Sustainability Statement for Planning

Client: Mukhbinder Chana

Site: 88 Alexandra Park Road,
London.

Proposals: The conversion of three floors of an existing building into three apartments and the construction of one new build duplex apartment as well as two semi-detached dwellings.

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Contents:

Report Details:

Assessor	Checked	Date	Job
CT	PK	03/09/2025	10766 Rev0

1 - Introduction

This Sustainability Statement (SS) has been prepared in support of the planning application for the proposed redevelopment of 88 Alexandra Park Road in London, comprising of the conversion of three floors of an existing building into three apartments and the construction of one new build duplex apartment and two semi-detached dwellings falling under the requirements of Haringey District Council.

2 - Planning Policies

National Planning Policy Framework 2025

The NPPF was updated in December 2025 to place greater emphasis on beauty, place-making, the environment, and sustainable development. The strengthened environmental objectives aim to protect and enhance the natural, built, and historic environment, and encourage effective land use, greater biodiversity, prudent use of natural resources, minimisation of waste and pollution, and adaptation to climate change alongside a move to a low carbon economy.

The London Plan 2021 is the latest strategy for Greater London which sets out the below policies.

Chapter 8 Green Infrastructure and Natural Environment G1- G7

Chapter 9 Sustainable Infrastructure SI1 - SI17

Chapter 10 Transport T1 – T9

Only some of the above policies will be relevant to the proposed development, as they can vary depending on the size and type of project, therefore we would taylor the guidance to the site.

The proposed development will use the above policies as a guide to implement the sustainable design principles within the development.

Haringey Council

The Local Plan sets out to promote Sustainable Development. Furthermore, Local Plan. Policy DM21 Sustainable Design Layout and Construction, requires a sustainability statement to be provided for all planning applications in line with the key principals of the Sustainable Design and Construction of the London Plan.

3 - Existing and Proposed Development

The site is located on land to 88 Alexandra Park in London (see Figure 1). The site is currently an existing building to be converted into three apartments the rear hardstanding land is to be converted into a duplex apartment and the building to Roseberry Mews is to be demolished and two new build semi-detached dwellings are to be constructed.

Given the scale and nature of the development, this constrains the development proposals in terms of the layout, positioning and orientation of the proposed dwellings. Subsequently, these constraints will impact on the feasibility of certain sustainability and energy efficient measures that can feasibly be incorporated into the new dwellings.

Figure 1: Site Location and floor plans

4 – Sustainability Statement

Energy	
Issue	Compliance
Energy Demand	Throughout the new development of 88 Alexandra Park Road, best efforts have been made to reduce the need for energy and reduce heat demand. A preliminary Energy assessment has been carried out on the full development to show how the dwellings can be improved beyond Part L 2021 building regulations. As the drawings supplied are at a planning stage, assumptions have been made about the construction, heating and ventilation. Therefore energy strategy which has been used, should be used as a guide to design the dwellings.
Maximise use of passive energy	Through the use of passive and active design measures the design team have enabled the development to require less energy through the use of optimised insulation, improved window u-values, higher air tightness, reduced cold bridging and light coloured materials.
Increased Energy Efficiency	An Energy Statement has been carried out for the proposed dwellings which shows how the dwellings will go beyond building regulations Part L 2021. The dwellings will incorporate: <u>Change of use</u> • Low fabric element u-values, External wall u-value 0.24W/m2k, New walls 0.18W/m2k, Floor 0.15W/m2k, Roof 0.12W/m2k and Windows 1.2W/m2k • High efficiency ASHP system for water heating • Electric panel heaters • Shower Heat recovery system • Decentralised mechanical extract fans This has a potential 35% CO2 reduction over Part L 2021.

	<u>New Build</u> • Low fabric element u-values, External wall u-value 0.15W/m2k, Floor 0.12W/m2k, Roof 0.10W/m2k, Windows 1.2W/m2k and doors 1.0W/m2k • High efficiency ASHP system for space and water heating • Time and temperature zone control, weather compensator • Shower heat recovery system • Decentralised mechanical extract fans • Solar PV totalling 6.4kWp This has a potential 94% CO2 reduction over Part L 2021. With the above improvements to the new build and change of use apartments, the total development has shown to be an improvement over building regulations Part L1 2021 baseline, by achieving a potential 61% improvement in CO2 emissions.
Renewable Energy Sources	As shown in the Energy Statement, the feasibility of several renewable technologies has been reviewed and shown that there is the potential for Solar panels, ASHP for space and water heating to the new build apartments and an ASHP for water heating to the apartments.
Responsible Travel Provisions	The site is in a suburban area and therefore has excellent access to public transport. Including Alexandra Palace train station train station 1.2km away and Bounds Green Under ground station is 1.4km away. There are also several bus nodes along Alexandra Park Road. There will also be cycle storage for 7 cycles provided for the apartments and 2 for each of the semi-detached house occupiers to promote healthier travel methods and reduce CO2 emissions from vehicles.

Water	
Issue	Compliance
Water Saving Measures	Initial advice from the design team suggests the water saving measures can be incorporated in order to reduce water usage. It has been identified that there is the opportunity to have low flow rates and dual flush toilets.
Water Consumption Targets	Water efficient fixtures, fittings and appliances will be provided to ensure that internal water use targets are achieved to comply with the local council of target of 110 L/person/day including the 5L for external usage. In comparison, Building Regulations Approved Document G requires internal water use to be at 125litres/person/day or less.
Reusing Water	A preliminary feasibility study of the potential to include rainwater harvesting should be carried out; given the nature of the development however it may be considered not feasible to install a rainwater harvesting system. Further assessment with a drainage engineer would be needed.
Metering	A water meter could be provided. During detailed design, consideration will be given to the provision of digital meters with connectivity to a central building management / billing system, rather than standard analogue meters.

Materials and Waste	
Issue	Compliance
Design Stage **Choosing materials that minimise the use of resources are sustainably sourced, do not cause harm to health and are robust.**	The contractor and developer will aim to design and choose materials that will influence the construction process and reduce the embodied carbon of the development. Ensuring that materials are responsibly sourced, sourcing materials from local sources, minimising the harmful effects of some materials on human health, ensuring that specified materials are robust and sensitive to the building type and age. Where feasible the developer use materials and products with Environmental Product Declaration (EPD) certificates. It is intended that insulation materials will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of less than five. Where specified by the developer (e.g. low VOC paint), finishes and other materials will not contain or emit toxic substances. Where timber is to be installed it will be 100% legally sourced and FSC certified.

Construction Stage **Management of materials resulting from demolition through the waste hierarchy**	The Contractor will aim to reduce waste during the construction phase of the development via the hierarchy of, Reduce, Reuse (prioritising on-site reuse of demolition materials, followed by offsite reuse), Recycle (prioritising on-site recycling, then off-site recycling), Resource recovery (for energy generation processes – fuels, heat and power); and Disposal. A Site Waste Management Plan (SWMP) will be prepared and incorporate non-hazardous waste, demolition and excavation waste if applicable. The BRE Smartwaste tool can be used as an easy tool by contractors.
Storage for Recyclables & Waste	Sufficient internal and external space will be provided to facilitate recycling and the good management of waste for the building occupiers. The dwellings will be fitted with internal waste storage facilities in the kitchen for the segregation of recyclable materials, in compliance with BS5096.

Nature Conservation and Biodiversity	
Issue	Compliance
Protecting Species **Promoting the Protection and Planting of Trees**	The existing site is a building with hardstanding areas and is considered to be of low ecological value. Existing trees (and the space they require) have been considered throughout this development. It has been necessary to remove one tree on site which is being replanted along the boundary. Whilst measures to enhance the ecological potential of the site will be investigated where possible, opportunities to enhance the ecological value of the site are limited. There are plans to install a green roof to the flat roof space within the development.
Designing development proposals	The green space has been increase compared to the previous site due to the installation of the green roof to the flat roof areas of the development. Efforts will be made to improve the ecological value of the site with planting of native plant species and bird boxes relevant to the native birds in the area.

Increased Green Cover and Trees	
Issue	Compliance
Promoting Urban Greening	To help the city to adapt to future climates. Green infrastructure is a network of mainly vegetated spaces and other environmental features which can promote urban cooling, reduced runoff, reduced energy demand, improved air quality, improved biodiversity, enhanced aesthetic and an increased health and well-being. The development will look to encompass ecological features such as native plant species and trees in the rear garden. The site doesn't allow for further greening.

Tackling Increased Temperatures and Drought	
Issue	Compliance
Preventing Developments from Overheating	Overheating within buildings can result from either too much heat entering a building and not being released or too much heat being generated within a building and not being released. Therefore, if the internal environment becomes too hot it is likely occupiers will try to find a way to cool their environment. In order to continue minimising CO_2 emissions the design team have considered the internal comfort and implemented the following measures to reduce over heating, via cross ventilation, lightly colours external walls, and blinds. The dwellings are orientated where summer over heating should be reduced with less windows facing in a south direction.

Promoting Heat and Drought Resistant Planting	London's water demand already outstrips mains water supply. Therefore it is essential that landscaping does not use excessive amounts of water. have ensured the landscaping of the development does not require excessive amounts of water. Consideration will be given the including plant species which are heat and drought resistant. Advice from an ecologist should ideally be sought before any plant species are selected.

Flooding	
Issue	Compliance
Surface Water Flooding	Surface water flooding is the most likely form of flooding that development may be exposed to. Surface water flooding is likely to increase due to the anticipated increased intensity in rainfall events as well as the continuing urbanisation of London. There will be no significant increase in hard-standing areas and no increase in the peak rates and volumes of surface water runoff. Therefore, this will not need to be compensated for by SUDs.
Flooding Resilience and Resistance	The development site is located in a flood zone 1 area, which is low risk.
Flooding and Basement Developments	There is no basement planned for the proposed development.

Land Contamination	
Issue	Compliance
Responsible Person/Organisation	The current site is not identified as being contaminated as a result of previous uses.
Bioremediation	Bioremediation is not required.

Air Pollution	
Issue	Compliance
Assessment Requirements	An air quality test should not be needed for the proposed development being located on a residential road.
Construction and Demolition	To recognise and encourage construction-sites which are managed in an environmentally and socially considerate, responsible and accountable manner. For the proposed development, the contractor will comply with 'The Control of Dust and Emissions during Construction Demolition SPG'. Control measures will be implemented by the contractor on site to prevent air and dust pollution. An example of this could be using dust sheets on materials and skips, damping down in waste areas.

Design and Occupation	Ventilation pathways will need to be designed to reduce the build-up of air pollutants in the dwellings, through cross ventilation, and either naturally ventilated or mechanical ventilation. Where there is mechanical ventilation, exhaust flues will be positioned away from intake flues for fresh air. In naturally ventilated buildings/spaces: openable windows/ventilators are over 10m from sources of external pollution. There is no requirement for mechanical ventilation for this development.

Noise	
Issue	Compliance
Sources of Noise	The proposed site is located within an existing built up residential area, with few commercial units in the vicinity. The area is identified having a low potential for noise pollution from residential dwellings.
Mitigation of Noise Emitted by Development	Noise attenuation measures will be incorporated on-site where required, to ensure that any noise generated by equipment or services will not generate a source of noise pollution or negatively impact the surrounding area. The developer will comply with the council's construction noise rules which states what hours of the day the site can work within.

