

Energy Statement

Langford
Maryland Road
London
N22 5AR

Job number: 13080

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1 Executive Summary

This report has been produced by Base Energy on behalf of Halil Seker and in support of the planning application for the development named as Langford, Maryland Road, London, N22 5AR comprising of the construction of a new residential development containing 8 flats, consisting of 2 different types and falling under the requirements of Haringey Council.

It sets out the design approach with regards to energy, carbon dioxide emissions, and sustainability in order to ensure the development complies with:

- National Planning Policy.
- The London Plan Policy SI 2: Minimising greenhouse gas emissions
- The Haringey Council Local Plan Policy SP4: Working Towards a Low Carbon Haringey

The above policies require:

- A minimum 35% CO₂ reduction over Part L1 2021 with an aim to achieve zero carbon.
- A 10% CO₂ reduction over Part L1 2021 through energy saving measures.
- A 20% CO₂ reduction from on-site renewable technology sources

The design of the development will incorporate energy efficient building fabric and services in addition to low carbon technology:

- Thermal specification exceeding Part L 2021 notional U-values
- A design which limits air permeability, targeting 3.5
- A design which limits thermal bridging by targeting the notional Y-value 0.05.
- Energy saving building services including Wastewater Heat Recovery, MVHR, low energy lighting and heating controls.
- Low carbon Air Source Heat Pumps

- Solar PV Panels
 - 2.85kWp for Flat 1 displayed at 30° angle on South pitch with little or no shading.
 - 2.85kWp for Flat 2 displayed at 30° angle on East pitch with little or no shading.
 - 2.85kWp for Flat 3 displayed at 30° angle on North pitch with little or no shading.
 - 2.85kWp for Flat 4 displayed at 30° angle on West pitch with little or no shading.
 - 2.85kWp for Flat 5 displayed at 30° angle on South pitch with little or no shading.
 - 2.85kWp for Flat 6 displayed at 30° angle on East pitch with little or no shading.
 - 2.85kWp for Flat 7 displayed at 30° angle on North pitch with little or no shading.
 - 2.85kWp for Flat 8 displayed at 30° angle on West pitch with little or no shading.

Table 1.1: Carbon emissions summary

	Total CO ₂ Emission (Tonnes CO ₂ /year)	CO ₂ saving (Tonnes CO ₂ /year)	Percentage savings (%)
Part L Baseline	7.0	NA	N/A
Be Lean Design	5.4	1.6	23%
Be Clean	5.4	0.0	0%
Be Green	0.0	5.4	77%
Cumulative saving	7.0		100%

This results in an 100% saving in CO₂ emissions over Part L building regulations.

For the carbon off set contribution, please see the GLA spreadsheet provided.

2 Existing and Proposed Development

The development site is located at Langford, Maryland Road, London, N22 5AR.

The development proposals are for the construction of a new residential development containing 8 flats, consisting of 2 different types.

The development proposals constitute a minor development.

Aspects of the site location, shape, and surroundings (in particular the adjacent buildings), along with any other requirements of planning, use type, and scale will naturally constrain the development proposals in terms of the layout, positioning, and orientation of the proposed development. Subsequently, these constraints will impact on the feasibility of certain renewable technologies (as discussed in Section 4 of this report).

Figure 2.1: Site Location and proposals



3 Planning Policy

National Planning Policy Framework 2024

The December 2024 NPPF places greater emphasis on beauty, placemaking, environmental stewardship and sustainable development. Its strengthened environmental objectives seek to protect and enhance the natural, built and historic environment, while promoting the effective use of land, increasing biodiversity, encouraging the prudent use of natural resources, minimising waste and pollution, and supporting both climate change adaptation and the transition to a low-carbon economy.

Local Planning Policy

The Haringey Local Planning Policy requirements are as follows.

The development should target:

- Haringey Local plan - Policy SP4: Working Towards a Low Carbon Haringey
 - A 20% CO₂ reduction from on-site renewable technology sources
- The London Plan Policy SI 2 Minimising greenhouse gas emissions
 - A minimum 35% CO₂ reduction over Part L1 2021 with an aim to achieve zero carbon
 - A 10% CO₂ reduction over Part L1 2021 through energy saving measures

4 Methodology

The Standard Assessment Procedure (SAP) is the UK Government methodology for assessing and calculating the energy performance of dwellings.

The Simplified Building Energy Model (SBEM) is the UK Government methodology for assessing and calculating the energy performance of non-domestic buildings.

SAP and SBEM calculations take into account a range of factors that contribute to energy efficiency, including:

- Materials used for the construction and the thermal insulation of the building fabric (u-values¹ and thermal mass)
- Air permeability
- Efficiency, fuel source, and control of heating and cooling systems
- Ventilation system energy use and heat recovery
- Lighting energy
- Low carbon and energy saving or generating technologies

Approved Document Part L of current Building Regulations addresses the conservation of fuel and power. Part L is divided into two separate documents:

- Part L1 Newly constructed and extended or renovated existing dwellings
- Part L2 Newly constructed and extended or renovated existing non-domestic buildings

To comply with Part L, the calculations should demonstrate how the building will either meet or achieve a percentage reduction in the Building Emission Rate (BER) under the required Target Emission Rate (TER).

The calculation software has been used to calculate a baseline of energy demand and carbon dioxide emissions as appropriate from which any reductions or contributions have been measured.

¹ U-values (Thermal Transmittance) - the measure of the overall rate of heat transfer by all mechanisms under standard conditions, through a particular section of a construction. Lower u-values mean better thermal insulation

5 Baseline Energy & CO₂

Energy modelling software has been used to calculate a baseline for the development. This forms the basis from which compliance with planning policy has been measured.

Table 5.1: Baseline CO₂

	CO ₂ Emission Rate (kg CO ₂ /m ² /year)	Floor Area (m ²)	Total Baseline Emissions (kg CO ₂ /year)
Baseline	12.4	567	7,042

The **Total Baseline CO₂ Emissions** for the development are shown to be 7,042 kg/year.

Table 5.2: Baseline Energy Demand

	Energy Demand (kWh/m ² /year)	Floor Area (m ²)	Total Baseline Energy Demand (kWh/year)
Baseline	66.50	567	37,705

The **Baseline Energy Demand** for the development is shown to be 37,705 kWh per year.

6 Low Carbon Design – Fabric First – Be Lean

Before considering low carbon energy generating technology the development has been designed to reduce energy demand through the first step of the energy hierarchy by considering 'fabric first'. A thermally efficient building envelope will follow the design standards as set out below.

Table 6.0: Building Fabric Standards (including u-values W/m²K)

	Part L 2021 Limiting Parameters	Part L 2021 Notional Targets	Proposed Development
Walls	0.26	0.18	0.17
Ground Floor	0.18	0.13	0.11
Roof	0.16	0.11	0.10
Windows	1.6	1.2	1.2 & G Value 0.35
Doors to corridor	1.6	1.0	1.4
Air permeability	8.00	5.00	3.5

- Insulation: The specified building envelope is designed to meet and exceed the notional Part L targets and will help to limit the energy demand of the dwelling for space heating
- Thermal bridging: The design will seek to limit heat loss through thermal bridging targeting a global 'y-value' of 0.05.

Once heat retention has been addressed the next step is to ensure energy consuming building services are efficient.

- Lighting: Low energy LED lighting throughout with a minimum efficacy of 80 lumens per watt.
- Space & Water Heating: Condensing gas boiler as per GLA requirements with an 89.5% efficiency boiler
- Heating Controls: Time and temperature zone control
- Ventilation: MVHR – Assumed model: EnviroVent EnergiSava 400 (SFP 0.61)
- Waster Water Heat Recovery: Assumed model – RECOUP Easyfit+ (Utilisation factor 0.97)

The specifications outlined above, and with the heating provided by a gas system as required by the GLA guidance, have been incorporated into the calculation to generate a dwelling emission rate to be measured against the baseline data.

Table 6.1: Total Baseline vs Be Lean CO₂ (with Notional PV savings included)

	CO ₂ Emission Rate (kg CO ₂ /m ² /year)	Floor Area (m ²)	Total Baseline Emissions (kg CO ₂ /year)	Total Baseline Emissions (kg CO ₂ /year) – minus notional Solar PV (New Build)	Reduction in CO ₂
Baseline	12.4	567	7,042	N/A	N/A
Be Lean	9.6	567	6,341	5,432 (6,341 minus PV -908)	23%

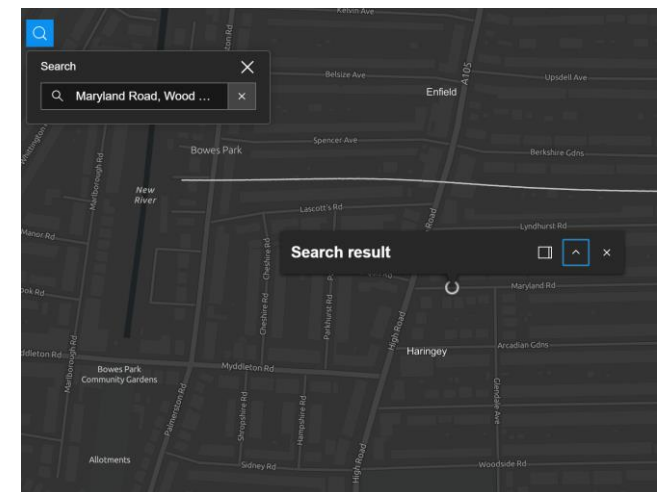
The **CO₂ Emissions reduction** as a result of energy efficient fabric and services is shown to be 1,610 kg/year which is a 23% saving. The notional PV for the development is -908 and this is deducted from the be lean figure to give 5,432kgCO₂/year.

7 Low Carbon Design – Exploit Local Energy Resources – Be Clean

Based on the London Heat Map, there are no existing or potential proposed heat networks in the vicinity of the site.

A development with electric heat pumps/boilers and radiators can be designed to allow a future connection to a district heating system with the below key steps:

1. **Future-Proofed Piping** – Instead of only installing electric boilers, the building can include insulated pipework that can later connect to a district heating network. This way, when district heating becomes available, switching over will be simple.
2. **Heat Interface Unit (HIU) Ready** – A Heat Interface Unit (HIU) is used to transfer heat from the district heating system to the building's heating and hot water system. If the building is designed with space and pipework ready for an HIU, it makes future connection easy.
3. **Dual Heating Compatibility** – The radiators and internal heating system should be compatible with both electric heating and district heating. Typically, water-based radiators (rather than direct electric radiators) can work with both systems.
4. **Centralized Connection Point** – A designated connection point for the future district heating system can be included in the development design. This will allow easy integration when the district network expands.
5. **Smart Controls** – Modern heating controls can be designed to switch from electric boilers to district heating when it becomes available, reducing disruption to residents.



By planning ahead, switching from electric or gas heating to district heating in the future will be cost-effective and straightforward, reducing reliance on electricity while benefiting from more sustainable heat sources.

8 Low Carbon Technology Review & Recommendations

Having set out an energy efficient design, the next step is to incorporate low carbon technology for energy generation. A number of technologies exist and should be specified where they:

- Compliance with planning policy
- Are feasible for the site
- Are cost efficient
- Are appropriate for proposed development form and function
- Protect against fuel poverty
- Promote fuel security
- Reduce reliance on fossil fuels
- Reduce carbon emissions
- Reduce resource depletion
- Reduce pollution

Site location and development form and function will influence the suitability of different technologies through:

- Orientation
- Space (inside and outside of the buildings)
- Surrounding topography, structures, and natural features
- Wind speed
- Overshading
- Geology and ground conditions
- Building form, function, and density

In determining the most feasible renewable technologies for the dwelling, the following have been reviewed:

- Wind turbines
- Ground Source Heat Pumps
- Air Source Heat Pumps
- Biomass
- Combined Heat and Power
- Photovoltaic Panels
- Solar water heating

WIND TURBINES

Wind turbines are used to produce electricity. They can be either pole mounted (in a suitably exposed position) or building mounted; building mounted systems need a sufficient wind speed at the structural height and both a structural survey and planning permission.

- Wind speed can be too low on low rise buildings
- Taller systems need sufficient space
- Wind resources very variable and unpredictable
- May need planning permission

Wind turbines technology is **not recommended** for this development

GROUND SOURCE HEAT PUMP (GSHP)

GSHPs use naturally occurring underground low-level heat in areas with appropriate geological features. Heat is transferred from the ground by either extracting and discharging (re-charging) water from/to the ground directly (open loop) or circulating water through pipes buried within the ground, (closed loop). The water is passed through a heat pump to transfer the heat from this water into a higher temperature water circuit to provide heating. The loop can be fitted horizontally (laid in a shallow trench) or vertically (in a borehole).

- Feasibility analysis is costly
- Suitable ground conditions required
- More capital intensive than air source heat pumps
- Can be more efficient and lower running costs than ASHPs
- Well suited to highly insulated buildings

Ground source heat pump technology is **not recommended** for this development

AIR SOURCE HEAT PUMP (ASHP)

ASHP systems absorb heat from outside air at a low temperature into a fluid which is then passed through an electrically driven compressor where its temperature is increased. There are two main types of ASHP systems: Air to Water systems distribute heat through wet central heating; Air to air produce warm air which is circulated by fans. For an ASHP system to be installed, there needs to be ample outdoor space for the external condensing unit; these units can also be noisy and blow out colder air to the neighbouring environment.

- Requires space for external plant and internal hot water tank for wet systems supplying DHW
- Can generate noise though quieter systems have been developed
- Least efficient when most needed
- Longer life than fossil fuel boilers
- High capital costs vs gas systems but lower than GSHPs
- Well suited to highly insulated buildings

Air source heat pump technology **is recommended** for this development

BIOMASS

Biomass systems burn wood pellets, chips, or logs to provide heat in a single room, or to power central heating and hot water boilers. There needs to be ample space available for both the boiler and the storage of fuel. There will also be regular deliveries of fuel and therefore adequate site access is required.

- Carbon emissions are cyclical unlike fossil fuel
- Requires fuel storage space and bulk delivery
- Carbon 'neutral' fuel in isolation but supply side emissions are still present so not neutral overall
- Harmful particulate emissions impact air quality and health

Biomass technology **is not recommended** for this development

COMBINED HEAT AND POWER (CHP)

CHP is effectively an on-site small power plant providing both electrical power and thermal heat energy. It is an energy efficiency and low carbon measure rather than a renewable energy technology. A CHP system operates by burning a primary fuel (normally natural gas) by use of either a reciprocating engine or turbine, which in turn drives an alternator to generate electrical power. The heat emitted by the engine and exhaust gases is recovered and used to heat the building or to provide hot water.

- Reduces consumption of and reliance on grid electricity
- Works best with high and consistent heat and hot water demand
- Recovers waste energy
- Can export to the grid
- Uses fossil fuel
- Emissions on site rather than upstream
- Efficiency is sensitive to sizing

CHP **is not recommended** for this development

DISTRICT HEATING

District Heating systems provide multiple buildings or dwellings with heat and hot water from a central boiler house, or 'energy centre'. The system can provide heating or cooling which is transferred from the energy centre through a network of highly insulated pipes carrying the heated water to each dwelling.

