 0.9965 0.9942 0.9933 0.9975 0.9940 19.8969 19.8969 19.8969 19.8961 19.8963 19.8960 19.8970 19.8983 (89) Mest 2.1600 20.9971 0.9970 0.9991 0.9965 0.9942 0.9933 0.7931 0.5843 0.6629 0.9224 0.9936 0.9992 0.9998 (80) Mest 2.1600 20.9971 0.9991 0.9965 0.9942 0.9933 0.7931 0.5843 0.6629 0.9224 0.9936 0.9992 0.9998 (80) Mest 2.1600 20.9971 19.9935 19.5644 19.0355 18.4988 18.8880 (90) Mest 2.1600 20.9971 19.9935 19.5644 19.0355 18.4988 18.8880 (90) Mest 2.1600 20.9971 19.9935 19.5644 19.0355 18.4988 18.8880 (90) Mest 2.1600 20.9971 19.9935 19.5644 19.0355 18.4988 18.8880 (90) Mest 2.1600 20.9971 19.9935 19.5644 19.0355 18.4988 18.8880 (90) Mest 2.1600 20.9971 19.9935 19.5644 19.0355 18.4988 18.8880 (90) Mest 2.1600 20.9971 19.9935 19.5644 19.035	South		0.9	000					.7000	0.77			
South 2.2400 46.7521 0.6300 0.7000 0.7700 32.0052 (78) East 1.0800 26.4634 0.6300 0.7000 1.0000 11.3436 (82) West 2.1600 26.2379 0.6300 0.7000 1.0000 22.4939 (82) Solar gains 241.1730 460.1608 737.9355 1058.7091 1290.6958 1320.2946 1257.2328 1082.9637 851.3358 539.9819 298.4095 199.9222 (83) Total gains 935.5923 1152.1320 1406.8210 1689.4941 1881.0119 1873.0744 1786.5697 1619.2502 1408.0279 1135.0204 937.5631 873.8765 (84)	meat.				10 (400								1001
2.1600 26.2379 0.6300 0.7000 1.0000 22.4939 (82) Solar gains 241.1730 460.1608 737.9355 1058.7091 1290.6958 1320.2946 1257.2328 1082.9637 851.3358 539.9819 298.4095 199.9222 (83) Foctal gains 935.5923 1152.1320 1406.8210 1689.4941 1881.0119 1873.0744 1786.5697 1619.2502 1408.0279 1135.0204 937.5631 873.8765 (84) The momentume during heating periods in the living area from Table 9, Th1 (C) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area, nil, m (see Table 9a) The propertume during heating periods in the living area from Table 9, Th1 (C) The propertume and the propertume	North		1.2	000	10.6334		0.4500 0.6300	0	.7000 .7000	0.77 0.77	00 00	142.2550 3.8996	(74)
The probability of the probabili	North East South		1.2 2.8 2.2	000 200 400	10.6334 19.6403 46.7521		0.4500 0.6300 0.6300 0.6300	0 0 0	.7000 .7000 .7000 .7000	0.77 0.77 0.77 0.77	00 00 00 00	142.2550 3.8996 16.9265 32.0052	(74) (76) (78)
7. Mean internal temperature (heating season) Pemperature during heating periods in the living area from Table 9, Th1 (C) Itilisation factor for gains for living area, nil,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Lau 52.9986 53.0907 53.1814 53.6113 53.6925 54.0738 54.0738 54.1450 53.9263 53.6925 53.5285 53.3581 Lipha 4.5332 4.5394 4.5454 4.5741 4.5795 4.6049 4.6049 4.6047 4.5951 4.5795 4.5686 4.5572 Litiliving area 0.9998 0.9993 0.9975 0.9891 0.9574 0.8679 0.7287 0.7947 0.9558 0.9959 0.9995 0.9998 (86) ATT 19.6912 19.8045 20.0167 20.3104 20.5951 20.8100 20.9001 20.8790 20.6895 20.3187 19.5322 19.6743 (87) The 2 19.8772 19.8789 19.8806 19.8885 19.8900 19.8969 19.8969 19.8982 19.8943 19.8900 19.8870 19.8839 (88) Litil rest of house 0.9997 0.9991 0.9965 0.9842 0.9353 0.7931 0.5843 0.6629 0.9224 0.9936 0.9992 0.9998 (89) Living area fraction 10 18.716 18.8582 19.1319 19.5122 19.8713 20.1274 20.2149 20.1991 19.9935 19.5249 19.0355 18.4988 18.6886 (92) Pemperature adjustment	North Cast South Cast West		1.2 2.8 2.2 1.0 2.1	000 200 400 800 600	10.6334 19.6403 46.7521 26.4634 26.2379		0.4500 0.6300 0.6300 0.6300 0.6300 0.6300	0 0 0 0 0	.7000 .7000 .7000 .7000 .7000	0.77 0.77 0.77 0.77 1.00	00 00 00 00 00	142.2550 3.8996 16.9265 32.0052 11.3436	(74) (76) (78) (82)
Temperature during heating periods in the living area from Table 9, Th1 (C) 1	North East South East West	460.1608	1.2 2.8 2.2 1.0 2.1 737.9355	000 200 400 800 600 	10.6334 19.6403 46.7521 26.4634 26.2379	1320.2946	0.4500 0.6300 0.6300 0.6300 0.6300 0.6300	0 0 0 0 0 0	.7000 .7000 .7000 .7000 .7000 .7000 .7000	0.77 0.77 0.77 0.77 1.00 1.00	00 00 00 00 00 00 00 00	142.2550 3.8996 16.9265 32.0052 11.3436 22.4939	(74) (76) (78) (82) (82)
Lau 52.986 53.0907 53.1814 53.6113 53.625 54.0738 54.0738 54.1450 53.926 53.5265 53.5285 53.3581 alpha 4.5332 4.5394 4.5454 4.5741 4.5795 4.6049 4.6049 4.6047 4.5951 4.5795 4.5686 4.5572 artilliving area 0.9998 0.9993 0.9975 0.9891 0.9574 0.8679 0.7287 0.7947 0.9558 0.9959 0.9995 0.9998 (86) AIT 19.6912 19.8045 20.0167 20.3104 20.5951 20.8100 20.9001 20.8790 20.6895 20.3187 19.9532 19.6743 (87) artillirest of house 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	North Cast South Cast West Solar gains 241.1730 Total gains 935.5923	460.1608 1152.1320 ature (heati	1.2 2.8 2.2 1.0 2.1 737.9355 1406.8210	000 200 400 800 600 	10.6334 19.6403 46.7521 26.4634 26.2379 1290.6958 1881.0119	1320.2946 1873.0744	0.4500 0.6330 0.6330 0.6330 0.6300 0.6300 0.6300 1257.2328 1786.5697	0 0 0 0 0 0 0 1082.9637 1619.2502	.7000 .7000 .7000 .7000 .7000 .7000 .7000	0.77 0.77 0.77 0.77 1.00 1.00	00 00 00 00 00 00 00 00	142.2550 3.8996 16.9265 32.0052 11.3436 22.4939	(74) (76) (78) (82) (82)
0.9998 0.9993 0.9975 0.9891 0.9574 0.8679 0.7287 0.7947 0.9558 0.9959 0.9995 0.9998 (86) AIT 19.6912 19.8045 20.0167 20.3104 20.5951 20.8100 20.9001 20.8790 20.6895 20.3187 19.9532 19.6743 (87) The 2 19.8772 19.8789 19.8806 19.8885 19.8900 19.8969 19.8969 19.8982 19.8943 19.8900 19.8870 19.8839 (88) AIT 2 18.1076 18.2748 18.5865 19.0200 19.4251 19.7065 19.7925 19.7799 19.5644 19.0355 18.4988 18.0880 (90) Living area fraction AIT 18.7116 18.8582 19.1319 19.5122 19.8713 20.1274 20.2149 20.1991 19.9935 19.5249 19.0539 18.6930 (92) Temperature adjustment	North Cast South Cast Solar gains 241.1730 Cotal gains 935.5923 7. Mean internal temperature during heat: Stillstation factor for contents	460.1608 1152.1320 ature (heati ing periods gains for li	1,2 2.8 2,2 1,0 2.1 737.9355 1406.8210	000 200 400 800 600 1058.7091 1689.4941	10.6334 19.6403 46.7521 26.4634 26.2379 1290.6958 1881.0119	1320.2946 1873.0744	0.4500 0.6300 0.6300 0.6300 0.6300 0.6300 	1082.9637 1619.2502	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000	0.77 0.77 0.77 0.77 1.00 1.00 539.9819 1135.0204	00 00 00 00 00 00 00 298.4095 937.5631	142.2550 3.8996 16.9265 32.0052 11.3436 22.4939 199.9222 873.8765	(74) (76) (78) (82) (82) (83) (84)
Th 2 19.8772 19.8789 19.8806 19.8885 19.8900 19.8969 19.8969 19.8982 19.8943 19.8900 19.8970 19.8839 (88) til rest of house 0.9997 0.9991 0.9965 0.9842 0.9353 0.7931 0.5843 0.6629 0.9224 0.9936 0.9922 0.9998 (89) 4IT 2 18.1076 18.2748 18.5865 19.0200 19.4251 19.7065 19.7925 19.7799 19.5644 19.0355 18.4988 18.0880 (90) tiving area fraction 18.7116 18.8582 19.1319 19.5122 19.8713 20.1274 20.2149 20.1991 19.9935 19.5249 19.0535 18.6930 (92) Temperature adjustment	North East South East South Cast West Solar gains 241.1730 Fotal gains 935.5923 7. Mean internal temper Temperature during heat: Utilisation factor for G Jan Lau 52.9986 Lau 52.9986 Lau 4.5332	460.1608 1152.1320 ature (heati- ing periods gains for li Feb 53.0907	1,2 2.8 2,2 1,0 2.1 737.9355 1406.8210 ing season) in the livitiving area, Mar 53.1814	000 200 400 800 600 	10.6334 19.6403 46.7521 26.4634 26.2379 1290.6958 1881.0119 m Table 9, Table 9a) May 53.6925	1320.2946 1873.0744	0.4500 0.6330 0.6330 0.6330 0.6330 0.6330 1257.2328 1786.5697	1082.9637 1619.2502	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .851.3358 1408.0279	0.77 0.77 0.77 0.77 1.00 1.00 539.9819 1135.0204	00 00 00 00 00 00 00 298.4095 937.5631	142.2550 3.8996 16.9265 32.0052 11.3436 22.4939 199.9222 873.8765	(74) (76) (78) (82) (82) (83) (84)
0.9997 0.9991 0.9965 0.9842 0.9353 0.7931 0.5843 0.6629 0.9224 0.9936 0.9992 0.9998 (89) AIT 2 18.1076 18.2748 18.5865 19.0200 19.4251 19.7065 19.7925 19.7799 19.5644 19.0355 18.4988 18.0880 (90) Aiving area fraction fLA = Living area / (4) = 0.3814 (91) AIT 18.7116 18.8582 19.1319 19.5122 19.8713 20.1274 20.2149 20.1991 19.9935 19.5249 19.0535 18.6930 (92) Comperature adjustment0.1500	Conth clast clouds and clast clouds and clast clouds and clast class clouds and class clas	460.1608 1152.1320 ature (heati ing periods gains for li Feb 53.0907 4.5394	1.2 2.8 2.2 1.0 2.1 737.9355 1406.8210 ing season) in the livi ving area, Mar 53.1814 4.5454	000 200 400 800 600 	10.6334 19.6403 46.7521 26.4634 26.2379 1290.6958 1881.0119 1290.6958 1881.0119 1290.6958 1881.0119	1320.2946 1873.0744 	0.4500 0.6330 0.6330 0.6330 0.6300 0.6300 1257.2328 1786.5697 Jul 54.0738 4.6049	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .851.3358 1408.0279 Sep 53.9263 4.5951	0.77 0.77 0.77 0.77 1.00 1.00 539.9819 1135.0204	00 00 00 00 00 00 00 298.4095 937.5631 Nov 53.5285 4.5686	142.2550 3.8996 16.9265 32.0052 11.3436 22.4939 199.9222 873.8765 21.0000 Dec 53.3581 4.5572	(74) (76) (78) (82) (82) (83) (84)
MIT 18.7116 18.8582 19.1319 19.5122 19.8713 20.1274 20.2149 20.1991 19.9935 19.5249 19.0535 18.6930 (92) Pemperature adjustment -0.1500	North Bast South Cast South Cast Solar gains 241.1730 Potal gains 935.5923 7. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923 10. Mean internal temper Temperature during heat: Solar gains 935.5923	460.1608 1152.1320 ature (heati ing periods gains for li Feb 53.0907 4.5394 0.9993 19.8045	1,2 2.8 2,2 1,0 2,1 737.9355 1406.8210 ing season) in the livitiving area, Mar 53.1814 4.5454 0.9975 20.0167	000 200 400 800 600 1058.7091 1689.4941 ng area fro ni1,m (see Apr 53.6113 4.5741 0.9891 20.3104	10.6334 19.6403 46.7521 26.4634 26.2379 1290.6958 1881.0119 m Table 9, Table 9a) May 53.6925 4.5795 0.9574 20.5951	1320.2946 1873.0744 	0.4500 0.6300 0.6300 0.6300 0.6300 1257.2328 1786.5697 Jul 54.0738 4.6049 0.7287 20.9001	1082.9637 1619.2502 Aug 54.1450 4.6097 0.7947 20.8790	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .851.3358 1408.0279 .8ep 53.9263 4.5951 0.9558 20.6895	0.77 0.77 0.77 1.00 1.00 539.9819 1135.0204	00 00 00 00 00 00 00 298.4095 937.5631 Nov 53.5285 4.5686 0.9995	142.2550 3.8996 16.9265 32.0052 11.3436 22.4939 199.9222 873.8765 21.0000 Dec 53.3581 4.5572 0.9998 19.6743	(74) (76) (78) (82) (82) (83) (84) (85)
	North East South Cast South Cast Solar gains 241.1730 Fotal gains 935.5923 7. Mean internal temper: Pemperature during heat: Utilisation factor for 6 Jan Lau 52.9986 Alpha 4.5332 Util living area 0.9998 AUT 19.6912 Th 2 19.8772 Util rest of house 0.9997 AUT 2 18.1076	460.1608 1152.1320 ature (heati ing periods gains for li Feb 53.0907 4.5394 0.9993 19.8045 19.8789 0.9991	1,2 2.8 2,2 1,0 2,1 737.9355 1406.8210 737.9355 1406.8210 ing season) in the livitiving area, Mar 53.1814 4.5454 0.9975 20.0167 19.8806 0.9965	000 200 400 800 600 	10.6334 19.6403 46.7521 26.4634 26.2379 1290.6958 1881.0119 1290.6958 1881.0119 1290.6958 1881.0119 1890.6958 4.5795 0.9574 20.5951 19.8900 0.9353	1320.2946 1873.0744 Th1 (C) Jun 54.0738 4.6049 0.8679 20.8100 19.8969 0.7931	0.4500 0.6300 0.6300 0.6300 0.6300 1257.2328 1786.5697 3u1 54.0738 4.6049 0.7287 20.9001 19.8969 0.5843	1082.9637 1619.2502 Aug 54.1450 4.6097 0.7947 20.8790 19.8982 0.6629	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .851.3358 1408.0279 .8ep 53.9263 4.5951 0.9558 20.6895 19.8943	0.77 0.77 0.77 1.00 1.00 539.9819 1135.0204 Oct 53.6925 4.5795 0.9959 20.3187 19.8900 0.9936 19.0355	00 00 00 00 00 00 00 00 00 00 00 00 00	142.2550 3.8996 16.9265 32.0052 11.3436 22.4939 199.9222 873.8765 21.0000 Dec 53.3581 4.5572 0.9998 19.6743 19.8839 0.9998 18.0880	(74) (76) (78) (82) (82) (83) (84) (85) (86) (87) (88) (89) (90)
	North East South East West Solar gains 241.1730 Total gains 935.5923 7. Mean internal temperature during heat: Utilisation factor for gains 4.5332 util living area MIT 19.6912 Th 2 19.8772 util rest of house 0.9997 MIT 2 18.1076 Living area fraction MIT 18.7116	460.1608 1152.1320 ature (heati ing periods gains for li Feb 53.0907 4.5394 0.9993 19.8045 19.8789 0.9991 18.2748	1.2 2.8 2.2 1.0 2.1 737.9355 1406.8210 737.9355 1406.8210 ing season) in the livitying area, Mar 53.1814 4.5454 0.9975 20.0167 19.8806 0.9965 18.5865	000 200 400 800 600	10.6334 19.6403 46.7521 26.4634 26.2379 1290.6958 1881.0119 1290.6958 1881.0119 1290.6958 1881.0119 1290.6958 1881.0119 1290.6958 1881.0119 1290.6958 1881.0119	1320.2946 1873.0744 Th1 (C) Jun 54.0738 4.6049 0.8679 20.8100 19.8969 0.7931 19.7065	0.4500 0.6300 0.6300 0.6300 0.6300 0.6300 1257.2328 1786.5697 Jul 54.0738 4.6049 0.7287 20.9001 19.8969 0.5843 19.7925	1082.9637 1619.2502 Aug 54.1450 4.6097 0.7947 20.8790 19.8982 0.6629 19.7799	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .851.3358 1408.0279 .3.9263 4.5951 0.9558 20.6895 19.8943 0.9224 19.5644 fla =	0.77 0.77 0.77 1.00 1.00 539.9819 1135.0204 Oct 53.6925 4.5795 0.9959 20.3187 19.8900 0.9936 19.0355 Living are	00 00 00 00 00 00 00 00 00 00 00 00 00	142.2550 3.8996 16.9265 32.0052 11.3436 22.4939 199.9222 873.8765 21.0000 Dec 53.3581 4.5572 0.9998 19.6743 19.8839 0.9998 18.0880 0.3814 18.6930	(74) (76) (78) (82) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91)