Mitigation of Noise impacts on the Development	For the occupiers of the dwellings, the specification of the partition walls, floors and external walls will be designed to go beyond Document E of the building regulations. The following should be followed, and best efforts will be made here were possible to avoid impacts of external noise to the occupiers. Locate noise sensitive areas/rooms away from the parts of the site most exposed to noises, create setbacks, design the building so its shape and orientation reflect noise and protect the most sensitive uses, position non-residential uses closer to the noise source in mixed use developments, design in lobbies, balconies, winter gardens and dual facades; and carefully locate noise generating equipment for the building such as plant and services away from sensitive uses.

Light Pollution	
Issue	Compliance
Type of Light Pollution	Light pollution comprises any adverse effect of lighting for building occupiers, and for this development includes; Glare, 'Light Trespass' and 'Sky Glow' and Poor Artificial Lighting
Potential Effects	Light pollution can have a detrimental impact on the quality of life of residents; by significantly changing the character of the locality, altering wildlife and ecological patterns and wasting energy
Lighting Design to Minimise Impacts	To minimise obtrusive light where applicable, lights will be designed to be used only in appropriate areas, and that upward lighting is minimised, this will help to reduce light pollution and effect to neighbours.

	Where there is external lighting, it will have to be designed to the following standards. First to be energy efficient going beyond Part L of the building regulations, with the aim to achieve no less than 60 lumens per circuit watt. Second all external lights will be automatically controlled for the prevention of operation during daylight hours and presence detection in areas of intermitted pedestrian traffic. The ILP Guidance for the reduction of obtrusive light, 2001 will be used to design the lighting strategy. All external lighting (except for safety and security lighting) can be automatically switched off between 23:00 and 07:00. If safety or security lighting is provided and will be used between 23:00 and 07:00, this part of the lighting system complies with the lower levels of lighting recommended during these hours in Table 2 of the ILP's Guidance notes. Illuminated advertisements, where specified, must be designed in compliance with ILE Technical Report 5 – The Brightness of Illuminated Advertisements

Water Pollution	
Issue	Compliance
How Sustainable Drainage Contributes to Water Quality	There are no activities on site which lead to pollutants accumulating on hardstanding areas, therefore traditional drainage systems will be sufficient. Where applicable, the design team will incorporate the drainage hierarchy set out in London Plan Policy. Further details is required by a drainage engineer.
Connection of New Developments to the Sewer Network	The site is in close proximity to the main sewer network therefore connection should not be a problem.

5 Conclusion

The proposed development is to be located on land off 88 Alexandra Park Road, London. Where the existing site is currently an existing building to be converted into three apartments the rear hardstanding land is to be converted into a duplex apartment and the building to Rosebery Mews is to be demolished and two new build semi-detached dwellings are to be constructed.

Haringey Council Core strategy sets out in their Local Plan, Policy DM21 Sustainable Design Layout and Construction, requires a sustainability statement to be provided for all planning applications in line with the key principals of the Sustainable Design and Construction of the London Plan to promote Sustainable Development.

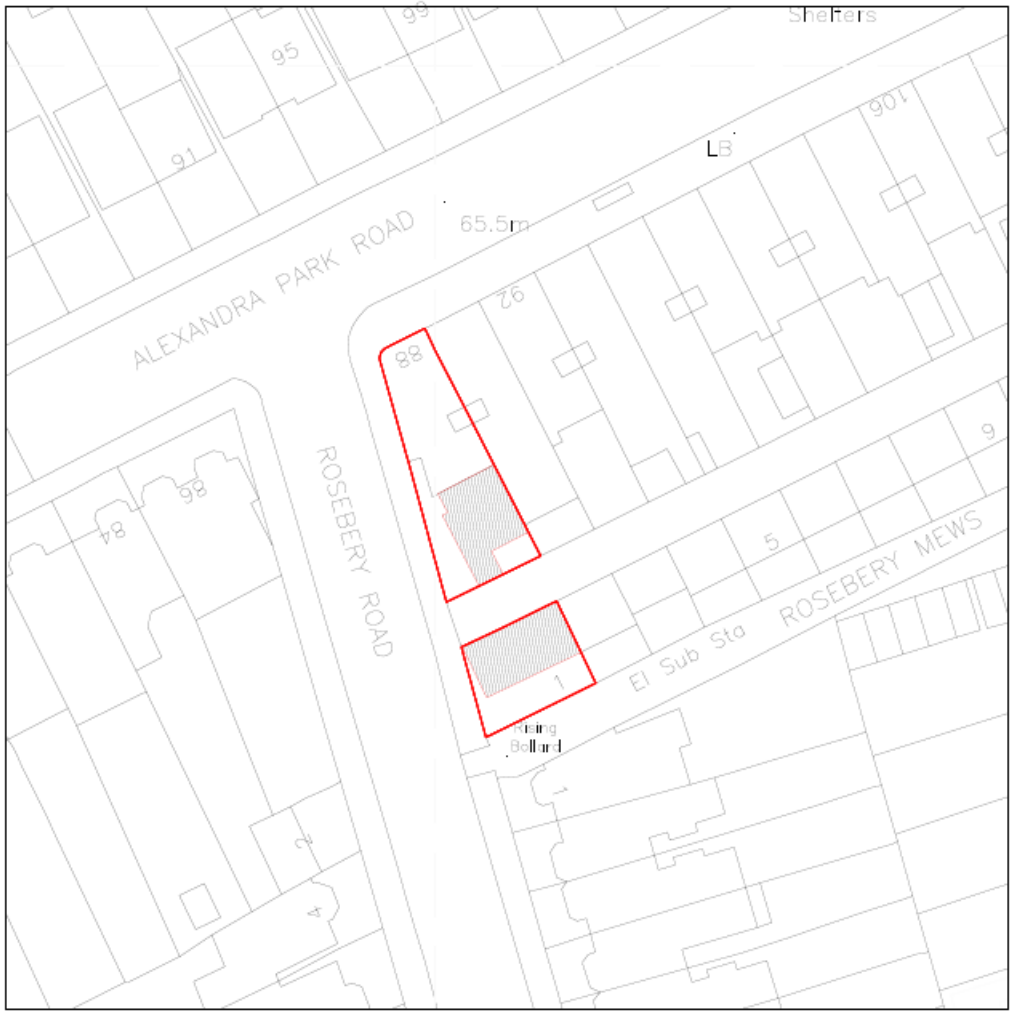
Given the scale and nature of the development, this constrains the development proposals in terms of the layout, positioning and orientation of the proposed dwelling. Subsequently, these constraints will impact on the feasibility of certain sustainability and energy efficient measures that can feasibly be incorporated into the development (as discussed in Section 4 of this report).

The above sustainability statement sets out what the requirements are of the planning policies and what can be achieved for the proposed development.

The main features of the site to meet the building environmental standards are:

- The energy efficiency measures of the building are to go beyond Part L1 2021, with a potentially a 61% CO2 improvement
- The development is to take a fabric first approach, which is to be designed to be highly insulated, with low u-values, good air tightness, high heating efficiency and controls as well as shower heat recovery systems in all dwelling
- Low carbon and renewable technologies to be installed through out the development to include ASHP for space and water heating with solar PV to the new build elements and ASHP for water heating to the existing apartments
- Water efficiency is a big driver of sustainability and indoor fittings which will have water efficiency will be installed. These will help to go beyond Part G minimum standard of 125L/person/day and achieve a 110L/person/day including the external 5L water usage.
- Materials to be used in the proposed development are to consist of having a high Green Guide rating, using the BRE Green Guide for reference. All timber used on site is to be sustainably sourced. Where possible recycled aggregates will be used.
- The contractor to be used for this development will need to monitor, record construction site impacts (energy, water and transport), having policies in place for reducing air and surface water pollution
- The contractor will need to have a site waste management plan in place from the beginning of construction and use this throughout the construction period. Any demolition waste will be recycled

Appendix A Site Plan



BLOCK PLAN

10 Appendix 1 – Conversion - DER/TER Notional

Full SAP Calculation Printout

Property Reference	S10766 01	**Issued on Date**	10/09/2025
Assessment Reference	Notional	**Prop Type Ref**	
Property			

SAP Rating	44 E	**DER**	20.10	**TER**	
Environmental	88 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.62	**DFEE**	108.87	**TFEE**	
Compliance Check	N/A	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	208.26	**TPER**	

Assessor Details	Mr. Peter Kinsella	**Assessor ID**	L770-0002
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	36.0600	(1b)	x 2.9200	(2b) =	105.2952	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	36.0600					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	105.2952	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1899 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.9399 (18)
Number of sides sheltered		3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7285 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.9288	0.9106	0.8924	0.8013	0.7831	0.6920	0.6920	0.6738	0.7285	0.7831	0.8195	0.8559	(22b)
Effective ac	0.9313	0.9146	0.8982	0.8210	0.8066	0.7395	0.7395	0.7270	0.7653	0.8066	0.8358	0.8663	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			3.8900	1.3258	5.1572			(27)
Door			2.4300	1.4000	3.4020			(26)
Heat Loss Floor 1			36.0600	0.2500	9.0150			(28a)
Old External wall	23.1256	3.8900	19.2356	0.3000	5.7707			(29a)
Corridor wall	26.9500	2.4300	24.5200	0.1700	4.1684			(29a)
Commercial wall	19.8000		19.8000	0.3000	5.9400			(29a)
Total net area of external elements Aum(A, m2)			105.9356					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.4533			(33)
Main dwelling								
Party Wall 1			8.9100	0.0000	0.0000			(32)
Party Ceiling 1			36.0600					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000	(35)
Thermal bridges (Default value 0.200 * total exposed area)	21.1871	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	54.6404	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	32.3608	31.7789	31.2084	28.5291	28.0278	25.6941	25.6941	25.2620	26.5930	28.0278	29.0419	30.1021	(38)

Heat transfer coeff

	87.0012	86.4193	85.8488	83.1695	82.6682	80.3345	80.3345	79.9024	81.2334	82.6682	83.6823	84.7425 (39)
Average = Sum(39)m / 12 =												83.1671

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4127	2.3965	2.3807	2.3064	2.2925	2.2278	2.2278	2.2158	2.2527	2.2925	2.3206	2.3500	(40)
HLP (average)												2.3064	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3060 (42)

Hot water usage for mixer showers

	63.4107	62.4577	61.0691	58.4122	56.4515	54.2650	53.0221	54.4002	55.9109	58.2586	60.9725	63.1677 (42a)

Hot water usage for baths

	19.9550	19.6586	19.2413	18.4718	17.8956	17.2567	16.9116	17.3260	17.7772	18.4609	19.2462	19.8875 (42b)

Hot water usage for other uses

	28.0048	26.9865	25.9681	24.9498	23.9314	22.9130	22.9130	23.9314	24.9498	25.9681	26.9865	28.0048 (42c)

Average daily hot water use (litres/day) 102.4229 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	111.3705	109.1028	106.2785	101.8338	98.2785	94.4347	92.8468	95.6577	98.6379	102.6876	107.2052	111.0601	(44)
Energy conte	176.3836	155.3610	163.3461	139.4054	132.3018	116.1185	112.2901	118.4442	121.6304	139.3461	152.7335	173.8932	(45)
Energy content (annual)										Total = Sum(45)m =		1701.2539	
Distribution loss (46)m = 0.15 x (45)m													
	26.4575	23.3041	24.5019	20.9108	19.8453	17.4178	16.8435	17.7666	18.2446	20.9019	22.9100	26.0840	(46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.8800 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 1.0152 (55)