- Economies of scale
- Frees up space in habitable areas of development
- Variety of systems
- Can make use of waste heat from industry
- Can be fossil fuel based and dependent

With reference to the Local Heat Map it has been determined that there are proposed heat networks or energy centres within a suitable radius from the development and there are no existing networks local to the site

District heating can be considered in the future and has been detailed on Section 7, page 11 of this report.

SOLAR PHOTOVOLTAIC (PV)

Solar PV cells (which are mounted together in panels or tiles on the roof) convert sunlight into electricity. The cells are made from layers of semi-conducting material; when the light shines on the cell, an electric field is created across the layers. Although PV cells are most effective in bright sunlight, they can still generate electricity on a cloudy day. The power of a PV cell is measured in kilowatts peak (kWp). Each PV panel produces 0.25Watts to 0.35Watts depending on the manufacture.

- Passive technology, requires no energy input from grid
- Does not require sunny days to generate power
- Capital costs can be high although payback is effective
- Needs sufficient roof space and orientation
- Zero site or upstream emissions
- Can export to the grid

Solar PV technology **is recommended** for this development

SOLAR HOT WATER

Solar hot water systems absorb energy from the sun and transfer this energy using heat exchangers to heat water which can then be stored. Systems should be roof mounted and oriented to face between a south-east and south-west direction.

- Mostly passive technology but requires pump energy
- Not suitable for combi boilers and developments without roof space
- Lower CO₂ reductions than other technologies

Solar hot water technology **is not recommended** for this development

Low Carbon Technology Summary

The low carbon technology review indicates that ASHP with Solar PV would be potentially feasible. The following low carbon technology is recommended:

ASHP - Model: Mitsubishi Ecodan PUZ-WZ50VAA unit with a SCOP of 4.42 (Data sheet in Appendix 5)

Solar PV -

- 2.85kWp for Flat 1 displayed at 30° angle on South pitch with little or no shading.
- 2.85kWp for Flat 2 displayed at 30° angle on East pitch with little or no shading.
- 2.85kWp for Flat 3 displayed at 30° angle on North pitch with little or no shading.
- 2.85kWp for Flat 4 displayed at 30° angle on West pitch with little or no shading.
- 2.85kWp for Flat 5 displayed at 30° angle on South pitch with little or no shading.
- 2.85kWp for Flat 6 displayed at 30° angle on East pitch with little or no shading.
- 2.85kWp for Flat 7 displayed at 30° angle on North pitch with little or no shading.
- 2.85kWp for Flat 8 displayed at 30° angle on West pitch with little or no shading.

As shown in Appendix 3, the roof space at Maryland Road has been fully utilised with Solar PV.

Both these technologies are deemed optimal for meeting the needs of the development and achieving policy compliance. It has been incorporated into the energy model and the results are presented in the next section. **The feasibility and size of the heating system should be checked with an installer or M&E designer.**

9 Low Carbon Technology – Renewable Energy Generation - Be Green

The selected Low and Zero Carbon Technology has been incorporated into the calculation and the results are set out below.

Table 8.1: Baseline vs Be Green CO₂

	CO ₂ Emission Rate (kg CO ₂ /m ² /year)	Floor Area (m ²)	Total Baseline Emissions (kg CO ₂ /year)	Reduction in CO ₂
Baseline	12.4	567	7,042	N/A
Lean & Green Design	0.1	567	35	100%

The **CO₂ Emissions reduction** as a result of energy efficient fabric and services is shown to be 7,007 kg/year.

Table 8.2: Baseline vs Be Green Energy Demand

	Energy Demand (kWh/m ² /year)	Floor Area (m ²)	Total Baseline Energy Demand (kWh/year)	Reduction in Energy Demand
Baseline	66.50	567	37,705	N/A
Be Lean & Green Design	13.73	567	7,785	79%

The **Energy Demand reduction** as a result of energy efficient fabric and services is shown to be 29,920 kWh per year

Table 8.3: Fabric Efficiency

	Target Fabric Energy Efficiency (kWh/m ²)	Dwelling Fabric Energy Efficiency (kWh/m ²)	Improvement (%)
Development total	32.47	29.63	9%

10 Zero Carbon Standard Summary

As previously detailed, this project falls under the London Plan's 2021 'Zero Carbon Policy' which states that major developments (10 dwellings or more) must achieve a minimum reduction of 35% in CO₂ emissions over Part L1 2021 Building Regulations with the view to achieving 'zero carbon'. The remaining amount of CO₂ is subject to a cash in lieu contribution which acts as the alternative to offsetting the zero carbon emissions.

Haringey Council have stipulated that their price is £95 per tonne of carbon charged over a 30-year period. With the specification, we have used to achieve the average 100% reduction in CO₂ emissions over the baseline, this leaves the following tonnes /year for the development.

Image 9.1 has been taken from the GLA spread sheet shows the total on site CO₂ reduction following the energy hierarchy with the required carbon off set payment.

Image 9.1 Carbon Off set payment

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	1.6	23%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	5.4	77%
Cumulative on site savings	7.0	100%
Annual savings from off-set payment	0.0	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	1	-
Cash in-lieu contribution (£)	99	

However, it must be noted that this figure can change depending on the construction specifications, drawings, heating system type or fuel changes, all of which are decided at the Building Regulations design stage. Where SAP calculations will need to be undertaken after planning approval to determine the exact specification that will be incorporated. Only when this is carried out can a more accurate figure of the remaining tonnage of CO₂ be calculated. An 'As Built' SAP calculation and EPC will then be carried out at the post construction stage which will then state the exact amount of CO₂ emissions for each dwelling, in turn only then can the official cash contribution sum be determined.

This energy statement is to provide the feasibility of how the near zero carbon can be achieved with a minimum 35% reduction in CO₂ emissions, what will actually be used to achieve this figure will be decided by a combination of the SAP assessor and the client at building regulations stage.

11 Conclusion

Proposals are for the development named as Langford, Maryland Road, London, N22 5AR comprising of the construction of a new residential development containing 8 flats, consisting of 2 different types falling under the requirements of Haringey Council.

- A minimum 35% CO2 reduction over Part L1 2021 with an aim to achieve zero carbon.
- A 10% CO2 reduction over Part L1 2021 through energy saving measures.
- A 20% CO2 reduction from on-site renewable technology sources

Energy modelling software has been used to calculate a baseline against which compliance with the above can be measured.

The proposed development will be designed to limit energy demand through the inclusion of a thermally efficient building fabric and energy efficient services.

Low carbon technology will be incorporated and is to comprise ASHP with 2.85kWp solar PV for each flat, totalling 22.8kWp for the total development.

This results in an 23% be lean saving, a 77% saving from low and zero carbon technology and a total 100% saving in CO2 over Part L 2021.

This Energy Statement and the calculations on which it is based demonstrate that the proposed development complies with the local planning policy requirements.

12 Appendix 1 – Be Lean SAP Worksheets

Full SAP Calculation Printout



Plot Reference	13080 1			Issued on Date	24/04/2026
Assessment Reference	Be Lean V1	Plot Type Ref	Flat 1		
Plot Address	Corner of, Maryland Road & High Road, London, N22			SAP Version	10.2
SAP Rating	85 B	DER	11.52	TER	12.66
Environmental	90 B	% DER < TER			9.00
CO ₂ Emissions (t/year)	0.82	DFEE	31.96	TFEE	34.30
Compliance Check	See BREL	% DFEE < TFEE			6.83
% DPER < TPER	1.13	DPER	66.32	TPER	67.08
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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	78.6000		
Dwelling volume			

2. Ventilation rate

	m ³ 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)

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	3.5000 (17)
Infiltration rate	0.1750 (18)
Number of sides sheltered	2 (19)

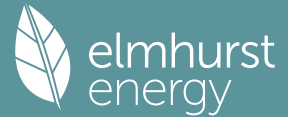
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1487 (21)

	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	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
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)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2892	0.2854	0.2817	0.2631	0.2594	0.2408	0.2408	0.2371	0.2482	0.2594	0.2668	0.2743 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			1.9900	1.4000	2.6460		(26)
Window			11.2500	1.1450	12.8817		(27)
Heat Loss Floor 1			78.6000	0.1100	8.6460		(28a)
External Wall	69.4400	11.2500	58.1900	0.1700	9.8923		(29a)
Corridor Wall	16.8000	1.8900	14.9100	0.1700	2.5347		(29a)
Total net area of external elements Aum(A, m ²)			164.8400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 36.6007		(33)
Main dwelling							
Party Ceiling 1			78.6000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							8.2420 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	44.8427 (37)

Full SAP Calculation Printout



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	17.6253	17.3986	17.1720	16.0386	15.8119	14.6786	14.6786	14.4519	15.1319	15.8119	16.2653	16.7186	(38)
Heat transfer coeff	62.4680	62.2413	62.0146	60.8813	60.6546	59.5212	59.5212	59.2946	59.9746	60.6546	61.1080	61.5613	(39)
Average = Sum(39)m / 12 =												60.8246	
HLP	0.7948	0.7919	0.7890	0.7746	0.7717	0.7573	0.7573	0.7544	0.7630	0.7717	0.7775	0.7832	(40)
HLP (average)												0.7739	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4358 (42)
Hot water usage for mixer showers													
73.1918	72.0919	70.4891	67.4224	65.1592	62.6354	61.2008	62.7915	64.5352	67.2450	70.3776	72.9114	(42a)	
Hot water usage for baths													
28.1009	27.6836	27.0959	26.0122	25.2008	24.3011	23.8152	24.3988	25.0342	25.9969	27.1028	28.0059	(42b)	
Hot water usage for other uses													
39.5746	38.1355	36.6965	35.2574	33.8183	32.3792	32.3792	33.8183	35.2574	36.6965	38.1355	39.5746	(42c)	
Average daily hot water use (litres/day)												129.5113	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
140.8673	137.9110	134.2814	128.6920	124.1784	119.3158	117.3952	121.0086	124.8268	129.9384	135.6160	140.4919	(44)	
Energy content	223.0994	196.3834	206.3855	176.1729	167.1680	146.7127	141.9794	149.8339	153.9239	176.3252	193.2098	219.9764	(45)
Energy content (annual)										Total = Sum(45)m =		2151.1705	
Distribution loss (46)m = 0.15 x (45)m													
33.4649	29.4575	30.9578	26.4259	25.0752	22.0069	21.2969	22.4751	23.0886	26.4488	28.9815	32.9965	(46)	
Water storage loss (or HIU loss):													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8900	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												1.0206	(55)
Total storage loss													
31.6386	28.5768	31.6386	30.6180	31.6386	30.6180	31.6386	31.6386	30.6180	31.6386	30.6180	31.6386	(56)	
If cylinder contains dedicated solar storage													
31.6386	28.5768	31.6386	30.6180	31.6386	30.6180	31.6386	31.6386	30.6180	31.6386	30.6180	31.6386	(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													
278.0004	245.9714	261.2865	229.3029	222.0690	199.8427	196.8804	204.7349	207.0539	231.2262	246.3398	274.8774	(62)	
WWHRS	-44.8026	-39.6238	-41.4917	-34.3568	-32.0193	-27.3991	-25.6823	-27.3106	-28.3482	-33.4194	-37.8601	-43.9729	(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													
233.1978	206.3476	219.7948	194.9461	190.0497	172.4435	171.1980	177.4243	178.7057	197.8068	208.4797	230.9045	(64)	
12Total per year (kWh/year)												2381.2986	(64)
Electric shower(s)												2381	(64)
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													
118.1014	104.9679	112.5440	101.0815	99.5042	91.2860	91.1289	93.7406	93.6837	102.5489	106.7463	117.0629	(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	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.5857	129.0770	116.5857	120.4719	116.5857	120.4719	116.5857	116.5857	120.4719	116.5857	120.4719	116.5857	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	216.4897	218.7362	213.0751	201.0233	185.8102	171.5119	161.9598	159.7134	165.3744	177.4262	192.6393	206.9376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	(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)	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	(71)
Water heating gains (Table 5)	158.7384	156.2022	151.2688	140.3910	133.7421	126.7861	122.4851	125.9954	130.1162	137.8346	148.2587	157.3427	(72)
Total internal gains	554.3502	566.5518	543.4660	524.4226	498.6744	478.3063	460.5671	461.8309	475.4990	494.3829	523.9063	543.4024	(73)

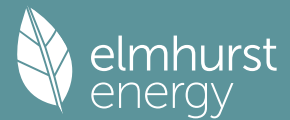
6. Solar gains

[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				4.9500	46.7521	0.3500	0.0000	0.7700	62.3684 (78)			
West				6.3000	19.6403	0.3500	0.0000	0.7700	33.3462 (80)			
Solar gains	95.7146	167.3757	237.5409	303.7332	345.2553	344.0345	331.2246	260.8615	187.5748	115.5067	81.3144 (83)	
Total gains	650.0648	733.9275	781.0068	828.1558	843.9298	822.3408	791.7917	762.5082	736.3605	681.9577	639.4130	624.7167 (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	34.9512	35.0785	35.2067	35.8621	35.9962	36.6816	36.6816	36.8218	36.4043	35.9962	35.7291	35.4660
alpha	3.3301	3.3386	3.3471	3.3908	3.3997	3.4454	3.4454	3.4548	3.4270	3.3997	3.3819	3.3644
util living area												
	0.9104	0.8723	0.8210	0.7251	0.6005	0.4451	0.3258	0.3511	0.5249	0.7417	0.8671	0.9183 (86)

