



Cantium

Land and Development Ltd

EYHORN STREET - HOLLINGBOURNE, KENT



ENERGY & SUSTAINABILITY STATEMENT

November 2025

SEC/dc/ss/ESS- 3815/-



Southern Energy
Consultants
Energy & Sustainability Solutions



About Southern Energy Consultants Ltd

Southern Energy Consultants Ltd are a construction consultancy formed in 2009 specialising in sustainability, energy conservation, suitability of renewable technologies, building regulation compliance services, thermal modelling and overheating modelling. As a consultancy we do not sell or have financial interest in any products so are able to take an objective view of developments to assist Clients with incorporating cost effective, compliant and practical solutions.

Our services include Planning Energy Statements, Planning Sustainability Statements, Energy Calculations for Residential and Commercial Building Regulation compliance, Air Permeability Testing, Sound Testing, psi value Construction Junction Modelling, CIBSE TM52 and TM59 Overheating Modelling, AD Part O Overheating Modelling and Compliance Reports.

Within SEC Ltd we have over fifty years of combined experience working with and for National Developers, Construction and Design and Build Contractors we apply our expertise not only to assist with Client understanding of new energy and sustainability obligations but also in a way that ensures that the needs and responsibilities of all stakeholders are wholly respected and considered.

Document Prepared by: David Cook

QA: Steve Smith

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1.00 Example SAP Calculations:

- 1a. Type 2B4P with energy efficiency measures, ASHP and solar PV
- 1b. Type 3B5P with energy efficiency measures, ASHP and solar PV
- 1c. Type 4B.1 with energy efficiency measures, ASHP and solar PV

2.00 ASHP and Solar PV Layout Plan

3.00 Part G Water Efficiency Calculation

- 1.2 The Proposed Development covers an area of 1.18 hectares and is located near the centre of the village of Hollingbourne, situated approximately 8 km from Maidstone's town centre. Despite the rural location of the Proposed Development, many amenities are situated in close proximity (within a 1 km walk), including a primary school, public houses, a village hall, church, sports ground, café, and several shops and local business. In addition, the Proposed Development is located only around 550 metres away from Hollingbourne Railway Station, which offers a typical off-peak service of one train per hour to London Victoria and Ashford International, with additional services available to London Charing Cross during peak periods. National Cycle Route 17 runs approximately 1.1 km to the north-east of the Proposed Development, enabling connections between Maidstone and Ashford, as well as many other nearby villages.
- 1.3 This Statement first summarises the national and local energy and sustainability policies applicable to the Proposed Development, before outlining the Applicant's various sustainability measures in response to these.

National policies

- 1.4 In preparing this Statement in support of the planning application, the policies set out in the National Planning Policy Framework (2024 version) and the Ashford Borough Council Local Plan (2030) (adopted 2019) a summary of the main applicable content in each of these policy documents is set out in the following paragraphs.
- 1.5 National and derived local policies for sustainable development are led by the **National Planning Policy Framework (2024 version)**, which includes a 'presumption in favour of sustainable development' and sets out three core objectives that all new developments must meet in order to be considered sustainable. These objectives are interdependent and need to be pursued in mutually supporting ways. They are as follows:
- a) **Economic** – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at

the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure.

- b) **Social** – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural well-being.
- c) **Environmental** – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

Local policies

- 1.6 More locally, Maidstone Borough Council’s Local Plan Review 2021-2038 was adopted on 20th March 2024. Relevant policies to this Statement include LPRSP14(C) on climate change and LPRQD1 on sustainable design.
- 1.7 Policy LPRSP14(C) assets that in order to ensure the Maidstone Borough mitigates and adapts to climate change, the Council will:
- Encourage the delivery of sustainable buildings and a reduction in carbon dioxide emissions.
 - Encourage and support the delivery of low carbon energy and low carbon heat networks in new developments.
 - Support the provision of renewable energy infrastructure within new development.
 - Require new development involving the creation of new dwellings to plan for and respond to the impacts of climate change.
- 1.6 Policy LPRQD1 stipulates that new developments involving the erection of dwellings should demonstrate how sustainability has been incorporated into the design, construction, and operations. In particular, proposals should show how the scheme has adopted a ‘fabric first’ approach to sustainable design through the

incorporation of energy efficiency measures. All developments will be expected to incorporate 10% on-site renewable energy production and battery storage, where feasible. In addition, all new dwellings should be built to ensure that internal potable water consumption is not greater than 110/litres/person/day. New development proposals shall incorporate into the fabric of the building bird, bat, and bee habitats, and shall provide the planting of native tree and shrub species, wildflower grasses, and habitats for insects and invertebrates, where appropriate.