Total storage loss

	31.4712	28.4256	31.4712	30.4560	31.4712	30.4560	31.4712	31.4712	30.4560	31.4712	30.4560	31.4712	(56)

If cylinder contains dedicated solar storage

	31.4712	28.4256	31.4712	30.4560	31.4712	30.4560	31.4712	31.4712	30.4560	31.4712	30.4560	31.4712	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi 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	(61)

Total heat required for water heating calculated for each month

	231.1172	204.7978	218.0797	192.3734	187.0354	169.0865	167.0237	173.1778	174.5984	194.0797	205.7015	228.6268	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	231.1172	204.7978	218.0797	192.3734	187.0354	169.0865	167.0237	173.1778	174.5984	194.0797	205.7015	228.6268	(64)
										Total per year (kWh/year) = Sum(64)m =		2345.6979	(64)
12Total per year (kWh/year)												2346	(64)

Electric shower(s)

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)

Heat gains from water heating, kWh/month

	102.4344	91.2070	98.0995	88.7267	87.7772	80.9838	81.1233	83.1696	82.8165	90.1195	93.1583	101.6064	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	64.0512	70.9139	64.0512	66.1863	64.0512	66.1863	64.0512	64.0512	66.1863	64.0512	66.1863	64.0512	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	111.7672	112.9270	110.0043	103.7824	95.9283	88.5465	83.6151	82.4553	85.3779	91.5999	99.4540	106.8357	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	(71)
Water heating gains (Table 5)													
	137.6807	135.7246	131.8541	123.2315	117.9801	112.4775	109.0368	111.7870	115.0229	121.1283	129.3865	136.5677	(72)
Total internal gains													
	356.0892	362.1556	348.4998	335.7903	320.5498	309.8004	299.2932	300.8837	309.1772	319.3695	337.6169	350.0448	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
West	3.8900	19.6403	0.6300	0.7000	0.7700	23.3490	(80)

Solar gains	23.3490	45.6756	75.2213	109.7058	134.4485	137.6320	131.0313	112.5539	87.4855	54.1980	29.1135	19.2011	(83)
Total gains	379.4383	407.8313	423.7211	445.4961	454.9983	447.4324	430.3244	413.4376	396.6627	373.5675	366.7304	369.2459	(84)

7. Mean internal temperature (heating season)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.7831	28.9769	29.1695	30.1092	30.2918	31.1717	31.1717	31.3403	30.8268	30.2918	29.9247	29.5503	
alpha	2.9189	2.9318	2.9446	3.0073	3.0195	3.0781	3.0781	3.0894	3.0551	3.0195	2.9950	2.9700	
util living area													
	0.9852	0.9805	0.9720	0.9500	0.9047	0.8045	0.6763	0.7094	0.8652	0.9527	0.9782	0.9865	(86)
MIT	18.3920	18.5980	18.9773	19.5681	20.1211	20.6168	20.8448	20.8151	20.4620	19.7602	19.0289	18.4155	(87)
Th 2	19.0724	19.0821	19.0916	19.1369	19.1455	19.1858	19.1858	19.1933	19.1702	19.1455	19.1281	19.1102	(88)
util rest of house													

	0.9798	0.9731	0.9604	0.9265	0.8511	0.6773	0.4548	0.4996	0.7674	0.9254	0.9685	0.9815	(89)
MIT 2	16.2395	16.5058	16.9913	17.7548	18.4247	18.9774	19.1474	19.1402	18.8288	18.0064	17.0802	16.2894	(90)
Living area fraction										fLA = Living area / (4) =		0.8600	(91)
MIT	18.0905	18.3050	18.6991	19.3142	19.8835	20.3872	20.6071	20.5805	20.2333	19.5146	18.7560	18.1178	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.0905	18.3050	18.6991	19.3142	19.8835	20.3872	20.6071	20.5805	20.2333	19.5146	18.7560	18.1178	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9760	0.9691	0.9573	0.9293	0.8760	0.7691	0.6369	0.6700	0.8316	0.9322	0.9660	0.9780	(94)
Useful gains	370.3287	395.2426	405.6446	414.0051	398.5635	344.1010	274.0780	276.9903	329.8645	348.2391	354.2570	361.1059	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1199.7942	1158.4473	1047.2820	866.1429	676.5153	464.9156	321.9094	334.0358	498.2268	736.9521	975.3980	1179.4270	(97)
Space heating kWh	617.1223	512.8736	477.3782	325.5392	206.7961	0.0000	0.0000	0.0000	0.0000	289.2025	447.2215	608.8309	(98a)
Space heating requirement - total per year (kWh/year)												3484.9643	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	617.1223	512.8736	477.3782	325.5392	206.7961	0.0000	0.0000	0.0000	0.0000	289.2025	447.2215	608.8309	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3484.9643	
Space heating per m2											(98c) / (4) =	96.6435	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	219.3000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	617.1223	512.8736	477.3782	325.5392	206.7961	0.0000	0.0000	0.0000	0.0000	289.2025	447.2215	608.8309	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	617.1223	512.8736	477.3782	325.5392	206.7961	0.0000	0.0000	0.0000	0.0000	289.2025	447.2215	608.8309	(211)
Space heating efficiency (main heating system 2)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	231.1172	204.7978	218.0797	192.3734	187.0354	169.0865	167.0237	173.1778	174.5984	194.0797	205.7015	228.6268	(64)
Efficiency of water heater												190.4000	(216)
(217)m	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	(217)
Fuel for water heating, kWh/month	121.3851	107.5619	114.5377	101.0364	98.2329	88.8059	87.7225	90.9547	91.7008	101.9326	108.0365	120.0771	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	13.6169	10.9240	9.8358	7.2061	5.5662	4.5477	5.0777	6.6002	8.5730	11.2482	12.7048	13.9953	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	3484.9643	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	190.4000	
Water heating fuel used	1231.9842	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	109.8960	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	4826.8445	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3484.9643	0.1537	535.6402	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1231.9842	0.1408	173.4521	(264)
Space and water heating			709.0923	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	109.8960	0.1443	15.8614	(268)
Total CO2, kg/year			724.9537	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			20.1000	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3484.9643	1.5690	5468.0439	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1231.9842	1.5206	1873.3409	(278)
Space and water heating			7341.3848	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	109.8960	1.5338	168.5621	(282)
Total Primary energy kWh/year			7509.9469	(286)
Dwelling Primary energy Rate (DPER)			208.2600	(287)

11 Appendix 2 - Conversion - DER/TER Be Lean

Full SAP Calculation Printout

Property Reference	S10766 01	**Issued on Date**	10/09/2025
Assessment Reference	Be Lean	**Prop Type Ref**	
Property			

SAP Rating	61 D	**DER**	13.99	**TER**	
Environmental	92 A	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.45	**DFEE**	78.66	**TFEE**	
Compliance Check	N/A	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	145.19	**TPER**	

Assessor Details	Mr. Peter Kinsella	**Assessor ID**	L770-0002
Client			

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

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1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		36.0600	(1b)	x 2.9200	(2b) =	105.2952	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	36.0600						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	105.2952	(5)

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2. Ventilation rate

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		m3 per hour	
Number of open chimneys		0 * 80 =	0.0000 (6a)
Number of open flues		0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000 (6d)
Number of flues attached to other heater		0 * 35 =	0.0000 (6e)
Number of blocked chimneys		0 * 20 =	0.0000 (6f)
Number of intermittent extract fans		0 * 10 =	0.0000 (7a)
Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		0.0000 / (5) =	0.0000 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0000 (17)
Infiltration rate			0.2500 (18)
Number of sides sheltered			3 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.1938 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.2470	0.2422	0.2373	0.2131	0.2083	0.1841	0.1841	0.1792	0.1938	0.2083	0.2180	0.2277	(22b)

Mechanical extract ventilation - decentralised

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Windows			3.8900	1.1450	4.4542			(27)
Door			2.4300	1.0000	2.4300			(26)
Heat Loss Floor 1			36.0600	0.1500	5.4090			(28a)
Old External wall	23.1256	3.8900	19.2356	0.2400	4.6165			(29a)
Corridor wall	26.9500	2.4300	24.5200	0.1700	4.1684			(29a)
Commercial wall	19.8000		19.8000	0.1800	3.5640			(29a)
Total net area of external elements Aum(A, m2)			105.9356					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.6421			(33)
Main dwelling								
Party Wall 1			8.9100	0.0000	0.0000			(32)
Party Ceiling 1			36.0600					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000	(35)
Thermal bridges (Default value 0.200 * total exposed area)	21.1871	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	45.8293	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	(38)
Heat transfer coeff	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	(39)
Average = Sum(39)m / 12 =												63.2030	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	(40)
HLP (average)												1.7527	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3060 (42)

Hot water usage for mixer showers

54.7638	53.9408	52.7415	50.4469	48.7536	46.8652	45.7918	46.9820	48.2867	50.3142	52.6581	54.5539	(42a)

Hot water usage for baths

19.9550	19.6586	19.2413	18.4718	17.8956	17.2567	16.9116	17.3260	17.7772	18.4609	19.2462	19.8875	(42b)

Hot water usage for other uses

28.0048	26.9865	25.9681	24.9498	23.9314	22.9130	22.9130	23.9314	24.9498	25.9681	26.9865	28.0048	(42c)

Average daily hot water use (litres/day) 94.4507 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	102.7236	100.5859	97.9509	93.8685	90.5806	87.0350	85.6165	88.2394	91.0137	94.7433	98.8908	102.4463	(44)
Energy conte	162.6890	143.2329	150.5469	128.5013	121.9389	107.0196	103.5457	109.2589	112.2290	128.5657	140.8881	160.4061	(45)
Energy content (annual)										Total = Sum(45)m =		1568.8221	
Distribution loss (46)m = 0.15 x (45)m	24.4034	21.4849	22.5820	19.2752	18.2908	16.0529	15.5319	16.3888	16.8343	19.2849	21.1332	24.0609	(46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.8800 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 1.0152 (55)

Total storage loss

31.4712	28.4256	31.4712	30.4560	31.4712	30.4560	31.4712	31.4712	30.4560	31.4712	30.4560	31.4712	(56)

If cylinder contains dedicated solar storage

31.4712	28.4256	31.4712	30.4560	31.4712	30.4560	31.4712	31.4712	30.4560	31.4712	30.4560	31.4712	(57)
23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss, Combi loss

Total heat required for water heating calculated for each month

217.4226	192.6697	205.2805	181.4693	176.6725	159.9876	158.2793	163.9925	165.1970	183.2993	193.8561	215.1397	(62)
-35.4054	-31.3128	-32.7890	-27.1506	-25.3034	-21.6523	-20.2955	-21.5823	-22.4023	-26.4098	-29.9191	-34.7497	(63a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

WWHRS, PV diverter, Solar input, FGHRS

Output from w/h

182.0172	161.3569	172.4915	154.3187	151.3691	138.3354	137.9838	142.4102	142.7947	156.8895	163.9370	180.3900	(64)
								Total per year (kWh/year) = Sum(64)m =			1884.2940	(64)

12Total per year (kWh/year) 1884 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			0.0000	(64a)

Heat gains from water heating, kWh/month

97.8810	87.1744	93.8437	85.1011	84.3316	77.9584	78.2158	80.1155	79.6905	86.5350	89.2197	97.1219	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