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MIT	19.6646	19.9282	20.2348	20.5940	20.8290	20.9552	20.9883	20.9847	20.9183	20.6268	20.1213	19.6312 (87)
Th 2	20.2579	20.2604	20.2629	20.2754	20.2779	20.2905	20.2905	20.2930	20.2855	20.2779	20.2729	20.2679 (88)
util rest of house	0.9006	0.8592	0.8029	0.6990	0.5647	0.4003	0.2750	0.2993	0.4787	0.7117	0.8514	0.9093 (89)
MIT 2	18.6960	19.0233	19.4012	19.8403	20.1103	20.2537	20.2831	20.2830	20.2145	19.8885	19.2769	18.6619 (90)
Living area fraction									FLA = Living area / (4) =			0.3448 (91)
MIT	19.0300	19.3353	19.6886	20.1002	20.3581	20.4956	20.5262	20.5249	20.4572	20.1430	19.5680	18.9961 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0300	19.3353	19.6886	20.1002	20.3581	20.4956	20.5262	20.5249	20.4572	20.1430	19.5680	18.9961 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8814	0.8405	0.7874	0.6923	0.5688	0.4134	0.2920	0.3165	0.4901	0.7057	0.8342	0.8906 (94)
Useful gains	572.9449	616.8298	614.9614	573.3257	480.0137	339.9657	231.2249	241.2965	360.8944	481.2876	533.4042	556.3447 (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	920.1523	898.4723	817.8889	681.8812	525.1545	350.9107	233.6950	244.5865	381.2688	578.8294	761.8970	910.8661 (97)
Space heating kWh	258.3223	189.2637	150.9781	78.1599	33.5848	0.0000	0.0000	0.0000	0.0000	72.5711	164.5148	263.7639 (98a)
Space heating requirement - total per year (kWh/year)												1211.1586
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	258.3223	189.2637	150.9781	78.1599	33.5848	0.0000	0.0000	0.0000	0.0000	72.5711	164.5148	263.7639 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1211.1586
Space heating per m2										(98c) / (4) =		15.4091 (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 %)												89.5000 (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	258.3223	189.2637	150.9781	78.1599	33.5848	0.0000	0.0000	0.0000	0.0000	72.5711	164.5148	263.7639 (98)
Space heating efficiency (main heating system 1)	89.5000	89.5000	89.5000	89.5000	89.5000	0.0000	0.0000	0.0000	0.0000	89.5000	89.5000	89.5000 (210)
Space heating fuel (main heating system)	288.6282	211.4679	168.6906	87.3295	37.5249	0.0000	0.0000	0.0000	0.0000	81.0850	183.8154	294.7083 (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	233.1978	206.3476	219.7948	194.9461	190.0497	172.4435	171.1980	177.4243	178.7057	197.8068	208.4797	230.9045 (64)
Efficiency of water heater (217)m	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000 (216)
Fuel for water heating, kWh/month	260.5562	230.5560	245.5808	217.8169	212.3460	192.6743	191.2827	198.2395	199.6712	221.0132	232.9382	257.9938 (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	20.3628	18.3922	20.3628	19.7059	20.3628	19.7059	20.3628	20.3628	19.7059	20.3628	19.7059	20.3628 (231)
Lighting	25.4016	20.3781	18.3482	13.4427	10.3835	8.4834	9.4722	12.3123	15.9925	20.9830	23.7003	26.1076 (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												1353.2499 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												89.5000
Water heating fuel used												2660.6688 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8820)												
mechanical ventilation fans (SFP = 0.8820)												198.7553 (230a)
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												239.7553 (231)
Electricity for lighting (calculated in Appendix L)												205.0054 (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												4458.6795 (238)

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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	1353.2499	0.2100	284.1825 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2660.6688	0.2100	558.7405 (264)
Space and water heating			842.9229 (265)
Pumps, fans and electric keep-hot	239.7553	0.1387	33.2570 (267)
Energy for lighting	205.0054	0.1443	29.5886 (268)
Total CO2, kg/year			905.7686 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.5200 (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	1353.2499	1.1300	1529.1723 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2660.6688	1.1300	3006.5558 (278)
Space and water heating			4535.7281 (279)
Pumps, fans and electric keep-hot	239.7553	1.5128	362.7019 (281)
Energy for lighting	205.0054	1.5338	314.4441 (282)
Total Primary energy kWh/year			5212.8742 (286)
Dwelling Primary energy Rate (DPER)			66.3200 (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	78.6000 (1b)	x 2.3500 (2b)	= 184.7100 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	78.6000		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 184.7100 (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	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1624 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4124 (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) = 0.3506 (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	0.4470	0.4382	0.4294	0.3856	0.3768	0.3330	0.3330	0.3243	0.3506	0.3768	0.3944	0.4119 (22b)
Effective ac	0.5999	0.5960	0.5922	0.5743	0.5710	0.5555	0.5555	0.5526	0.5614	0.5710	0.5778	0.5848 (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			1.8900	1.0000	1.8900		(26)
TER Opening Type			11.2500	1.1450	12.8817		(27)
Heat Loss Floor 1			78.6000	0.1300	10.2180		(28a)
External Wall	69.4400	11.2500	58.1900	0.1800	10.4742		(29a)
Corridor Wall	16.8000	1.8900	14.9100	0.1800	2.6838		(29a)
Total net area of external elements Aum(A, m2)			164.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.1477		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				14.3000	0.0500	0.7150	
E3 Sill				13.4000	0.0500	0.6700	

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E4 Jamb						27.6000		0.0500		1.3800		
E5 Ground floor (normal)						34.2000		0.1600		5.4720		
E6 Intermediate floor within a dwelling						29.4000		0.0000		0.0000		
E16 Corner (normal)						10.0000		0.0900		0.9000		
E18 Party wall between dwellings						10.0000		0.0600		0.6000		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)										9.7370	(36)	
Point Thermal bridges										(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =	47.8847	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	36.5656	36.3292	36.0974	35.0089	34.8053	33.8573	33.8573	33.6817	34.2224	34.8053	35.2173	35.6480
Average = Sum(39)m / 12 =	84.4503	84.2138	83.9821	82.8936	82.6900	81.7419	81.7419	81.5664	82.1071	82.6900	83.1020	83.5327
												82.8926
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0744	1.0714	1.0685	1.0546	1.0520	1.0400	1.0400	1.0377	1.0446	1.0520	1.0573	1.0628
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.0546

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.4358
Hot water usage for mixer showers												(42)
Hot water usage for baths	65.0594	64.0817	62.6570	59.9310	57.9193	55.6759	54.4007	55.8147	57.3646	59.7734	62.5579	64.8101
Hot water usage for other uses	28.1009	27.6836	27.0959	26.0122	25.2008	24.3011	23.8152	24.3988	25.0342	25.9969	27.1028	28.0059
Average daily hot water use (litres/day)	39.5746	38.1355	36.6965	35.2574	33.8183	32.3792	32.3792	33.8183	35.2574	36.6965	38.1355	39.5746
												122.0135
												(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	132.7349	129.9008	126.4493	121.2006	116.9385	112.3563	110.5951	114.0318	117.6562	122.4667	127.7962	132.3906
Energy content (annual)	210.2197	184.9770	194.3478	165.9176	157.4217	138.1552	133.7552	141.1951	145.0819	166.1862	182.0692	207.2917
Distribution loss (46)m = 0.15 x (45)m	31.5329	27.7465	29.1522	24.8876	23.6133	20.7233	20.0633	21.1793	21.7623	24.9279	27.3104	31.0938
Water storage loss (or HIU loss):												150.0000
Store volume												(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938
Temperature factor from Table 2b												(48)
Enter (49) or (54) in (55)												0.5400
Total storage loss												(49)
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325
If cylinder contains dedicated solar storage												(50)
Primary loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325
Combi 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
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WWHRS	256.8146	227.0627	240.9427	211.0095	204.0166	183.2470	180.3502	187.7900	190.1737	212.7811	227.1610	253.8867
PV diverter	-29.7424	-26.3045	-27.5445	-22.8079	-21.2562	-18.1891	-17.0494	-18.1303	-18.8191	-22.1857	-25.1337	-29.1917
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
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
Output from w/h	227.0721	200.7582	213.3982	188.2015	182.7604	165.0579	163.3008	169.6598	171.3546	190.5954	202.0274	224.6950
12Total per year (kWh/year)												2298.8814
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
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000
Heat gains from water heating, kWh/month	107.1740	95.1734	101.8966	91.2411	89.6186	82.0101	81.7495	84.2233	84.3132	92.5328	96.6115	106.2004
												(65)

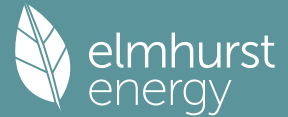
5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.5857	129.0770	116.5857	120.4719	116.5857	120.4719	116.5857	116.5857	120.4719	116.5857	120.4719	116.5857
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	216.4897	218.7362	213.0751	201.0233	185.8102	171.5119	161.9598	159.7134	165.3744	177.4262	192.6393	206.9376
Pumps, fans	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000
Water heating gains (Table 5)	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304
Total internal gains	144.0510	141.6271	136.9578	126.7237	120.4551	113.9029	109.8784	113.2034	117.1017	124.3721	134.1826	142.7425
	539.6628	551.9767	529.1550	510.7554	485.3874	465.4231	447.9604	449.0388	462.4844	480.9204	509.8302	528.8022
												(73)

6. Solar gains												

[Jan]												
South												
West												
Solar gains	108.5404	189.8040	269.3713	344.4335	391.5196	390.1351	375.6087	340.9681	295.8169	212.7099	130.9846	92.2105
Total gains	648.2032	741.7807	798.5263	855.1888	876.9070	855.5582	823.5691	790.0069	758.3013	693.6302	640.8148	621.0127
												(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	25.8535	25.9261	25.9976	26.3390	26.4038	26.7101	26.7101	26.7676	26.5913	26.4038	26.2729	26.1375
alpha	2.7236	2.7284	2.7332	2.7559	2.7603	2.7807	2.7807	2.7845	2.7728	2.7603	2.7515	2.7425
util living area	0.9311	0.9023	0.8630	0.7892	0.6842	0.5398	0.4110	0.4416	0.6209	0.8072	0.9012	0.9374 (86)
MIT	18.8507	19.1690	19.5887	20.1197	20.5461	20.8346	20.9429	20.9289	20.7423	20.1942	19.4516	18.8031 (87)
Th 2	20.0218	20.0242	20.0267	20.0381	20.0402	20.0502	20.0502	20.0520	20.0463	20.0402	20.0359	20.0314 (88)
util rest of house	0.9220	0.8898	0.8451	0.7612	0.6410	0.4763	0.3308	0.3611	0.5603	0.7758	0.8864	0.9291 (89)
MIT 2	17.5259	17.9241	18.4467	19.1005	19.6005	19.9186	20.0170	20.0084	19.8275	19.2045	18.2920	17.4723 (90)
Living area fraction	17.9827	18.3534	18.8405	19.4519	19.9265	20.2344	20.3362	20.3258	20.1429	19.5457	18.6918	17.9311 (92)
MIT	17.9827	18.3534	18.8405	19.4519	19.9265	20.2344	20.3362	20.3258	20.1429	19.5457	18.6918	17.9311 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9827	18.3534	18.8405	19.4519	19.9265	20.2344	20.3362	20.3258	20.1429	19.5457	18.6918	17.9311 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8971	0.8630	0.8191	0.7420	0.6354	0.4892	0.3557	0.3852	0.5669	0.7572	0.8608	0.9052 (94)
Useful gains	581.5124	640.1924	654.0845	634.5241	557.2144	418.5271	292.9327	304.2834	429.8783	525.2215	551.5971	562.1545 (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	1155.5047	1132.9584	1036.3795	874.6865	680.2517	460.5691	305.4066	320.2099	496.1672	739.7230	963.3051	1146.9958 (97)
Space heating kWh	427.0502	331.1388	284.4275	172.9170	91.5398	0.0000	0.0000	0.0000	0.0000	159.5891	296.4297	435.1219 (98a)
Space heating requirement - total per year (kWh/year)												2198.2139
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	427.0502	331.1388	284.4275	172.9170	91.5398	0.0000	0.0000	0.0000	0.0000	159.5891	296.4297	435.1219 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2198.2139
Space heating per m2										(98c) / (4) =		27.9671 (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	427.0502	331.1388	284.4275	172.9170	91.5398	0.0000	0.0000	0.0000	0.0000	159.5891	296.4297	435.1219 (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)	462.6763	358.7635	308.1554	187.3423	99.1763	0.0000	0.0000	0.0000	0.0000	172.9026	321.1590	471.4213 (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	227.0721	200.7582	213.3982	188.2015	182.7604	165.0579	163.3008	169.6598	171.3546	190.5954	202.0274	224.6950 (64)
Efficiency of water heater (217)m	85.4544	85.1743	84.7049	83.8703	82.5936	79.8000	79.8000	79.8000	79.8000	83.6643	84.9183	79.8000 (216)
Fuel for water heating, kWh/month	265.7233	235.7029	251.9313	224.3959	221.2768	206.8395	204.6376	212.6062	214.7301	227.8096	237.9080	262.7532 (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	24.2242	19.4336	17.4978	12.8196	9.9022	8.0902	9.0332	11.7416	15.2512	20.0104	22.6017	24.8975 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-20.9817	-31.0403	-46.7880	-55.2434	-61.8751	-58.5911	-57.8759	-53.4978	-46.1716	-36.6500	-23.5802	-17.9736 (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	-7.7898	-16.7298	-33.9025	-51.8890	-69.5705	-70.2605	-69.4342	-58.3457	-42.1863	-24.2390	-10.4999	-6.1346 (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												2381.5969 (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												2766.3143 (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)												195.5032 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-971.2505 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)

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Appendix Q - special features

Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	4458.1639 (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	2381.5969	0.2100	500.1353 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2766.3143	0.2100	580.9260 (264)
Space and water heating			1081.0613 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	195.5032	0.1443	28.2172 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-510.2687	0.1336	-68.1669
PV Unit electricity exported	-460.9817	0.1253	-57.7822
Total			-125.9491 (269)
Total CO2, kg/year			995.2587 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6600 (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	2381.5969	1.1300	2691.2045 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2766.3143	1.1300	3125.9352 (278)
Space and water heating			5817.1396 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	195.5032	1.5338	299.8694 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-510.2687	1.4937	-762.1732
PV Unit electricity exported	-460.9817	0.4601	-212.0881
Total			-974.2614 (283)
Total Primary energy kWh/year			5272.8484 (286)
Target Primary Energy Rate (TPER)			67.0800 (287)

13 Appendix 2 – Be Green SAP Worksheets

Full SAP Calculation Printout



Plot Reference	13080 1			Issued on Date	24/04/2026
Assessment Reference	Be Green V2	Plot Type Ref	Flat 1		
Plot Address	Corner of, Maryland Road & High Road, London, N22			SAP Version	10.2
SAP Rating	96 A	DER	-0.21	TER	12.72
Environmental	100 A	% DER < TER			101.65
CO ₂ Emissions (t/year)	-0.05	DFEE	31.96	TFEE	34.30
Compliance Check	See BREL	% DFEE < TFEE			6.83
% DPER < TPER	81.82	DPER	12.25	TPER	67.39
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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	78.6000		
Dwelling volume			

2. Ventilation rate

	m ³ 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)

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	3.5000	(17)
Infiltration rate	0.1750	(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) =	0.1487 (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	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
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)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												71.2000 (23c)
Effective ac	0.3337	0.3299	0.3262	0.3076	0.3039	0.2853	0.2853	0.2816	0.2927	0.3039	0.3113	0.3188 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			1.9900	1.4000	2.6460		(26)
Window			11.2500	1.1450	12.8817		(27)
Heat Loss Floor 1			78.6000	0.1100	8.6460		(28a)
External Wall	69.4400	11.2500	58.1900	0.1700	9.8923		(29a)
Corridor Wall	16.8000	1.8900	14.9100	0.1700	2.5347		(29a)
Total net area of external elements Aum(A, m ²)			164.8400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	36.6007	(33)
Main dwelling							
Party Ceiling 1			78.6000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							8.2420 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	44.8427 (37)

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Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	20.3378	20.1111	19.8844	18.7511	18.5244	17.3910	17.3910	17.1643	17.8444	18.5244	18.9777	19.4311 (38)
Average = Sum(39)m / 12 =	65.1805	64.9538	64.7271	63.5937	63.3671	62.2337	62.2337	62.0070	62.6871	63.3671	63.8204	64.2738 (39)
												63.5371
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8293	0.8264	0.8235	0.8091	0.8062	0.7918	0.7918	0.7889	0.7975	0.8062	0.8120	0.8177 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