CALCULATION OF I	DWELLIN	G EMISSI	ONS FOR	R REGULA	TIONS C	OMPLIAN	ICE 09	Jan 2014	ļ			
Ext temp. 4.3000	Feb 0.9987 1150.5954 4.9000	Mar 0.9954 1400.3084 6.5000	Apr 0.9810 1657.3885 8.9000	May 0.9309 1751.1279 11.7000	Jun 0.7997 1497.9445 14.6000	Jul 0.6091 1088.1201 16.6000	Aug 0.6841 1107.7777 16.4000	Sep 0.9203 1295.7744 14.1000	Oct 0.9919 1125.8529 10.6000	Nov 0.9989 936.5546 7.1000	Dec 0.9997 873.5747 4.2000	(95)
Heat loss rate W 4813.2428 Month fracti 1.0000	4652.1467 1.0000	4198.1370 1.0000	3490.5912 1.0000	2672.1772	1778.7556	1146.1453	1205.4868	1905.0613	2923.2295	3944.2255		
Space heating kWh 2885.3063 Space heating	2353.0425	2081.5845	1319.9059	685.2607	0.0000	0.0000	0.0000	0.0000	1337.2482	2165.5231	2927.2933 15755.1644	
Space heating per m2									(98) / (4) =	58.5324	
8c. Space cooling require												
Not applicable												
9a. Energy requirements												
Fraction of space heat f. Fraction of space heat f. Efficiency of main space Efficiency of secondary/ Space heating requiremen	rom main sy: heating sy: supplementa:	stem(s) stem 1 (in	%)	m (Table 11)						0.1000 0.9000 90.3000 65.0000 15702.8217	(202) (206) (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(===)
	2353.0425			685.2607	0.0000	0.0000	0.0000	0.0000	1337.2482	2165.5231	2927.2933	(98)
Space heating efficiency 90.3000	90.3000	90.3000	90.3000	90.3000	0.0000	0.0000	0.0000	0.0000	90.3000	90.3000	90.3000	(210)
Space heating fuel (main 2875.7205) Water heating requirement	2345.2251		1315.5209	682.9841	0.0000	0.0000	0.0000	0.0000	1332.8055	2158.3286	2917.5681	(211)
	362.0065	320.2438	203.0625	105.4247	0.0000	0.0000	0.0000	0.0000	205.7305	333.1574	450.3528	(215)
Water heating Water heating requirement	t											
Efficiency of water heat		224.4512	202.0118	198.5488	178.2496	171.9877	187.6237	186.9476	209.4351	220.4426	79.6000	(216)
(217)m 89.2786 Fuel for water heating, 270.5767	89.2034 kWh/month 238.9649	89.0197 252.1365	88.5696 228.0824	87.4376 227.0748	79.6000 223.9316	79.6000	79.6000 235.7082	79.6000 234.8588	88.5360 236.5537	89.0832 247.4570	89.3129 264.2700	
Water heating fuel used Annual totals kWh/year Space heating fuel - main Space heating fuel - second	n system	232.1303	220.0024	227.0740	223.9310	210.0030	233.7002	234.0300	230.3337	247.4370	2875.6797 15702.8217 2423.8715	(219) (211)
Electricity for pumps and central heating pump main heating flue fan	d fans:										30.0000 45.0000	
Total electricity for the Electricity for lighting	e above, kW		ix L)								75.0000 703.3187	(231)
Energy saving/generation PV Unit 0 (0.80 * 4.00 * Total delivered energy for	853 * 0.80		ces M ,N an	d Q)							-2183.7566 19596.9350	
12a. Carbon dioxide emis												
							Energy	Emiss	ion factor		Emissions	
Space heating - main sys							kWh/year 15702.8217		kg CO2/kWh 0.2160	:	kg CO2/year 3391.8095	(261)
Space heating - secondar Water heating (other fue							2423.8715 2875.6797		0.0390 0.2160		94.5310 621.1468	(264)
Space and water heating Pumps and fans Energy for lighting							75.0000 703.3187		0.5190 0.5190		4107.4873 38.9250 365.0224	(267)
Energy saving/generation PV Unit Total CO2, kg/year	n technolog	ies					-2183.7566		0.5190		-1133.3697 3378.0650	
Dwelling Carbon Dioxide	Emission Ra	te (DER)									12.5500	
16 CO2 EMISSIONS ASSOCIA	TED WITH AP	PLIANCES AN	D COOKING A	ND SITE-WID	E ELECTRICI	TY GENERATI	ON TECHNOLO	GIES				
DER Total Floor Area										TFA	12.5500 269.1700	ZC1
Assumed number of occupations of actor in Touristic CO2 emissions from applications from the control of accupations from the c	able 12 for		y displaced	from grid						N EF	3.0919 0.5190 9.5279	702
CO2 emissions from cookis Total CO2 emissions											0.7178 22.7957	ZC3
Residual CO2 emissions of Additional allowable elec											0.0000	ZC5
Resulting CO2 emissions Net CO2 emissions				electricity	generation						0.0000 22.7957	ZC7





CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014 1. Overall dwelling dimensions Volume (m3) 330.0846 (1b) - (3b) (m2) 148.0200 (1b) (m) 2.2300 (2b) First floor
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)
Dwelling volume 121.1500 (1c) 3.8400 (2c) 465.2160 (1c) - (3c) (4) 269.1700 2. Ventilation rate secondary other total m3 per hour 0 * 40 = 0 * 20 = 4 * 10 = 0 * 10 = Number of chimneys Number of open flues Number of intermittent fans Number of passive vents Number of flueless gas fires 0 0.0000 (6b) 40.0000 (7a) Air changes 40.0000 / (5) = Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 0.0503 (8) Pressure test Measured/design q50 5.0000 0.3003 (18) Infiltration rate Number of sides sheltered 2 (19) - [0.075 x (19)] = (21) = (18) x (20) = (20) = 1 -0.8500 (20) 0.2553 (21) Infiltration rate adjusted to include shelter factor Feb 5.0000 1.2500 Jul 3.8000 Aug 3.7000 0.9250 Sep 4.0000 Dec 4.7000 (22) 1.1750 (22a) 5.1000 1.2750 4.9000 1.2250 Wind speed 1.1000 1.0750 1.0750 1.1250 Wind factor 0.9500 0.9500 1.0000 Adj infilt rate 3. Heat losses and heat loss parameter U-value W/m2K 1.0000 A x U W/K 1.8900 55.2311 TER Opaque door TER Opening Type (Uw = 1.40)
TER Room Window (Uw = 1.70)
Upper Ground Floor
Lower Ground Floor
Main Cottage 41.6600 1.3258 (27) 3.2400 39.5300 148.0200 5.1573 5.1389 19.2426 1.5918 (27a) 7.3500 112.3700 0.1800 20.2266 (29a) 112.3700 100.7500 11.4000 93.1800 50.7400 64.5300 136.1500 12.2000 94.2600 Lower Cottage 35.4000 0.1800 18.1350 (29a) 2.0520 12.1134 6.5962 (29a) (30) (30) Retaining Wall Sloping Roof 0.8000 0.1800 2.1600 Plane Roof Flat Roof 64.5300 0.1300 8.3889 (30) Total net area of external elements Aum(A, m2) Fabric heat loss, $W/K = Sum (A \times U)$ 667.3100 (26)...(30) + (32) = 154.1720 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K Thermal bridges (Sum(L x Psi) calculated using Appendix K) Total fabric heat loss 250.0000 (35) 25.9500 (36) (33) + (36) = 180.1220 (37) Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$ Jan Feb Mar Apr May 145.1232 144.5835 144.0545 141.5697 141.1048 Jun 138.9407 Aug 138.5399 Sep 139.7743 Oct 141.1048 Nov 142.0453 Dec 143.0285 (38) 138.9407 Heat transfer coeff 325.2452 Average = Sum(39)m / 12 324.7055 324.1764 321.6917 321.2268 319.0627 319.0627 318.6619 319.8963 321.2268 Apr 1.1951 May 1.1934 Aug 1.1839 Sep 1.1885 Oct 1.1934 1.2005 (40) 1.1951 (40) HLP (average) 1.2083 1.2063 1.2044 1.1854 1.1854 1.1969 Days in month 31 (41) 31 28 31 30 31 30 31 31 30 31 30 4. Water heating energy requirements (kWh/year) Assumed occupancy Average daily hot water use (litres/day) 3.0919 (42) 107.6315 (43) Sep Apr May Aug Daily hot water use
118.3946
Energy conte 175.5758 114.0893 109.7841 105.4788 96.8683 96.8683 101.1736 105.4788 109.7841 114.0893 118.3946 (44) 143.4437 156.5800 Total = Sum (45) m = 153.5597