64.0512	70.9139	64.0512	66.1863	64.0512	66.1863	64.0512	64.0512	66.1863	64.0512	66.1863	64.0512	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

111.7672	112.9270	110.0043	103.7824	95.9283	88.5465	83.6151	82.4553	85.3779	91.5999	99.4540	106.8357	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	(69)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)

Pumps, fans

Losses e.g. evaporation (negative values) (Table 5)

-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	(71)

Water heating gains (Table 5)

131.5605	129.7238	126.1340	118.1959	113.3489	108.2756	105.1288	107.6821	110.6813	116.3105	123.9162	130.5402	(72)

Total internal gains

349.9690	356.1548	342.7797	330.7547	315.9185	305.5985	295.3852	296.7787	304.8356	314.5517	332.1466	344.0173	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
West	3.8900	19.6403	0.5000	0.0000	0.7700	29.4142	(80)

Solar gains	29.4142	57.5405	94.7610	138.2033	169.3733	173.3837	165.0684	141.7913	110.2110	68.2766	36.6761	24.1888	(83)
Total gains	379.3833	413.6953	437.5407	468.9580	485.2918	478.9822	460.4536	438.5700	415.0466	382.8283	368.8227	368.2061	(84)

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7. Mean internal temperature (heating season)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210
alpha	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414
util living area	0.9844	0.9773	0.9634	0.9273	0.8527	0.7140	0.5618	0.6042	0.8035	0.9365	0.9750	0.9861 (86)

MIT	19.1731	19.3572	19.6743	20.1163	20.5339	20.8325	20.9480	20.9310	20.7252	20.1996	19.6099	19.1283	(87)
Th 2	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	(88)
util rest of house	0.9792	0.9696	0.9502	0.8989	0.7908	0.5931	0.3900	0.4337	0.7025	0.9056	0.9649	0.9814	(89)
MIT 2	17.4774	17.7095	18.1075	18.6487	19.1272	19.4145	19.4898	19.4829	19.3316	18.7607	18.0320	17.4208	(90)
Living area fraction										fLA = Living area / (4) =		0.8600	(91)
MIT	18.9356	19.1265	19.4549	19.9108	20.3369	20.6339	20.7437	20.7282	20.5300	19.9981	19.3890	18.8892	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9356	19.1265	19.4549	19.9108	20.3369	20.6339	20.7437	20.7282	20.5300	19.9981	19.3890	18.8892	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9767	0.9671	0.9497	0.9078	0.8281	0.6878	0.5349	0.5764	0.7762	0.9174	0.9640	0.9789	(94)
Useful gains	370.5251	400.1034	415.5419	425.6998	401.8862	329.4405	246.2891	252.7797	322.1631	351.2258	355.5410	360.4415	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	925.0153	899.1552	818.7870	695.9163	545.8797	381.3621	261.8972	273.5561	406.3954	593.9896	776.6986	928.4016	(97)
Space heating kWh	412.5407	335.3628	300.0144	194.5559	107.1311	0.0000	0.0000	0.0000	0.0000	180.6163	303.2335	422.5623	(98a)
Space heating requirement - total per year (kWh/year)												2256.0169	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	412.5407	335.3628	300.0144	194.5559	107.1311	0.0000	0.0000	0.0000	0.0000	180.6163	303.2335	422.5623	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2256.0169	
Space heating per m2											(98c) / (4) =	62.5629	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	219.3000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	412.5407	335.3628	300.0144	194.5559	107.1311	0.0000	0.0000	0.0000	0.0000	180.6163	303.2335	422.5623	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	412.5407	335.3628	300.0144	194.5559	107.1311	0.0000	0.0000	0.0000	0.0000	180.6163	303.2335	422.5623	(211)
Space heating efficiency (main heating system 2)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	182.0172	161.3569	172.4915	154.3187	151.3691	138.3354	137.9838	142.4102	142.7947	156.8895	163.9370	180.3900	(64)
Efficiency of water heater												190.4000	(216)
(217)m	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	(217)
Fuel for water heating, kWh/month	95.5973	84.7463	90.5943	81.0497	79.5006	72.6551	72.4705	74.7953	74.9972	82.3999	86.1014	94.7426	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	1.2846	1.1602	1.2846	1.2431	1.2846	1.2431	1.2846	1.2846	1.2431	1.2846	1.2431	1.2846	(231)
Lighting	13.3086	10.6766	9.6131	7.0430	5.4402	4.4447	4.9627	6.4508	8.3789	10.9936	12.4172	13.6785	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2256.0169	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												190.4000	
Water heating fuel used												989.6502	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4725, total flow = 21.0000, SFP = 0.1177)													
mechanical ventilation fans (SFP = 0.1177)												15.1247	(230a)
Total electricity for the above, kWh/year												15.1247	(231)
Electricity for lighting (calculated in Appendix L)												107.4079	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)

Total delivered energy for all uses 3368.1997 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2256.0169	0.1543	347.9969	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	989.6502	0.1405	139.0272	(264)
Space and water heating			487.0241	(265)
Pumps, fans and electric keep-hot	15.1247	0.1387	2.0980	(267)
Energy for lighting	107.4079	0.1443	15.5023	(268)
Total CO2, kg/year			504.6244	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.9900	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2256.0169	1.5711	3544.3947	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	989.6502	1.5194	1503.7017	(278)
Space and water heating			5048.0964	(279)
Pumps, fans and electric keep-hot	15.1247	1.5128	22.8806	(281)
Energy for lighting	107.4079	1.5338	164.7458	(282)
Total Primary energy kWh/year			5235.7228	(286)
Dwelling Primary energy Rate (DPER)			145.1900	(287)

12 Appendix 3 - Conversion - DER/TER Be Green

Full SAP Calculation Printout

Property Reference	S10766 01	**Issued on Date**	10/09/2025
Assessment Reference	Be Green	**Prop Type Ref**	
Property			

SAP Rating	65 D	**DER**	12.85	**TER**	
Environmental	93 A	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.41	**DFEE**	78.66	**TFEE**	
Compliance Check	N/A	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	132.25	**TPER**	

Assessor Details	Mr. Peter Kinsella	**Assessor ID**	L770-0002
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	36.0600	(1b)	x 2.9200	(2b) =	105.2952	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	36.0600					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	105.2952	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.2500	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1938	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.2470	0.2422	0.2373	0.2131	0.2083	0.1841	0.1841	0.1792	0.1938	0.2083	0.2180	0.2277	(22b)

Mechanical extract ventilation - decentralised

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			3.8900	1.1450	4.4542			(27)
Door			2.4300	1.0000	2.4300			(26)
Heat Loss Floor 1			36.0600	0.1500	5.4090			(28a)
Old External wall	23.1256	3.8900	19.2356	0.2400	4.6165			(29a)
Corridor wall	26.9500	2.4300	24.5200	0.1700	4.1684			(29a)
Commercial wall	19.8000		19.8000	0.1800	3.5640			(29a)
Total net area of external elements Aum(A, m2)			105.9356					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	24.6421			(33)
Main dwelling								
Party Wall 1			8.9100	0.0000	0.0000			(32)
Party Ceiling 1			36.0600					(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000	(35)
Thermal bridges (Default value 0.200 * total exposed area)	21.1871	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	45.8293	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	17.3737	(38)
Heat transfer coeff	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	63.2030	(39)
Average = Sum(39)m / 12 =												63.2030	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	1.7527	(40)
HLP (average)												1.7527	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.3060 (42)

Hot water usage for mixer showers

54.7638	53.9408	52.7415	50.4469	48.7536	46.8652	45.7918	46.9820	48.2867	50.3142	52.6581	54.5539	(42a)

Hot water usage for baths

19.9550	19.6586	19.2413	18.4718	17.8956	17.2567	16.9116	17.3260	17.7772	18.4609	19.2462	19.8875	(42b)

Hot water usage for other uses

28.0048	26.9865	25.9681	24.9498	23.9314	22.9130	22.9130	23.9314	24.9498	25.9681	26.9865	28.0048	(42c)

Average daily hot water use (litres/day) 94.4507 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	102.7236	100.5859	97.9509	93.8685	90.5806	87.0350	85.6165	88.2394	91.0137	94.7433	98.8908	102.4463	(44)
Energy conte	162.6890	143.2329	150.5469	128.5013	121.9389	107.0196	103.5457	109.2589	112.2290	128.5657	140.8881	160.4061	(45)
Energy content (annual)										Total = Sum(45)m =		1568.8221	

Distribution loss (46)m = 0.15 x (45)m

24.4034	21.4849	22.5820	19.2752	18.2908	16.0529	15.5319	16.3888	16.8343	19.2849	21.1332	24.0609	(46)

Water storage loss:

Store volume 201.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.8694 (55)

Total storage loss

26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)

If cylinder contains dedicated solar storage

26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss, Combi loss

Total heat required for water heating calculated for each month

189.6404	167.5761	177.4983	154.5833	148.8903	133.1016	130.4971	136.2103	138.3110	155.5171	166.9701	187.3575	(62)
-35.4054	-31.3128	-32.7890	-27.1506	-25.3034	-21.6523	-20.2955	-21.5823	-22.4023	-26.4098	-29.9191	-34.7497	(63a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

WWHRS, PV diverter, Solar input, FGHRS

Output from w/h

154.2350	136.2633	144.7093	127.4327	123.5869	111.4494	110.2016	114.6280	115.9087	129.1073	137.0510	152.6078	(64)
								Total per year (kWh/year) = Sum(64)m =			1557.1810	(64)

12Total per year (kWh/year) 1557 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

54.0941	47.6249	50.0568	42.7267	40.5447	35.5840	34.4290	36.3286	37.3161	42.7481	46.8453	53.3350	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	65.3004	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

64.0512	70.9139	64.0512	66.1863	64.0512	66.1863	64.0512	64.0512	66.1863	64.0512	66.1863	64.0512	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

111.7672	112.9270	110.0043	103.7824	95.9283	88.5465	83.6151	82.4553	85.3779	91.5999	99.4540	106.8357	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	29.5300	(69)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)

Pumps, fans

Losses e.g. evaporation (negative values) (Table 5)

-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	-52.2403	(71)

Water heating gains (Table 5)

72.7071	70.8705	67.2807	59.3426	54.4955	49.4223	46.2755	48.8287	51.8280	57.4571	65.0629	71.6869	(72)

Total internal gains

291.1157	297.3014	283.9264	271.9014	257.0652	246.7452	236.5319	237.9254	245.9823	255.6984	273.2933	285.1640	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
West	3.8900	19.6403	0.5000	0.0000	0.7700	29.4142	(80)

Solar gains	29.4142	57.5405	94.7610	138.2033	169.3733	173.3837	165.0684	141.7913	110.2110	68.2766	36.6761	24.1888	(83)
Total gains	320.5299	354.8419	378.6874	410.1047	426.4385	420.1289	401.6003	379.7166	356.1932	323.9750	309.9694	309.3528	(84)

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7. Mean internal temperature (heating season)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210	39.6210
alpha	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414	3.6414

util living area

0.9909	0.9858	0.9761	0.9492	0.8898	0.7694	0.6242	0.6701	0.8561	0.9599	0.9853	0.9920	(86)