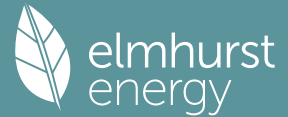
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.4358 (42)
Hot water usage for mixer showers	73.1918	72.0919	70.4891	67.4224	65.1592	62.6354	61.2008	62.7915	64.5352	67.2450	70.3776	72.9114 (42a)
Hot water usage for baths	28.1009	27.6836	27.0959	26.0122	25.2008	24.3011	23.8152	24.3988	25.0342	25.9969	27.1028	28.0059 (42b)
Hot water usage for other uses	39.5746	38.1355	36.6965	35.2574	33.8183	32.3792	32.3792	33.8183	35.2574	36.6965	38.1355	39.5746 (42c)
Average daily hot water use (litres/day)												129.5113 (43)
Daily hot water use	140.8673	137.9110	134.2814	128.6920	124.1784	119.3158	117.3952	121.0086	124.8268	129.9384	135.6160	140.4919 (44)
Energy conte	223.0994	196.3834	206.3855	176.1729	167.1680	146.7127	141.9794	149.8339	153.9239	176.3252	193.2098	219.9764 (45)
Energy content (annual)										Total = Sum(45)m =		2151.1705
Distribution loss (46)m = 0.15 x (45)m	33.4649	29.4575	30.9578	26.4259	25.0752	22.0069	21.2969	22.4751	23.0886	26.4488	28.9815	32.9965 (46)
Water storage loss (or HIU loss):												
Store volume												170.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2300 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6642 (55)
Total storage loss	20.5902	18.5976	20.5902	19.9260	20.5902	19.9260	20.5902	20.5902	19.9260	20.5902	19.9260	20.5902 (56)
If cylinder contains dedicated solar storage	20.5902	18.5976	20.5902	19.9260	20.5902	19.9260	20.5902	20.5902	19.9260	20.5902	19.9260	20.5902 (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	266.9520	235.9922	250.2381	218.6109	211.0206	189.1507	185.8320	193.6865	196.3619	220.1778	235.6478	263.8290 (62)
WWHRS	-44.8026	-39.6238	-41.4917	-34.3568	-32.0193	-27.3991	-25.6823	-27.3106	-28.3482	-33.4194	-37.8601	-43.9729 (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	222.1494	196.3684	208.7464	184.2541	179.0013	161.7515	160.1496	166.3759	168.0137	186.7584	197.7877	219.8561 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2251.2126 (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	109.2626	96.9845	103.7053	92.5279	90.6654	82.7324	82.2902	84.9019	85.1301	93.7102	98.1927	108.2242 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.5857	129.0770	116.5857	120.4719	116.5857	120.4719	116.5857	116.5857	120.4719	116.5857	120.4719	116.5857 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	216.4897	218.7362	213.0751	201.0233	185.8102	171.5119	161.9598	159.7134	165.3744	177.4262	192.6393	206.9376 (68)
Pumps, fans	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304 (71)
Total internal gains	146.8584	144.3222	139.3888	128.5110	121.8621	114.9061	110.6051	114.1154	118.2362	125.9546	136.3787	145.4627 (72)
	539.4702	551.6718	528.5860	509.5426	483.7944	466.4263	448.6871	449.9509	463.6190	479.5029	509.0263	528.5224 (73)

6. Solar gains												
[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
South	4.9500	46.7521	0.3500	0.0000	0.7700	62.3684 (78)						
West	6.3000	19.6403	0.3500	0.0000	0.7700	33.3462 (80)						
Solar gains	95.7146	167.3757	237.5409	303.7332	345.2553	344.0345	331.2246	300.6773	260.8615	187.5748	115.5067	81.3144 (83)
Total gains	635.1848	719.0475	766.1268	813.2758	829.0498	810.4608	779.9117	750.6282	724.4805	667.0777	624.5330	609.8367 (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	33.4967	33.6136	33.7314	34.3325	34.4553	35.0828	35.0828	35.2111	34.8291	34.4553	34.2106	33.9693
alpha	3.2331	3.2409	3.2488	3.2888	3.2970	3.3389	3.3389	3.3474	3.3219	3.2970	3.2807	3.2646
util living area	0.9187	0.8834	0.8356	0.7452	0.6241	0.4670	0.3441	0.3706	0.5484	0.7626	0.8796	0.9261 (86)

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Living	19.5261	19.8003	20.1272	20.5192	20.7883	20.9413	20.9839	20.9791	20.8960	20.5573	20.0075	19.4900
Non living	18.5031	18.8445	19.2487	19.7293	20.0402	20.2123	20.2504	20.2493	20.1652	19.7848	19.1163	18.4651
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	20.2460	19.8003	20.1272	20.5192	20.7883	20.9413	20.9839	20.9791	20.8960	20.5573	20.0075	19.7012 (87)
Th 2	20.2280	20.2305	20.2330	20.2455	20.2480	20.2605	20.2605	20.2630	20.2555	20.2480	20.2430	20.2380 (88)
util rest of house	0.9094	0.8708	0.8180	0.7190	0.5870	0.4190	0.2887	0.3143	0.4997	0.7328	0.8647	0.9176 (89)
MIT 2	19.5404	18.8445	19.2487	19.7293	20.0402	20.2123	20.2504	20.2493	20.1652	19.7848	19.1163	18.7846 (90)
Living area fraction									FLA = Living area / (4) =			0.3448 (91)
MIT	19.7837	19.1741	19.5516	20.0016	20.2981	20.4637	20.5032	20.5009	20.4171	20.0512	19.4236	19.1006 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7837	19.1741	19.5516	20.0016	20.2981	20.4637	20.5032	20.5009	20.4171	20.0512	19.4236	19.1006 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9035	0.8507	0.8005	0.7100	0.5896	0.4325	0.3071	0.3327	0.5106	0.7243	0.8459	0.9026	(94)
Ext temp.	573.8628	611.7105	613.3203	577.4191	488.8134	350.4909	239.4884	249.7581	369.9474	483.1967	528.3171	550.4146	(95)
Heat loss rate W	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)
Space heating kWh	1009.2318	927.1540	844.7919	705.9935	544.8375	364.9171	242.9137	254.2872	396.0020	598.8928	786.4951	957.7201	(97)
Space heating requirement - total per year (kWh/year)	323.9146	211.9780	172.2149	92.5736	41.6820	0.0000	0.0000	0.0000	0.0000	86.0779	185.8881	303.0353	(98a)
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)	323.9146	211.9780	172.2149	92.5736	41.6820	0.0000	0.0000	0.0000	0.0000	86.0779	185.8881	303.0353	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1417.3644	(99)
Space heating per m2												18.0326	(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 %)													299.7231	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating efficiency (main heating system 1)	323.9146	211.9780	172.2149	92.5736	41.6820	0.0000	0.0000	0.0000	0.0000	86.0779	185.8881	303.0353	(98)	
Space heating fuel (main heating system)	299.7231	299.7231	299.7231	299.7231	299.7231	0.0000	0.0000	0.0000	0.0000	299.7231	299.7231	299.7231	(210)	
Space heating efficiency (main heating system 2)	108.0713	70.7246	57.4580	30.8864	13.9068	0.0000	0.0000	0.0000	0.0000	28.7192	62.0199	101.1051	(211)	
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	(212)	
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	(213)	
Water heating	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 requirement	222.1494	196.3684	208.7464	184.2541	179.0013	161.7515	160.1496	166.3759	168.0137	186.7584	197.7877	219.8561	(64)	
Efficiency of water heater	185.8107	185.8107	185.8107	185.8107	185.8107	185.8107	185.8107	185.8107	185.8107	185.8107	185.8107	185.8107	(216)	
Fuel for water heating, kWh/month	119.5569	105.6820	112.3436	99.1623	96.3353	87.0518	86.1897	89.5406	90.4220	100.5100	106.4458	118.3226	(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	16.8806	15.2470	16.8806	16.3361	16.8806	16.3361	16.8806	16.8806	16.3361	16.8806	16.3361	16.8806	(231)	
Lighting	25.4016	20.3781	18.3482	13.4427	10.3835	8.4834	9.4722	12.3123	15.9925	20.9830	23.7003	26.1076	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-49.3247	-70.6374	-103.1114	-116.0677	-124.8587	-114.9229	-113.5842	-107.0961	-94.5793	-80.1002	-54.1760	-42.3669	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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)	-22.0486	-48.4640	-99.7320	-155.7824	-210.9892	-215.2691	-212.2442	-177.5818	-128.3806	-72.1551	-30.4830	-17.3603	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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													472.8912	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													185.8107	
Water heating fuel used													1211.5627	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8820)													198.7553	(230a)
mechanical ventilation fans (SFP = 0.8820)													198.7553	(231)
Total electricity for the above, kWh/year													205.0054	(232)
Electricity for lighting (calculated in Appendix L)														
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2461.3161	(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)

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Energy used 0.0000 (237)
Total delivered energy for all uses -373.1014 (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	472.8912	0.1559	73.7260 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1211.5627	0.1408	170.5845 (264)
Space and water heating			244.3105 (265)
Pumps, fans and electric keep-hot	198.7553	0.1387	27.5698 (267)
Energy for lighting	205.0054	0.1443	29.5886 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1070.8256	0.1346	-144.1090
PV Unit electricity exported	-1390.4906	0.1248	-173.5461
Total			-317.6551 (269)
Total CO2, kg/year			-16.1862 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.2100 (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	472.8912	1.5771	745.8174 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1211.5627	1.5206	1842.3159 (278)
Space and water heating			2588.1333 (279)
Pumps, fans and electric keep-hot	198.7553	1.5128	300.6771 (281)
Energy for lighting	205.0054	1.5338	314.4441 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1070.8256	1.4974	-1603.4340
PV Unit electricity exported	-1390.4906	0.4581	-636.9660
Total			-2240.4000 (283)
Total Primary energy kWh/year			962.8546 (286)
Dwelling Primary energy Rate (DPER)			12.2500 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	78.6000	2.3500	184.7100
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	78.6000		184.7100
Dwelling volume			184.7100

2. Ventilation rate

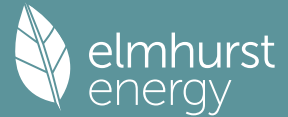
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1624 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4124 (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) = 0.3506 (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	0.4470	0.4382	0.4294	0.3856	0.3768	0.3330	0.3330	0.3243	0.3506	0.3768	0.3944	0.4119 (22b)
Effective ac	0.5999	0.5960	0.5922	0.5743	0.5710	0.5555	0.5555	0.5526	0.5614	0.5710	0.5778	0.5848 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
TER Opaque door			1.8900	1.0000	1.8900			(26)					
TER Opening Type			11.2500	1.1450	12.8817			(27)					
Heat Loss Floor 1			78.6000	0.1300	10.2180			(28a)					
External Wall	69.4400	11.2500	58.1900	0.1800	10.4742			(29a)					
Corridor Wall	16.8000	1.8900	14.9100	0.1800	2.6838			(29a)					
Total net area of external elements Aum(A, m2)			164.8400					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.1477			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				14.3000	0.0500	0.7150							
E3 Sill				13.4000	0.0500	0.6700							
E4 Jamb				27.6000	0.0500	1.3800							
E5 Ground floor (normal)				34.2000	0.1600	5.4720							
E6 Intermediate floor within a dwelling				29.4000	0.0000	0.0000							
E16 Corner (normal)				10.0000	0.0900	0.9000							
E18 Party wall between dwellings				10.0000	0.0600	0.6000							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.7370	(36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	47.8847 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	36.5656	36.3292	36.0974	35.0089	34.8053	33.8573	33.8573	33.6817	34.2224	34.8053	35.2173	35.6480	(38)
Average = Sum(39)m / 12 =	84.4503	84.2138	83.9821	82.8936	82.6900	81.7419	81.7419	81.5664	82.1071	82.6900	83.1020	83.5327	(39)
												82.8926	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0744	1.0714	1.0685	1.0546	1.0520	1.0400	1.0400	1.0377	1.0446	1.0520	1.0573	1.0628	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

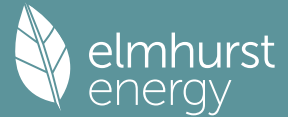
Assumed occupancy													2.4358	(42)
Hot water usage for mixer showers	65.0594	64.0817	62.6570	59.9310	57.9193	55.6759	54.4007	55.8147	57.3646	59.7734	62.5579	64.8101	(42a)	
Hot water usage for baths	28.1009	27.6836	27.0959	26.0122	25.2008	24.3011	23.8152	24.3988	25.0342	25.9969	27.1028	28.0059	(42b)	
Hot water usage for other uses	39.5746	38.1355	36.6965	35.2574	33.8183	32.3792	32.3792	33.8183	35.2574	36.6965	38.1355	39.5746	(42c)	
Average daily hot water use (litres/day)													122.0135	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	132.7349	129.9008	126.4493	121.2006	116.9385	112.3563	110.5951	114.0318	117.6562	122.4667	127.7962	132.3906	(44)	
Energy content (annual)	210.2197	184.9770	194.3478	165.9176	157.4217	138.1552	133.7552	141.1951	145.0819	166.1862	182.0692	207.2917	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =			2026.6183	
	31.5329	27.7465	29.1522	24.8876	23.6133	20.7233	20.0633	21.1793	21.7623	24.9279	27.3104	31.0938	(46)	
Water storage loss (or HIU loss):														
Store volume													170.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5003	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8102	(55)
Total storage loss														
	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	(56)	
If cylinder contains dedicated solar storage														
	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	(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														
	258.5974	228.6730	242.7255	212.7347	205.7994	184.9723	182.1329	189.5728	191.8990	214.5639	228.8863	255.6695	(62)	
WWHRS	-29.7424	-26.3045	-27.5445	-22.8079	-21.2562	-18.1891	-17.0494	-18.1303	-18.8191	-22.1857	-25.1337	-29.1917	(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														
	228.8549	202.3685	215.1810	189.9268	184.5432	166.7832	165.0836	171.4426	173.0799	192.3782	203.7527	226.4778	(64)	
12Total per year (kWh/year)													2319.8724	(64)
Electric shower(s)													2320	(64)
	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)	
													0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =														
Heat gains from water heating, kWh/month														
	108.6002	96.4616	103.3228	92.6213	91.0449	83.3903	83.1758	85.6495	85.6934	93.9591	97.9917	107.6267	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	121.7880	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
116.5857	129.0770	116.5857	120.4719	116.5857	120.4719	116.5857	116.5857	120.4719	116.5857	120.4719	116.5857	116.5857	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
216.4897	218.7362	213.0751	201.0233	185.8102	171.5119	161.9598	159.7134	165.3744	177.4262	192.6393	206.9376	206.9376	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	35.1788	(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)													
-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	-97.4304	(71)
Water heating gains (Table 5)													
145.9680	143.5441	138.8748	128.6407	122.3721	115.8199	111.7954	115.1204	119.0186	126.2891	136.0996	144.6595	144.6595	(72)
Total internal gains	541.5798	553.8937	531.0719	512.6723	487.3044	467.3401	449.8774	450.9558	464.4014	482.8374	511.7472	530.7192	(73)