CALCULAT	ION OF	TARGET I	EMISSION	IS 09.	Jan 2014								
Distribution :				20 7224	19.8836	17 1500	15 0004	10 2440	10 4600	21 5166	23.4870	25 5054	(46)
Water storage Store volume		23.0340	23.7690	20.7224	19.8836	17.1580	15.8994	18.2448	18.4628	21.5166	23.4870	25.5054 300.0000	
a) If manufacture				own (kWh/c	day):							2.1127 0.5400	(48)
Enter (49) or Total storage	loss											1.1409	
If cylinder co	ontains ded	icated sola	r storage		35.3664			35.3664			34.2256	35.3664	
Primary loss Total heat red	23.2624	21.0112	23.2624	22.5120		22.5120		35.3664 23.2624			34.2256 22.5120		
Solar input					191.1862	171.1245 0.0000				202.0725		228.6646	
Output from w.	/h							-		months) = S	um(63)m =	0.0000	(63)
			217.0887	194.8867	191.1862	171.1245	164.6251			202.0725 Jh/year) = S			
Heat gains fro			99.5910	91.3246	90.9784	83.4237	82.1468	87.3458	86.3158	94.5981	97.4529	103.4399	(65)
5. Internal ga	ains (see T	able 5 and	5a)										
Metabolic gain	ns (Table 5			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m Lighting gain:	154.5925	154.5925	154.5925	154.5925	154.5925	154.5925	154.5925				154.5925		(66)
Appliances ga:	39.8248	35.3721	28.7665	21.7781	16.2794	13.7437	14.8506	19.3034	25.9089	32.8973	38.3960	40.9317	(67)
Cooking gains	(calculate	d in Append	lix L, equat	ion L15 or		see Table	5				385.1118	413.6959	
Pumps, fans Losses e.g. e	3.0000	3.0000	3.0000	3.0000	38.4593 3.0000		38.4593 3.0000	38.4593 3.0000	38.4593 3.0000	38.4593 3.0000	38.4593 3.0000	38.4593 3.0000	
	-123.6740	-123.6740			-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	(71)
Total internal	141.5081 l gains	139.0218			122.2828				119.8831			139.0322	
	686.5025	684.0545	660.9687	622.8682	582.3993	544.8631	521.4202	528.3698	548.7754	587.1217	631.2369	666.0375	(73)
6. Solar gains													
[Jan]			A	rea	Solar flux		g		FF	Acce		Gains	
				m2	Table 6a W/m2	. Speci or	fic data Table 6b	Specific or Tab	: data :le 6c	fact Table		W	
North					Solar flux Table 6a W/m2				.7000	Table 0.77	6d 00	8.1893	
North East South			2.5 2.8 3.1	200 200 400	10.6334 19.6403 46.7521		0.6300 0.6300 0.6300	0 0	.7000	Table 0.77	6d 00	8.1893 16.9265 44.8644	(76) (78)
North East			2.5 2.8 3.1	200 200 400 800 800				0 0 0 0	.7000	Table 0.77	6d 00	8.1893 16.9265	(76) (78) (80) (82)
North East South West East West			2.5 2.8 3.1 33.1 1.0 2.1	200 200 400 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379		0.6300 0.6300 0.6300 0.6300 0.6300 0.6300	0 0 0 0 0	.7000 .7000 .7000 .7000 .7000 .7000	Table 0.77 0.77 0.77 0.77 1.00	6d 00 00 00 00 00 00 00	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939	(76) (78) (80) (82) (82)
North East South West East	302.9747	579.8325	2.5 2.8 3.1 33.1 1.0 2.1	200 200 400 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379	1673.6128	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300	0 0 0 0 0 0 0 0	.7000 .7000 .7000 .7000 .7000 .7000	Table 0.77 0.77 0.77 0.77 1.00 1.00	6d 00 00 00 00 00 00 00 00 00 375.2265	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939	(76) (78) (80) (82) (82)
North East South West East West Solar gains	302.9747	579.8325	2.5 2.8 3.1 33.1 1.0 2.1	200 200 400 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379	1673.6128	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300	0 0 0 0 0 0 0 0	.7000 .7000 .7000 .7000 .7000 .7000	Table 0.77 0.77 0.77 0.77 1.00 1.00	6d 00 00 00 00 00 00 00 00 00 375.2265	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939	(76) (78) (80) (82) (82)
North East South West East West Solar gains	302.9747 989.4772 nal tempera	579.8325 1263.8870 ture (heati	2.5 2.8 3.1 1.0 2.1 932.8959 1593.8646	200 200 400 800 800 600 	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876	1673.6128 2218.4759	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 1593.6538 2115.0739	0 0 0 0 0 0 0 0 1372.3316 1900.7014	.7000 .7000 .7000 .7000 .7000 .7000	Table 0.77 0.77 0.77 0.77 1.00 1.00	6d 00 00 00 00 00 00 00 00 00 375.2265	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939	(76) (78) (80) (82) (82)
North East South West East West Solar gains Total gains	302.9747 989.4772 nal tempera	579.8325 1263.8870 	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646	200 200 400 800 800 600 	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876	1673.6128 2218.4759	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 1593.6538 2115.0739	0 0 0 0 0 0 0 0 1372.3316 1900.7014	.7000 .7000 .7000 .7000 .7000 .7000	Table 0.77 0.77 0.77 0.77 1.00 1.00	6d 00 00 00 00 00 00 00 00 00 375.2265	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939	(76) (78) (80) (82) (82) (83) (84)
North East South West East West Solar gains Total gains 7. Mean intern Temperature di Utilisation fo	302.9747 989.4772 nal tempera uring heati actor for g Jan 57.4716	579.8325 1263.8870 ture (heati ng periods ains for li Feb 57.5671	2.5 2.8 3.1 1.0 2.1 932.8959 1593.8646 	200 200 400 800 800 600 1341.1198 1963.9880	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876	1673.6128 2218.4759 Th1 (C) Jun 58.5852	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 1593.6538 2115.0739	1372.3316 1900.7014	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 Sep 58,4326	Table 0.77 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633	6d 00 00 00 00 00 00 00 00 375.2265 1006.4634	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441	(76) (78) (80) (82) (82) (83) (84)
North East South West East West Total gains Total gains Total gains Temperature di Utilisation fe	302.9747 989.4772 nal tempera uring heati actor for g Jan 57.4716 4.8314	579.8325 1263.8870 ture (heati- ng periods ains for li Feb 57.5671 4.8378	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 	200 200 400 800 800 600 1341.1198 1963.9880 ng area fro nii,m (see Apr 58.1064 4.8738	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 Dm Table 9, Table 9a) May 58.1905 4.8794	1673.6128 2218.4759 Thl (C) Jun 58.5852 4.9057	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 1593.6538 2115.0739	0 0 0 0 0 0 0 1372.3316 1900.7014	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 Sep 58.4326 4.8955	Table 0.77 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633	00 00 00 00 00 00 00 00 375.2265 1006.4634 Nov 58.0207 4.8680	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563	(76) (78) (80) (82) (82) (83) (84)
North East South West East West Total gains The province of the prov	302.9747 989.4772 nal tempera uring heati actor for g Jan 57.4716 4.8314 rea 0.9998 19.4663	579.8325 1263.8870 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9992 19.6307	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 in the livi ving area, Mar 57.6611 4.8441 0.9965	200 200 400 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 20m Table 9, Table 9a) May 58.1905 4.8794 0.9271 20.6778	1673.6128 2218.4759 Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031	Jul 58.5852 4.9057 0.6309 20.9759	1372.3316 1900.7014 Aug 58.6589 4.9106 0.7084	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 Sep 58.4326 4.8955 0.9294	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802	00 00 00 00 00 00 00 375.2265 1006.4634 Nov 58.0207 4.8680 0.9995 19.7988	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999	(76) (78) (80) (82) (82) (83) (84) (85)
North East South West East West Total gains 7. Mean inter Temperature di Utilisation fortal tau alpha util living as	302.9747 989.4772 anal tempera uring heati actor for g Jan 57.4716 4.8314 rea 0.9998 19.4663 19.9133 house	579.8325 1263.8870 ture (heati	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 	200 200 400 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 Dom Table 9, Table 9a) May 58.1905 4.8794 0.9271 20.6778 19.9253	Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317	Jul 58.5852 4.9057 0.6309 20.9759 19.9317	Aug 58,6589 4,9106 0.7084 20,9586 19,9329	.7000 .7000	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253	00 00 00 00 00 00 00 00 375.2265 1006.4634 Nov 58.0207 4.8680 0.9995 19.7988 19.9225	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196	(76) (78) (80) (82) (82) (83) (84) (85)
North East South West East West Total gains Total gains Total gains Total gains Total gains The gains Total gains MIT Th 2	302.9747 989.4772 nal tempera uring heati actor for Jan 57.4716 4.8314 rea 0.9998 19.4663 19.9133 house 0.9997 17.8457	579.8325 1263.8870 	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 	200 200 400 800 800 600 1341.1198 1963.9880 mg area frc nil,m (see Apr 58.1064 4.8738 0.9820 20.3204 19.9239 0.9742	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 Table 9a) May 58.1905 4.8794 0.9271 20.6778 19.9253 0.8936	1673.6128 2218.4759 Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 1593.6538 2115.0739 Jul 58.5852 4.9057 0.6309 20.9759 19.9317	1372.3316 1900.7014 Aug 58.6589 4.9106 0.7084	.7000 .7000	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912	Nov 58.0207 4.8680 0.9995 10.9992 18.3389	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.815	(76) (78) (80) (82) (82) (83) (84) (85) (86) (87) (88) (89) (90)
North East South West East West Total gains Total gains Total gains Total gains Total gains Temperature di Utilisation fatau alpha util living a: MIT Th 2 util rest of 1 MIT 2 Living area f: MIT Temperature ac	302.9747 989.4772 anal tempera 	579.8325 1263.8870 ture (heati 	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 932.8959 1593.8646 in the livi ving area, Mar 57.6611 4.8441 0.9965 19.9247 19.9165 0.9951 18.5182	200 200 400 800 800 800 1341.1198 1963.9880	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 Dom Table 9, Table 9a) May 58.1905 4.8794 0.9271 20.6778 19.9253 0.8936 19.5907 20.0053	Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317 0.7054 19.8626 20.2594	Jul 58.5852 4.9057 0.6309 20.9759 19.9317 0.4939 19.9224 20.3242	Aug 58.6589 4.9106 0.7084 20.9586 19.9329 0.5730 19.9143 20.3126	.7000 .7000	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912 19.0440 Living are 19.5155	Nov 58.0207 4.8680 0.9995 19.7988 19.9225 0.9992 18.3389 a / (4) = 18.8957	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.8115 0.3814 18.4326 0.0000	(85) (86) (87) (85) (82) (83) (84) (85) (85)
North East South West East West Tomperature dr Utilisation for the south autil living a: MIT Th 2 util rest of l MIT 2 Living area for MIT Living area for MIT	302.9747 989.4772 anal tempera 	579.8325 1263.8870 ture (heati 	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 932.8959 1593.8646 in the livi ving area, Mar 57.6611 4.8441 0.9965 19.9247 19.9165 0.9951 18.5182	200 200 400 800 800 800 1341.1198 1963.9880	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 Dom Table 9, Table 9a) May 58.1905 4.8794 0.9271 20.6778 19.9253 0.8936 19.5907 20.0053	Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317 0.7054 19.8626 20.2594	Jul 58.5852 4.9057 0.6309 20.9759 19.9317 0.4939 19.9224 20.3242	Aug 58.6589 4.9106 0.7084 20.9586 19.9329 0.5730 19.9143	.7000 .7000	Table 0.77 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912 19.0440 11.19.0440 12.19.0440	Nov 58.0207 4.8680 0.9995 19.7988 19.9225 0.9992 18.3389 a / (4) = 18.8957	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.8115 0.3814 18.4326 0.0000	(85) (86) (87) (85) (82) (83) (84) (85) (85)
North East South West East West Total gains Total gains Total gains Total gains Total gains Temperature di Utilisation fatau alpha util living a: MIT Th 2 util rest of 1 MIT 2 Living area f: MIT Temperature ac	302.9747 989.4772 nal tempera actor for g Jan 57.4716 4.8314 rea 0.9998 19.4663 19.9133 house 0.9997 17.8457 raction 18.4638 djustment 18.4638	579.8325 1263.8870 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9992 19.6307 19.9149 0.9989 18.0874 18.6760	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 ang season) in the livitiving area, Mar 57.6611 4.8441 0.9965 19.9247 19.9165 0.9951 18.5182 19.0547	200 200 400 800 800 800 800 800 900 900 900 900 9	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 1635.9883 2218.3876 May 58.1905 4.8794 0.9271 20.6778 19.9253 0.8936 19.5907 20.0053	1673.6128 2218.4759 Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317 0.7054 19.8626 20.2594	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 1593.6538 2115.0739 Jul 58.5852 4.9057 0.6309 20.9759 19.9317 0.4939 19.9224 20.3242	Aug 58.6589 4.9106 0.7084 20.9586 19.9329 0.5730 19.9143 20.3126	.7000 .7000	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912 19.0440 Living are 19.5155	Nov 58.0207 4.8680 0.9995 19.7988 19.9225 0.9992 18.3389 a / (4) = 18.8957	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.8115 0.3814 18.4326 0.0000	(85) (86) (87) (85) (82) (83) (84) (85) (85)
North East South West East West Tomperature dr Utilisation fr tau alpha util living a: MIT Th 2 util rest of l MIT 2 Living area fr MIT Temperature ar adjusted MIT	302.9747 989.4772 nal tempera auring heati actor for g Jan 57.4716 4.8314 rea 0.9998 19.4663 19.9133 house 0.9997 17.8457 raction 18.4638 djustment 18.4638	579.8325 1263.8870 ture (heati repriods ains for li Feb 57.5671 4.8378 0.9992 19.6307 19.9149 0.9989 18.0874 18.6760 18.6760	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 mg season) in the livi ving area, Mar 57.6611 4.8441 0.9965 19.9247 19.9165 0.9951 18.5182 19.0547	200 200 400 800 800 800 600 1341.1198 1963.9880 ng area frc nil, m (see Apr 58.1064 4.8738 0.9820 20.3204 19.9239 0.9742 19.0962 19.5631 19.5631	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 Table 9a) May 58.1905 4.8794 0.9271 20.6778 19.9253 0.8936 19.5907 20.0053	Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317 0.7054 19.8626 20.2594	Jul 58.5852 4.9057 0.6309 20.9759 19.9317 0.4939 19.9224 20.3242	Aug 58.6589 4.9106 0.7084 20.9586 19.9329 0.5730 19.9143 20.3126 20.3126	.7000 .7000	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912 19.0440 Living are 19.5155	Nov 58.0207 4.8680 0.9995 19.7988 19.9225 0.9992 18.3389 a / (4) = 18.8957	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.8115 0.3814 18.4326 0.0000	(85) (86) (87) (85) (82) (83) (84) (85) (85)
North East South West East West Solar gains Total gains 7. Mean intern Temperature du Utilisation fo tau alpha util living a: MIT Th 2 util rest of I MIT 2 Living area fo MIT Temperature ac adjusted MIT 8. Space heat:	302.9747 989.4772 mal tempera mal tempera actor for g Jan 57.4716 4.8314 rea 0.9998 19.4663 19.9133 house 0.9997 17.8457 raction 18.4638 djustment 18.4638 ing require Jan	579.8325 1263.8870 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9992 19.6307 19.9149 0.9989 18.0874 18.6760	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 ang season) in the livit ving area, Mar 57.6611 4.8441 0.9965 19.9247 19.9165 0.9951 18.5182 19.0547	200 200 440 800 800 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 1635.9883 2218.3876 20.0053	1673.6128 2218.4759 Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317 0.7054 19.8626 20.2594	0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 1593.6538 2115.0739 Jul 58.5852 4.9057 0.6309 20.9759 19.9317 0.4939 19.9224 20.3242	Aug 58.6589 4.9106 0.7084 20.9586 19.9329 0.5730 19.9143 20.3126	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 1077.3314 1626.1068 Sep 58.4326 4.8955 0.9294 20.7588 19.9292 0.8818 19.7106 fLA = 20.1104	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912 19.0440 c.Living are 19.5155 19.5155	Nov 58.0207 4.8680 0.9995 19.7988 19.7988 19.7988 19.7988 19.8257 18.8957	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.8115 0.3814 18.4326 0.0000 18.4326	(76) (78) (80) (82) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93)
North East South West East West	302.9747 989.4772 mal tempera actor for g Jan 57.4716 4.8314 rea 0.9998 19.4663 19.9133 house 0.9997 17.8457 raction 18.4638 djustment 18.4638	579.8325 1263.8870 ture (heati 	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646	200 200 400 800 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 1635.9883 2218.3876 0.8936 19.5907 20.0053 20.0053 May 0.8966 1988.9100	Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317 0.7054 19.8626 20.2594 20.2594	Jul 58.5852 4.9057 0.6309 20.9759 19.9317 0.4939 19.9224 20.3242 Jul 0.5468 1156.4296	Aug 58.6589 4.9106 0.7084 20.9586 19.9329 0.5730 20.3126 20.3126 Aug 0.6249	.7000 .7000	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912 19.0440 5.Living are 19.5155 19.5155	Nov 58.0207 4.8680 0.9995 19.7988 19.9225 0.9992 18.3389 a / (4) = 18.8957	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.8115 0.3814 18.4326 Dec 0.9997	(76) (78) (78) (80) (82) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93)
North East South West East West Solar gains Total gains 7. Mean intern Temperature du Utilisation for tau alpha util living a: MIT Th 2 util rest of I Living area for MIT Temperature ac adjusted MIT 8. Space heat: Utilisation Useful gains Ext temp. Heat loss rate	302.9747 989.4772 mal tempera actor for g Jan 57.4716 4.8314 rea 0.9998 19.4663 19.9133 house 0.9997 17.8457 raction 18.4638 djustment 18.4638 autor for g Jan 0.9995 989.0168 4.3000 e W 4606.7102	579.8325 1263.8870 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9992 19.6307 19.9149 0.9989 18.0874 18.6760 18.6760	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 ng season) in the livi ving area, Mar 57.6611 4.8441 0.9965 19.9247 19.9165 0.9951 18.5182 19.0547 Mar 0.9935 1583.4833 6.5000 4069.9290	200 200 4400 800 800 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 1635.9883 2218.3876 20.6778 19.9253 0.8936 19.5907 20.0053 May 0.8966 1988.9100 11.7000 2667.8898	1673.6128 2218.4759 Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317 0.7054 19.8626 20.2594 Jun 0.7355 1631.7629 14.6000 1805.7108	Jul 58.5852 4.9057 0.6309 20.9759 19.9317 0.4939 19.9224 20.3242 20.3242 Jul 58.5852 4.9057 0.6309 19.9254 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242 20.3242	Aug 58.6589 4.9106 0.7084 20.9586 19.9329 0.5730 19.9143 20.3126 20.3126	.7000 .7000	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912 19.0440 1. Living are 19.5155 19.5155 Oct 0.9894 1255.0633 10.6000 2863.8892	Nov 58.0207 4.8680 0.9995 19.7988 19.7988 19.9225 0.9992 18.3389 a / (4) = 18.8957	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.8115 0.3814 18.4326 0.0000 18.4326	(76) (78) (80) (82) (83) (84) (85) (86) (87) (88) (89) (91) (92) (93) (93)
North East South West East West	302.9747 989.4772 mal tempera actor for g Jan 57.4716 4.8314 rea 0.9998 19.4663 19.9133 house 0.9997 17.8457 raction 18.4638 djustment 18.4638 djustment 18.4638 djustment 18.4638 diustment 18.4638	579.8325 1263.8870 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9992 19.6307 19.9149 0.9989 18.0874 18.6760 18.6760	2.5 2.8 3.1 33.1 1.0 2.1 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 932.8959 1593.8646 933.865000	200 200 400 800 800 800 600	10.6334 19.6403 46.7521 19.6403 26.4634 26.2379 1635.9883 2218.3876 1635.9883 2218.3876 0.8936 19.5907 20.0053 20.0053 May 0.8966 198.9100 11.7000 2667.8898 1.0000	Th1 (C) Jun 58.5852 4.9057 0.7945 20.9031 19.9317 0.7054 19.8626 20.2594 20.2594	Jul 58.5852 4.9057 0.6309 20.9759 19.9317 0.4939 19.9224 20.3242 Jul 0.5468 1156.4296 16.6000	Aug 58.6589 4.9106 0.7084 20.9586 19.9329 0.5730 19.9143 20.3126 20.3126 Aug 0.6249 1187.8149 16.4000	.7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .7000 .8184 .8955 .9294 .8955 .9294 .8186 .7106 .61A = 20.1104 .71	Table 0.77 0.77 0.77 1.00 1.00 681.3416 1268.4633 Oct 58.1905 4.8794 0.9945 20.2802 19.9253 0.9912 19.0440 21.10 iving are 19.5155 19.5155 19.5155	Nov 58.0207 4.8680 0.9995 19.7988 19.9225 0.9992 18.3389 a / (4) = 18.8957 Nov 0.9989 105.3140 7.1000	8.1893 16.9265 44.8644 199.1570 11.3436 22.4939 250.9121 916.9496 21.0000 Dec 57.8441 4.8563 0.9999 19.4400 19.9196 0.9998 17.8115 0.3814 18.4326 0.0000 18.4326 Dec 0.9997 916.6581 4.2000 4599.2863 1.0000	(76) (78) (88) (80) (82) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (97a)





CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Space heating Space heating per m2								(98	(4) =	14250.9114 52.9439	
8c. Space cooling requirement											
Not applicable											
9a. Energy requirements - Individua	l heating s	systems, inc	luding micro	o-CHP							
Fraction of space heat from seconda Fraction of space heat from main sy Efficiency of main space heating sy Efficiency of secondary/supplementa Space heating requirement	ry/suppleme stem(s) stem 1 (in	entary system								0.0000 1.0000 93.5000 0.0000 15241.6164	(202) (206) (208)
Jan Feb Space heating requirement	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2691.5639 2157.9647 Space heating efficiency (main heat			505.1610	0.0000	0.0000	0.0000	0.0000	1196.9665	2012.3050	2739.8754	(98)
93.5000 93.5000 Space heating fuel (main heating sy	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)
2878.6779 2307.9837 Water heating requirement		1173.4325	540.2791	0.0000	0.0000	0.0000	0.0000	1280.1780	2152.1979	2930.3480	(211)
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 234.2046 206.5148	217.0887	194.8867	191.1862	171.1245	164.6251	180.2611	179.8226	202.0725	213.3176		
Efficiency of water heater (217)m 89.5389 89.4524	89.2432	88.7059	87.2866	79.8000	79.8000	79.8000	79.8000	88.7806	89.3517	79.8000 89.5748	
Fuel for water heating, kWh/month 261.5673 230.8655 Water heating fuel used	243.2550	219.6997	219.0326	214.4417	206.2972	225.8912	225.3416	227.6089	238.7393	255.2777 2768.0177	
Annual totals kWh/year Space heating fuel - main system Space heating fuel - secondary										15241.6164	
Electricity for pumps and fans: central heating pump main heating flue fan Total electricity for the above, kW Electricity for lighting (calculate Total delivered energy for all uses	d in Append	dix L)								30.0000 45.0000 75.0000 703.3187 18787.9528	(230e) (231) (232)
12a. Carbon dioxide emissions - Ind	ividual hea	ting system	s including	micro-CHP							
Space heating - main system 1 Space heating - secondary Water heating (other fuel) Space and water heating Pumps and fans Energy for lighting Total CO2, kg/m2/year Emissions per m2 for space and wate Fuel factor (mains gas) Emissions per m2 for lighting Emissions per m2 for pumps and fans Target Carbon Dioxide Emission Rate	r heating					Energy kWh/year 15241.6164 0.0000 2768.0177 75.0000 703.3187		sion factor kg CO2/kWh 0.2160 0.0000 0.2160 0.5190	:	Emissions kg CO2/year 3292.1892 0.0000 597.8918 3890.0810 38.9250 365.0224 4294.0284 14.4521 1.0000 1.3361 0.1446 15.9500	(261) (263) (264) (265) (267) (268) (272) (272a) (272b) (272c)
rarget carbon broxide bmrssion Rate	(1ER) - (1	.4.43ZI ~ I.	υυ, τ 1.336.	1 + 0.1440,	rounded to	, z a.p.				10.9000	(2/3)





CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014) CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014 1. Overall dwelling dimensions Volume (m3) 330.0846 (1b) - (3b) (m2) 148.0200 (1b) (m) 2.2300 (2b) First floor
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)
Dwelling volume 3.8400 (2c) 121.1500 (1c) 465.2160 (1c) - (3c) (4) 269.1700 2. Ventilation rate secondary other total m3 per hour 0 * 40 = 0 * 20 = 4 * 10 = 0 * 10 = Number of chimneys Number of open flues Number of intermittent fans Number of passive vents Number of flueless gas fires 0 0 0.0000 (6b) 40.0000 (7a) Air changes 40.0000 / (5) = Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 0.0503 (8) Pressure test Measured/design q50 5.0000 0.3003 (18) Infiltration rate Number of sides sheltered 2 (19) - [0.075 x (19)] = (21) = (18) x (20) = (20) = 1 -0.8500 (20) 0.2553 (21) Infiltration rate adjusted to include shelter factor Feb 5.0000 1.2500 Aug 3.7000 0.9250 Dec 4.7000 (22) 1.1750 (22a) 5.1000 1.2750 4.9000 1.2250 Wind speed 1.1000 1.0750 1.0750 1.1250 Wind factor 0.9500 0.9500 1.0000 Adj infilt rate 3. Heat losses and heat loss parameter NetArea m2 35.4000 6.2600 U-value W/m2K 1.3616 A x U W/K 48.1997 Lower Cottage Windows (Uw = 1.44) Main Cottage Windows (Uw = 1.60) 1.5038 9.4135 (27) Rooflights (Uw = 1.60)
Upper Ground Floor
Lower Ground Floor 1.4700 1.5038 0.1300 1.8900 2.7783 (26) (26) (27a) 2964.7500 (28a) 16282.2000 (28a) 6742.2000 (29a) 17.7624 20.2266 110.0000 148.0200 0.1200 148.0200 112.3700 100.7500 11.4000 93.1800 50.7400 60.0000 60.0000 150.0000 9.0000 9.0000 119.7200 7.3500 35.4000 0.8000 1.0800 0.1800 0.1800 0.2000 0.1700 Main Cottage 136.1500 12.2000 94.2600 18.1350 2.2800 15.8406 6045.0000 (29a) 1710.0000 (29a) 838.6200 (30) 456.6600 (30) Lower Cottage Retaining Wall Sloping Roof Plane Roof 52.9000 2.1600 0.1800 9.1332 Plane Roof Flat Roof Total net area of external elements Aum(A, m2) Fabric heat loss, W/K = Sum (A x U) Internal - Insulating Block Internal Floor 64.5300 0.1400 9.0342 580.7700 (30) 64.3300 0.1400 667.3100 (26)...(30) + (32) = 430.5700 60.0000 25834.2000 (32c) 81.6200 18.0000 1469.1600 (32d) Internal Ceiling 81.6200 9.0000 734.5800 (32e) Heat capacity Cm = Sum(A x k) Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K Thermal bridges (Sum(L x Psi) calculated using Appendix K) (28)...(30) + (32) + (32a)...(32e) = 236.4979 (35) 28.3710 (36) (33) + (36) =Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$ Jan Feb Mar Apr May (38)m 145.1232 144.5835 144.0545 141.5697 141.1048 Jun J111 Sep 139.7743 138.5399 138.9407 138.9407 141.1048 142.0453 143.0285 (38) Heat transfer coeff 336.3088 Average = Sum(39)m / 12 = 335.7691 332.7553 329.7255 334.2141 (39) 332.7531 (39) 335.2401 332.2905 333.2309 May 1.2345 Aug 1.2250 Apr 1.2362 1.2455 1.2416 (40) 1.2362 (40) HLP (average) 1.2494 Davs in month 31 28 31 30 31 30 31 31 30 31 30 31 (41) 4. Water heating energy requirements (kWh/year) Assumed occupancy 3.0919 (42) Average daily hot water use (litres/day)





		ABRIC E	NERGY E	FFICIENC	Y 09 Ja	ın 2014							
Daily hot water	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	118.3946 175.5758	114.0893 153.5597	109.7841 158.4599	105.4788 138.1491	101.1736 132.5574	96.8683 114.3869	96.8683 105.9963	101.1736 121.6323	105.4788 123.0850	109.7841 143.4437 Total = S	114.0893 156.5800 um(45)m =	118.3946 170.0358 1693.4620	(45)
Distribution los Water storage lo	0.0000 oss:	= 0.15 x (45)m 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Total storage lo	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)
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	
Heat gains from	water hea 37.3099	32.6314	month 33.6727	29.3567	28.1684	24.3072	22.5242	25.8469	26.1556	30.4818	33.2733	36.1326	(65)
5. Internal gain													
Metabolic gains	(Table 5)	, Watts											
(66)m 1 Lighting gains ((calculate	ed in Appen	dix L, equa	tion L9 or		see Table 5		Aug 154.5925	Sep 154.5925	Oct 154.5925	Nov 154.5925	Dec 154.5925	
Appliances gains	s (calcula	ated in App	endix L, eq	uation L13		lso see Tab		19.3034	25.9089	32.8973	38.3960	40.9317	
Cooking gains (c					371.4594 L15a), also 38.4593			319.2884	330.6056 38.4593	354.6987 38.4593	385.1118	413.6959 38.4593	, ,
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
	123.6740	-123.6740			-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	(71)
Total internal g	50.1477 gains	48.5587	45.2590	40.7732	37.8608	33.7600	30.2745	34.7404	36.3272	40.9701	46.2129	48.5653	
5	592.1421	590.5914	569.3689	533.8016	494.9774	459.7569	438.2822	442.7099	462.2195	497.9439	539.0985	572.5707	(73)
6. Solar gains													
[Jan]			А	rea m2	Solar flux Table 6a W/m2	Speci	g fic data Table 6b	Specific or Tal		Acce fact Table	or	Gains W	
North				200	10.6334		0.4500		0.7000	0.77		3.0640	
South West North			0.9 33.1 1.2	800	46.7521 19.6403 10.6334		0.4500 0.4500 0.6300	(0.7000 0.7000 0.7000	0.77 0.77 0.77	00	9.1852 142.2550 3.8996	(80)
East South				200	19.6403 46.7521		0.6300	(0.7000 0.7000	0.77 0.77	00	16.9265 32.0052	(76)
East West			1.0	800	26.4634 26.2379		0.6300	(0.7000 0.7000	1.00	00	11.3436 22.4939	(82)
									851.3358 1313.5553			199.9222 772.4929	
Total gains 8	833.3151	1050.7521	1307.3045	1592.5107	1785.6732	1780.0514	1695.5150	1525.6736					
Total gains 8 7. Mean internal Temperature duri	833.3151	1050.7521 ture (heati	1307.3045 ng season) in the livi	1592.5107	1785.6732	1780.0514	1695.5150	1525.6736					(84)
Total gains 8 7. Mean internal Temperature duri Utilisation fact	l temperation for garage Jan 52.5791	ure (heati- ag periods hins for li Feb 52.6636	ng season) in the livi ving area, Mar 52.7467	1592.5107 	1785.6732 om Table 9, Table 9a) May 53.2149	1780.0514 Th1 (C) Jun 53.5638	Jul 53.5638	1525.6736	1313.5553 Sep 53.4289	0ct 53.2149	Nov 53.0648	772.4929 21.0000 Dec 52.9086	(84)
Total gains 8	1 temperating heatir ing heatir tor for gar Jan 52.5791 4.5053	1050.7521 Lure (heati 	ng season) in the livi ving area, Mar 52.7467 4.5164	1592.5107 	1785.6732 	Th1 (C) Jun 53.5638 4.5709	Jul 53.5638 4.5709	1525.6736 Aug 53.6289 4.5753	Sep 53.4289 4.5619	Oct 53.2149 4.5477	Nov 53.0648 4.5377	772.4929 21.0000 Dec 52.9086 4.5272	(84)
Total gains 8	1 temperat 	1050.7521	1307.3045 ng season) in the livi ving area, Mar 52.7467 4.5164 0.9981	1592.5107 	1785.6732 mm Table 9, Table 9a) May 53.2149 4.5477 0.9634	1780.0514 Th1 (C) Jun 53.5638 4.5709 0.8830	Jul 53.5638 4.5709 0.7519	Aug 53.6289 4.5753 0.8182	Sep 53.4289 4.5619 0.9643	Oct 53.2149 4.5477 0.9971	Nov 53.0648 4.5377 0.9997	772.4929 21.0000 Dec 52.9086 4.5272 0.9999	(84)
Total gains 8 7. Mean internal Temperature duri Utilisation fact tau alpha util living area MIT Th 2	1 temperate 1 temperate 1 temperate 2 Jan 52.5791 4.5053 a 0.9998 19.2890 19.8807	1050.7521 Lure (heati 	ng season) in the livi ving area, Mar 52.7467 4.5164	1592.5107 	1785.6732 	Th1 (C) Jun 53.5638 4.5709	Jul 53.5638 4.5709	1525.6736 Aug 53.6289 4.5753	Sep 53.4289 4.5619 0.9643 20.6349	Oct 53.2149 4.5477 0.9971 20.1316	Nov 53.0648 4.5377 0.9997	772.4929 21.0000 Dec 52.9086 4.5272	(84) (85) (86) (87)
Total gains 8 7. Mean internal Temperature duri Utilisation fact tau alpha util living area MIT Th 2 util rest of hou MIT 2 Living area frace	1 temperat ing heatir tor for ge Jan 52.5791 4.5053 a 0.9998 19.2890 19.8807 use 0.9998 18.3043 ction	1050.7521 Lure (heati reperiods sins for li Feb 52.6636 4.5109 0.9995 19.4414 19.8822 0.9993 18.4579	1307.3045	1592.5107 ng area frc nil,m (see Apr 53.1406 4.5427 0.9910 20.1221 19.8911 0.9869 19.1432	1785.6732 m Table 9, Table 9a) May 53.2149 4.5477 0.9634 20.5086 19.8925 0.9440 19.5207	Th1 (C) Jun 53.5638 4.5709 0.8830 20.8056 19.8989 0.8133 19.7905	Jul 53.5638 4.5709 0.7519 20.9361 19.8989 0.6091 19.8787	Aug 53.6289 4.5753 0.8182 20.9036 19.9001 0.6913 19.8644	Sep 53.4289 4.5619 0.9643 20.6349 19.8964 0.9362 19.6492 fLA =	Oct 53.2149 4.5477 0.9971 20.1316 19.8925 0.9953 19.1555	Nov 53.0648 4.5377 0.9997 19.6397 19.8897 0.9995 18.6620 a / (4) =	21.0000 Dec 52.9086 4.5272 0.9999 19.2653 19.8868 0.9999 18.2854 0.3814	(84) (85) (86) (87) (88) (89) (90) (91)
Total gains 8 7. Mean internal Temperature duri Utilisation fact tau alpha util living area MIT Th 2 util rest of hou MIT 2 Living area frace	l temperating heating heating heating tor for gray Jan 4.5053 a 0.9998 l9.2890 19.8807 use 0.9998 l8.3043 ction l18.6799	1050.7521 eure (heati- eg periods s for li Feb 52.6636 4.5109 0.9995 19.4414 19.8822 0.9993	1307.3045 ng season) in the livi ving area, Mar 52.7467 4.5164 0.9981 19.7270 19.8838 0.9973	1592.5107	1785.6732 m Table 9, Table 9a) May 53.2149 4.5477 0.9634 20.5086 19.8925 0.9440	Th1 (C) Jun 53.5638 4.5709 0.8830 20.8056 19.8989 0.8133	Jul 53.5638 4.5709 0.7519 20.9361 19.8989 0.6091	Aug 53.6289 4.5753 0.8182 20.9036 19.9001 0.6913	Sep 53.4289 4.5619 0.9643 20.6349 19.8964 0.9362 19.6492 fLA =	Oct 53.2149 4.5477 0.9971 20.1316 19.8925 0.9953 19.1555	Nov 53.0648 4.5377 0.9997 19.6397 19.8897 0.9995 18.6620 a / (4) =	21.0000 Dec 52.9086 4.5272 0.9999 19.2653 19.8868 0.9999 18.2854 0.3814	(84) (85) (86) (87) (88) (89) (90) (91)
Total gains 8 7. Mean internal Temperature duri Utilisation fact tau alpha util living area MIT Th 2 util rest of hou MIT 2 Living area frac MIT	1 temperating heating heating heating for for gramma for for gramma for for gramma for	1050.7521 Lure (heati reperiods sins for li Feb 52.6636 4.5109 0.9995 19.4414 19.8822 0.9993 18.4579	1307.3045	1592.5107 ng area frc nil,m (see Apr 53.1406 4.5427 0.9910 20.1221 19.8911 0.9869 19.1432	1785.6732 m Table 9, Table 9a) May 53.2149 4.5477 0.9634 20.5086 19.8925 0.9440 19.5207	Th1 (C) Jun 53.5638 4.5709 0.8830 20.8056 19.8989 0.8133 19.7905	Jul 53.5638 4.5709 0.7519 20.9361 19.8989 0.6091 19.8787	Aug 53.6289 4.5753 0.8182 20.9036 19.9001 0.6913 19.8644	Sep 53.4289 4.5619 0.9643 20.6349 19.8964 0.9362 19.6492 fLA = 20.0251	Oct 53.2149 4.5477 0.9971 20.1316 19.8925 0.9953 19.1555	Nov 53.0648 4.5377 0.9997 19.6397 19.8897 0.9995 18.6620 a / (4) = 19.0349	772.4929 21.0000 Dec 52.9086 4.5272 0.9999 19.2653 19.8868 0.9999 18.2854 0.3814 18.6592 0.0000	(84) (85) (86) (87) (88) (89) (90) (91) (92)
Total gains 8	1 temperation for gradient for	1050.7521 Lure (heati- lurg periods lins for li Feb 52.6636 4.5109 0.9995 19.4414 19.8822 0.9993 18.4579 18.8330 18.8330	1307.3045	1592.5107	1785.6732 m Table 9, Table 9a) May 53.2149 4.5477 0.9634 20.5086 19.8925 0.9440 19.5207 19.8975	Th1 (C) Jun 53.5638 4.5709 0.8830 20.8056 19.8989 0.8133 19.7905 20.1777 20.1777	Jul 53.5638 4.5709 0.7519 20.9361 19.8989 0.6091 19.8787 20.2820 20.2820	Aug 53.6289 4.5753 0.8182 20.9036 19.9001 0.6913 19.8644 20.2607 20.2607	Sep 53.4289 4.5619 0.9643 20.6349 19.8964 0.9362 19.6492 fLA = 20.0251	Oct 53.2149 4.5477 0.9971 20.1316 19.8925 0.9953 19.1555 Living are 19.5278	Nov 53.0648 4.5377 0.9997 19.6397 19.8897 0.9995 18.6620 a / (4) = 19.0349	772.4929 21.0000 Dec 52.9086 4.5272 0.9999 19.2653 19.8868 0.9999 18.2854 0.3814 18.6592 0.0000	(84) (85) (86) (87) (88) (89) (90) (91) (92)
Total gains 8 7. Mean internal 7. Mean internal Temperature duri Utilisation fact tau alpha util living area MIT Th 2 util rest of hou MIT 2 Living area frac MIT Temperature adju adjusted MIT 8. Space heating	1 temperat ing heating for for ge Jan 52.5791 4.5053 a 0.9998 19.2890 19.8807 use 0.9998 18.3043 ction 18.6799 ustment 18.6799 g requirer	1050.7521	1307.3045	1592.5107	1785.6732 m Table 9, Table 9a) May 53.2149 4.5477 0.9634 20.5086 19.8925 0.9440 19.5207 19.8975	Th1 (C) Jun 53.5638 4.5709 0.8830 20.8056 19.8989 0.8133 19.7905 20.1777 20.1777	Jul 53.5638 4.5709 0.7519 20.9361 19.8989 0.6091 19.8787 20.2820 20.2820	Aug 53.6289 4.5753 0.8182 20.9036 19.9001 0.6913 19.8644 20.2607 20.2607	Sep 53.4289 4.5619 0.9643 20.6349 19.8964 19.6492 fLA = 20.0251 20.0251	Oct 53.2149 4.5477 0.9971 20.1316 19.8925 0.9953 19.1555 Living are 19.5278	Nov 53.0648 4.5377 0.9997 19.6397 10.8897 0.9995 18.6620 a / (4) = 19.0349	21.0000 Dec 52.9086 4.5272 0.9999 19.2653 19.8868 0.9999 18.2854 0.3814 18.6592 0.0000 18.6592	(84) (85) (86) (87) (88) (90) (91) (92) (93)
Total gains 8	1 temperat ing heatir tor for ge Jan 52.5791 4.5053 a 0.9998 19.2890 19.8807 use 0.9998 18.3043 etion 18.6799 ustment 18.6799 g requirer Jan 0.9997 833.0650 4.3000	1050.7521 Lure (heati Ing periods lins for li Feb 0.9995 19.4414 19.8822 0.9993 18.4579 18.8330 18.8330 18.09991 10.9991 10.9991	1307.3045	1592.5107	Table 9, Table 9, Table 9a) May 53,2149 4,5477 0,9634 20,5086 19,8925 0,9440 19,5207 19,8975 19,8975	Th1 (C) Jun 53.5638 4.5709 0.8830 20.8056 19.8989 0.8133 19.7905 20.1777 20.1777	Jul 53.5638 4.5709 0.7519 20.9361 19.8989 0.6091 19.8787 20.2820 20.2820	Aug 53.6289 4.5753 0.8182 20.9036 19.9001 0.6913 19.8644 20.2607 20.2607	Sep 53.4289 4.5619 0.9643 20.6349 19.8964 0.9362 19.6492 £LA = 20.0251 20.0251	Oct 53,2149 4.5477 0.9971 20,1316 19.8925 19.1555 Living are 19.5278 19.5278	Nov 53.0648 4.5377 0.9997 19.6397 19.8897 0.9995 18.6620 a / (4) = 19.0349 19.0349	21.0000 Dec 52.9086 4.5272 0.9999 19.2653 19.8868 0.9999 18.2854 0.3814 18.6592 0.0000 18.6592	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93)
Total gains 8 7. Mean internal 7. Mean internal Temperature duri Utilisation fact tau alpha util living area MIT Th 2 util rest of hou MIT 2 Living area frac MIT Temperature adju adjusted MIT 8. Space heating Utilisation Useful gains 8 Ext temp. Heat loss rate W	1 temperating heating heating heating heating for graph of the form of the for	1050.7521 Eure (heati- g periods ins for li Feb 52.6636 4.5109 0.9995 19.4414 19.8822 0.9993 18.4579 18.8330 18.8330 18.8330 18.8330 4678.2611	1307.3045	1592.5107	1785.6732 m Table 9, Table 9a) May 53.2149 4.5477 0.9634 20.5086 19.8925 0.9440 19.5207 19.8975 19.8975	1780.0514	Jul 53.5638 4.5709 0.7519 20.9361 19.8989 0.6091 19.8787 20.2820 20.2820 Jul 60.6643 1126.3994 16.6000 1215.5215	Aug 53.6289 4.5753 0.8182 20.9036 19.9001 0.6913 19.8644 20.2607 20.2607 Aug 0.7394 1128.1135 16.4000	Sep 53.4289 4.5619 0.9643 20.6349 19.8964 0.9362 19.6492 £LA = 20.0251	Oct 53.2149 4.5477 0.9971 20.1316 19.8925 0.9953 19.1555 Living are 19.5278 19.5278	Nov 53.0648 4.5377 0.9997 19.6397 19.8897 0.9995 18.6620 a / (4) = 19.0349 19.0349 Nov 0.9993 836.9452 7.1000	772.4929 21.0000 Dec 52.9086 4.5272 0.9999 19.2653 19.8868 0.9999 18.2854 18.6592 0.0000 18.6592 Dec 0.9998 772.3317 4.2000 4832.4554	(84) (85) (86) (87) (88) (89) (91) (92) (93) (93)





CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

8c. Space cool	ing require	ment											
Calculated for													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate													
	0.0000	0.0000	0.0000	0.0000	0.0000	3103.1873	2442.9347	2505.9141	0.0000	0.0000	0.0000	0.0000	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6593	0.7538	0.6958	0.0000	0.0000	0.0000	0.0000	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	2045.8211	1841.5305	1743.6448	0.0000	0.0000	0.0000	0.0000	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2202.3502	2101.5070	1912.6955	0.0000	0.0000	0.0000	0.0000	
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling													
	0.0000	0.0000	0.0000	0.0000	0.0000	112.7010	193.4225	125.7737	0.0000	0.0000	0.0000	0.0000	
Space cooling												431.8972	
Cooled fractio									fC =	cooled area /	(4) =	1.0000	(105)
Intermittency													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000	(106)
Space cooling													
	0.0000	0.0000	0.0000	0.0000	0.0000	28.1752	48.3556	31.4434	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling												107.9743	
Space cooling												0.4011	
Energy for spa	ce heating											61.3064	(99)
Energy for spa	ce cooling											0.4011	
Total												61.7076	(109)
Dwelling Fabri	c Energy Ef	ficiency (DI	FEE)									61.7	(109)

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CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

(Version 9.92, January 2014) SAP 2012 WORKSHEET FOR New Build (As Designed) CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014 1. Overall dwelling dimensions Volume (m3) 330.0846 (1b) - (3b) (m2) 148.0200 (1b) (m) 2.2300 (2b) First floor
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)
Dwelling volume 121.1500 (1c) 3.8400 (2c) 465.2160 (1c) - (3c) (4) 269.1700 2. Ventilation rate secondary other total m3 per hour 0 * 40 = 0 * 20 = 4 * 10 = 0 * 10 = Number of chimneys Number of open flues Number of intermittent fans Number of passive vents Number of flueless gas fires 0 0.0000 (6b) 40.0000 (7a) Air changes 40.0000 / (5) = Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 0.0503 (8) Pressure test Measured/design q50 5.0000 0.3003 (18) Infiltration rate Number of sides sheltered 2 (19) - [0.075 x (19)] = (21) = (18) x (20) = (20) = 1 -0.8500 (20) 0.2553 (21) Infiltration rate adjusted to include shelter factor Feb 5.0000 1.2500 Aug 3.7000 0.9250 Dec 4.7000 (22) 1.1750 (22a) 5.1000 1.2750 4.9000 1.2250 Wind speed 1.1000 1.0750 1.0750 1.1250 Wind factor 0.9500 0.9500 1.0000 Adj infilt rate 3. Heat losses and heat loss parameter U-value W/m2K 1.0000 A x U W/K 1.8900 55.2311 TER Opaque door TER Opening Type (Uw = 1.40)
TER Room Window (Uw = 1.70)
Upper Ground Floor
Lower Ground Floor
Main Cottage 41.6600 1.3258 (27) 3.2400 39.5300 148.0200 5.1573 5.1389 19.2426 1.5918 (27a) 7.3500 112.3700 0.1800 20.2266 (29a) 112.3700 100.7500 11.4000 93.1800 50.7400 64.5300 136.1500 12.2000 94.2600 Lower Cottage 35.4000 0.1800 18.1350 (29a) 2.0520 12.1134 6.5962 (29a) (30) (30) Retaining Wall Sloping Roof 0.8000 0.1800 2.1600 Plane Roof Flat Roof 64.5300 0.1300 8.3889 (30) Total net area of external elements Aum(A, m2) Fabric heat loss, $W/K = Sum (A \times U)$ 667.3100 (26)...(30) + (32) = 154.1720 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K Thermal bridges (Sum(L x Psi) calculated using Appendix K) Total fabric heat loss 250.0000 (35) 25.9500 (36) (33) + (36) = 180.1220 (37) Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$ Jan Feb Mar Apr May 145.1232 144.5835 144.0545 141.5697 141.1048 Jun 138.9407 Jul 138.9407 Aug 138.5399 Sep 139.7743 Oct 141.1048 Nov 142.0453 Dec 143.0285 (38) Heat transfer coeff 325.2452 Average = Sum(39)m / 12 324.7055 324.1764 321.6917 321.2268 319.0627 319.0627 318.6619 319.8963 321.2268 Apr 1.1951 May 1.1934 Aug 1.1839 Sep 1.1885 Oct 1.1934 1.2005 (40) 1.1951 (40) HLP (average) 1.2083 1.2063 1.2044 1.1854 1.1854 1.1969 Days in month 31 (41) 31 28 31 30 31 30 31 31 30 31 30 4. Water heating energy requirements (kWh/year) Assumed occupancy Average daily hot water use (litres/day) 3.0919 (42) 107.6315 (43) Sep Aug Apr May Daily hot water use
118.3946
Energy conte 175.5758 109.7841 158.4599 114.0893 105.4788 96.8683 96.8683 101.1736 105.4788 109.7841 114.0893 118.3946 (44) 143.4437 156.5800 Total = Sum (45) m = 153.5597





CALCULAI	TION OF	TARGET I	FABRIC EI	NERGY E	FFICIENCY	′ 0 9 Ja	n 2014						
Distribution :													
Water storage Total storage	loss			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
If cylinder co		icated sola	ır storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Primary loss	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Heat gains fro		ating, kWh/ 32.6314		29.3567	28.1684	24.3072	22.5242	25.8469	26.1556	30.4818	33.2733	36.1326	(65)
5. Internal ga													
Metabolic gair), Watts Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m Lighting gains					154.5925 L9a), also			154.5925	154.5925	154.5925	154.5925	154.5925	(66)
Appliances gai	ins (calcul	ated in App	endix L, eq	uation L13	16.2794 or L13a), a	lso see Tab	le 5	19.3034	25.9089	32.8973	38.3960	40.9317	(67)
Cooking gains	(calculate	d in Append	dix L, equat	ion L15 or		see Table	5		330.6056	354.6987	385.1118	413.6959	
Pumps, fans	0.0000	0.0000	0.0000	0.0000	38.4593 0.0000	38.4593 0.0000	38.4593 0.0000	38.4593 0.0000	38.4593 0.0000	38.4593 0.0000	38.4593 0.0000	38.4593 0.0000	
	-123.6740	-123.6740			-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	(71)
Water heating	50.1477	le 5) 48.5587	45.2590	40.7732	37.8608	33.7600	30.2745	34.7404	36.3272	40.9701	46.2129	48.5653	(72)
Total internal		590.5914	569.3689	533.8016	494.9774	459.7569	438.2822	442.7099	462.2195	497.9439	539.0985	572.5707	(73)
6. Solar gains	s												
[Jan]				rea m2	Solar flux Table 6a		g fic data	Specific	FF	Acce fact		Gains W	
					W/m2	or	Table 6b	or Tab	le 6c	Table	6d		
North East			2.8	200	10.6334 19.6403		0 6300	0	.7000 .7000	0.77	00	8.1893 16.9265	(76)
South West			33.1		46.7521 19.6403		0.6300 0.6300	0	.7000 .7000	0.77 0.77	00	44.8644 199.1570	(80)
East West			1.0 2.1	600	26.4634 26.2379		0.6300 0.6300	0	.7000 .7000	1.00		11.3436 22.4939	
Colon colo													
Solar gains Total gains					1635.9883 2130.9656								
Total gains	895.1168	1170.4239	1502.2648	1874.9214	2130.9656	2133.3697	2031.9360	1815.0415					
Total gains 7. Mean intern	895.1168	1170.4239	1502.2648	1874.9214	2130.9656	2133.3697	2031.9360	1815.0415				823.4828	(84)
Total gains 7. Mean intern	895.1168 nal tempera uring heati actor for g	1170.4239 ture (heati	ng season) in the livi	1874.9214	2130.9656 om Table 9, Table 9a)	2133.3697	2031.9360	1815.0415	1539.5509	1179.2855	914.3250	21.0000	(84)
7. Mean intern Temperature du Utilisation fa	mal tempera uring heati actor for g Jan 57.4716	ture (heati	in the liviving area, Mar 57.6611	1874.9214 ng area frc nil,m (see Apr 58.1064	2130.9656 om Table 9, Table 9a) May 58.1905	2133.3697 Th1 (C) Jun 58.5852	Jul 58.5852	1815.0415	1539.5509 Sep 58.4326	0ct 58.1905	914.3250 Nov 58.0207	21.0000 Dec 57.8441	(84)
7. Mean interr Temperature du	mal tempera uring heati actor for g Jan 57.4716 4.8314	ture (heati	ng season) in the livi ving area, Mar 57.6611 4.8441	1874.9214 ng area fr nil,m (see Apr 58.1064 4.8738	2130.9656 Dom Table 9, Table 9a) May 58.1905 4.8794	2133.3697 Th1 (C) Jun 58.5852	2031.9360	1815.0415	1539.5509 Sep	1179.2855	914.3250 Nov 58.0207 4.8680	21.0000 Dec 57.8441 4.8563	(84)
Total gains 7. Mean interr Temperature du Utilisation fa	895.1168	1170.4239 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985	1502.2648	1874.9214 ng area frr n1,m (see Apr 58.1064 4.8738 0.9851 20.2921	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926	Jul 58.5852 4.9057 0.6517 20.9724	Aug 58.6589 4.9106 0.7317 20.9522	Sep 58.4326 4.8955 0.9411	Oct 58.1905 4.8794 0.9960 20.2501	Nov 58.0207 4.8680 0.9997	21.0000 Dec 57.8441 4.8563 0.9999	(84) (85) (86) (87)
Total gains 7. Mean interr Temperature du Utilisation for tau alpha util living an	895.1168	1170.4239 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149	1502.2648	1874.9214 ng area fro ni,m (see Apr 58.1064 4.8738 0.9851 20.2921 19.9239	2130.9656 Dom Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317	Jul 58.5852 4.9057 0.6517 20.9724 19.9317	Aug 58.6589 4.9106 0.7317 20.9522 19.9329	Sep 58.4326 4.8955 0.9411 20.7372 19.9292	Oct 58.1905 4.8794 0.9960 20.2501 19.9253	Nov 58.0207 4.8680 0.9997 19.7670 19.9225	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196	(84) (85) (86) (87) (88)
Total gains 7. Mean inter Temperature du Utilisation for tau alpha util living au MIT Th 2 util rest of 1	895.1168	1170.4239 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149	1502.2648	1874.9214 ng area frr n1,m (see Apr 58.1064 4.8738 0.9851 20.2921	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926	Jul 58.5852 4.9057 0.6517 20.9724	Aug 58.6589 4.9106 0.7317 20.9522	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 0.8992 19.7628	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480	(84) (85) (86) (87) (88) (89) (90)
Total gains 7. Mean interpretation for the state of the	895.1168 nal tempera uring heati actor for g Jan 57.4716 4.8314 rea 0.9999 19.4338 19.9133 house 0.9998 18.4691 ration 18.8370	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992	1502.2648	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 0.8992 19.7628 fLA =	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141	(84) (85) (86) (87) (88) (89) (90) (91) (92)
7. Mean internation for the state of the sta	895.1168	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025	1502.2648	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787	2133.3697 Thi (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178	Sep 58, 4326 4,8955 0,9411 20,7372 19,9292 0,8992 19,7628 fLA = 20,1344	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 ea / (4) = 19.1747	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 0.0000	(84) (85) (86) (87) (88) (89) (90) (91) (92)
7. Mean internation of the state of the stat	895.1168 nal tempera uring heati actor for g Jan 57.4716 4.8314 rea 0.9999 19.4338 19.9133 house 0.9998 18.4691 raction 18.8370 djustment 18.8370	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025	1502.2648	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123	Sep 58, 4326 4,8955 0,9411 20,7372 19,9292 0,8992 19,7628 fLA = 20,1344	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Living are 19.6586	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 ea / (4) = 19.1747	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 0.0000	(84) (85) (86) (87) (88) (89) (90) (91) (92)
Total gains 7. Mean internation for the second sec	895.1168 nal tempera uring heati actor for g Jan 57.4716 4.8314 rea 0.9999 19.4338 19.9133 house 0.9998 18.4691 raction 18.8370 djustment 18.8370	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025	1502.2648	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123	Sep 58, 4326 4,8955 0,9411 20,7372 19,9292 0,8992 19,7628 fLA = 20,1344	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Living are 19.6586	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 ea / (4) = 19.1747	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 0.0000	(84) (85) (86) (87) (88) (89) (90) (91) (92)
Total gains 7. Mean interpretation of the second of the s	895.1168 nal tempera uring heati actor for g Jan 57.4716 4.8314 rea 0.9999 19.4338 19.9133 house 0.9998 18.4691 raction 18.8370 djustment 18.8370 ing require	1170.4239 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025 19.0025	1502.2648	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.3240	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 0.8992 19.7628 fLA = 20.1344 20.1344	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Elving are 19.6586 19.6586	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 18.1747 19.1747	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 0.0000 18.8141	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93)
Total gains 7. Mean intern Temperature du Utilisation for the second s	895.1168 nal tempera uring heati actor for g Jan 77.4716 4.8314 rea 0.9999 19.4338 19.9133 house 0.9998 18.4691 raction 18.8370 djustment 18.8370 Jan 0.9997 894.8831	1170.4239 ture (heati- ng periods ains for li Feb 0.9992 18.6350 19.0025 19.0025	1502.2648	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.3240	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123 Aug 0.6487 1177.4696	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 19.7628 fLA = 20.1344 20.1344	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Elving are 19.6586 19.6586	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 18.8095 19.1747 19.1747	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 0.0000 18.8141	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93)
Total gains 7. Mean internation of the state of the stat	895.1168	1170.4239 ture (heati ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025 19.0025	1502.2648	1874.9214	2130.9656 Dom Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652 Jun 0.7553 1611.4084 14.6000	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.3240 Jul 0.5665 1151.1448 16.6000	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123 Aug 0.6487 1177.4696 16.4000	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 19.7628 fLA = 20.1344 20.1344 Sep 0.9092 1399.7284 14.1000	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Eliving are 19.6586 19.6586	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 18.1747 19.1747	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.3914 18.8141 0.0000 18.8141	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96)
Total gains 7. Mean internations of the second of the sec	895.1168 nal tempera uring heati actor for g Jan 77.4716 4.8314 rea 0.9999 19.4338 19.9133 house 0.9998 18.4691 raction 18.8370 djustment 18.8370 Jan 0.9997 894.8831 4,3000 e W 4728.1007 1.0000 kWh	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025 19.0025 19.0025 45.9169.2376 4.9000 4579.1611 1.0000	ng season) in the livi ving area, Mar 77.6611 4.8441 0.9973 19.8936 19.9165 0.9962 18.9309 19.2981 19.2981 Mar 0.9953 1495.2576 6.5000 4148.8374 1.0000	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516 May 0.9098 1938.8525 11.7000 2682.7419 1.0000	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652 Jun 0.7553 1611.4084 14.6000	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.3240 20.5665 151.1448 16.6000 1188.1874	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123 20.6487 1177.4696 16.4000 1246.7164	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 19.7628 fLA = 20.1344 20.1344 Sep 0.9092 1399.7284 14.1000	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Elving are 19.6586 19.6586 Oct 0.9927 170.6927 10.6000 2909.8669	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 19.1747 19.1747	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.44480 0.3814 18.8141 0.0000 18.8141 Dec 0.9998 823.3419 4.2000	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93)
Total gains 7. Mean intern 7. Mean intern Temperature du Utilisation for tau alpha util living an MIT Th 2 util rest of h MIT 2 Living area for MIT Z Living area for MIT 8. Space heat: Utilisation Useful gains Ext temp. Heat loss rate Month fracti Space heating Space heating	895.1168	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025 19.0025 19.0025 45.9169.2376 4.9000 4579.1611 1.0000	1502.2648	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516 May 0.9098 1938.8525 11.7000 2682.7419 1.0000	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652 Jun 0.7553 1611.4084 14.6000 1807.5529	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.3240 20.5665 151.1448 16.6000 1188.1874	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123 20.6487 1177.4696 16.4000 1246.7164	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 19.7628 fLA = 20.1344 20.1344 20.1344 20.1344 20.1344 20.1399.7284 14.1000 1930.3926 0.0000	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Eliving are 19.6586 19.6586 0ct 0.9927 110.6000 2909.8669 1.0000 1293.9456	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 18.1747 19.1747 19.1747 Nov 0.9993 913.7175 7.1000 3890.0671 1.0000	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 Dec 0.9998 823.3419 4.2000 4722.5375 1.0000 2901.0015 15191.6673	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (97a) (98) (98)
Total gains 7. Mean intern 7. Mean intern Temperature du Utilisation for tau alpha util living an MIT Th 2 util rest of 1 MIT 2 Living area for MIT Temperature ac adjusted MIT 8. Space heat: Utilisation Useful gains Ext temp. Heat loss rate Month fracti Space heating	895.1168	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025 19.0025 19.0025 45.9169.2376 4.9000 4579.1611 1.0000	ng season) in the livi ving area, Mar 77.6611 4.8441 0.9973 19.8936 19.9165 0.9962 18.9309 19.2981 19.2981 Mar 0.9953 1495.2576 6.5000 4148.8374 1.0000	1874.9214	2130.9656 mm Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516 May 0.9098 1938.8525 11.7000 2682.7419 1.0000	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652 Jun 0.7553 1611.4084 14.6000 1807.5529 0.0000	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.3240 20.5665 1151.1448 16.6000 1188.1874 0.0000	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123 20.6487 1177.4696 16.4000 1246.7164 0.0000	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 19.7628 fLA = 20.1344 20.1344 20.1344 20.1344 20.1344 20.1399.7284 14.1000 1930.3926 0.0000	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Eliving are 19.6586 19.6586 0ct 0.9927 110.6000 2909.8669 1.0000 1293.9456	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 19.1747 19.1747 19.1747	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 0.0000 18.8141 Dec 0.9998 823.34199 4.2000 4722.5375 1.0000 2901.0015	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (97a) (98) (98)
Total gains 7. Mean interrections 7. Mean interrections Temperature du Utilisation for the second	895.1168	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025 19.0025	1502.2648	1874.9214	2130.9656 Dom Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516 May 0.9098 1938.8525 11.7000 2682.7419 1.0000 553.4537	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652 Jun 0.7553 1611.4084 14.6000 1807.5529 0.0000 0.0000	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.32	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123 20.4687 1177.4696 16.4000 1246.7164 0.0000 0.0000	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 19.7628 fLA = 20.1344 20.1344 20.1344 20.1344 20.1344 20.1399.7284 14.1000 1930.3926 0.0000	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Eliving are 19.6586 19.6586 0ct 0.9927 110.6000 2909.8669 1.0000 1293.9456	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 18.1747 19.1747 19.1747 Nov 0.9993 913.7175 7.1000 3890.0671 1.0000	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 Dec 0.9998 823.3419 4.2000 4722.5375 1.0000 2901.0015 15191.6673	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (97a) (98) (98)
Total gains 7. Mean intern 7. Mean intern Temperature du Utilisation for the second of the second	895.1168	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025 19.0025 ment	1502.2648	1874.9214	2130.9656 Dom Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516 May 0.9098 1938.8525 11.7000 2682.7419 1.0000 553.4537	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652 Jun 0.7553 1611.4084 14.6000 1807.5529 0.0000 0.0000	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.3240	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123 20.46487 1177.4696 16.4000 1246.7164 0.0000 0.0000	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 19.7628 fLA = 20.1344 20.1344 20.1344 20.1344 20.1344 20.1399.7284 14.1000 1930.3926 0.0000	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Eliving are 19.6586 19.6586 0ct 0.9927 110.6000 2909.8669 1.0000 1293.9456	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 18.1747 19.1747 19.1747 Nov 0.9993 913.7175 7.1000 3890.0671 1.0000	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 Dec 0.9998 823.3419 4.2000 4722.5375 1.0000 2901.0015 15191.6673	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (97a) (98) (98)
Total gains 7. Mean intern 7. Mean intern Temperature du Utilisation for tau alpha util living an MIT Th 2 util rest of 1 MIT 2 Living area for MIT Temperature ac adjusted MIT 8. Space heat: Utilisation Useful gains Ext temp. Heat loss rate Month fracti Space heating Space heating Space heating Space heating 8c. Space coo.	895.1168	1170.4239 ture (heati- ng periods ains for li Feb 57.5671 4.8378 0.9994 19.5985 19.9149 0.9992 18.6350 19.0025 19.0025 ment	1502.2648	1874.9214	2130.9656 Dom Table 9, Table 9a) May 58.1905 4.8794 0.9361 20.6564 19.9253 0.9056 19.6787 20.0516 20.0516 May 0.9098 1938.8525 11.7000 2682.7419 1.0000 553.4537	2133.3697 Th1 (C) Jun 58.5852 4.9057 0.8120 20.8926 19.9317 0.7252 19.8784 20.2652 20.2652 Jun 0.7553 1611.4084 14.6000 1807.5529 0.0000 0.0000	Jul 58.5852 4.9057 0.6517 20.9724 19.9317 0.5125 19.9242 20.3240 20.32	Aug 58.6589 4.9106 0.7317 20.9522 19.9329 0.5963 19.9178 20.3123 20.3123 20.4687 1177.4696 16.4000 1246.7164 0.0000 0.0000	Sep 58.4326 4.8955 0.9411 20.7372 19.9292 19.7628 fLA = 20.1344 20.1344 20.1344 20.1344 20.1344 20.1399.7284 14.1000 1930.3926 0.0000	Oct 58.1905 4.8794 0.9960 20.2501 19.9253 0.9936 19.2939 Eliving are 19.6586 19.6586 0ct 0.9927 110.6000 2909.8669 1.0000 1293.9456	Nov 58.0207 4.8680 0.9997 19.7670 19.9225 0.9995 18.8095 18.1747 19.1747 19.1747 Nov 0.9993 913.7175 7.1000 3890.0671 1.0000	21.0000 Dec 57.8441 4.8563 0.9999 19.4077 19.9196 0.9999 18.4480 0.3814 18.8141 Dec 0.9998 823.3419 4.2000 4722.5375 1.0000 2901.0015 15191.6673	(84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (97a) (98) (98)