MIT	19.0235	19.2113	19.5353	19.9942	20.4420	20.7824	20.9266	20.9028	20.6486	20.0723	19.4648	18.9778	(87)
Th 2	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	19.5033	(88)
util rest of house													
	0.9877	0.9808	0.9670	0.9277	0.8376	0.6532	0.4422	0.4929	0.7677	0.9384	0.9791	0.9892	(89)
MIT 2	17.2886	17.5271	17.9371	18.5075	19.0358	19.3813	19.4830	19.4724	19.2694	18.6141	17.8519	17.2306	(90)
Living area fraction										fLA = Living area / (4) =		0.8600	(91)
MIT	18.7805	18.9754	19.3115	19.7860	20.2450	20.5862	20.7244	20.7025	20.4555	19.8681	19.2390	18.7331	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7805	18.9754	19.3115	19.7860	20.2450	20.5862	20.7244	20.7025	20.4555	19.8681	19.2390	18.7331	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9856	0.9785	0.9655	0.9325	0.8663	0.7417	0.5945	0.6396	0.8290	0.9448	0.9777	0.9873	(94)
Useful gains	315.9299	347.2278	365.6394	382.4236	369.4377	311.6123	238.7681	242.8779	295.2897	306.0756	303.0540	305.4280	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	915.2107	889.6102	809.7236	688.0291	540.0717	378.3441	260.6744	271.9323	401.6841	585.7721	767.2181	918.5363	(97)
Space heating kWh													
	445.8650	364.4810	330.3986	220.0359	126.9517	0.0000	0.0000	0.0000	0.0000	208.0942	334.1982	456.1525	(98a)
Space heating requirement - total per year (kWh/year)												2486.1771	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	445.8650	364.4810	330.3986	220.0359	126.9517	0.0000	0.0000	0.0000	0.0000	208.0942	334.1982	456.1525	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2486.1771	
Space heating per m2											(98c) / (4) =	68.9456	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	445.8650	364.4810	330.3986	220.0359	126.9517	0.0000	0.0000	0.0000	0.0000	208.0942	334.1982	456.1525	(98)
Space heating efficiency (main heating system 1)													
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)													
	445.8650	364.4810	330.3986	220.0359	126.9517	0.0000	0.0000	0.0000	0.0000	208.0942	334.1982	456.1525	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement													
	154.2350	136.2633	144.7093	127.4327	123.5869	111.4494	110.2016	114.6280	115.9087	129.1073	137.0510	152.6078	(64)
Efficiency of water heater												349.4100	(216)
(217)m	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	349.4100	(217)
Fuel for water heating, kWh/month													
	44.1416	38.9981	41.4153	36.4708	35.3702	31.8964	31.5393	32.8062	33.1727	36.9501	39.2235	43.6758	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	1.2846	1.1602	1.2846	1.2431	1.2846	1.2431	1.2846	1.2846	1.2431	1.2846	1.2431	1.2846	(231)
Lighting	13.3086	10.6766	9.6131	7.0430	5.4402	4.4447	4.9627	6.4508	8.3789	10.9936	12.4172	13.6785	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2486.1771	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												349.4100	
Water heating fuel used												445.6601	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4725, total flow = 21.0000, SFP = 0.1177)													
mechanical ventilation fans (SFP = 0.1177)												15.1247	(230a)
Total electricity for the above, kWh/year												15.1247	(231)
Electricity for lighting (calculated in Appendix L)												107.4079	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)

Total delivered energy for all uses	3054.3697	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2486.1771	0.1540	382.8843	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	445.6601	0.1409	62.7724	(264)
Space and water heating			445.6567	(265)
Pumps, fans and electric keep-hot	15.1247	0.1387	2.0980	(267)
Energy for lighting	107.4079	0.1443	15.5023	(268)
Total CO2, kg/year			463.2570	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.8500	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2486.1771	1.5702	3903.7141	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	445.6601	1.5208	677.7686	(278)
Space and water heating			4581.4828	(279)
Pumps, fans and electric keep-hot	15.1247	1.5128	22.8806	(281)
Energy for lighting	107.4079	1.5338	164.7458	(282)
Total Primary energy kWh/year			4769.1091	(286)
Dwelling Primary energy Rate (DPER)			132.2500	(287)

13 Appendix 4 - New Build - DER/TER Be Lean

Full SAP Calculation Printout

Property Reference	S10766 02	**Issued on Date**	10/09/2025
Assessment Reference	Be Lean	**Prop Type Ref**	
Property			

SAP Rating	85 B	**DER**	14.01	**TER**	15.08
Environmental	90 B	**% DER < TER**			7.10
CO_2 Emissions (t/year)	0.7	**DFEE**	35.43	**TFEE**	42.15
Compliance Check	See BREL	**% DFEE < TFEE**			15.94
% DPER < TPER	0.76	**DPER**	78.87	**TPER**	79.47

Assessor Details	Mr. Peter Kinsella	**Assessor ID**	L770-0002
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	27.7600 (1b)	x	2.5000 (2b)	=	69.4000	(1b) - (3b)
First floor	27.7600 (1c)	x	2.7000 (2c)	=	74.9520	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.5200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.3520	(5)

2. Ventilation rate

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

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.2000	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1700	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998	(22b)

Mechanical extract ventilation - decentralised

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			7.9200	1.1450	9.0687			(27)
Door			2.4300	1.0000	2.4300			(26)
Heat Loss Floor 1			27.7600	0.1200	3.3312			(28a)
New wall	81.8960	7.9200	73.9760	0.1500	11.0964			(29a)
Corridor wall	28.2400	2.4300	25.8100	0.1400	3.6134			(29a)
External Roof 1	27.7600		27.7600	0.1000	2.7760			(30)
Total net area of external elements Aum(A, m2)			165.6560					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.3157			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000	(35)
Thermal bridges (User defined value 0.050 * total exposed area)	8.2828	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	40.5985	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	(38)
Heat transfer coeff													
	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	(39)
Average = Sum(39)m / 12 =												64.4166	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	(40)
HLP (average)												1.1602	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8526	(42)
Hot water usage for mixer showers													
	65.6464	64.6599	63.2223	60.4717	58.4419	56.1783	54.8916	56.3183	57.8822	60.3127	63.1223	65.3949	(42a)
Hot water usage for baths													
	23.8959	23.5411	23.0413	22.1198	21.4299	20.6648	20.2515	20.7478	21.2881	22.1068	23.0472	23.8152	(42b)
Hot water usage for other uses													
	33.6023	32.3804	31.1585	29.9366	28.7147	27.4928	27.4928	28.7147	29.9366	31.1585	32.3804	33.6023	(42c)
Average daily hot water use (litres/day)												113.2266	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	123.1446	120.5813	117.4221	112.5281	108.5864	104.3358	102.6359	105.7807	109.1069	113.5779	118.5499	122.8123	(44)
Energy conte	195.0310	171.7062	180.4733	154.0454	146.1782	128.2930	124.1292	130.9787	134.5397	154.1242	168.8961	192.2944	(45)
Energy content (annual)										Total = Sum(45)m =		1880.6894	
Distribution loss (46)m = 0.15 x (45)m													
	29.2546	25.7559	27.0710	23.1068	21.9267	19.2440	18.6194	19.6468	20.1810	23.1186	25.3344	28.8442	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	14.3008	12.9039	14.2585	13.7388	14.1591	13.6641	14.0951	14.1150	13.6823	14.1821	13.7819	14.2928	(61)
Total heat required for water heating calculated for each month													
	209.3317	184.6101	194.7319	167.7842	160.3373	141.9572	138.2243	145.0937	148.2220	168.3063	182.6780	206.5872	(62)
WWHRS	-42.4412	-37.5353	-39.3048	-32.5459	-30.3316	-25.9550	-24.3287	-25.8711	-26.8541	-31.6580	-35.8646	-41.6552	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	166.8906	147.0748	155.4271	135.2383	130.0056	116.0022	113.8957	119.2225	121.3679	136.6484	146.8134	164.9320	(64)
										Total per year (kWh/year) = Sum(64)m =		1653.5184	(64)
12Total per year (kWh/year)												1654	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
							Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
Heat gains from water heating, kWh/month													
	68.4230	60.3183	63.5720	54.6548	52.1440	46.0735	44.7967	47.0792	48.1550	54.7918	59.6034	67.5111	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	87.0484	96.3750	87.0484	89.9500	87.0484	89.9500	87.0484	87.0484	89.9500	87.0484	89.9500	87.0484	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	161.5247	163.2008	158.9770	149.9851	138.6345	127.9664	120.8395	119.1634	123.3872	132.3791	143.7298	154.3978	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	(71)
Water heating gains (Table 5)													
	91.9664	89.7593	85.4463	75.9095	70.0861	63.9909	60.2107	63.2784	66.8820	73.6449	82.7825	90.7407	(72)
Total internal gains													
	394.3281	403.1238	385.2603	369.6332	349.5576	332.6960	318.8873	320.2789	331.0078	346.8611	370.2509	385.9756	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
South	7.9200	46.7521	0.5000	0.0000	0.7700	142.5564	(78)

Solar gains	142.5564	233.4706	297.4002	336.1268	350.2649	337.0823	329.3499	319.8444	310.6696	251.8200	168.9779	123.1818	(83)
Total gains	536.8845	636.5944	682.6605	705.7600	699.8224	669.7783	648.2372	640.1233	641.6774	598.6811	539.2289	509.1574	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	
alpha	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	
util living area													
	0.9841	0.9643	0.9335	0.8715	0.7624	0.5933	0.4332	0.4575	0.6544	0.8762	0.9667	0.9876	(86)
MIT	19.9451	20.1843	20.4281	20.6833	20.8737	20.9713	20.9950	20.9934	20.9526	20.7198	20.2790	19.8834	(87)
Th 2	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	(88)
util rest of house													
	0.9794	0.9542	0.9151	0.8367	0.7022	0.5055	0.3322	0.3561	0.5697	0.8356	0.9555	0.9838	(89)
MIT 2	18.7589	19.0564	19.3539	19.6516	19.8527	19.9366	19.9505	19.9498	19.9237	19.6994	19.1788	18.6814	(90)