6. Solar gains

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[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
South	4.9500				46.7521	0.6300		0.7000		0.7700	70.7258 (78)
West	6.3000				19.6403	0.6300		0.7000		0.7700	37.8146 (80)

Solar gains	108.5404	189.8040	269.3713	344.4335	391.5196	390.1351	375.6087	340.9681	295.8169	212.7099	130.9846	92.2105 (83)
Total gains	650.1202	743.6977	800.4433	857.1058	878.8240	857.4752	825.4861	791.9239	760.2183	695.5472	642.7318	622.9297 (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	25.8535	25.9261	25.9976	26.3390	26.4038	26.7101	26.7101	26.7676	26.5913	26.4038	26.2729	26.1375
alpha	2.7236	2.7284	2.7332	2.7559	2.7603	2.7807	2.7807	2.7845	2.7728	2.7603	2.7515	2.7425
util living area	0.9307	0.9018	0.8624	0.7885	0.6834	0.5389	0.4102	0.4407	0.6199	0.8064	0.9006	0.9370 (86)
MIT	18.8547	19.1727	19.5919	20.1221	20.5476	20.8353	20.9432	20.9292	20.7434	20.1967	19.4552	18.8072 (87)
Th 2	20.0218	20.0242	20.0267	20.0381	20.0402	20.0502	20.0502	20.0520	20.0463	20.0402	20.0359	20.0314 (88)
util rest of house	0.9215	0.8892	0.8445	0.7604	0.6401	0.4754	0.3301	0.3603	0.5593	0.7749	0.8858	0.9286 (89)
MIT 2	17.5309	17.9286	18.4505	19.1032	19.6021	19.9192	20.0172	20.0086	19.8285	19.2074	18.2965	17.4774 (90)
Living area fraction	17.9873	18.3575	18.8440	19.4545	19.9281	20.2351	20.3364	20.3260	20.1440	19.5485	18.6960	17.9359 (92)
MIT	17.9873	18.3575	18.8440	19.4545	19.9281	20.2351	20.3364	20.3260	20.1440	19.5485	18.6960	17.9359 (93)
Temperature adjustment												0.0000
adjusted MIT	17.9873	18.3575	18.8440	19.4545	19.9281	20.2351	20.3364	20.3260	20.1440	19.5485	18.6960	17.9359 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8966	0.8625	0.8185	0.7412	0.6346	0.4884	0.3550	0.3844	0.5659	0.7563	0.8601	0.9047 (94)
Useful gains	582.8933	641.4298	655.1524	635.3279	557.7250	418.7543	293.0141	304.3887	430.2384	526.0723	552.8224	563.5695 (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	1155.8979	1133.3096	1036.6787	874.9019	680.3799	460.6211	305.4243	320.2330	496.2534	739.9520	963.6493	1147.3954 (97)
Space heating kWh	426.3154	330.5432	283.8555	172.4933	91.2552	0.0000	0.0000	0.0000	0.0000	159.1265	295.7954	434.3665 (98a)
Space heating requirement - total per year (kWh/year)												2193.7510
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	426.3154	330.5432	283.8555	172.4933	91.2552	0.0000	0.0000	0.0000	0.0000	159.1265	295.7954	434.3665 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2193.7510
Space heating per m2										(98c) / (4) =		27.9103 (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	426.3154	330.5432	283.8555	172.4933	91.2552	0.0000	0.0000	0.0000	0.0000	159.1265	295.7954	434.3665 (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)	461.8802	358.1183	307.5358	186.8833	98.8681	0.0000	0.0000	0.0000	0.0000	172.4014	320.4717	470.6029 (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	228.8549	202.3685	215.1810	189.9268	184.5432	166.7832	165.0836	171.4426	173.0799	192.3782	203.7527	226.4778 (64)
Efficiency of water heater (217)m	85.4343	85.1531	84.6819	83.8445	82.5689	79.8000	79.8000	79.8000	79.8000	83.6374	84.8948	79.8000 (216)
Fuel for water heating, kWh/month	267.8725	237.6526	254.1052	226.5227	223.5020	209.0015	206.8717	214.8403	216.8921	230.0145	240.0061	264.9003 (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	24.2242	19.4336	17.4978	12.8196	9.9022	8.0902	9.0332	11.7416	15.2512	20.0104	22.6017	24.8975 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-20.9817	-31.0403	-46.7880	-55.2434	-61.8751	-58.5911	-57.8759	-53.4978	-46.1716	-36.6500	-23.5802	-17.9736 (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	-7.7898	-16.7298	-33.9025	-51.8890	-69.5705	-70.2605	-69.4342	-58.3457	-42.1863	-24.2390	-10.4999	-6.1346 (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												2376.7616 (211)
Space heating fuel - main system 2												0.0000 (213)

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2792.1815 (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)	195.5032 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-971.2505 (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	4479.1959 (238)

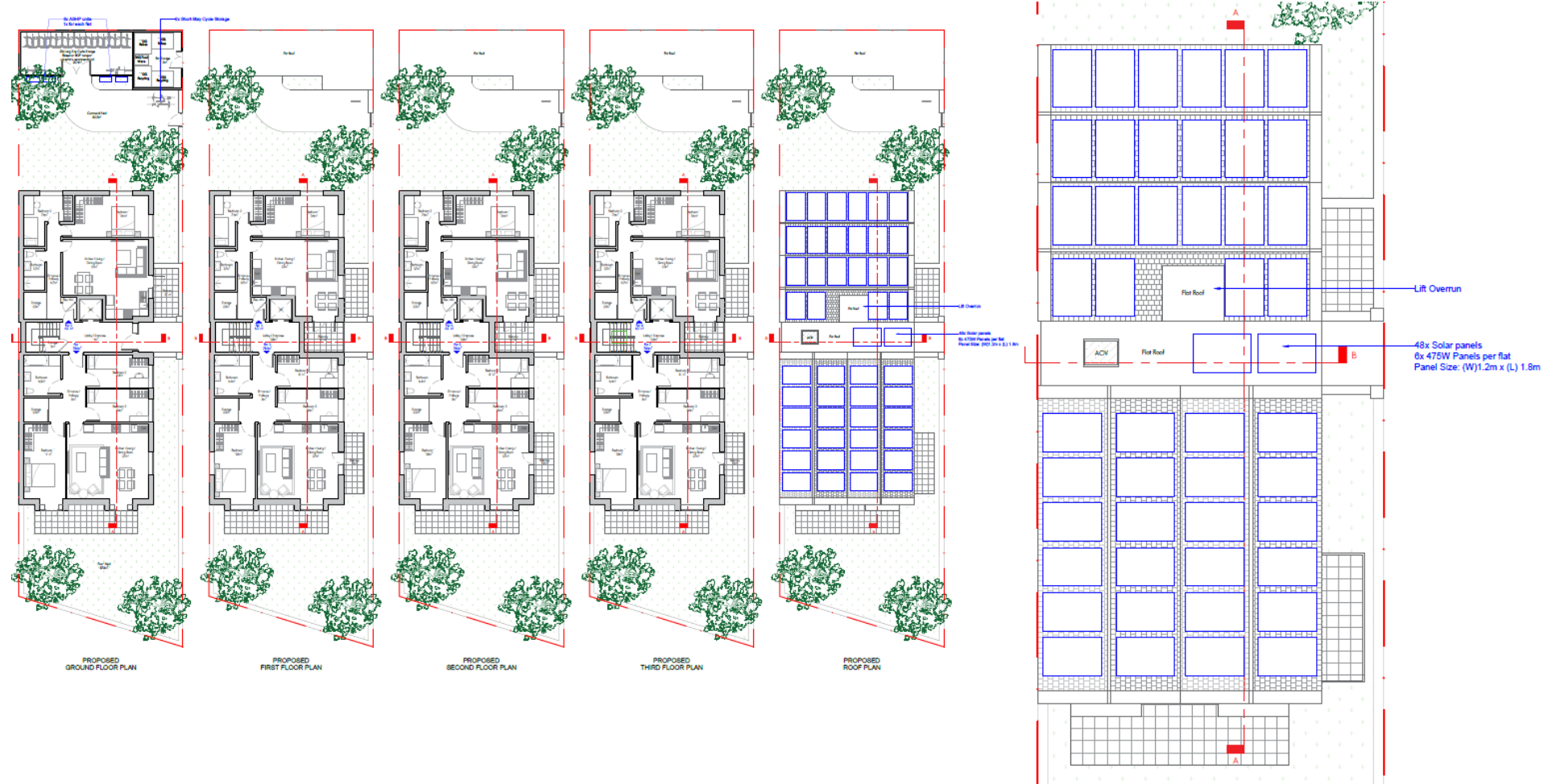
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2376.7616	0.2100	499.1199 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2792.1815	0.2100	586.3581 (264)
Space and water heating			1085.4781 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	195.5032	0.1443	28.2172 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-510.2687	0.1336	-68.1669
PV Unit electricity exported	-460.9817	0.1253	-57.7822
Total			-125.9491 (269)
Total CO2, kg/year			999.6754 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.7200 (273)

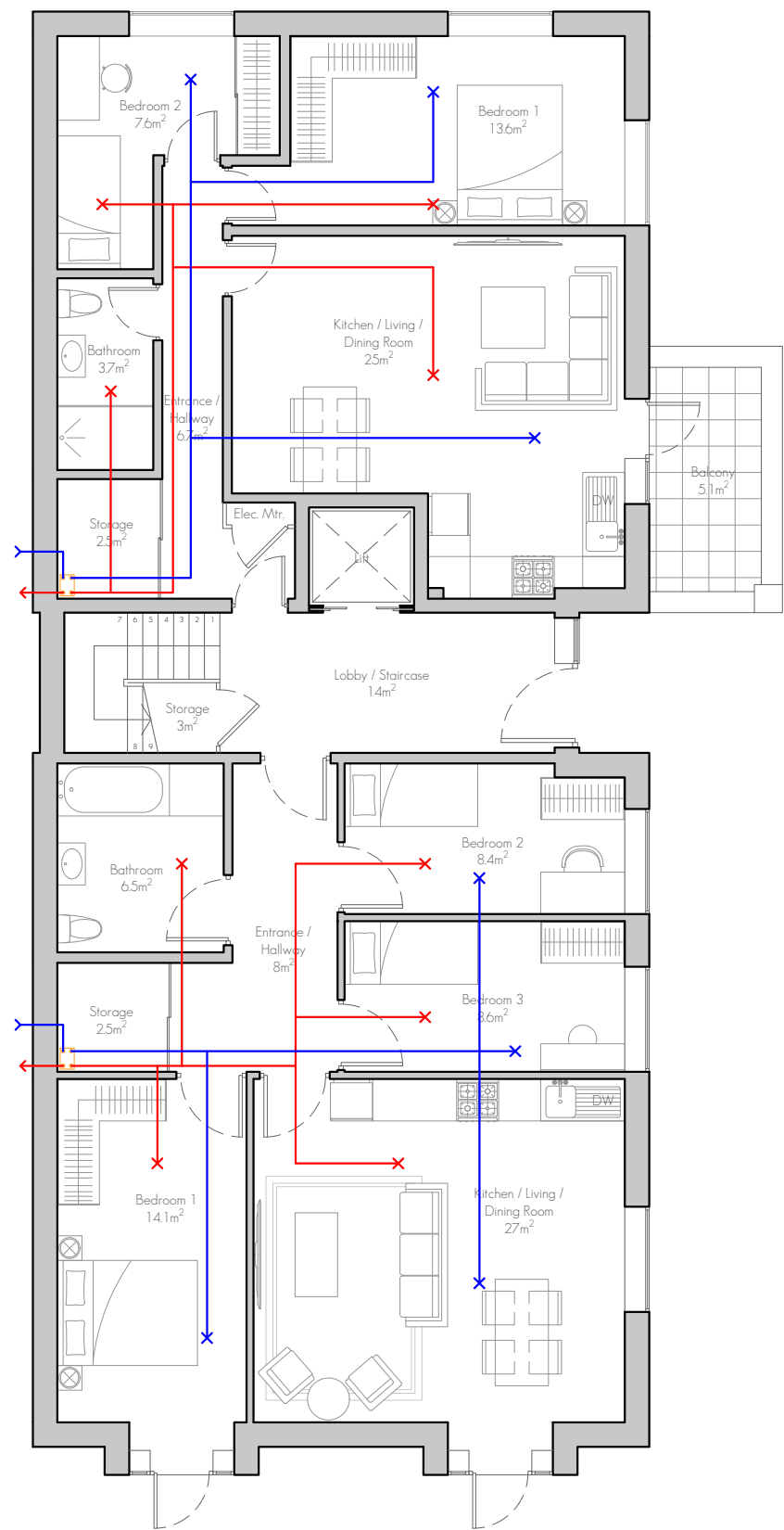
13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2376.7616	1.1300	2685.7407 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2792.1815	1.1300	3155.1651 (278)
Space and water heating			5840.9058 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	195.5032	1.5338	299.8694 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-510.2687	1.4937	-762.1732
PV Unit electricity exported	-460.9817	0.4601	-212.0881
Total			-974.2614 (283)
Total Primary energy kWh/year			5296.6146 (286)
Target Primary Energy Rate (TPER)			67.3900 (287)