CALCULAT	ION OF T	ARGET FA	ABRIC EN	ERGY EF	ICIENC	Y 09 Ja	n 2014						
Heat loss rate	W												
11000 1000 1000	0.0000	0.0000	0.0000	0.0000	0.0000	2999.1890	2361.0637	2421.8304	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7692	0.8527	0.7990	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	2307.0524	2013.2712	1935.1228	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2615.3196	2494.7263	2250.9177	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling													
	0.0000	0.0000	0.0000	0.0000	0.0000	221.9524	358.2026	234.9515	0.0000	0.0000	0.0000	0.0000	
Space cooling												815.1065	
Cooled fractio									fC =	cooled area	/ (4) =	1.0000	(105)
Intermittency													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000	(106)
Space cooling							00 5505						
0	0.0000	0.0000	0.0000	0.0000	0.0000	55.4881	89.5507	58.7379	0.0000	0.0000	0.0000	0.0000	
Space cooling Space cooling												203.7766 0.7571	
Energy for spa												56.4389	
Energy for spa												0.7571	
Total	00 00011119											57.1960	
Target Fabric	Energy Effic	ciency (TFE	E)										(109)
			-,										(/





CALCULAT	ION OF HEA	T DEMAND	09 Jan 2014

1. Overall dwel		nsions						Area	Store	y height		Volume	
Ground floor First floor Total floor are Dwelling volume		la)+(1b)+(1c	c)+(1d)+(1e)(1n)	2	69.1700		(m2) 148.0200 121.1500	(1b) x	(m) 2.2300 3.8400	(2c) =		(1b) - (3i (1c) - (3i (4) (5)
2. Ventilation													
					main heating	s	econdary heating		other	tot	al n	n3 per hour	
Number of chimr Number of open Number of inter Number of passi Number of fluel	flues mittent factories				0	+ +	0	+ +	0 = 0		0 * 40 = 0 * 20 = 5 * 10 = 0 * 10 = 0 * 40 =	0.0000 0.0000 50.0000 0.0000	(6b) (7a) (7b)
Infiltration du Pressure test Measured/design Infiltration ra	n q50	neys, flues	and fans	= (6a)+(6b)+(7a)+(7b)+	(7c) =				50.0000	Air change / (5) =	0.0629 Yes 5.0000 0.3129	(8)
Number of sides Shelter factor Infiltration ra			de shelter	factor					(20) = 1 -		(19)] = x (20) =		(19)
Wind speed	Jan 5.4000	Feb 5.1000	Mar 5.0000	Apr 4.6000	May 4.4000	Jun 3.9000	Jul 3.9000	Aug 3.9000	Sep 4.2000	Oct 4.5000	Nov 4.6000	Dec 4.9000	
Wind factor Adj infilt rate	1.3500	1.2750	1.2500	1.1500	1.1000	0.9750	0.9750	0.9750	1.0500	1.1250	1.1500	1.2250	
Effective ac	0.3590 0.5644	0.3391 0.5575	0.3324 0.5553	0.3058 0.5468	0.2925 0.5428	0.2593 0.5336	0.2593 0.5336	0.2593 0.5336	0.2792 0.5390	0.2992 0.5448	0.3058 0.5468	0.3258 0.5531	
3. Heat losses	and heat	loss parame	 ter										
Element				Gross	Openings		tArea	U-value	AxU		-value	AxK	
Lower Cottage W Main Cottage Wi Solid Door Rooflights (Uw Upper Ground Fl Lower Ground Fl Main Cottage Lower Cottage Retaining Wall Sloping Roof Plane Roof Flat Roof Total net area	ndows (Uw = 1.60) .oor .oor	= 1.60)		m2 119.7200 136.1500 12.2000 94.2600 52.9000 64.5300	7.3500 35.4000 0.8000 1.0800 2.1600	35 6 1 3 39 148 112 100 11 93 50 64	m2 .4000 .2600 .8900 .2400 .5300 .0200 .3700 .7500 .4000 .1800 .7400 .5300 .3100	W/m2K 1.3616 1.5038 1.4700 1.5038 0.1300 0.1200 0.1800 0.2000 0.1700 0.1800 0.1700	W/k 48.1997 9.4135 2.7783 4.8722 5.1389 17.7624 20.2266 18.1350 2.2800 15.8406 9.1332 9.0342	7 11 6 6 15	5.0000 0.0000 0.0000 0.0000 0.0000 0.0000 9.0000 9.0000 9.0000	kJ/K 2964.7500 16282.2000 6742.2000 6045.0000 1710.0000 838.6200 456.6600 580.7700	(27) (27) (26) (27a) (28a) (28a) (29a) (29a) (29a) (30) (30)
Fabric heat los Internal - Insu Internal Floor Internal Ceilir	lating Bl					81	(26)(.5700 .6200 .6200	30) + (32)	= 162.8146	1	0.0000 8.0000 8.0000	25834.2000 1469.1600 1469.1600	(32d)
Heat capacity (Thermal mass pa Thermal bridges Total fabric he	rameter (' s (Sum(L x	IMP = Cm /)			(28).	(30) + (32)		(32e) = + (36) =	64392.7200 239.2270 28.3710 191.1856	(35) (36)
	Jan 148.1386	lculated mon Feb 146.3115	Mar	Apr	25)m x (5) May 142.4542	Jun 140.0470	Jul 140.0470	Aug 140.0470	Sep 141.4565	Oct 142.9704	Nov 143.4983	Dec 145.1514	(38)
Heat transfer of Average = Sum(3	339.3242	337.4971	336.9112	334.6839	333.6398	331.2326	331.2326	331.2326	332.6421	334.1561	334.6839	336.3370 334.4644	
HLP HLP (average)	Jan 1.2606	Feb 1.2538	Mar 1.2517	Apr 1.2434	May 1.2395	Jun 1.2306	Jul 1.2306	Aug 1.2306	Sep 1.2358	Oct 1.2414	Nov 1.2434	Dec 1.2495 1.2426	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)





CALCULAT	ION OF I	HEAT DE	MAND	09 Jan 2	014								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot wate Energy conte Energy content	118.3946 175.5758 (annual)	153.5597	109.7841 158.4599	105.4788 138.1491	101.1736 132.5574	96.8683 114.3869	96.8683 105.9963	101.1736 121.6323	105.4788 123.0850	109.7841 143.4437 Total = S		118.3946 170.0358 1693.4620	(45)
Distribution 1	26.3364		45)m 23.7690	20.7224	19.8836	17.1580	15.8994	18.2448	18.4628	21.5166	23.4870	25.5054	(46)
Store volume b) If manufa	cturer dec											300.0000	(47)
Hot water st Volume facto Temperature Enter (49) or	or from Tab factor fro	le 2a m Table 2b	om Table 2	kWh/litre/c	lay)							0.0115 0.7368 0.5400 1.3784	(52) (53)
Total storage	42.7290		42.7290	41.3506	42.7290	41.3506	42.7290	42.7290	41.3506	42.7290	41.3506	42.7290	(56)
If cylinder co			1r storage 42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	
Total heat reg	quired for	water heati		ed for each	month	178.2496 0.0000	171.9877 0.0000	187.6237 0.0000	186.9476	209.4351	220.4426		(62)
Output from w/	'h	213.1648		202.0118	198.5488	178.2496	171.9877	Solar inp	out (sum of 186.9476	months) = S	um (63) m =	0.0000	(63)
RHI water heat								Total p	oer year (kW	Th/year) = S	um (64) m =	2470.4572 2470	
Heat gains fro			month 105.4810	97.0247	96.8684	89.1238	88.0369	93.2359	92.0159	100.4881	103.1530	109.3300	(65)
5. Internal ga													
Metabolic gain	ns (Table 5), Watts											
(66)m Lighting gains	185.5111				May 185.5111			Aug 185.5111	Sep 185.5111	Oct 185.5111	Nov 185.5111	Dec 185.5111	(66)
Appliances gai	99.5620	88.4301	71.9162	54.4452	40.6984	34.3593	37.1265	48.2584	64.7723	82.2433	95.9901	102.3292	(67)
Cooking gains	645.9580	652.6610	635.7696	599.8098	554.4170	511.7542	483.2528	476.5498	493.4412	529.4010	574.7938	617.4566	(68)
Pumps, fans	3.0000	56.6430 3.0000	3.0000	3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	
	-123.6740	-123.6740			-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	(71)
Water heating Total internal	149.4248	146.9385	141.7755	134.7565	130.1995	123.7830	118.3291	125.3170	127.7998	135.0647	143.2680	146.9489	(72)
		1009.5096	970.9413	910.4915	846.7949	791.3765	760.1884	771.6052	807.4933	868.1890	935.5318	988.2147	(73)
6. Solar gains													
[Jan]				ırea	Solar flux		g		FF	Acce	:SS	Gains	
				m2	Table 6a W/m2	or	fic data Table 6b	Specific or Tak	data ole 6c	fact Table		W	
North South			0.9	200 000	12.8263 54.8726		0.4500 0.4500		0.7000 0.7000	0.77 0.77		3.6959 10.7806	. ,
West North				000	23.8751 12.8263		0.4500 0.6300	(0.7000 0.7000	0.77 0.77	00	172.9283 4.7039	(74)
East South				1200 1400	23.8751 54.8726		0.6300 0.6300		0.7000 0.7000	0.77 0.77		20.5763 37.5643	(78)
East West				1800 .600 	32.3546 32.0564		0.6300 0.6300		0.7000 0.7000	1.00		13.8689 27.4821	
Solar gains Total gains	291.6001 1308.0249	494.6957 1504.2053	766.1358 1737.0771	1125.3037 2035.7952	1314.9063 2161.7012	1450.2577 2241.6342	1335.0509 2095.2394	1176.2771 1947.8823	929.0779 1736.5712	588.2556 1456.4446	346.5952 1282.1270	233.7262 1221.9409	(83) (84)
7. Mean intern	nal tempera	ture (heati	ng season)										
Temperature du Utilisation fa	ring heati	ng periods	in the livi	ng area fro	om Table 9,							21.0000	(85)
tau	Jan 52.7132	Feb 52.9986	Mar 53.0907	Apr 53.4441	May 53.6113		Jul 54.0009	Aug 54.0009	Sep 53.7721	Oct 53.5285	Nov 53.4441	Dec 53.1814	
alpha util living ar						4.6001	4.6001	4.6001	4.5848	4.5686	4.5629	4.5454	(0.5)
MIT	0.9990		0.9944	0.9786	0.9330 20.6514	0.7908	0.6497	0.6977					
Th 2 util rest of h	19.8718		19.8789	19.8854	19.8885	19.8956	19.8956	19.8956	19.8915	19.8870			
MIT 2 Living area fr	0.9987 18.1983 caction	18.3538	0.9923 18.6814	0.9697 19.1216	0.9019 19.4964	0.6993 19.7494	0.5082 19.7989	0.5570 19.7937	fLA =	Living are	a / (4) =	18.1884 0.3814	(90) (91)
MIT Temperature ad	djustment	18.9280	19.2160	19.6030	19.9369	20.1719	20.2247	20.2179		19.6139		18.7819 -0.1500	
adjusted MIT	18.6424	18.7780	19.0660	19.4530	19.7869	20.0219	20.0747	20.0679	19.9036	19.4639	18.9950	18.6319	(93)
8. Space heati													





CALCULATION OF HEAT DEMAND 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9982	0.9965	0.9902	0.9652	0.8983	0.7112	0.5330	0.5812	0.8675	0.9806	0.9964	0.9987	(94)
Useful gains	1305.6929	1498.9167	1720.0695	1964.9404	1941.8818	1594.2426	1116.7781	1132.1253	1506.4090	1428.1760	1277.5039	1220.3072	(95)
Ext temp.	4.0000	4.5000	6.3000	8.8000	11.7000	14.7000	16.6000	16.5000	14.0000	10.5000	6.9000	4.0000	(96)
Heat loss rat	e W												
	4968.5161	4818.7999	4300.9972	3565.4002	2698.1192	1762.7893	1150.9374	1181.8161	1963.7963	2995.3454	4047.9915	4921.2658	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating	kWh												
	2725.1405	2230.9615	1920.2102	1152.3310	562.6406	0.0000	0.0000	0.0000	0.0000	1165.9740	1994.7510	2753.5132	(98)
Space heating												14505.5221	(98)
RHI space hea	ting demand											14506	(98)





SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014) CALCULATION OF ENERGY RATINGS 09 Jan 2014 1. Overall dwelling dimensions Volume (m3) 330.0846 (1b) - (3b) (m2) 148.0200 (1b) (m) 2.2300 (2b) First floor
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)
Dwelling volume 121.1500 (1c) 3.8400 (2c) 465.2160 (1c) - (3c) (4) 269.1700 2. Ventilation rate secondary other m3 per hour 0 * 40 = 0 * 20 = 5 * 10 = 0 * 10 = Number of chimneys Number of open flues Number of intermittent fans Number of passive vents Number of flueless gas fires 0 0.0000 (6b) 50.0000 (7a) Air changes 50.0000 / (5) = Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 0 0629 (8) Yes 5.0000 0.3129 (18) Pressure test Measured/design q50 Infiltration rate Number of sides sheltered - [0.075 x (19)] = (21) = (18) x (20) = 0.8500 (20) 0.2659 (21) (20) = 1 -Infiltration rate adjusted to include shelter factor Feb 5.0000 1.2500 Jul 3.8000 Aug 3.7000 0.9250 Sep 4.0000 Dec 4.7000 (22) 1.1750 (22a) 5.1000 1.2750 4.9000 1.2250 Wind speed 1.1000 1.0750 1.0750 1.1250 Wind factor 0.9500 0.9500 1.0000 Adj infilt rate 3. Heat losses and heat loss parameter NetArea m2 35.4000 6.2600 U-value W/m2K 1.3616 A x U W/K 48.1997 Lower Cottage Windows (Uw = 1.44) Main Cottage Windows (Uw = 1.60) 1.5038 9.4135 (27) Rooflights (Uw = 1.60)
Upper Ground Floor
Lower Ground Floor 1.4700 1.5038 0.1300 1.8900 2.7783 (26) (26) (27a) 2964.7500 (28a) 16282.2000 (28a) 6742.2000 (29a) 17.7624 20.2266 110.0000 148.0200 0.1200 148.0200 112.3700 100.7500 11.4000 93.1800 50.7400 60.0000 60.0000 150.0000 9.0000 9.0000 119.7200 7.3500 35.4000 0.8000 1.0800 0.1800 0.1800 0.2000 0.1700 Main Cottage 136.1500 12.2000 94.2600 18.1350 2.2800 15.8406 6045.0000 (29a) 1710.0000 (29a) 838.6200 (30) 456.6600 (30) Lower Cottage Retaining Wall Sloping Roof Plane Roof 52.9000 2.1600 0.1800 9.1332 Plane Roof Flat Roof Total net area of external elements Aum(A, m2) Fabric heat loss, W/K = Sum (A x U) Internal - Insulating Block Internal Floor 64.5300 0.1400 9.0342 580.7700 (30) 64.3300 0.1400 667.3100 (26)...(30) + (32) = 430.5700 60.0000 25834.2000 (32c) 81.6200 18.0000 1469.1600 (32d) Internal Ceiling 81.6200 18.0000 1469.1600 (32e) Heat capacity Cm = Sum(A x k) Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K Thermal bridges (Sum(L x Psi) calculated using Appendix K) (28)...(30) + (32) + (32a)...(32e) = 64392.7200 (34) 239.2270 (35) 28.3710 (36) (33) + (36) =J111 Sep 140.5053 142.9704 144.0377 (38) 139.6004 139.6004 139.1654 141.9496 335.2233 (39) 333.6374 (39) 330.3510 334.1561 May 1.2376 Apr 1.2395 1.2495 1.2454 (40) 1.2395 (40) HLP (average) 1.2538 1.2517 1.2289 Days in month 31 28 31 30 31 30 31 31 30 31 30 31 (41) 4. Water heating energy requirements (kWh/year) Assumed occupancy 3.0919 (42)



Average daily hot water use (litres/day)



CALCULA	TION OF I	ENERGY I	RATINGS	09 Jai	n 2014								
Daily hot wat	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte Energy conten Distribution	118.3946 175.5758 nt (annual)	153.5597			101.1736 132.5574	96.8683 114.3869	96.8683 105.9963	101.1736 121.6323	105.4788 123.0850	143.4437	114.0893 156.5800 um(45)m =	118.3946 170.0358 1693.4620	(45)
Water storage	26.3364	23.0340		20.7224	19.8836	17.1580	15.8994	18.2448	18.4628	21.5166	23.4870	25.5054	
	Facturer dec storage loss				lav)							300.0000 0.0115	
Volume fact	tor from Tab e factor fro r (54) in (5	le 2a m Table 2b	14010 1	(11111) 11010)	,							0.7368 0.5400 1.3784	(52) (53)
If cylinder c	42.7290 contains ded		r storage			41.3506	42.7290	42.7290	41.3506	42.7290	41.3506	42.7290	
Primary loss Total heat re	23.2624	38.5939 21.0112 water heati	23.2624	41.3506 22.5120	23.2624	41.3506 22.5120	42.7290 23.2624	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	
Solar input	241.5672 0.0000	213.1648		202.0118	198.5488	178.2496 0.0000	171.9877 0.0000	187.6237 0.0000 Solar inp	186.9476 0.0000 out (sum of	209.4351 0.0000 months) = S	220.4426 0.0000 um(63)m =	236.0271 0.0000 0.0000	(63)
Output from w		213.1648	224.4512	202.0118	198.5488	178.2496	171.9877		186.9476 per year (kW				
Heat gains fr	rom water he 111.1720		month 105.4810	97.0247	96.8684	89.1238	88.0369	93.2359	92.0159	100.4881		109.3300	
5. Internal q													
Metabolic gai	ins (Table 5), Watts											
(66)m Lighting gain		185.5111			May 185.5111			Aug 185.5111	Sep 185.5111	Oct 185.5111	Nov 185.5111	Dec 185.5111	(66)
Appliances ga	99.5620	88.4301	71.9162	54.4452	40.6984	34.3593	37.1265	48.2584	64.7723	82.2433	95.9901	102.3292	(67)
Cooking gains	645.9580 s (calculate	652.6610 d in Append	635.7696 lix L, equat	599.8098 ion L15 or	554.4170 L15a), also	511.7542 see Table	483.2528 5		493.4412	529.4010	574.7938	617.4566	
Pumps, fans	3.0000	56.6430 3.0000	3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	
Losses e.g. e Water heating	-123.6740	-123.6740			-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	(71)
Total interna	149.4248	146.9385	141.7755	134.7565	130.1995	123.7830	118.3291	125.3170	127.7998	135.0647	143.2680	146.9489	(72)
10001 111001110		1009.5096	970.9413	910.4915	846.7949	791.3765	760.1884	771.6052	807.4933	868.1890	935.5318	988.2147	(73)
6. Solar gain													
[Jan]				Area m2	Solar flux Table 6a		g fic data		FF	Acce		Gains W	
					W/m2	or		Specific or Tab		Table		ri .	
North South			0.9	3200 9000	10.6334 46.7521		0.4500 0.4500	C	0.7000 0.7000	0.77 0.77	00	3.0640 9.1852	(78)
West North				2000	19.6403		0.4500	C	0.7000 0.7000	0.77	00	142.2550	(74)
East South East			2.2	3200 2400 3800	19.6403 46.7521 26.4634		0.6300 0.6300 0.6300	C).7000).7000).7000	0.77 0.77 1.00	00	16.9265 32.0052 11.3436	(78)
West			2.1	.600	26.2379		0.6300	C	0.7000	1.00		22.4939	
Solar gains Total gains									851.3358 1658.8291				
7. Mean inter													
Temperature d	during heati Eactor for g	ng periods ains for li	in the livi	ng area fron	om Table 9, Table 9a)	Th1 (C)						21.0000	(85)
tau alpha	Jan 52.9986 4.5332	Feb 53.0907 4.5394			May 53.6925 4.5795			Aug 54.1450 4.6097			Nov 53.5285 4.5686	Dec 53.3581 4.5572	
util living a		0.9981	0.9945			0.8226	0.6682	0.7316		0.9903		0.9993	(86)
	0.9991					20.8397	20.9125	20.8977			20.0317	19.7578	
MIT Th 2 util rest of	19.7765 19.8772	19.8883	20.0954 19.8806			19.8969	19.8969	19.8982	19.8943	19.8900	19.8870	19.8839	(88)
Th 2 util rest of MIT 2	19.7765 19.8772 house 0.9988 18.2325	19.8883		19.8885	19.8900		19.8969 0.5255 19.7988	0.5946	0.8760 19.6247	0.9850 19.1367	0.9976 18.6136	0.9991 18.2102	(89) (90)
Th 2 util rest of MIT 2 Living area f MIT	19.7765 19.8772 house 0.9988 18.2325 Fraction 18.8214	19.8883 19.8789 0.9974	19.8806	19.8885	19.8900	19.8969	0.5255	0.5946	0.8760 19.6247	0.9850 19.1367 Living are	0.9976 18.6136	0.9991 18.2102 0.3814 18.8004	(89) (90) (91)
Th 2 util rest of MIT 2 Living area f	19.7765 19.8772 house 0.9988 18.2325 fraction 18.8214 adjustment	19.8883 19.8789 0.9974 18.3974	19.8806 0.9924 18.7009 19.2328	19.8885 0.9722 19.1182	19.8900 0.9048 19.4932 19.9336	19.8969 0.7375 19.7346 20.1561	0.5255 19.7988	0.5946 19.7914 20.2133	0.8760 19.6247 fLA = 20.0500	0.9850 19.1367 Living are 19.6144	0.9976 18.6136 a / (4) =	0.9991 18.2102 0.3814 18.8004 -0.1500	(89) (90) (91) (92)
Th 2 util rest of MIT 2 Living area f MIT Temperature a adjusted MIT	19.7765 19.8772 house 0.9988 18.2325 fraction 18.8214 adjustment	19.8883 19.8789 0.9974 18.3974 18.9660 18.8160	19.8806 0.9924 18.7009 19.2328 19.0828	19.8885 0.9722 19.1182 19.5993 19.4493	19.8900 0.9048 19.4932 19.9336 19.7836	19.8969 0.7375 19.7346 20.1561 20.0061	0.5255 19.7988 20.2236 20.0736	0.5946 19.7914 20.2133 20.0633	0.8760 19.6247 fLA = 20.0500	0.9850 19.1367 Living are 19.6144	0.9976 18.6136 a / (4) = 19.1544	0.9991 18.2102 0.3814 18.8004 -0.1500	(89) (90) (91) (92)





CALCULATION OF	ENERGY	RATINGS	09 Jar	2014								
Utilisation 0.9984 Useful gains 1255.5470 Ext temp. 4.3000 Heat loss rate W	Feb 0.9964 1464.4513 4.9000	Mar 0.9903 1692.2509 6.5000	Apr 0.9678 1905.8106 8.9000	May 0.9011 1926.1854 11.7000	Jun 0.7473 1578.1052 14.6000	Jul 0.5504 1110.3328 16.6000	Aug 0.6177 1145.5172 16.4000	Sep 0.8763 1453.6379 14.1000	Oct 0.9821 1382.9665 10.6000	Nov 0.9967 1229.8846 7.1000	Dec 0.9988 1186.6532 4.2000	(95)
4850.2955 Month fracti 1.0000	4688.4634 1.0000	4232.0542 1.0000	3519.6530 1.0000	2692.9303 1.0000	1788.2571 0.0000	1149.0038 0.0000	1210.1863	1923.7962 0.0000	2953.0355 1.0000	3977.9415 1.0000	4844.1130 1.0000	
Space heating	2166.5361	1889.6137	1161.9666	570.4582	0.0000	0.0000	0.0000	0.0000	1168.1313		14330.9499	(98)
Space heating per m2									(98	(4) =	53.2413	(99)
8c. Space cooling requir	rement											
9a. Energy requirements	- Individua	al heating s	ystems, inc	luding micr	o-CHP							
Fraction of space heat if Fraction of space heat if Efficiency of main space Efficiency of secondary, Space heating requirement	From seconda From main sy heating sy supplementa	ry/suppleme /stem(s) /stem 1 (in	ntary syste %)								0.1000 0.9000 90.3000 65.0000 14283.3388	(202) (206) (208)
Jan Space heating requiremen		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency	/ (main heat		1)	570.4582	0.0000	0.0000	0.0000		1168.1313			
90.3000 Space heating fuel (mair	n heating sy		90.3000	90.3000	0.0000	0.0000	0.0000	0.0000	90.3000	90.3000	90.3000	
Water heating requiremen		1883.3359 290.7098	178.7641	568.5630 87.7628	0.0000	0.0000	0.0000	0.0000	1164.2505 179.7125	304.4001	2712.1097 418.6385	
Water heating Water heating requiremen	nt											
	213.1648	224.4512	202.0118	198.5488	178.2496	171.9877	187.6237	186.9476	209.4351	220.4426	236.0271 79.6000	
(217)m 89.2063 Fuel for water heating,		88.9066	88.3767	87.0372	79.6000	79.6000	79.6000	79.6000	88.3276	88.9824	89.2455	
270.7960 Water heating fuel used Annual totals kWh/year	239.1901	252.4573	228.5803	228.1194	223.9316	216.0650	235.7082	234.8588	237.1116	247.7374	264.4696 2879.0252	
Space heating fuel - mai Space heating fuel - sec											14283.3388 2204.7615	
Electricity for pumps ar central heating pump main heating flue far Total electricity for th Electricity for lighting	n ne above, kW		ix L)								30.0000 45.0000 75.0000 703.3187	(230e) (231)
Energy saving/generation PV Unit 0 (0.80 * 4.00 % Total delivered energy f	853 * 0.80)) =	ces M ,N an	d Q)							-2183.7566 17961.6877	
10a. Fuel costs - using												
Space heating - main sys Space heating - secondar Water heating (other fue Pumps and fans for heati Energy for lighting Additional standing char	stem 1 ry el) ing						Fuel kWh/year 14283.3388 2204.7615 2879.0252 75.0000 703.3187		Fuel price p/kWh 3.4800 5.8100 3.4800 13.1900 13.1900		Fuel cost f/year 497.0602 128.0966 100.1901 9.8925 92.7677 120.0000	(242) (247) (249) (250)
Energy saving/generation PV Unit Total energy cost	on technolog	gies					0.0000		0.0000		0.0000 948.0072	
11a. SAP rating - Indivi	dual heatin	ng systems									0.4200	(256)
Energy cost factor (ECF) SAP value SAP rating (Section 12) SAP band								255) x (256	(4) +	45.0] =	1.2673 82.3205	
12a. Carbon dioxide emis	ssions - Ind	dividual hea	ting system	s including	micro-CHP							
Space heating - main sys Space heating - secondar Water heating (other fue Space and water heating	Y						Energy kWh/year 14283.3388 2204.7615 2879.0252		ion factor kg CO2/kWh 0.2160 0.0390 0.2160	1	Emissions og CO2/year 3085.2012 85.9857 621.8695 3793.0563	(263) (264)





CALCULATION OF ENERGY RATINGS	09 Jan 2014				
Pumps and fans Energy for lighting		75.0000 703.3187	0.5190 0.5190	38.9250 365.0224	
Energy saving/generation technologies PV Unit Total kg/year CO2 emissions per m2 EI value EI rating EI band		-2183.7566	0.5190	-1133.3697 3063.6341 11.3800 86.9330 87 B	(272)
Calculation of stars for heating and DHW					
Main heating energy efficiency Main heating environmental impact Water heating energy efficiency Water heating environmental impact				= 4	





SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014 1. Overall dwelling dimensions Volume (m3) 330.0846 (1b) - (3b) (m2) 148.0200 (1b) (m) 2.2300 (2b) First floor
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)
Dwelling volume 121.1500 (1c) 3.8400 (2c) 465.2160 (1c) - (3c) (4) 269.1700 2. Ventilation rate secondary other m3 per hour 0 * 40 = 0 * 20 = 5 * 10 = 0 * 10 = Number of chimneys Number of open flues Number of intermittent fans Number of passive vents Number of flueless gas fires 0 0.0000 (6b) 50.0000 (7a) Air changes 50.0000 / (5) = Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 0 0629 (8) Yes 5.0000 0.3129 (18) Pressure test Measured/design q50 Infiltration rate Number of sides sheltered - [0.075 x (19)] = (21) = (18) x (20) = 0.8500 (20) 0.2659 (21) (20) = 1 -Infiltration rate adjusted to include shelter factor Jan 5.4000 1.3500 Feb 5.1000 1.2750 May 4.4000 1.1000 Jul 3.9000 0.9750 Aug 3.9000 0.9750 Sep 4.2000 Dec 4.9000 (22) 1.2250 (22a) 5.0000 1.2500 Wind speed 1.1500 0.9750 1.1500 Wind factor 1.0500 1.1250 Adj infilt rate 3. Heat losses and heat loss parameter NetArea m2 35.4000 6.2600 U-value W/m2K 1.3616 A x U W/K 48.1997 Lower Cottage Windows (Uw = 1.44) Main Cottage Windows (Uw = 1.60) 1.5038 9.4135 (27) Rooflights (Uw = 1.60)
Upper Ground Floor
Lower Ground Floor 1.4700 1.5038 0.1300 1.8900 2.7783 (26) (26) (27a) 2964.7500 (28a) 16282.2000 (28a) 6742.2000 (29a) 17.7624 20.2266 110.0000 148.0200 0.1200 148.0200 112.3700 100.7500 11.4000 93.1800 50.7400 60.0000 60.0000 150.0000 9.0000 9.0000 119.7200 7.3500 35.4000 0.8000 1.0800 0.1800 0.1800 0.2000 0.1700 Main Cottage 136.1500 12.2000 94.2600 18.1350 2.2800 15.8406 6045.0000 (29a) 1710.0000 (29a) 838.6200 (30) 456.6600 (30) Lower Cottage Retaining Wall Sloping Roof Plane Roof 52.9000 2.1600 0.1800 9.1332 Plane Roof Flat Roof Total net area of external elements Aum(A, m2) Fabric heat loss, W/K = Sum (A x U) Internal - Insulating Block Internal Floor 64.5300 0.1400 9.0342 580.7700 (30) 64.3300 0.1400 667.3100 (26)...(30) + (32) = 430.5700 60.0000 25834.2000 (32c) 81.6200 18.0000 1469.1600 (32d) Internal Ceiling 81.6200 18.0000 1469.1600 (32e) Heat capacity Cm = Sum(A x k) Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K Thermal bridges (Sum(L x Psi) calculated using Appendix K) (28)...(30) + (32) + (32a)...(32e) = 239.2270 (35) 28.3710 (36) (33) + (36) =Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$ Jan Feb Mar Apr May (38)m 148.1386 146.3115 145.7256 143.4983 142.4542 J111 Dec 145.1514 (38) 140.0470 140.0470 140.0470 141.4565 142.9704 143.4983 Heat transfer coeff 339.3242 Average = Sum(39)m / 12 = 337.4971 331.2326 331.2326 336.3370 (39) 334.4644 (39) 336.9112 334.6839 333.6398 May 1.2395 Aug 1.2306 Apr 1.2434 1.2517 HLP (average) 1.2606 1.2538 1.2306 1.2495 (40) 1.2426 (40) Days in month 31 28 31 30 31 30 31 31 30 31 30 31 (41) 4. Water heating energy requirements (kWh/year) Assumed occupancy 3.0919 (42) Average daily hot water use (litres/day)





CALCULATION	OF E	PC COST	S, EMISS	IONS AN	D PRIMA	RY ENER	GY 09	Jan 2014					
Ja		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use 118. Energy conte 175. Energy content (ann	.3946 .5758	114.0893 153.5597	109.7841 158.4599	105.4788 138.1491	101.1736 132.5574	96.8683 114.3869	96.8683 105.9963	101.1736 121.6323	105.4788 123.0850	109.7841 143.4437 Total = S	114.0893 156.5800 um(45)m =	118.3946 170.0358 1693.4620	(45)
	3364		45)m 23.7690	20.7224	19.8836	17.1580	15.8994	18.2448	18.4628	21.5166	23.4870	25.5054	(46)
Water storage loss: Store volume b) If manufacture		ared loss	factor is n	ot known :								300.0000	(47)
Hot water storage Volume factor fro	loss	factor from			ay)							0.0115 0.7368	
Temperature factor Enter (49) or (54) Total storage loss												0.5400 1.3784	
	.7290 ns dedi	38.5939 cated sola	42.7290 r storage	41.3506	42.7290	41.3506	42.7290	42.7290	41.3506	42.7290	41.3506	42.7290	(56)
Primary loss 23.	.7290 .2624	38.5939 21.0112	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	41.3506 22.5120	42.7290 23.2624	
		213.1648 0.0000	224.4512 0.0000	202.0118 0.0000	198.5488 0.0000	178.2496 0.0000	171.9877 0.0000	187.6237 0.0000 Solar inp	186.9476 0.0000 ut (sum of	209.4351 0.0000 months) = S	220.4426 0.0000 um(63)m =	236.0271 0.0000 0.0000	(63)
Output from w/h 241.	.5672	213.1648	224.4512	202.0118	198.5488	178.2496	171.9877	187.6237		209.4351	220.4426		
Heat gains from wat	er hea		month 105.4810	97.0247	96.8684	89.1238	88.0369	93.2359	er year (kW 92.0159	100.4881	103.1530	2470.4572 109.3300	
5. Internal gains (
Metabolic gains (Ta													
(66)m 185.	5111				May 185.5111			Aug 185.5111	Sep 185.5111	Oct 185.5111	Nov 185.5111	Dec 185.5111	(66)
Lighting gains (cal 99. Appliances gains (c	5620	88.4301	71.9162	54.4452	40.6984	34.3593	37.1265	48.2584	64.7723	82.2433	95.9901	102.3292	(67)
	9580	652.6610	635.7696	599.8098	554.4170	511.7542	483.2528	476.5498	493.4412	529.4010	574.7938	617.4566	(68)
56. Pumps, fans 3.	.6430 .0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	56.6430 3.0000	
	6740	-123.6740			-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	-123.6740	(71)
Water heating gains 149. Total internal gain	4248	146.9385	141.7755	134.7565	130.1995	123.7830	118.3291	125.3170	127.7998	135.0647	143.2680	146.9489	(72)
		1009.5096	970.9413	910.4915	846.7949	791.3765	760.1884	771.6052	807.4933	868.1890	935.5318	988.2147	(73)
6. Solar gains													
[Jan]				rea	Solar flux		g		FF	Acce	ss	Gains	
				m2	Table 6a W/m2	or	fic data Table 6b	Specific or Tab		fact Table		W	
North South				200	12.8263 54.8726		0.4500 0.4500	0	.7000 .7000	0.77 0.77		3.6959 10.7806	
West North			33.1 1.2		23.8751 12.8263		0.4500 0.6300		.7000 .7000	0.77 0.77		172.9283 4.7039	(80)
East South			2.8	400	23.8751 54.8726		0.6300 0.6300	0	.7000 .7000	0.77 0.77	00	20.5763 37.5643	(78)
East West				600	32.3546 32.0564		0.6300 0.6300		.7000 .7000	1.00		13.8689 27.4821	
Solar gains 291. Total gains 1308.					1314.9063 2161.7012								
7. Mean internal te	emperat	ure (heati	ng season)										
Temperature during Utilisation factor	heatin	g periods	in the livi	ng area fro	m Table 9,		Jul	Aug	Sep	Oct	Nov	21.0000 Dec	(85)
tau 52.	.7132 .5142	52.9986 4.5332	53.0907 4.5394	53.4441 4.5629	53.6113 4.5741	54.0009 4.6001	54.0009 4.6001		53.7721 4.5848	53.5285 4.5686	53.4441 4.5629	53.1814 4.5454	
util living area 0.	.9990	0.9981	0.9944	0.9786	0.9330	0.7908	0.6497	0.6977	0.9178	0.9894	0.9981	0.9993	(86)
		19.8595 19.8772	20.0830 19.8789		20.6514 19.8885	20.8573 19.8956	20.9154 19.8956	20.9060 19.8956	20.7450 19.8915		20.0250 19.8854		
0. MIT 2 18. Living area fraction	on	0.9974 18.3538	0.9923 18.6814		0.9019 19.4964	0.6993 19.7494	0.5082 19.7989	0.5570 19.7937		0.9837 19.1354 Living are		0.3814	(90) (91)
Temperature adjustm	nent	18.9280	19.2160	19.6030	19.9369	20.1719	20.2247	20.2179	20.0536	19.6139		18.7819 -0.1500	
adjusted MIT 18.	6424	18.7780	19.0660	19.4530	19.7869	20.0219	20.0747	20.0679	19.9036	19.4639	18.9950	18.6319	(93)
8. Space heating re													





CALCULATION OF EPC COST	rs, EMISS	IONS AN	D PRIMA	RY ENER	GY 09	Jan 2014					
Jan Feb Utilisation 0.9982 0.9965 Useful gains 1305.6929 1498.9167	Mar 0.9902 1720.0695	Apr 0.9652 1964.9404	May 0.8983	Jun 0.7112 1594.2426	Jul 0.5330	Aug 0.5812 1132.1253	Sep 0.8675	Oct 0.9806 1428.1760	Nov 0.9964	Dec 0.9987 1220.3072	
Ext temp. 4.0000 4.5000 Heat loss rate W	6.3000	8.8000	11.7000	14.7000	16.6000	16.5000	14.0000	10.5000	6.9000	4.0000	(96)
4968.5161 4818.7999 Month fracti 1.0000 1.0000 Space heating kWh	1.0000	3565.4002 1.0000	1.0000	0.0000	0.0000	1181.8161	0.0000	2995.3454 1.0000	1.0000	4921.2658 1.0000	(97a)
2725.1405 2230.9615 Space heating Space heating per m2	1920.2102	1152.3310	562.6406	0.0000	0.0000	0.0000	0.0000	1165.9740		2753.5132 14505.5221 53.8898	(98)
31.								,	, , , ,		, ,
8c. Space cooling requirement											
Not applicable											
9a. Energy requirements - Individua											
Fraction of space heat from seconda Fraction of space heat from main sy	ry/suppleme									0.1000	
Efficiency of main space heating sy Efficiency of secondary/supplements Space heating requirement	stem 1 (in									90.3000 65.0000 14457.3310	(206) (208)
Jan Feb Space heating requirement	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2725.1405 2230.9615 Space heating efficiency (main heat			562.6406	0.0000	0.0000	0.0000	0.0000	1165.9740	1994.7510		
90.3000 90.3000 Space heating fuel (main heating sy	90.3000 /stem)	90.3000	90.3000	0.0000	0.0000	0.0000	0.0000	90.3000	90.3000	90.3000	
2716.0868 2223.5497 Water heating requirement 419.2524 343.2248	295.4170	177.2817	560.7714 86.5601	0.0000	0.0000	0.0000	0.0000	1162.1003	306.8848	2744.3653 423.6174	
Water heating Water heating requirement											
241.5672 213.1648 Efficiency of water heater	224.4512	202.0118	198.5488	178.2496	171.9877	187.6237	186.9476	209.4351	220.4426	236.0271 79.6000	(216)
(217)m 89.2246 89.1499 Fuel for water heating, kWh/month	88.9260	88.3635	87.0059	79.6000	79.6000	79.6000	79.6000	88.3247	88.9918	89.2566	
270.7405 239.1084 Water heating fuel used Annual totals kWh/year	252.4024	228.6144	228.2016	223.9316	216.0650	235.7082	234.8588	237.1196	247.7113	264.4365 2878.8983 14457.3310	(219)
Space heating fuel - main system Space heating fuel - secondary										2231.6188	
Electricity for pumps and fans: central heating pump main heating flue fan Total electricity for the above, kW Electricity for lighting (calculate		lix L)								30.0000 45.0000 75.0000 703.3187	(230e) (231)
Energy saving/generation technologi PV Unit 0 (0.80 * 4.00 * 922 * 0.80 Total delivered energy for all uses)) =	ces M ,N an	d Q)							-2361.4223 17984.7445	
10a. Fuel costs - using BEDF prices						Fuel		Fuel price		Fuel cost	
Space heating - main system 1						kWh/year 14457.3310		p/kWh 4.1000		£/year 592.7506	(240)
Space heating - secondary Water heating (other fuel)						2231.6188 2878.8983		6.0900 4.1000		135.9056 118.0348	(247)
Pumps and fans for heating Energy for lighting Additional standing charges						75.0000 703.3187		15.7000 15.7000		11.7750 110.4210 89.0000	(250)
Energy saving/generation technolog PV Unit	jies					0.0000		0.0000		0.0000	(252)
Total energy cost										1057.8870	(255)
12a. Carbon dioxide emissions - Ind											
						Energy	Emiss	ion factor		Emissions	
Space heating - main system 1						kWh/year 14457.3310		kg CO2/kWh 0.2160		3122.7835	
Space heating - secondary Water heating (other fuel)						2231.6188 2878.8983		0.0390 0.2160		87.0331 621.8420	(264)
Space and water heating Pumps and fans Energy for lighting						75.0000 703.3187		0.5190 0.5190		3831.6587 38.9250 365.0224	(267)
Energy saving/generation technolog	jies										
PV Unit Total kg/year						-2361.4223		0.5190		-1225.5782 3010.0279	
13a. Primary energy - Individual he	eating syste	ems includin	g micro-CHP								





CALCULATION OF EPC COSTS, I	MISSIONS	AND PRIMA	RY ENERGY	09 Jan 2014	1	
Space heating - main system 1 Space heating - secondary Water heating (other fuel) Space and water heating					1.2600	Primary energy kWh/year 17637.9438 (261) 2811.8397 (263) 3512.2559 (264) 23962.0394 (265)
Pumps and fans Energy for lighting				75.0000 703.3187		230.2500 (267) 2159.1885 (268)
Energy saving/generation technologies PV Unit Primary energy kWh/year Primary energy kWh/m2/year				-2361.4223	3.0700	-7249.5663 (269) 19101.9115 (272) 70.9660 (273)
SAP 2012 EPC IMPROVEMENTS						
Current energy efficiency rating: Current environmental impact rating:			B 82 B 87			
(For testing purposes):			Not cons	dered		
B C D			Not consi	dered. dered		
E Low energy lighting F G H I J			Already ins Not cons: Not cons: Not cons: Not cons: Not cons: Not cons:	dered dered dered dered dered		
M N Solar water heating O P R S			Not consi SAP increas Not consi Not consi Not consi	dered se too small dered dered dered dered		
T U Solar photovoltaic panels A2 A3 T2 W X			Not cons: Already in: Not cons: Not cons: Not cons: Not cons: Not cons: Not cons:	stalled .dered .dered .dered .dered .dered		
J2 Q2 Z1 Z2 Z3 Z4 Z5			Not consi Not consi Not consi Not consi Not consi	dered dered dered dered dered dered		
V2 Wind turbine L2 Q3 Q3			Not consi Not applica Not consi Not consi Not consi	able .dered .dered		
Recommended measures: (none)	SAP change	Cost change	CO2 change			
Measures omitted - SAP change or cost s N Solar water heating	aving too sma + 0.7	11: -£ 47	-266 kg (8.8	3%)		
Recommended measures	Typical an	nual savings	Energy Envir efficiency			
(none) Total Saving	s £0	0.00 kg/m	2			
Potential energy efficiency rating: Potential environmental impact rating:			B 82 B 8			
Fuel prices for cost data on this page Recommendation texts revision number 4.						
Recommendation texts revision number 4. Typical heating and lighting costs of t	his home (per	year, Thames Va				
Electricity Mains gas Wood	Current £122 £800 £136	Potential £122 £0 £800 £0 £136 £0				
Space heating Water heating Lighting	£829 £118 £110	£829 £0 £118 £0 £110 £0				
Total cost of fuels Total cost of uses Delivered energy Carbon dioxide emissions CO2 emissions per m² Primary energy	£1058 £1057 67 kWh/m² 3.0 tonnes 11 kg/m² 71 kWh/m²	£1058 £1057 67 kWh/m ² 3.0 tonnes 11 kg/m ² 71 kWh/m ²	£0 £0 0 kWh/m ² 0.0 tonnes 0 kg/m ² 0 kWh/m ²			





JLATION OF EPC (COSTS, EMISSIONS AND	PRIMARY ENERGY	09 Jan 2014	





CALCULATION OF ENERGY RATINGS FOR IMPROVED DWI	FILING 09 Ian 2014
. ALCULATION OF FINERGY RATINGS FOR INTROVED DWI	FILING U9 Jan /UT4

SAP 2012 WORKSHEET FOR New Build (As Designed) (Versio CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING	
No improvements selected / applicable	





CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING No improvements selected / applicable SAP 2012 OVERHEATING ASSESSMENT FOR New Build (As Designed) Overheating Calculation Input Data Dwelling type Number of storeys Cross ventilation possible Detached House Yes SAP Region Front of dwelling faces Overshading Thermal mass parameter Thames Valley North
Average or unknown
239.2 (calculated from construction elements) Night ventilation 8.00 (Windows fully open) Ventilation rate during hot weather (ach) Overheating Calculation 2099.59 (P1) Summer ventilation heat loss coefficient Transmission heat loss coefficient Summer heat loss coefficient 191.19 (37) 2290.78 (P2) Overhangs Orientation Ratio Z overhangs Overhang type East 1.000 None South 0.000 None West 0.000 1.000 None Solar access Z overhangs Orientation Z summer 0.900 (P8) 0.900 (P8) 1.000 (P8) 0.900 (P8) North 1.000 0.90 1.000 1.000 1.000 1.000 1.00 East South 1.000 0.90 1.000 0.900 (P8) 1.000 Solar flux Shading [Jul] Area Gains Specific data or Table 6c Table 6a W/m2 Specific data or Table 6b 27.3430 25.7664 994.8004 34.8002 118.3687 89.7817 0.9000 North 1.3200 81.1852 0.4500 81.1852 112.2060 117.5071 81.1852 117.5071 112.2060 0.7000 0.7000 0.7000 0.7000 0.7000 0.4500 0.4500 0.6300 0.6300 0.9000 0.9000 0.9000 0.9000 South 0.9000 33.1800 1.2000 2.8200 East South 2.2400 0.6300 0.9000 East West 0.6300 1.0000 1526.5566 total: Jul 1527 757 2284 (P3) Internal gains 769 2115 Total summer gains 2409 (P5) Summer gain/loss ratio Summer external temperature Thermal mass temperature increment (TMP = 239.2) 1.05 16.00 0.33 17.38 1.00 17.90 0.33 0.92 17.80 0.33 Threshold temperature 19.22 (P7) Likelihood of high internal temperature Not significant Not significant Assessment of likelihood of high internal temperature: Not significant