- 1.7 In addition, the Kent Design Guide (2005) provides adopted planning policy guidance seeking to improve the design and sustainability of new developments across the county. Similarly to the recently adopted Local Plan Review 2021-2038 of Maidstone Borough Council, it emphasises the importance of new developments adopting robust energy efficiency measures and various design measures linked to usage of renewable and low carbon energy sources, water, waste, and materials, integration of SuDS, establishment of links to local transport networks, and delivery of biodiversity enhancement.

Aims and structure

- 1.8 The Applicant will ensure that all dwellings at the Proposed Development will reduce regulated carbon dioxide emissions (and energy demand) beyond the level set by AD Part L Volume 1: Dwellings 2021 edition incorporating 2023 amendments (AD L 2021) and, as set out in Section 2, do so by incorporating a combination of energy efficiency measures and renewable or low carbon energy generation. Sections 3 to 7 of this Statement describe the other sustainability aspects of the Applicant's proposals.

2.0 Building Design and Emissions Reduction Measures

Building Regulations (2021) Baseline

- 2.1 All 17 proposed dwellings will be designed and built to better the baseline carbon dioxide emissions standard set by AD L 2021. The estimated carbon dioxide emissions for all proposed dwellings have been calculated using SAP 10.2 methodology and the most up-to-date Elmhurst software. SAP calculates the

regulated carbon dioxide emissions and energy demand associated with space heating, hot water and fixed electrical items. The methodology in SAP10.2/AD L 2021 requires fabric performance compliance to be delivered prior to consideration of heating, lighting, ventilation systems and incorporating renewable technologies, and is therefore consistent with 'Fabric First' design principles. The estimated regulated carbon dioxide emissions for the 17 proposed dwellings and corresponding energy demand are displayed per dwelling type and aggregated in Table 1 below.

Table 1: Baseline Carbon Dioxide Emissions and Energy Demand

Dwelling Type	No. of dwellings	Carbon dioxide emissions (kgCO ₂ /year)	Total carbon dioxide emissions (kgCO ₂ /year)	Energy demand (kWh/year)	Total energy demand (kWh/year)
Open Market Dwellings					
4B.1	2	1,102	2,204	7,066	14,132
4B.2	4	1,151	4,604	7,837	31,348
4B.3	3	1,221	3,663	7,199	21,597
3B.1	1	928	928	5,909	-
Open Market subtotal	10		11,399		72,986
Affordable Dwellings					
3B5P	3	959	2,887	6,113	18,339
2B4P	4	873	3,492	5,521	22,084
Affordable subtotal	7		6,379		40,423
TOTAL	17		17,778		113,409

- 2.2 Baseline carbon dioxide emissions for the Proposed Development are **17,778 kgCO₂/year**, averaging **1,046 kgCO₂/year** per dwelling. The equivalent energy demand total is **113,409 kWh/year**, averaging **6,671 kWh/year**. This Statement now sets out the Applicant's energy efficiency measures, which will contribute to the delivery of compliance with the baseline emissions standard.

Proposed enhanced energy efficiency measures

- 2.3 Insulation thicknesses and associated thermal conductivity will result in the attainment of average U-values considerably better than the limiting standards demanded by AD L 2021. Table 2 below identifies the Applicant's proposed U-values and compares these with the limiting area-weighted values set by AD L 2021.

Table 2: Insulation Enhancement Proposals for Main Thermal Elements

Thermal Element	Maximum Area-Weighted U-value (W/m ² K) Allowable Under AD L 2021	Proposed U-values (W/m ² K)	% Improvement Over AD L 2021 Allowable U-Value Standard
Main external walls (houses)	0.26	0.24-0.26	0.00-7.69
Party walls	0.20	0.00	100.00
Roof (plane ceiling)	0.16	0.09	43.75
Roof (sloping)	0.16	0.15	6.25
Ground floor	0.18	0.11-0.12	33.33-38.89
Windows	1.60	1.30	18.75

- 2.4 The Applicant intends to meet the U-value performance standards detailed in Table 2 through the insulation measures set out below in Table 3.