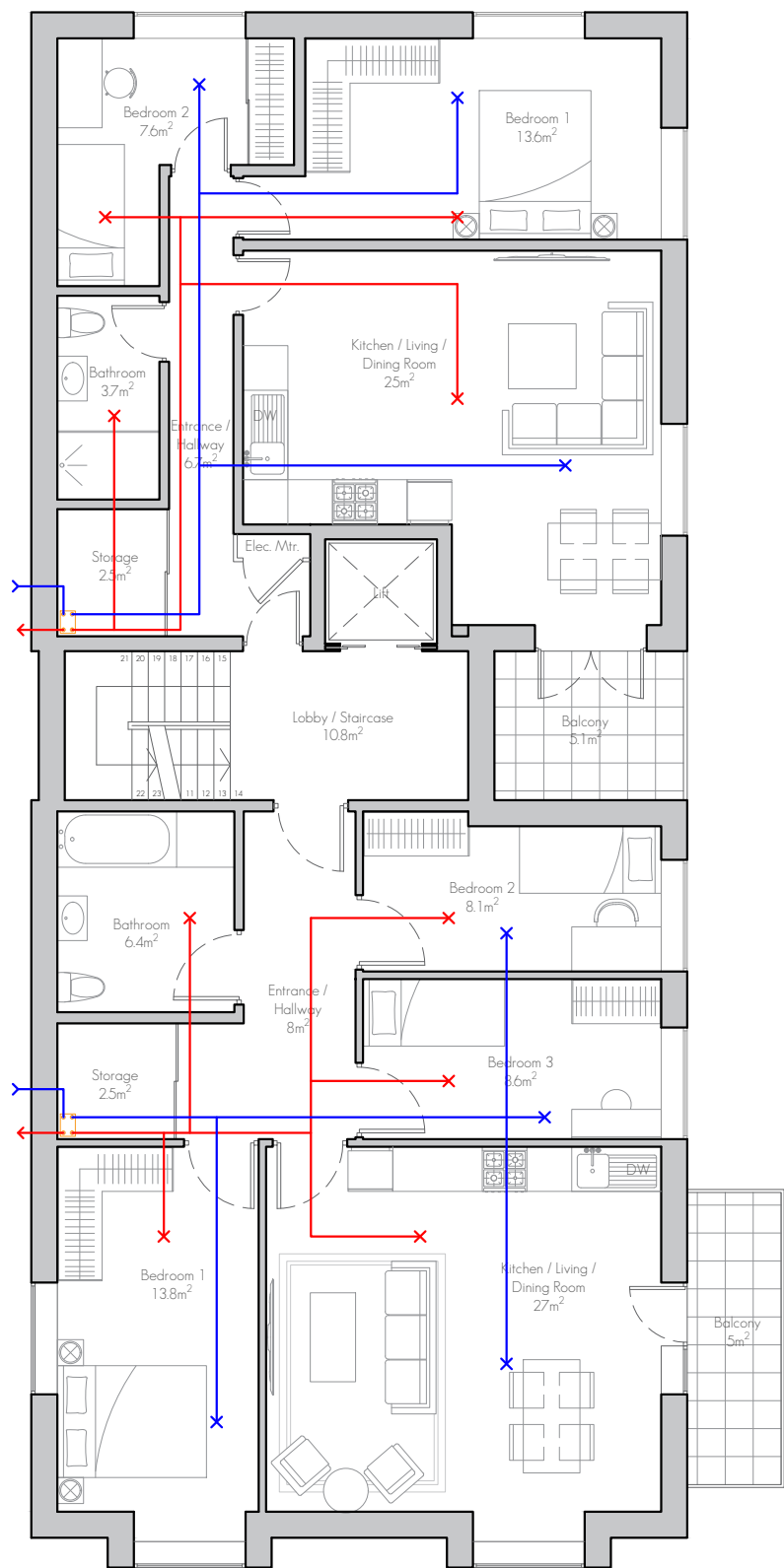
14 Appendix 3 – Solar PV Roof Plan



15 Appendix 4 – MVHR Plans and Product Data Sheet



PROPOSED
GROUND FLOOR PLAN



PROPOSED
FIRST FLOOR PLAN

KEY

 MHR UNIT

 COOL AIR INTAKE VENT

 WARM AIR OUTPUT VENT

 COOL AIR OUTPUT VENT

 WARM AIR INTAKE

All dimensions, levels, sizes, positions and locations of particulars as indicated on drawings are to be ascertained by the appointed Contractor on site prior to engaging in works.

Any discrepancies must be reported to Cadoo Ltd immediately.

No dimensions to be scaled from the drawings for construction purposes unless otherwise indicated. All works to comply with current Building Regulations.

Party Wall etc. Act 1996 would apply and contractor is to assure that no work is commenced until this formality is completed.

The sole purpose of this drawing is the procurement of Planning Permission and Building Regulation approval and work is not to commence before such approvals. Where this drawing is used for the works, the appointed Contractor should request at the time of tender, from the tenderer, full specification and schedule of work. To avoid any disputes, this schedule of works in conjunction with the drawings would be used to resolve matters.

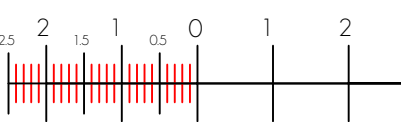
Contractor to assure and satisfy himself that necessary Planning permission and Building Regulations are approved before tendering or commencing works.

The competent person is to send to the local authority (via the scheme provider), a self-certification certificate within 30 days of the electrical works' completion. The Client must receive both a copy of the self-certificate and a BS7671 Electrical Installation Test Certificate (Reg. P1).

The Gas and Boiler installations will be carried out by a suitable qualified Gas Safety registered gas engineer.

The Contractor is responsible for ensuring compliance with the CDM Regulations, and appropriate Health & Safety on site precautions.

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REVISION	DATE	BY	GRID	DESCRIPTION
R1	09/04/26	IK		



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LANGFORD, MARYLAND ROAD
HARINGEY
LONDON
N22 5AR

TITLE
PROPOSED VENTILATION PLANS

CLIENT
BILAL USTUN

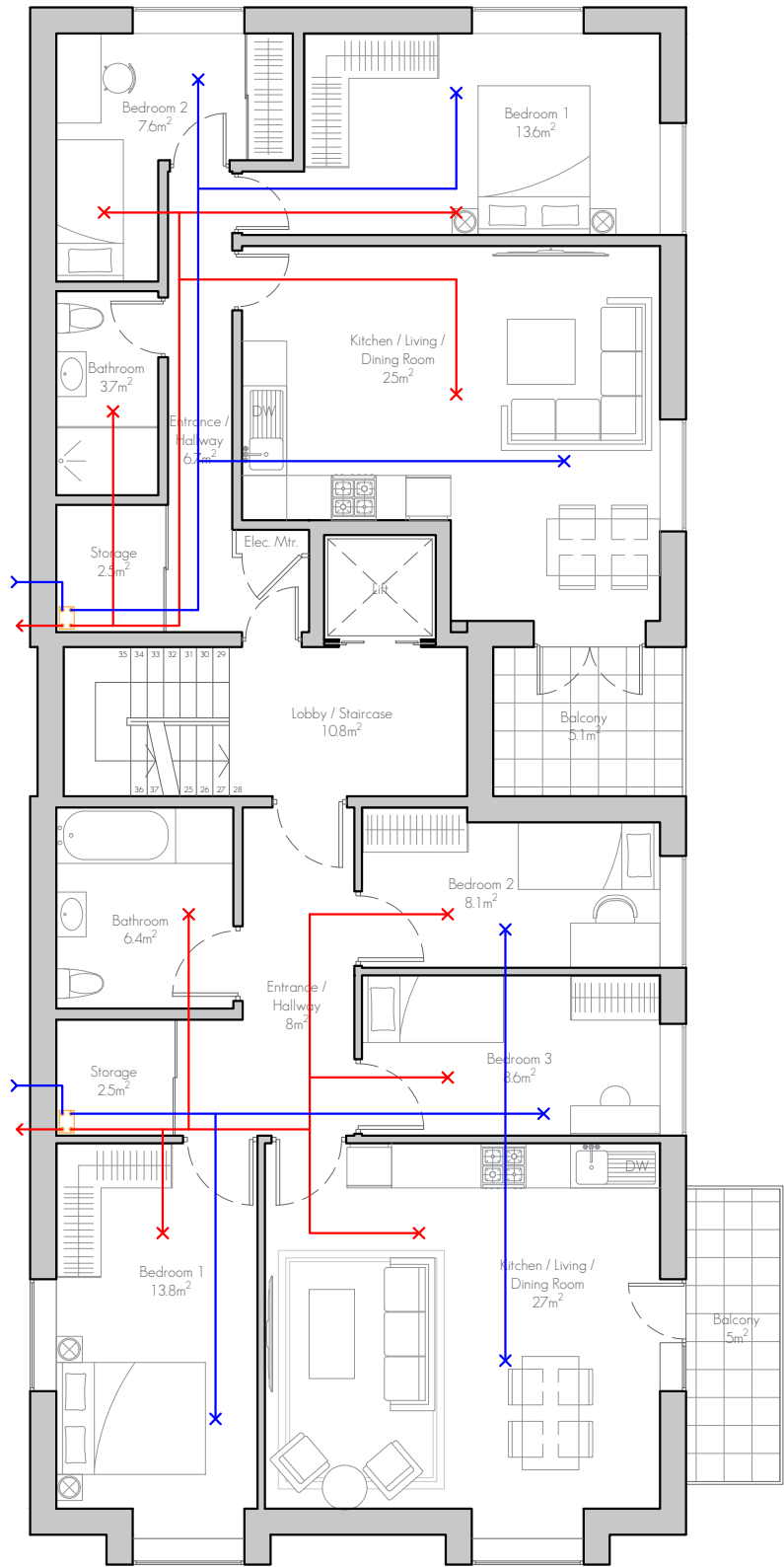
REFERENCE
26.003

REVISION
R1

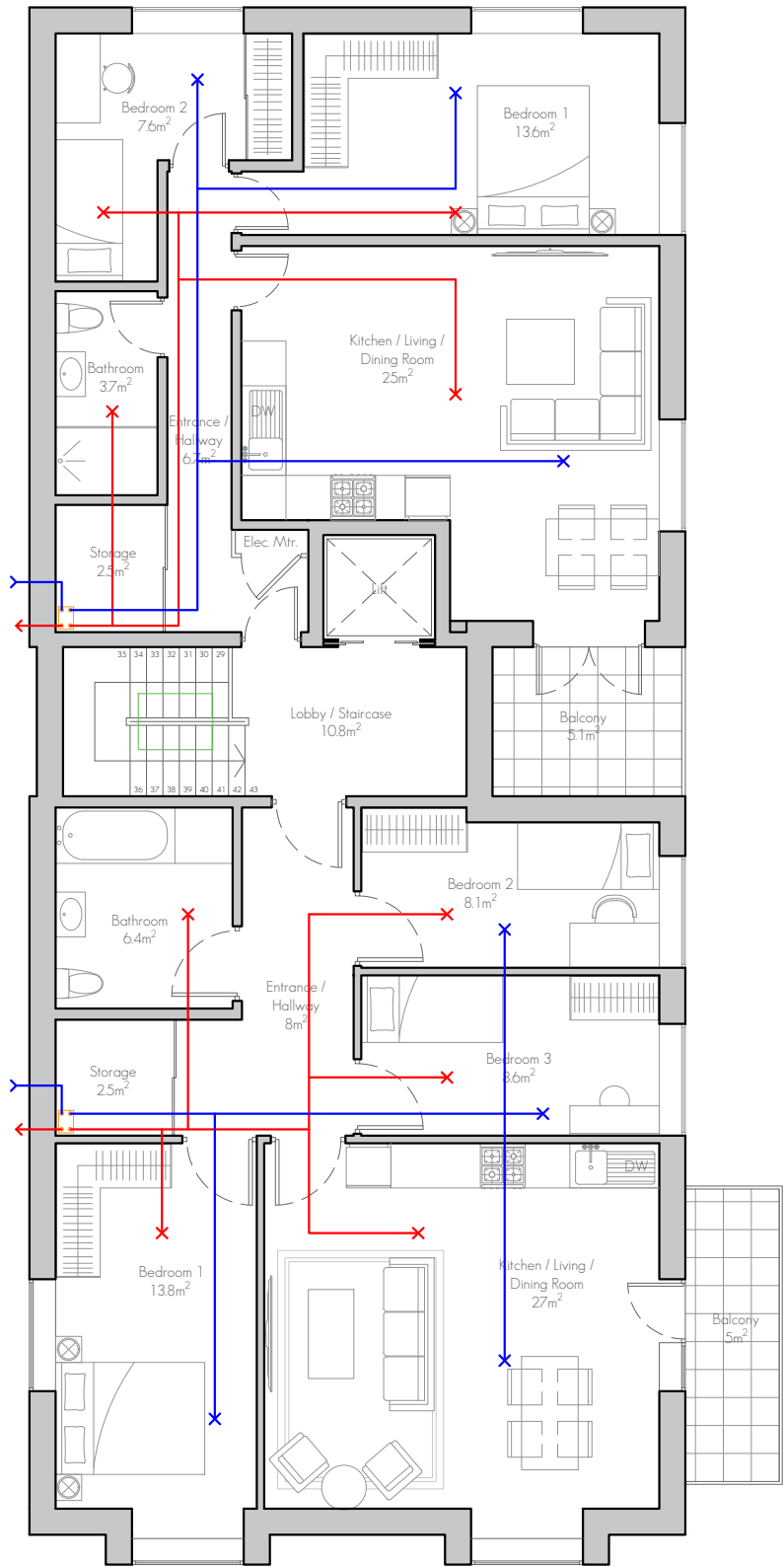
SHEET NO
459

SCALE
1:100@A3

DATE
09/04/2026



PROPOSED
SECOND FLOOR PLAN



PROPOSED
THIRD FLOOR PLAN

KEY

MWHR UNIT

COOL AIR INTAKE VENT

WARM AIR OUTPUT VENT

COOL AIR OUTPUT

WARM AIR INTAKE

All dimensions, levels, sizes, positions and locations of particulars as indicated on drawings are to be ascertained by the appointed Contractor on site prior to engaging in works.

Any discrepancies must be reported to Cadoo Ltd immediately.

No dimensions to be scaled from the drawings for construction purposes unless otherwise indicated. All works to comply with current Building Regulations.

Party Wall etc. Act 1996 would apply and contractor is to assure that no work is commenced until this formality is completed.

The sole purpose of this drawing is the procurement of Planning Permission and Building Regulation approval and work is not to commence before such approvals. Where this drawing is used for the works, the appointed Contractor should request at the time of tender, from the tenderer, full specification and schedule of work. To avoid any disputes, this schedule of works in conjunction with the drawings would be used to resolve matters.

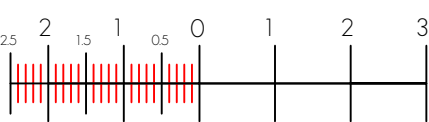
Contractor to assure and satisfy himself that necessary Planning permission and Building Regulations are approved before tendering or commencing works.

The competent person is to send to the local authority (via the scheme provider), a self-certification certificate within 30 days of the electrical works' completion. The Client must receive both a copy of the self-certificate and a BS7671 Electrical Installation Test Certificate (Reg. P1).

The Gas and Boiler installations will be carried out by a suitable qualified Gas Safety registered gas engineer.

The Contractor is responsible for ensuring compliance with the CDM Regulations, and appropriate Health & Safety on site precautions.

This drawing is the copyright of Cadoo Ltd and must not be traced or copied in anyway or form in part or whole by any means whatsoever without prior written consent and may only be used by the present owner in relation to the property as referred to on the drawing. This drawing may be copied for by an authorised officer of the Local Authority with the sole purpose to assist in the determination of a Planning or Building Regulations application and may not be used for any other purpose.



REVISION	DATE	BY	GRID	DESCRIPTION
R1	09/04/26	IK		



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WEB: www.cadoostudios.com

SITE
LANGFORD, MARYLAND ROAD
HARINGEY
LONDON
N22 5AR

TITLE
PROPOSED VENTILATION PLANS

CLIENT
BILAL USTUN

REFERENCE
26.003

REVISION
R1

SHEET NO
460

TECHNICAL DATA SHEET

energiSava 400 | High Efficiency Whole House Heat Recovery System

* **A+** **A**



KEY FEATURES

- ✓ Extremely low Specific Fan Power (SFP) of 0.61 W/l/s and high thermal efficiency of 89%
- ✓ 100% automatic integral mechanical bypass with no reduction in airflow
- ✓ Integral humidity sensor
- ✓ Stepped reduction intelligent frost protection
- ✓ Hard-wired LED status indicator
- ✓ Summer kick-up mode for increased airflow
- ✓ Left or right-hand configurations
- ✓ Passivhaus Certified

PRODUCT

The energisava® 400 shall be a high efficient, constant flow whole house heat recovery system.