Living area fraction											fLA = Living area / (4) =	0.4503	(91)
MIT	19.2930	19.5643	19.8376	20.1162	20.3125	20.4025	20.4208	20.4197	20.3870	20.1589	19.6743	19.2227	(92)
Temperature adjustment												-0.1500	
adjusted MIT	19.1430	19.4143	19.6876	19.9662	20.1625	20.2525	20.2708	20.2697	20.2370	20.0089	19.5243	19.0727	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9746	0.9479	0.9097	0.8372	0.7152	0.5315	0.3633	0.3873	0.5938	0.8381	0.9498	0.9795	(94)
Useful gains	523.2388	603.4386	620.9898	590.8581	500.4866	355.9671	235.4790	247.8925	381.0048	501.7789	512.1682	498.7444	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	956.1378	934.9611	849.5021	712.8446	545.1222	364.1162	236.4611	249.2729	395.3261	606.0873	800.3280	958.0455	(97)
Space heating kWh	322.0769	222.7831	170.0132	87.8303	33.2089	0.0000	0.0000	0.0000	0.0000	77.6054	207.4751	341.7200	(98a)
Space heating requirement - total per year (kWh/year)												1462.7128	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	322.0769	222.7831	170.0132	87.8303	33.2089	0.0000	0.0000	0.0000	0.0000	77.6054	207.4751	341.7200	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1462.7128	
Space heating per m2											(98c) / (4) =	26.3457	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												88.9000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	322.0769	222.7831	170.0132	87.8303	33.2089	0.0000	0.0000	0.0000	0.0000	77.6054	207.4751	341.7200	(98)
Space heating efficiency (main heating system 1)	88.9000	88.9000	88.9000	88.9000	88.9000	0.0000	0.0000	0.0000	0.0000	88.9000	88.9000	88.9000	(210)
Space heating fuel (main heating system)	362.2912	250.5997	191.2409	98.7967	37.3553	0.0000	0.0000	0.0000	0.0000	87.2952	233.3803	384.3869	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	166.8906	147.0748	155.4271	135.2383	130.0056	116.0022	113.8957	119.2225	121.3679	136.6484	146.8134	164.9320	(64)
Efficiency of water heater												86.8000	(216)
(217)m	88.1719	88.0529	87.8845	87.6149	87.2192	86.8000	86.8000	86.8000	86.8000	87.5491	88.0176	88.2053	(217)
Fuel for water heating, kWh/month	189.2786	167.0300	176.8537	154.3554	149.0562	133.6431	131.2162	137.3532	139.8248	156.0820	166.8000	186.9865	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	9.0651	8.1879	9.0651	8.7727	9.0651	8.7727	9.0651	9.0651	8.7727	9.0651	8.7727	9.0651	(231)
Lighting	18.0869	14.5100	13.0647	9.5717	7.3935	6.0405	6.7446	8.7669	11.3873	14.9407	16.8755	18.5896	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	1645.3463	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	86.8000	
Water heating fuel used	1888.4797	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.4725, total flow = 21.0000, SFP = 0.1177)		
mechanical ventilation fans (SFP = 0.1177)	20.7348	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	106.7348	(231)
Electricity for lighting (calculated in Appendix L)	145.9719	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3786.5327	(238)

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

	Energy	Emission factor	Emissions

	kWh/year	kg CO2/kWh	kg CO2/year	
Space heating - main system 1	1645.3463	0.2100	345.5227	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1888.4797	0.2100	396.5807	(264)
Space and water heating			742.1035	(265)
Pumps, fans and electric keep-hot	106.7348	0.1387	14.8054	(267)
Energy for lighting	145.9719	0.1443	21.0683	(268)
Total CO2, kg/year			777.9771	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.0100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1645.3463	1.1300	1859.2413	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1888.4797	1.1300	2133.9821	(278)
Space and water heating			3993.2234	(279)
Pumps, fans and electric keep-hot	106.7348	1.5128	161.4684	(281)
Energy for lighting	145.9719	1.5338	223.8966	(282)
Total Primary energy kWh/year			4378.5883	(286)
Dwelling Primary energy Rate (DPER)			78.8700	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	27.7600	(1b) x	2.5000	(2b) =	69.4000	(1b) - (3b)
First floor	27.7600	(1c) x	2.7000	(2c) =	74.9520	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.5200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		144.3520	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1386 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3886 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3303 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4211	0.4128	0.4046	0.3633	0.3550	0.3138	0.3138	0.3055	0.3303	0.3550	0.3716	0.3881	(22b)
Effective ac	0.5887	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5467	0.5545	0.5630	0.5690	0.5753	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.4300	1.0000	2.4300			(26)
TER Opening Type			7.9200	1.1450	9.0687			(27)
Heat Loss Floor 1			27.7600	0.1300	3.6088			(28a)
New wall	81.8960	7.9200	73.9760	0.1800	13.3157			(29a)
Corridor wall	28.2400	2.4300	25.8100	0.1800	4.6458			(29a)
External Roof 1	27.7600		27.7600	0.1100	3.0536			(30)
Total net area of external elements Aum(A, m2)			165.6560					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.1226			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	4.5400	0.0500	0.2270
E3 Sill	4.5400	0.0500	0.2270
E4 Jamb	9.0400	0.0500	0.4520
E5 Ground floor (normal)	21.1800	0.1600	3.3888
E6 Intermediate floor within a dwelling	21.1800	0.0000	0.0000

E14 Flat roof									21.1800	0.0800	1.6944		
E16 Corner (normal)									20.8000	0.0900	1.8720		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												7.8612	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	43.9838	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0415	27.8775	27.7167	26.9617	26.8204	26.1628	26.1628	26.0410	26.4161	26.8204	27.1062	27.4049	(38)
Heat transfer coeff	72.0252	71.8612	71.7005	70.9454	70.8042	70.1466	70.1466	70.0248	70.3999	70.8042	71.0900	71.3887	(39)
Average = Sum(39)m / 12 =												70.9448	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2973	1.2943	1.2914	1.2778	1.2753	1.2634	1.2634	1.2613	1.2680	1.2753	1.2804	1.2858	(40)
HLP (average)												1.2778	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8526	(42)
Hot water usage for mixer showers	55.2812	54.4504	53.2398	50.9236	49.2142	47.3080	46.2245	47.4259	48.7429	50.7896	53.1556	55.0694	(42a)
Hot water usage for baths	23.8959	23.5411	23.0413	22.1198	21.4299	20.6648	20.2515	20.7478	21.2881	22.1068	23.0472	23.8152	(42b)
Hot water usage for other uses	33.6023	32.3804	31.1585	29.9366	28.7147	27.4928	27.4928	28.7147	29.9366	31.1585	32.3804	33.6023	(42c)
Average daily hot water use (litres/day)												103.6702	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	112.7794	110.3718	107.4396	102.9800	99.3588	95.4655	93.9688	96.8884	99.9676	104.0549	108.5832	112.4868	(44)
Energy conte	178.6150	157.1680	165.1306	140.9744	133.7560	117.3860	113.6471	119.9681	123.2701	141.2015	154.6967	176.1272	(45)
Energy content (annual)										Total = Sum(45)m =		1721.9407	
Distribution loss (46)m = 0.15 x (45)m	26.7923	23.5752	24.7696	21.1462	20.0634	17.6079	17.0471	17.9952	18.4905	21.1802	23.2045	26.4191	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.6321	47.0789	47.8855	49.3733	49.2991	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	229.5739	203.1954	216.0896	190.2895	184.3881	164.4649	161.5326	169.3413	172.5692	192.1604	204.0118	227.0861	(62)
WWHRS	-25.2723	-22.3510	-23.4047	-19.3800	-18.0615	-15.4553	-14.4869	-15.4054	-15.9907	-18.8512	-21.3562	-24.8042	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	204.3017	180.8444	192.6849	170.9095	166.3267	149.0096	147.0457	153.9359	156.5785	173.3092	182.6556	202.2818	(64)
										Total per year (kWh/year) = Sum(64)m =		2079.8835	(64)
12Total per year (kWh/year)												2080	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month	72.1292	63.7652	67.6457	59.2028	57.1319	50.8006	49.7590	52.2327	53.3121	59.6892	63.7654	71.3020	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.0484	96.3750	87.0484	89.9500	87.0484	89.9500	87.0484	87.0484	89.9500	87.0484	89.9500	87.0484	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	161.5247	163.2008	158.9770	149.9851	138.6345	127.9664	120.8395	119.1634	123.3872	132.3791	143.7298	154.3978	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	(71)
Water heating gains (Table 5)	96.9479	94.8887	90.9216	82.2261	76.7902	70.5564	66.8804	70.2052	74.0445	80.2275	88.5631	95.8360	(72)
Total internal gains	399.3096	408.2532	390.7357	375.9498	356.2617	339.2614	325.5570	327.2057	338.1704	353.4436	376.0315	391.0709	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
South	7.9200	46.7521	0.6300	0.7000	0.7700	113.1613	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	113.1613	185.3290	236.0763	266.8174	278.0403	267.5759	261.4380	253.8925	246.6095	199.8947	134.1347	97.7818	(83)
Total gains	512.4709	593.5822	626.8119	642.7673	634.3020	606.8374	586.9950	581.0982	584.7799	553.3383	510.1662	488.8526	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	53.5306	53.6528	53.7731	54.3454	54.4538	54.9643	54.9643	55.0599	54.7665	54.4538	54.2349	54.0079	
alpha	4.5687	4.5769	4.5849	4.6230	4.6303	4.6643	4.6643	4.6707	4.6511	4.6303	4.6157	4.6005	
util living area													

	0.9883	0.9765	0.9585	0.9179	0.8374	0.6821	0.5130	0.5380	0.7393	0.9172	0.9766	0.9904	(86)
MIT	19.6906	19.9138	20.1740	20.4935	20.7597	20.9338	20.9858	20.9821	20.8990	20.5681	20.0760	19.6525	(87)
Th 2	19.8430	19.8453	19.8475	19.8582	19.8602	19.8696	19.8696	19.8713	19.8660	19.8602	19.8562	19.8520	(88)
util rest of house	0.9845	0.9692	0.9453	0.8905	0.7820	0.5840	0.3877	0.4141	0.6496	0.8844	0.9680	0.9873	(89)
MIT 2	18.3592	18.6414	18.9671	19.3618	19.6622	19.8326	19.8653	19.8654	19.8028	19.4574	18.8567	18.3174	(90)
Living area fraction										fLA = Living area / (4) =		0.4503	(91)
MIT	18.9587	19.2144	19.5105	19.8714	20.1564	20.3285	20.3699	20.3682	20.2964	19.9575	19.4057	18.9186	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9587	19.2144	19.5105	19.8714	20.1564	20.3285	20.3699	20.3682	20.2964	19.9575	19.4057	18.9186	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9807	0.9642	0.9405	0.8909	0.7979	0.6260	0.4444	0.4701	0.6860	0.8877	0.9637	0.9840	(94)
Useful gains	502.5897	572.3203	589.5475	572.6515	506.0920	379.8576	260.8804	273.1811	401.1852	491.1822	491.6220	481.0090	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1055.7975	1028.6488	932.8627	778.3725	598.7467	401.8324	264.4434	277.8752	436.2274	662.5523	874.8132	1050.7398	(97)
Space heating kWh	411.5866	306.6528	255.4265	148.1191	68.9351	0.0000	0.0000	0.0000	0.0000	127.4993	275.8976	423.8797	(98a)
Space heating requirement - total per year (kWh/year)												2017.9968	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	411.5866	306.6528	255.4265	148.1191	68.9351	0.0000	0.0000	0.0000	0.0000	127.4993	275.8976	423.8797	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2017.9968	
Space heating per m2											(98c) / (4) =	36.3472	(99)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	411.5866	306.6528	255.4265	148.1191	68.9351	0.0000	0.0000	0.0000	0.0000	127.4993	275.8976	423.8797	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	445.4401	331.8753	276.4356	160.3021	74.6051	0.0000	0.0000	0.0000	0.0000	137.9863	298.5905	458.7443	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	204.3017	180.8444	192.6849	170.9095	166.3267	149.0096	147.0457	153.9359	156.5785	173.3092	182.6556	202.2818	(64)
Efficiency of water heater												80.3000	(216)
(217)m	85.8500	85.5030	84.9862	84.0762	82.6426	80.3000	80.3000	80.3000	80.3000	83.7333	85.2627	85.9271	(217)
Fuel for water heating, kWh/month	237.9750	211.5066	226.7248	203.2794	201.2603	185.5661	183.1204	191.7011	194.9919	206.9776	214.2270	235.4110	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	18.0869	14.5100	13.0647	9.5717	7.3935	6.0405	6.7446	8.7669	11.3873	14.9407	16.8755	18.5896	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-26.3745	-37.3885	-54.0494	-61.1551	-66.3073	-62.0668	-61.3486	-57.7680	-51.4579	-42.9800	-29.0876	-22.7822	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-14.2716	-30.0973	-59.9440	-90.1932	-119.3889	-119.9647	-118.5053	-100.2358	-73.3673	-43.0393	-19.0581	-11.2759	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	2183.9793	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2492.7412	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	145.9719	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1372.1076	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3536.5848	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2183.9793	0.2100	458.6356	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2492.7412	0.2100	523.4757	(264)
Space and water heating			982.1113	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	145.9719	0.1443	21.0683	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-572.7660	0.1344	-77.0051	
PV Unit electricity exported	-799.3416	0.1259	-100.5994	
Total			-177.6045	(269)
Total CO2, kg/year			837.5044	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.0800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2183.9793	1.1300	2467.8966	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2492.7412	1.1300	2816.7976	(278)
Space and water heating			5284.6941	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	145.9719	1.5338	223.8966	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-572.7660	1.4969	-857.3591	
PV Unit electricity exported	-799.3416	0.4620	-369.2679	
Total			-1226.6271	(283)
Total Primary energy kWh/year			4412.0644	(286)
Target Primary Energy Rate (TPER)			79.4700	(287)