Table 3: Fabric Enhancement Construction Specification

Construction Element	U-Value (W/m ² K)	Insulation Specification
Main external walls (houses)	0.24-0.26	Outer leaf of 100mm brick, cavity fully filled with 100mm Knauf Supafil 34 insulation, and 100 mm blocks (thermal conductivity of 0.11 to 0.19 W/m ² K).
Party walls	0.00	Fully filled and edge sealed.
Ground floor	0.11-0.12	Approximately 150mm PIR insulation (thermal conductivity of 0.022 W/m ² K) under screed.
Roof (plane ceiling)	0.09	Total of 500mm mineral wool insulation.
Roof (sloping ceiling)	0.16	175mm 0.022 W/m.K PIR insulation between and under roof rafters.
Windows	1.30	Enhanced PVCu double-glazed windows to specialist BFRC approved manufacturers design and specification, 'g' value of 0.46.

- 2.5 The fabric measures detailed in Tables 2 and 3 will result in a reduced space heating requirement for the Proposed Development. All houses will benefit from advanced heating controls in the form of programmers, delayed start thermostats and thermostatic radiator valves and zoned heating control where required, which will increase the efficiency of the heating system.
- 2.6 Air tightness standards will be improved by the Applicant adopting predominantly bespoke dwelling type specific calculated psi values for non-repeating thermal bridges. These details typically incorporate an improvement over Building Regulations requirements by reducing air leakage loss and convective bypass of insulation. The Applicant will reduce each proposed dwelling's design air permeability from $8 \text{ m}^3/\text{hm}^2$ to not more than $5.0 \text{ m}^3/\text{hm}^2$, further reducing space heating requirements.
- 2.7 It is not proposed to provide any mechanical cooling to the proposed dwellings. Instead, it is the intention of the Applicant to reduce the need for active cooling as far as possible. This will be achieved through the specification of mainly non-mechanical measures such as good thermal insulation and an air tight build.
- 2.8 Ventilation to the proposed dwellings will be facilitated via the installation of highly efficient extract fans. Ventilation to all dwellings will be facilitated via the installation of low-energy fans (likely System 3), which incorporate SMART Technology to reduce heat loss and automatically sense humidity levels in kitchens, bathrooms and WCs. Openable windows will be installed as a necessary fixture to facilitate natural ventilation. These will help facilitate passive solar gains, cross-ventilation, convective-ventilation and night purging. At the detailed design stage, all dwellings at the Proposed Development will be assessed for regulatory overheating compliance via Approved Document O 2021 calculations.
- 2.9 All internal lighting throughout the Proposed Development will be low energy LED. Although not assessed under AD L 2021, external lighting will also be low energy, and some will be controlled through PIR sensors or daylight cut-off devices.

Renewable energy objective and feasibility

2.10 Renewable energy is defined as those energy flows that occur naturally and repeatedly in the environment – from the wind, the fall of water, the movement of oceans, from the sun, and also from biomass. The technologies to be evaluated in this Statement are as follows:

- Combined Heat and Power (CHP)
- Biomass
- Heat pumps (ground source and air source)
- Hydroelectric power
- Wind energy
- Solar thermal panels
- Solar photovoltaic panels

Combined Heat and Power

2.11 The Applicant has conducted a detailed review of the feasibility of installing Combined Heat and Power infrastructure (CHP) to serve the Proposed Development. CHP is a form of district heating that generally uses gas to generate electricity for local consumption, reducing the need for grid electricity and its associated high carbon dioxide emissions. As the CHP system is close to the point of energy demand, it is possible to use the heat that is generated during the electricity generation process. While CHP would enable reductions in carbon dioxide emissions beyond the baseline case, the following reasons make it unsuited to the Proposed Development:

- **Diversity and extent of heat demand** – CHP is best suited to developments where there is a diversity of energy demand. A mixed-use scheme built out in a single phase, or a very large residential scheme (>1,000 homes) will have extended periods of the day in which there is a continuous demand for heat. In these circumstances, the district heating network and CHP engine can operate consistently to generate electricity, with heat as a by-product. On a small-sized, entirely residential phase such as the Proposed Development, heat demand would be very low and not continuous, especially during the

working day, leading to an over-generation and subsequent dumping of heat.