APPLICATION SUITABILITY

The energisava® 400 is ideal for residential properties to provide a constant supply of filtered, tempered air and maintain stable humidity levels. With maximum airflow capacity of 400 m³/h, the unit shall be available in left-handed and right-handed versions with a range of options for connecting the ducts. A 'Plus' version shall also be available featuring additional connection options such as a CO₂ sensor.

PERFORMANCE

Ventilation capacity at 150Pa (m³/h)	Rated power at 70% of the max appliance capacity (W)
Max 400	64 at 280 m³/h & 50 Pa

PRODUCT CHARACTERISTICS DATABASE (PCDB)

Exhaust Terminal Configuration	Specific Fan Power (W/l/s)	Heat Recovery Efficiency (%)
Kitchen + 1 wet room	0.63	89
Kitchen + 2 wet rooms	0.61	89
Kitchen + 3 wet rooms	0.66	87
Kitchen + 4 wet rooms	0.74	86
Kitchen + 5 wet rooms	0.84	85
Kitchen + 6 wet rooms	0.95	84

*Note: 'A+' rating only applicable with 2 or more sensors

SAP 2012

SOUND POWER

In practice, the value may deviate 1 dB(A) as a result of measuring tolerances

Ventilation capacity (m³/h)		100		200		225		300			400	
Sound power level L _w (A)	Static pressure (Pa)	9	40	38	80	47	100	84	175	240	150	225
	Housing emission dB(A)	29.5	32.5	40.5	40.5	43.5	47.5	51.0	53.0	54.0	54.5	57.0
	Duct “from dwelling” dB(A)	31.5	34.5	46.5	48.0	48.5	50.0	56.5	57.0	58.0	59.0	60.0
	Duct “to dwelling” dB(A)	42.5	47.5	57.0	59.0	60.5	62.5	66.0	68.5	69.5	70.5	71.5

TECHNICAL DATA SHEET

energiSava 400 | High Efficiency Whole House Heat Recovery System

CONTROLS

The unit shall be controlled with the choice of either a 4-way switch with filter indication (1 supplied as standard) or a wireless remote control. Alternatively, using the intelligent control module with timer, or the relative humidity sensor, and/or the 2-zone demand flow system enables automatic ventilation control and saves even more energy.

MOTOR

The unit shall incorporate Ultra Low Watt EC motor technology to provide the lowest possible SFP and unit running costs with sealed for life ball bearings and designed to operate continuously at a pre-set 'background' rate.

FAN

EC motors shall power the centrifugal backward curved fan impellers.

HEAT EXCHANGE CELL

The heat exchange cell shall be a high efficiency counter flow cell.

SUMMER BYPASS & FROST PROTECTION

The energiSava® 400 unit shall incorporate a 100% mechanical summer bypass and preheater as standard. The bypass contributes to an improved comfort level in summer and is controlled automatically by measuring indoor and outdoor temperatures. The intelligent frost protection with preheater guarantees the high efficiency, even at extremely low temperatures. This energy-efficient frost protection helps to achieve significant energy savings per year.

CONSTANT FLOW CONTROL

The 'constant flow' technology ensures maximum efficiency and that the commissioned airflow rate is always delivered despite any resistance encountered in the ductwork or filters. The 'constant flow control' system also enables commissioning to be carried out much quicker and more easily, saving on installation costs.

FILTRATION

The unit shall incorporate 2 x ISO Coarse 60% (G3) filters with the option of an ePMI 50% (F7) supply filter.

SERVICING / MAINTENANCE

EnviroVent recommend that units should be serviced annually to maintain optimal performance and that filters should be checked regularly and cleaned as and when required.

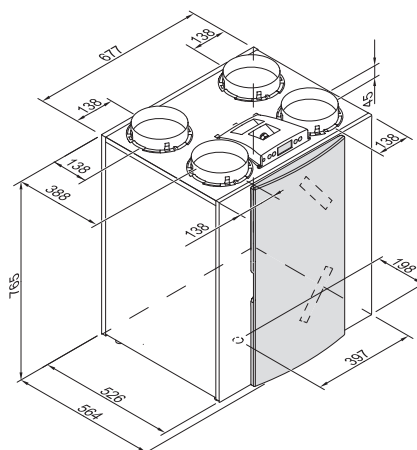
WARRANTY

The EnviroVent EnergiSava 300 units are covered by a parts only 2-year warranty. Please note that conditions and exclusions apply to the warranty which can be found at www.envirovent.com/warranty

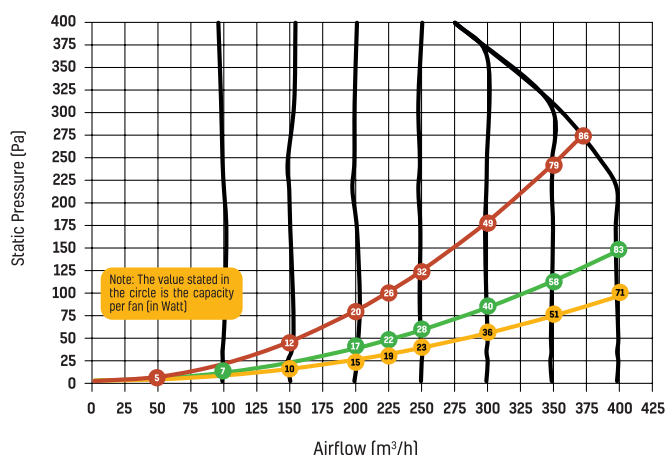
INSTALLATION

Full installation guide shall be enclosed with all products; or sent separately in advance if required. The unit shall be capable of being wall mounted with the wall mounted suspension kit. The unit shall be suitable for installation in a utility room or cupboard space. The unit shall incorporate the intelligent digital display panel for ease of commissioning. The energiSava® 400 shall incorporate Ø180mm extract and supply spigots.

SIZE



PERFORMANCE CURVE



TECHNICAL SPECIFICATIONS

Ventilation capacity at 150 Pa (m³/h)	Max 400
Rated power at 70% of the max appliance capacity (W)	64 at 280 m³/h & 50 Pa
Dimensions / Duct Connection (mm)	Ø180
Weight	38Kg
Temperature efficiency	89%
Constant flow control	✓
Standard bypass	✓
Standard preheater	✓
Connections provisions for humidity sensor	✓
Connections provisions for 2-zone demand flow	✓
Connection for timer	✓
Available as Plus version*	✓

A full Consultant Specification can be sent on request.

16 Appendix 5 – ASHP Location and Product Data Sheet



PUZ-WZ50VAA

Ecodan R290

Monobloc Air Source Heat Pump

R290

Key Features:

- A+++ heating efficiency
- Ultra quiet noise levels
- MELCloud Home enabled
- High water temperature of up to 75°C
- Fully electric source of heating and hot water

Key Benefits:

- Minimised energy consumption
- Flexible product placement
- Remote control, monitoring, maintenance and technical support
- Ideal for energy storage
- Zero carbon ready



**MELCloud
HOME**



Manufactured in the UK



037-0033-20-01



reddot design award

ecodan[®]
Renewable Heating Technology

OUTDOOR UNIT		PUZ-WZ50VAA
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_s	138%
	SCOP (MCS)	3.38
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++
	η_s	182%
	SCOP (MCS)	4.42
HEAT PUMP COMBINATION HEATER - Large Profile ¹	ErP Rating	A+
	η_{wh}	143%
	Capacity (kW)	5.2
HEATING ² (A-7/W35)	Power Input (kW)	1.94
	COP	2.68
OPERATING AMBIENT TEMPERATURE (°C DB)		-25 ~ +46
MAXIMUM WATER OUTLET TEMPERATURE (°C)		75
SOUND DATA ³	Pressure Level at 1m (dBA)	40
	Power Level (dBA) ⁴	56
	Pipework Size (mm)	22
WATER DATA	Flow Rate (l/min)	14
	Water Pressure Drop (kPa)	18.16
	Width	1050
DIMENSIONS (mm)	Depth	480
	Height	1020
	Weight (kg)	89
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz
	Phase	Single
	Nominal Running Current [MAX] (A) ⁵	13
	Fuse Rating - MCB Sizes (A) ⁶	16
REFRIGERANT CHARGE (kg) / CO ₂ EQUIVALENT (t)		R290 (GWP 0.02) 0.6 / 0.0018

NOTES:

*1 Combination with EHPT20X-MEHEW Cylinder

*2 Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.

*3 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.

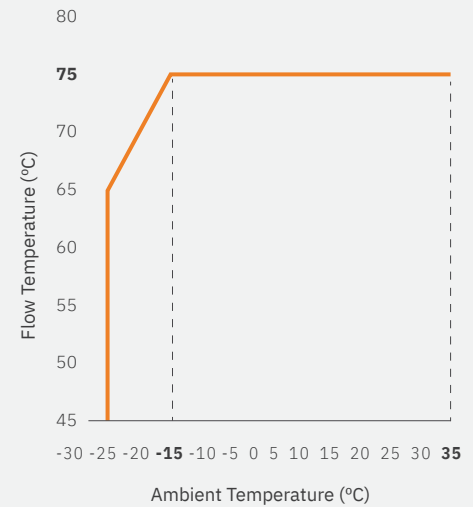
*4 Sound power level tested to BS EN12102.

*5 Under nominal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.

*6 MCB Sizes BS EN60898-2 & BS EN60947-2.

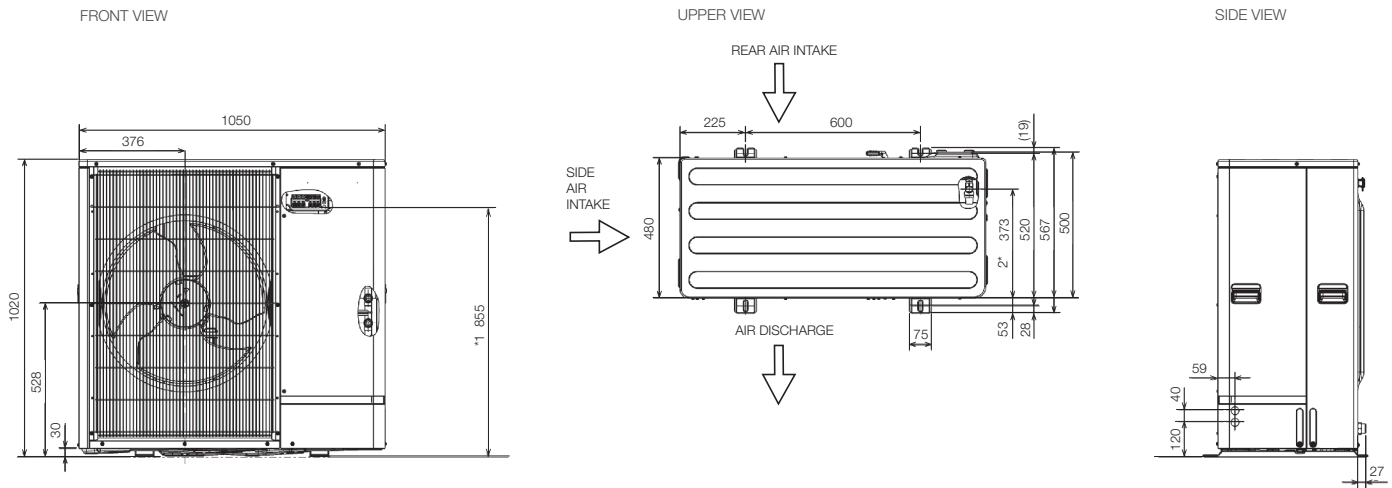
η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

FLOW TEMPERATURE

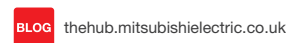
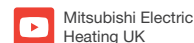
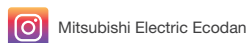
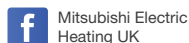
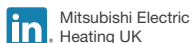


PUZ-WZ50VAA DIMENSIONS

All dimensions (mm)



Telephone: 01707 282880
email: heating@meuk.mee.com
ecoda.co.uk



UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880

IRELAND Mitsubishi Electric Europe, Plunkett House, Grange Castle Business Park, Nangor Road, Dublin 22, Ireland. Telephone: (00353) 1 4198800 Email: sales.info@meir.mee.com Web: les.mitsubishielectric.ie

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Note: The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R515B (GWP:292), R454C (GWP:148), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a hydrocarbon, R290 (GWP:0.02). *These GWP values are based on IPCC 6th edition.

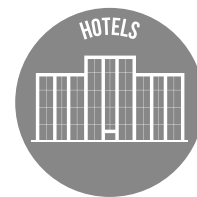
Effective as of January 2025



17 Appendix 6 – Shower Recovery Unit Product Data Sheet

TECHNICAL SPECIFICATION

RECOUP EASYFIT+



- Double-walled copper horizontal heat exchanger
- Designed to fit under a standard bath
- Can be installed under suitably sized riser shower tray
- Up to 47.6% heat recovery efficiency *
- Can be retrofitted into an existing system
- 3 recognised installation methods (System A, B & C)
- No-end user interaction required
- No planned maintenance
- SAP listed, SBEM, BREEAM, DEAP & ETL recognised
- WRAS approved

GENERAL DATA

DESCRIPTION	VALUE
Minimum height required for installation	95 mm
Overall product length	1176 mm
Overall product width	386 mm
Material - Heat Exchanger	Copper
Shower flow rate range	5 - 20 Litres/min
Max. Mains water inlet pressure	10 bar
Min. Mains water inlet pressure	1 bar
Max. Mains water working temp	85 °C
Mains & Preheated water connection	½" male BSP
Waste water connection	40 - 43 mm
Full product weight	9.7 kg
Water volume - mains water	0.87 Litres