14 Appendix 5 - New Build - Be Green DER/TER

Full SAP Calculation Printout

Property Reference	S10766 02	**Issued on Date**	10/09/2025
Assessment Reference	Be Green	**Prop Type Ref**	
Property			

SAP Rating	94 A	**DER**	0.49	**TER**	14.64
Environmental	100 A	**% DER < TER**			96.65
CO_2 Emissions (t/year)	-0.01	**DFEE**	35.43	**TFEE**	42.15
Compliance Check	See BREL	**% DFEE < TFEE**			15.94
% DPER < TPER	72.83	**DPER**	20.94	**TPER**	77.07

Assessor Details	Mr. Peter Kinsella	**Assessor ID**	L770-0002
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	27.7600 (1b)	x	2.5000 (2b)	=	69.4000	(1b) - (3b)
First floor	27.7600 (1c)	x	2.7000 (2c)	=	74.9520	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.5200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.3520	(5)

2. Ventilation rate

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

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.2000	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1700	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998	(22b)

Mechanical extract ventilation - decentralised

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Windows			7.9200	1.1450	9.0687			(27)
Door			2.4300	1.0000	2.4300			(26)
Heat Loss Floor 1			27.7600	0.1200	3.3312			(28a)
New wall	81.8960	7.9200	73.9760	0.1500	11.0964			(29a)
Corridor wall	28.2400	2.4300	25.8100	0.1400	3.6134			(29a)
External Roof 1	27.7600		27.7600	0.1000	2.7760			(30)
Total net area of external elements Aum(A, m2)			165.6560					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.3157			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000	(35)
Thermal bridges (User defined value 0.050 * total exposed area)	8.2828	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	40.5985	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	23.8181	(38)
Heat transfer coeff													
	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	64.4166	(39)
Average = Sum(39)m / 12 =												64.4166	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	1.1602	(40)
HLP (average)												1.1602	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8526 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers													
	65.6464	64.6599	63.2223	60.4717	58.4419	56.1783	54.8916	56.3183	57.8822	60.3127	63.1223	65.3949	(42a)
Hot water usage for baths													
	23.8959	23.5411	23.0413	22.1198	21.4299	20.6648	20.2515	20.7478	21.2881	22.1068	23.0472	23.8152	(42b)
Hot water usage for other uses													
	33.6023	32.3804	31.1585	29.9366	28.7147	27.4928	27.4928	28.7147	29.9366	31.1585	32.3804	33.6023	(42c)
Average daily hot water use (litres/day)												113.2266	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	123.1446	120.5813	117.4221	112.5281	108.5864	104.3358	102.6359	105.7807	109.1069	113.5779	118.5499	122.8123	(44)
Energy conte	195.0310	171.7062	180.4733	154.0454	146.1782	128.2930	124.1292	130.9787	134.5397	154.1242	168.8961	192.2944	(45)
Energy content (annual)										Total = Sum(45)m =		1880.6894	
Distribution loss (46)m = 0.15 x (45)m													
	29.2546	25.7559	27.0710	23.1068	21.9267	19.2440	18.6194	19.6468	20.1810	23.1186	25.3344	28.8442	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi 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	(61)
Total heat required for water heating calculated for each month													
	245.2448	217.0606	230.6871	202.6394	196.3920	176.8870	174.3430	181.1925	183.1337	204.3380	217.4901	242.5082	(62)
WWHRS	-42.4412	-37.5353	-39.3048	-32.5459	-30.3316	-25.9550	-24.3287	-25.8711	-26.8541	-31.6580	-35.8646	-41.6552	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
	202.8036	179.5252	191.3823	170.0935	166.0604	150.9320	150.0143	155.3213	156.2797	172.6800	181.6255	200.8530	(64)
										Total per year (kWh/year) = Sum(64)m =		2077.5708	(64)
12Total per year (kWh/year)												2078	(64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		0.0000	(64a)
Heat gains from water heating, kWh/month													
	105.0188	93.3758	100.1784	90.0953	88.7753	81.5326	81.4440	83.7214	83.6097	91.4173	95.0331	104.1089	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	87.0484	96.3750	87.0484	89.9500	87.0484	89.9500	87.0484	87.0484	89.9500	87.0484	89.9500	87.0484	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	161.5247	163.2008	158.9770	149.9851	138.6345	127.9664	120.8395	119.1634	123.3872	132.3791	143.7298	154.3978	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	(71)
Water heating gains (Table 5)													
	141.1544	138.9521	134.6484	125.1324	119.3216	113.2398	109.4677	112.5288	116.1245	122.8728	131.9905	139.9314	(72)
Total internal gains													
	440.5161	449.3166	431.4625	415.8561	395.7931	381.9449	368.1443	369.5293	380.2504	393.0889	416.4589	432.1662	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
South	7.9200	46.7521	0.5000	0.0000	0.7700	142.5564	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	142.5564	233.4706	297.4002	336.1268	350.2649	337.0823	329.3499	319.8444	310.6696	251.8200	168.9779	123.1818	(83)
Total gains	583.0725	682.7872	728.8627	751.9829	746.0580	719.0272	697.4942	689.3737	690.9200	644.9089	585.4368	555.3480	(84)

7. Mean internal temperature (heating season)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	59.8535	
alpha	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	4.9902	
util living area													
	0.9779	0.9538	0.9177	0.8476	0.7306	0.5576	0.4037	0.4262	0.6160	0.8485	0.9549	0.9822	(86)
Living	20.0257	20.2564	20.4889	20.7263	20.8959	20.9781	20.9964	20.9952	20.9636	20.7635	20.3518	19.9656	

Non living	18.8594	19.1438	19.4243	19.6967	19.8718	19.9405	19.9509	19.9504	19.9308	19.7435	19.2664	18.7845	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.5016	20.2564	20.4889	20.7263	20.8959	20.9781	20.9964	20.9952	20.9636	20.7635	20.3518	20.1103	(87)
Th 2	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	19.9519	(88)
util rest of house	0.9715	0.9414	0.8962	0.8095	0.6691	0.4730	0.3090	0.3310	0.5332	0.8034	0.9406	0.9770	(89)
MIT 2	19.5164	19.1438	19.4243	19.6967	19.8718	19.9405	19.9509	19.9504	19.9308	19.7435	19.2664	18.9948	(90)
Living area fraction										fLA = Living area / (4) =		0.4503	(91)
MIT	19.9600	19.6448	19.9037	20.1603	20.3330	20.4077	20.4216	20.4208	20.3958	20.2028	19.7551	19.4971	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9600	19.6448	19.9037	20.1603	20.3330	20.4077	20.4216	20.4208	20.3958	20.2028	19.7551	19.4971	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9716	0.9372	0.8950	0.8177	0.6925	0.5105	0.3517	0.3739	0.5693	0.8152	0.9374	0.9742	(94)
Useful gains	566.4914	639.8767	652.3630	614.8886	516.6441	367.0851	245.2943	257.7830	393.3209	525.7502	548.7691	541.0290	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1008.7638	949.8075	863.4208	725.3492	556.1058	374.1124	246.1773	259.0087	405.5568	618.5804	815.2005	985.3890	(97)
Space heating kWh	329.0507	208.2735	157.0269	79.5317	29.3595	0.0000	0.0000	0.0000	0.0000	69.0657	191.8306	330.6038	(98a)
Space heating requirement - total per year (kWh/year)												1394.7424	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	329.0507	208.2735	157.0269	79.5317	29.3595	0.0000	0.0000	0.0000	0.0000	69.0657	191.8306	330.6038	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1394.7424	
Space heating per m2											(98c) / (4) =	25.1214	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	265.8176	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	329.0507	208.2735	157.0269	79.5317	29.3595	0.0000	0.0000	0.0000	0.0000	69.0657	191.8306	330.6038	(98)
Space heating efficiency (main heating system 1)	265.8176	265.8176	265.8176	265.8176	265.8176	0.0000	0.0000	0.0000	0.0000	265.8176	265.8176	265.8176	(210)
Space heating fuel (main heating system)	123.7882	78.3521	59.0732	29.9196	11.0450	0.0000	0.0000	0.0000	0.0000	25.9824	72.1662	124.3724	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	202.8036	179.5252	191.3823	170.0935	166.0604	150.9320	150.0143	155.3213	156.2797	172.6800	181.6255	200.8530	(64)
Efficiency of water heater												175.6200	(216)
(217)m	175.6200	175.6200	175.6200	175.6200	175.6200	175.6200	175.6200	175.6200	175.6200	175.6200	175.6200	175.6200	(217)
Fuel for water heating, kWh/month	115.4787	102.2237	108.9752	96.8531	94.5566	85.9424	85.4198	88.4417	88.9874	98.3259	103.4196	114.3680	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	1.7610	1.5906	1.7610	1.7042	1.7610	1.7042	1.7610	1.7610	1.7042	1.7610	1.7042	1.7610	(231)
Lighting	18.0869	14.5100	13.0647	9.5717	7.3935	6.0405	6.7446	8.7669	11.3873	14.9407	16.8755	18.5896	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-29.4899	-47.4227	-77.5588	-93.8190	-103.2671	-95.7409	-94.2065	-87.1600	-73.0688	-56.1087	-33.7048	-24.4983	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-10.1266	-26.8952	-68.7176	-127.3650	-189.2856	-199.1711	-193.7751	-152.0628	-96.5056	-44.4563	-14.9557	-7.4997	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	524.6991	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	175.6200	
Water heating fuel used	1182.9922	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (MEVDecentralised, Database: total watage = 2.4725, total flow = 21.0000, SFP = 0.1177)		
mechanical ventilation fans (SFP = 0.1177)	20.7348	(230a)
Total electricity for the above, kWh/year	20.7348	(231)
Electricity for lighting (calculated in Appendix L)	145.9719	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1946.8616	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	-72.4636	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	524.6991	0.1566	82.1919	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1182.9922	0.1406	166.3708	(264)
Space and water heating			248.5626	(265)
Pumps, fans and electric keep-hot	20.7348	0.1387	2.8762	(267)
Energy for lighting	145.9719	0.1443	21.0683	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-816.0454	0.1331	-108.6439	
PV Unit electricity exported	-1130.8162	0.1210	-136.8620	
Total			-245.5059	(269)
Total CO2, kg/year			27.0012	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.4900	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	524.6991	1.5799	828.9571	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1182.9922	1.5200	1798.1553	(278)
Space and water heating			2627.1124	(279)
Pumps, fans and electric keep-hot	20.7348	1.5128	31.3676	(281)
Energy for lighting	145.9719	1.5338	223.8966	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-816.0454	1.4920	-1217.5228	
PV Unit electricity exported	-1130.8162	0.4440	-502.1132	
Total			-1719.6360	(283)
Total Primary energy kWh/year			1162.7405	(286)
Dwelling Primary energy Rate (DPER)			20.9400	(287)