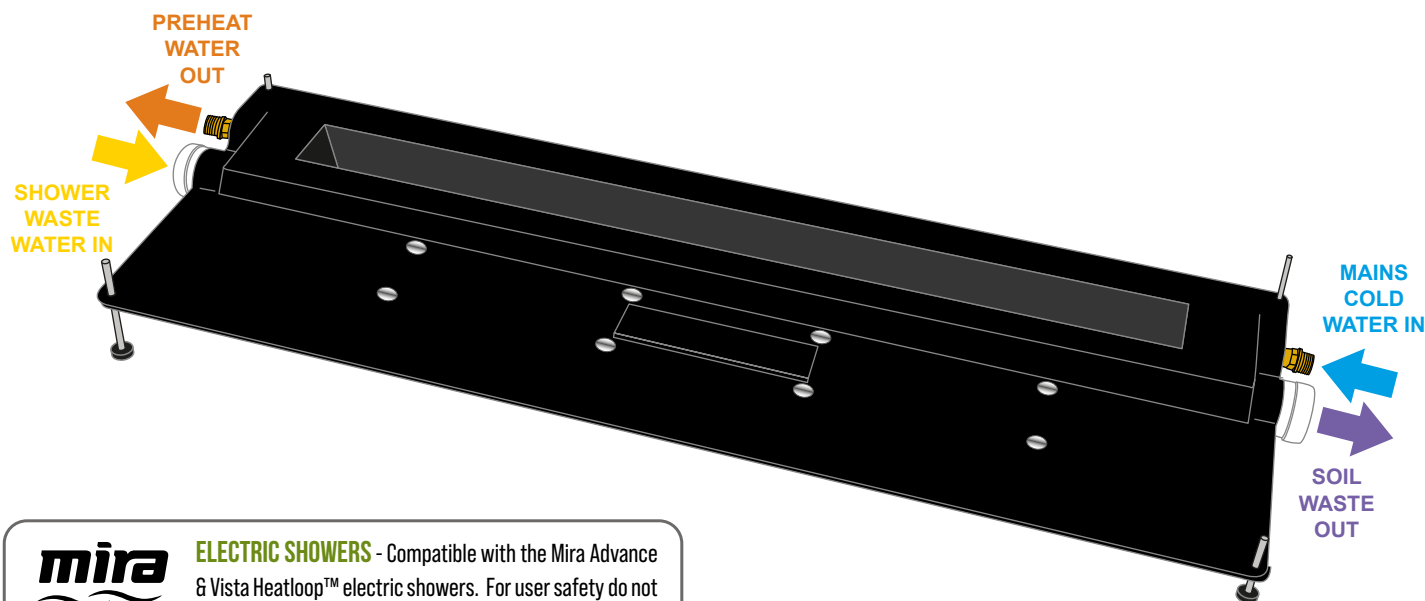
PERFORMANCE & EFFICIENCY

SHOWER FLOW RATE @ 40°C (LITRES/MIN)	EASYFIT+ EFFICIENCY (RECOVERED ENERGY KW) *		
	SYSTEM A	SYSTEM B	SYSTEM C
5.8	47.6% (5.01)		
9.2	46.4% (7.74)		
11.0	44.2% (8.70)	35.2% (7.02)	39.2% (7.82)
12.5	41.8% (9.48)		

PRESSURE DROP ON THE MAIN WATER CIRCUIT

SHOWER FLOW RATE @ 40°C (LITRES/MIN)	EASYFIT+ PRESSURE DROP (BAR)		
	SYSTEM A	SYSTEM B	SYSTEM C
5.8	0.09	0.06	0.04
9.2	0.26	0.16	0.10
12.5	0.45	0.28	0.18

* Based on KIWA test data and PCDB figures for SAP 2012



mira
SHOWERS

ELECTRIC SHOWERS - Compatible with the Mira Advance & Vista Heatloop™ electric showers. For user safety do not connect Recoup WWHRs to any other electric shower.

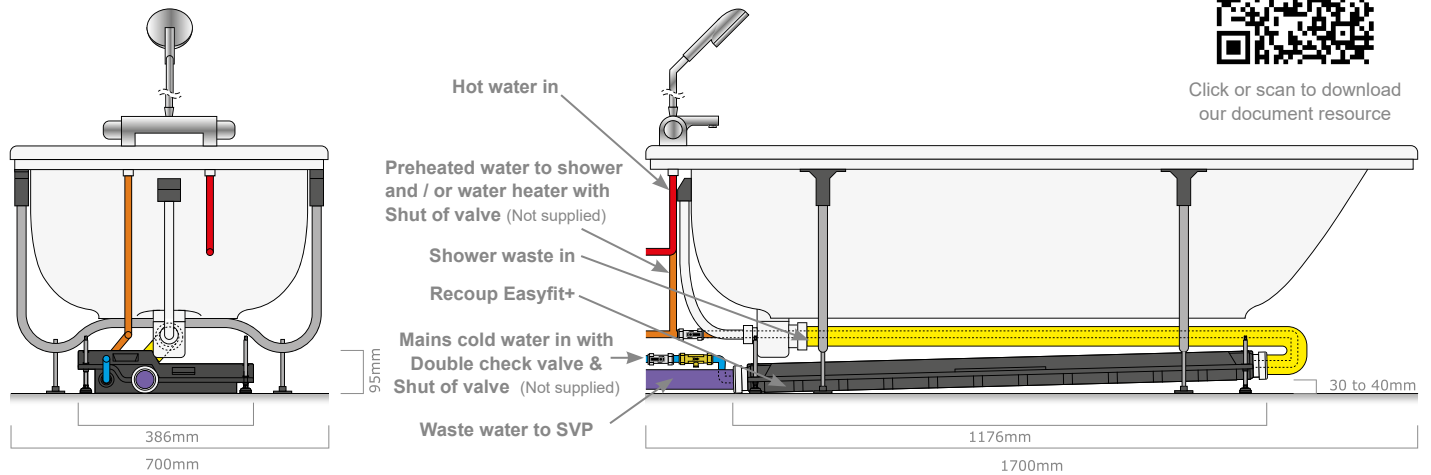
DRAWINGS & DIAGRAMS

DOCUMENT RESOURCE

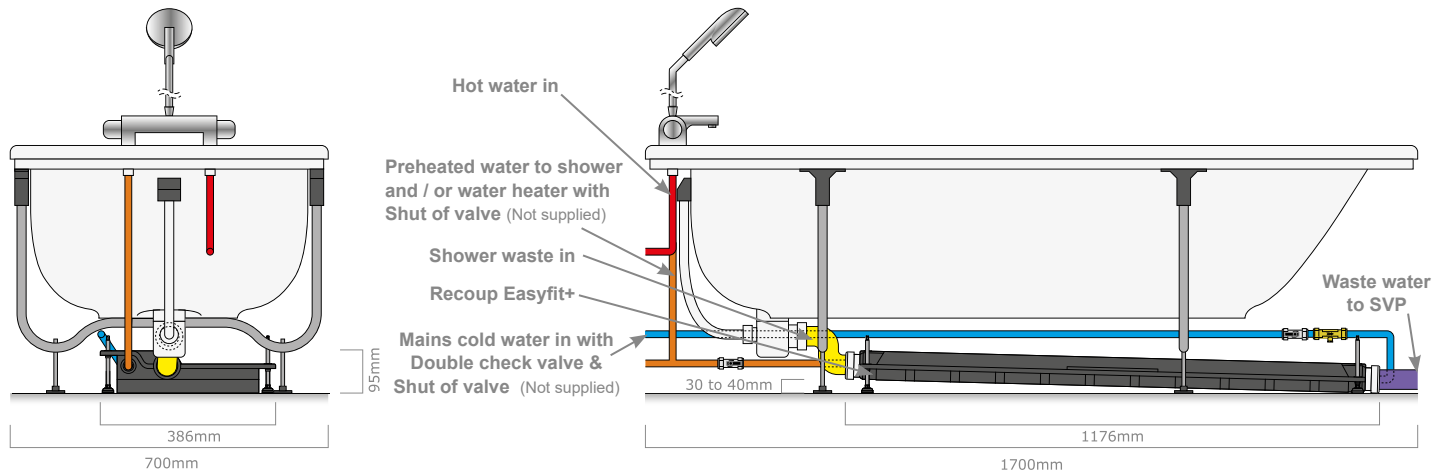


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our document resource

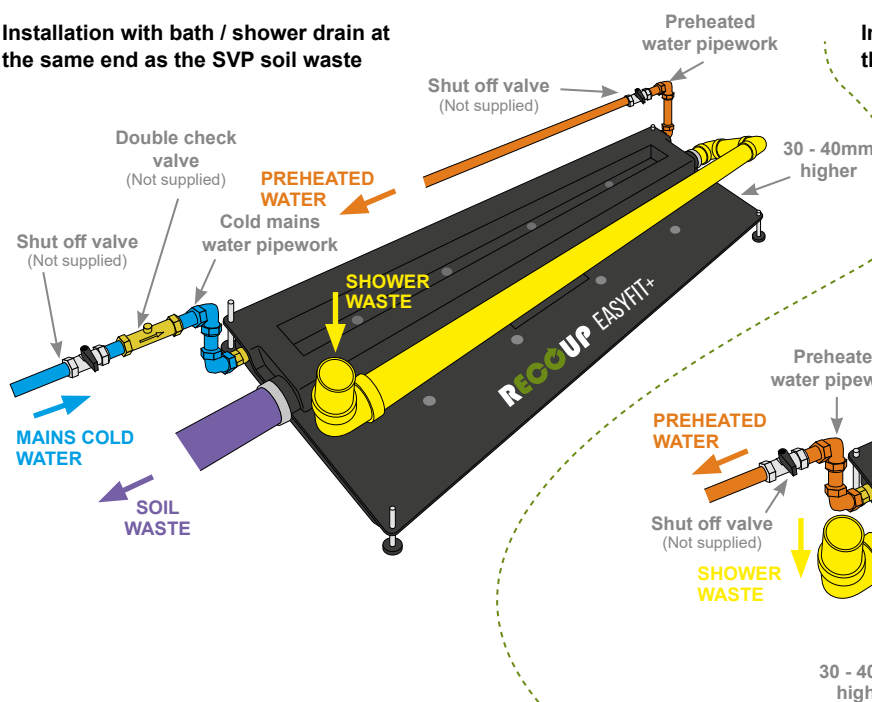
Installation with bath / shower drain at the same end as the SVP soil waste



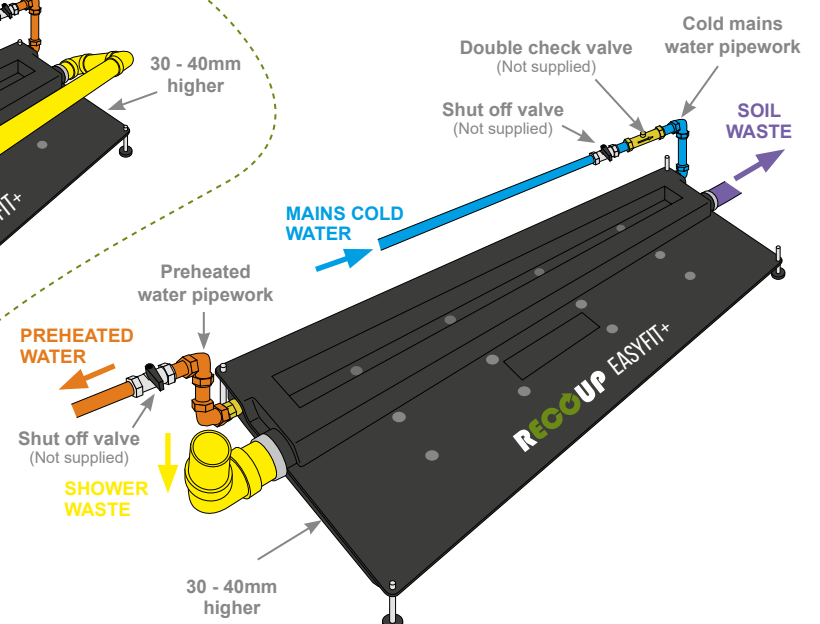
Installation with bath / shower drain at the opposite end to the SVP soil waste



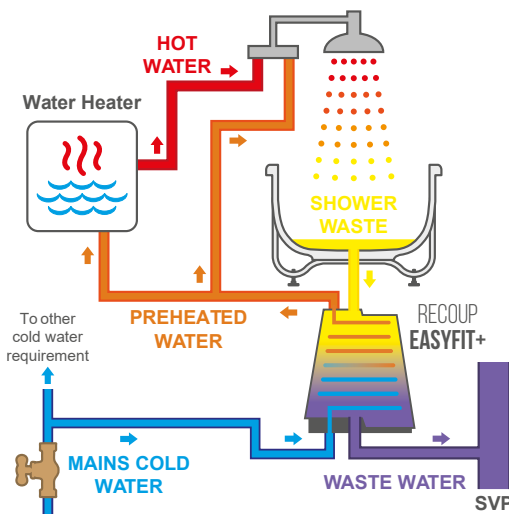
Installation with bath / shower drain at the same end as the SVP soil waste



Installation with bath / shower drain at the opposite end to the SVP soil waste



INSTALLATION METHODS



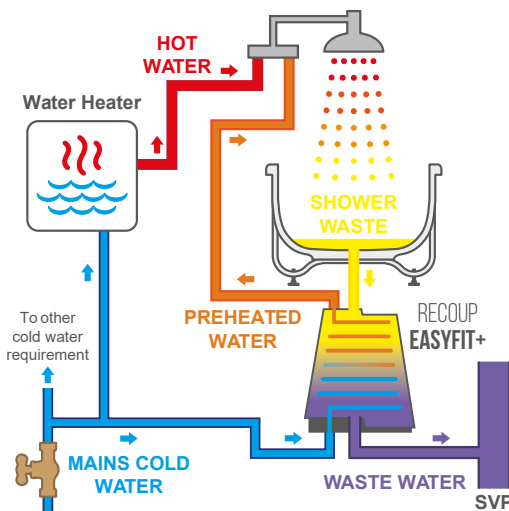
SYSTEM A

Preheated water supplied to shower mixer (cold inlet) and the water heater

This installation method provides the highest WWHRS efficiency.

Only one WWHRS unit can supply preheated water to the water heater as System A. All secondary WWHRS units should be connected as System B.

To maximise SAP impact, install WWHRS as System A on the primary shower, or in a room with a shower only.

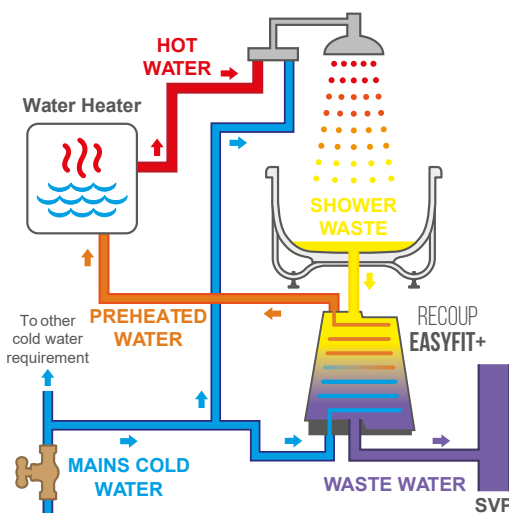


SYSTEM B

Preheated water supplied to shower mixer (cold inlet) on the shower only

The WWHRS efficiency of this installation method is not as high as System A or C but is the simplest and often the most cost-effective method to install or retrofit.

As preheated water is supplied to the cold side of the shower TMV only, there is no additional connection to the water heater . System B should be used for any secondary showers in a dwelling or where multiple showers are fed from centralised plant.



SYSTEM C

Preheated water supplied to water heater only

Greater WWHRS efficiencies are produced than System B but lower than System A. Only one WWHRS unit can feed preheated water to the water heater as System C.

Combi-Boiler, Cylinder (Any heat source inc. Boiler, Heat Pump, Direct Electric, Solar Thermal), Heat Interface Unit (HIU) or Thermal Store.

● For more detail watch our **installation method animation** [here](#).

SPECIFYING - RECOUP EASYFIT+

Recoup WWHRS | Easyfit+ | Installed as System A; System B; System C (delete as appropriate) | to (Add shower(s) install location)

Include the line of text above or go to specify.recoup.co.uk for the full Recoup Easyfit+ product specification.