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	27.7600 (1b)	x	2.5000 (2b)	=	69.4000 (1b) - (3b)	
First floor	27.7600 (1c)	x	2.7000 (2c)	=	74.9520 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.5200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.3520	(5)

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2. Ventilation rate

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	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1386	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3886	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3303	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4211	0.4128	0.4046	0.3633	0.3550	0.3138	0.3138	0.3055	0.3303	0.3550	0.3716	0.3881	(22b)
Effective ac	0.5887	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5467	0.5545	0.5630	0.5690	0.5753	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							

TER Opaque door			2.4300	1.0000	2.4300		(26)
TER Opening Type			7.9200	1.1450	9.0687		(27)
Heat Loss Floor 1			27.7600	0.1300	3.6088		(28a)
New wall	81.8960	7.9200	73.9760	0.1800	13.3157		(29a)
Corridor wall	28.2400	2.4300	25.8100	0.1800	4.6458		(29a)
External Roof 1	27.7600		27.7600	0.1100	3.0536		(30)
Total net area of external elements Aum(A, m2)			165.6560				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.1226		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	4.5400	0.0500	0.2270
E3 Sill	4.5400	0.0500	0.2270
E4 Jamb	9.0400	0.0500	0.4520
E5 Ground floor (normal)	21.1800	0.1600	3.3888
E6 Intermediate floor within a dwelling	21.1800	0.0000	0.0000
E14 Flat roof	21.1800	0.0800	1.6944
E16 Corner (normal)	20.8000	0.0900	1.8720

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.8612 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 43.9838 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0415	27.8775	27.7167	26.9617	26.8204	26.1628	26.1628	26.0410	26.4161	26.8204	27.1062	27.4049	(38)
Heat transfer coeff	72.0252	71.8612	71.7005	70.9454	70.8042	70.1466	70.1466	70.0248	70.3999	70.8042	71.0900	71.3887	(39)
Average = Sum(39)m / 12 =												70.9448	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2973	1.2943	1.2914	1.2778	1.2753	1.2634	1.2634	1.2613	1.2680	1.2753	1.2804	1.2858	(40)
HLP (average)												1.2778	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8526 (42)

Hot water usage for mixer showers

55.2812	54.4504	53.2398	50.9236	49.2142	47.3080	46.2245	47.4259	48.7429	50.7896	53.1556	55.0694	(42a)

Hot water usage for baths

23.8959	23.5411	23.0413	22.1198	21.4299	20.6648	20.2515	20.7478	21.2881	22.1068	23.0472	23.8152	(42b)

Hot water usage for other uses

33.6023	32.3804	31.1585	29.9366	28.7147	27.4928	27.4928	28.7147	29.9366	31.1585	32.3804	33.6023	(42c)

Average daily hot water use (litres/day) 103.6702 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	112.7794	110.3718	107.4396	102.9800	99.3588	95.4655	93.9688	96.8884	99.9676	104.0549	108.5832	112.4868	(44)
Energy conte	178.6150	157.1680	165.1306	140.9744	133.7560	117.3860	113.6471	119.9681	123.2701	141.2015	154.6967	176.1272	(45)
Energy content (annual)										Total = Sum(45)m =		1721.9407	
Distribution loss (46)m = 0.15 x (45)m	26.7923	23.5752	24.7696	21.1462	20.0634	17.6079	17.0471	17.9952	18.4905	21.1802	23.2045	26.4191	(46)

Water storage loss:

Store volume 201.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6575 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.8950 (55)

Total storage loss

27.7463	25.0612	27.7463	26.8513	27.7463	26.8513	27.7463	27.7463	26.8513	27.7463	26.8513	27.7463	(56)

If cylinder contains dedicated solar storage

27.7463	25.0612	27.7463	26.8513	27.7463	26.8513	27.7463	27.7463	26.8513	27.7463	26.8513	27.7463	(57)
23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss

Combi loss

Total heat required for water heating calculated for each month

229.6237	203.2404	216.1394	190.3377	184.7647	166.7493	164.6558	170.9768	172.6333	192.2102	204.0600	227.1359	(62)
-25.2723	-22.3510	-23.4047	-19.3800	-18.0615	-15.4553	-14.4869	-15.4054	-15.9907	-18.8512	-21.3562	-24.8042	(63a)
-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

204.3515	180.8894	192.7347	170.9577	166.7033	151.2940	150.1689	155.5714	156.6427	173.3590	182.7038	202.3316	(64)
									Total per year (kWh/year) = Sum(64)m =		2087.7082	(64)

12Total per year (kWh/year) 2088 (64)

Electric shower(s)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

100.1965	89.1163	95.7129	86.3646	85.2809	78.5215	78.5946	80.6964	80.4779	87.7565	90.9273	99.3693	(65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	92.6289	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	87.0484	96.3750	87.0484	89.9500	87.0484	89.9500	87.0484	87.0484	89.9500	87.0484	89.9500	87.0484	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	161.5247	163.2008	158.9770	149.9851	138.6345	127.9664	120.8395	119.1634	123.3872	132.3791	143.7298	154.3978	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	32.2629	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	-74.1032	(71)
Water heating gains (Table 5)	134.6727	132.6135	128.6464	119.9509	114.6248	109.0576	105.6380	108.4629	111.7749	117.9523	126.2879	133.5608	(72)
Total internal gains	437.0344	445.9780	428.4605	413.6747	394.0963	377.7627	364.3145	365.4633	375.9007	391.1684	413.7563	428.7957	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
South	7.9200	46.7521	0.6300	0.7000	0.7700	113.1613	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	113.1613	185.3290	236.0763	266.8174	278.0403	267.5759	261.4380	253.8925	246.6095	199.8947	134.1347	97.7818	(83)
Total gains	550.1957	631.3070	664.5367	680.4921	672.1366	645.3386	625.7525	619.3558	622.5103	591.0631	547.8910	526.5774	(84)

7. Mean internal temperature (heating season)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	53.5306	53.6528	53.7731	54.3454	54.4538	54.9643	54.9643	55.0599	54.7665	54.4538	54.2349	54.0079	
alpha	4.5687	4.5769	4.5849	4.6230	4.6303	4.6643	4.6643	4.6707	4.6511	4.6303	4.6157	4.6005	
util living area	0.9846	0.9706	0.9495	0.9029	0.8138	0.6510	0.4838	0.5080	0.7086	0.8995	0.9696	0.9872	(86)
MIT	19.7569	19.9761	20.2307	20.5395	20.7896	20.9455	20.9888	20.9858	20.9156	20.6136	20.1383	19.7197	(87)
Th 2	19.8430	19.8453	19.8475	19.8582	19.8602	19.8696	19.8696	19.8713	19.8660	19.8602	19.8562	19.8520	(88)
util rest of house	0.9798	0.9618	0.9340	0.8722	0.7551	0.5538	0.3644	0.3894	0.6180	0.8622	0.9589	0.9832	(89)
MIT 2	18.4426	18.7184	19.0351	19.4129	19.6901	19.8398	19.8663	19.8667	19.8145	19.5065	18.9330	18.4021	(90)
Living area fraction									fLA = Living area / (4) =			0.4503	(91)
MIT	19.0344	19.2847	19.5735	19.9202	20.1852	20.3377	20.3718	20.3707	20.3103	20.0050	19.4757	18.9954	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0344	19.2847	19.5735	19.9202	20.1852	20.3377	20.3718	20.3707	20.3103	20.0050	19.4757	18.9954	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9754	0.9565	0.9296	0.8741	0.7734	0.5958	0.4184	0.4430	0.6556	0.8677	0.9544	0.9792	(94)
Useful gains	536.6732	603.8262	617.7288	594.8151	519.8055	384.4912	261.8004	274.3685	408.0959	512.8373	522.9189	515.6157	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1061.2473	1033.7058	937.3766	781.8351	600.7877	402.4778	264.5766	278.0448	437.2050	665.9145	879.7902	1056.2245	(97)
Space heating kWh	390.2832	288.8791	237.8179	134.6544	60.2508	0.0000	0.0000	0.0000	0.0000	113.8894	256.9474	402.2129	(98a)
Space heating requirement - total per year (kWh/year)												1884.9351	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	390.2832	288.8791	237.8179	134.6544	60.2508	0.0000	0.0000	0.0000	0.0000	113.8894	256.9474	402.2129	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1884.9351	
Space heating per m2											(98c) / (4) =	33.9506	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.3000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	390.2832	288.8791	237.8179	134.6544	60.2508	0.0000	0.0000	0.0000	0.0000	113.8894	256.9474	402.2129	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	422.8420	312.9784	257.6576	145.8878	65.2772	0.0000	0.0000	0.0000	0.0000	123.3905	278.3828	435.7670	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	204.3515	180.8894	192.7347	170.9577	166.7033	151.2940	150.1689	155.5714	156.6427	173.3590	182.7038	202.3316	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.4867	85.1041	84.5323	83.5301	82.0065	79.8000	79.8000	79.8000	79.8000	83.1410	84.8244	85.5700	(217)
Fuel for water heating, kWh/month	239.0449	212.5508	228.0013	204.6660	203.2806	189.5915	188.1816	194.9517	196.2941	208.5122	215.3906	236.4515	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	18.0869	14.5100	13.0647	9.5717	7.3935	6.0405	6.7446	8.7669	11.3873	14.9407	16.8755	18.5896	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-26.3745	-37.3885	-54.0494	-61.1551	-66.3073	-62.0668	-61.3486	-57.7680	-51.4579	-42.9800	-29.0876	-22.7822	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-14.2716	-30.0973	-59.9440	-90.1932	-119.3889	-119.9647	-118.5053	-100.2358	-73.3673	-43.0393	-19.0581	-11.2759	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2042.1832	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)

Efficiency of water heater	79.8000	
Water heating fuel used	2516.9167	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	145.9719	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1372.1076	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	3418.9642	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2042.1832	0.2100	428.8585	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2516.9167	0.2100	528.5525	(264)
Space and water heating			957.4110	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	145.9719	0.1443	21.0683	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-572.7660	0.1344	-77.0051	
PV Unit electricity exported	-799.3416	0.1259	-100.5994	
Total			-177.6045	(269)
Total CO2, kg/year			812.8040	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.6400	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2042.1832	1.1300	2307.6670	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2516.9167	1.1300	2844.1158	(278)
Space and water heating			5151.7829	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	145.9719	1.5338	223.8966	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-572.7660	1.4969	-857.3591	
PV Unit electricity exported	-799.3416	0.4620	-369.2679	
Total			-1226.6271	(283)
Total Primary energy kWh/year			4279.1532	(286)
Target Primary Energy Rate (TPER)			77.0700	(287)