- **Distributional heat losses** – thermal stores are a source of standing heat losses, as are even the best insulated distribution networks. When communal systems satisfy only a small and intermittent demand, these standing losses will represent a large part (>30%) of total demand. Carbon dioxide emissions savings gained within the proposed dwellings through association with CHP may be considerably reduced by the additional heat losses associated with the network.
- **Plant room size and location** – to incorporate a central plant room would require a considerable amount of space, which does not exist based upon the consented plans.
- **Minimised heat demands** – the Applicant’s proposed energy strategy is based on the adoption of best practice standards for energy efficiency, an approach resulting in reduced space heating demands, which reduces the suitability of any district heating scheme.
- **Installed costs** – the installed costs of any CHP / district heating network benefit from economies of scale. However, pipe run costs remain approximately £1,000 per metre, and total costs for CHP infrastructure across the site – predominantly from the plant room, CHP engine and pipe runs – would likely extend beyond £4 million for a scheme of this scale.
- **Running costs** – the fixed costs associated with the management and operation of a communal plant room would need to be shared by future occupants as part of an energy standing charge. The smaller the scheme, the greater the cost for the individual occupant, a particularly unfair situation in the light of the recent ‘cost of living’ crisis. In addition, CHP engines impose additional running costs as contracts for maintenance and replacement costs are typically handled by specialist companies.

- **Absence of other local infrastructure** – there are no other CHP / district heating networks in the vicinity of the Proposed Development with which to forge a connection to serve the development.
- **Fossil Fuel Lock-In** – As the National Electricity Grid continues its journey towards 100% renewable energy, a gas fired development, no matter how energy efficient, would still contribute to substantial greenhouse gas emissions over its lifetime and not accord with the UK Government's priority of decarbonising heat in homes

Biomass

2.12 Biomass community heating is an alternative to conventional fossil fuel heating but, as per the reasons used against the installation of gas-fuelled CHP or district heating, with the exception of fossil fuel lock-in, should be discounted as an option for the Proposed Development. Biomass boilers within individual dwellings are often installed with a standard boiler as back-up in case the occupier runs out of fuel. Although they are reducing in size, they are still large enough to require a dedicated room with additional space for the fuel – there is insufficient space available for such infrastructure in the majority of proposed dwellings. The management of fuel deliveries and ash dispersal is also complex, necessitating a dedicated operative as opposed to residents of the future dwellings. Furthermore, the emissions of Nitrous Oxide and particulate matter that are associated with biomass installations would have the capacity to worsen local air pollution.

Ground and Air Source Heat Pumps (GSHPs and ASHPs)

2.13 Although GSHPs require considerable land area for deployment, ASHPs can be affixed to a property, providing space and hot water heating. In addition, ASHPs provide an efficient form of heating during summer and winter months due to a very high seasonal coefficient of performance, which is typically around 2.8. This means that a heat pump provides heating which is 280% efficient, as compared to a modern gas boiler which typically has a SEDBUK (2009) efficiency of circa 85-90%. Maintenance requirements are low and there is no requirement on the part of the future homeowner to store fuel, as would be the case with a biomass boiler. Although ASHPs have historically been thought of as a 'noisy technology',

technological advancements in recent years mean that modern systems rarely emit any more noise than a domestic fridge-freezer. Decarbonising heat in homes underpins the UK's Heat & Buildings Clean Growth strategies and with the potential for the technology to be positioned appropriately and presenting a low visual impact to surroundings technology has been deemed suitable for the proposed dwellings.

Hydroelectric power

- 2.14 Hydroelectric power plants generate electricity using the gravitational force of flowing or falling water. However, there are no rivers of sufficient scale in the vicinity of the Proposed Development to facilitate a hydroelectric power installation.

Wind Turbines

- 2.15 Wind turbines are a modern, high-technology descendant of the windmills that have been around for centuries. In modern windmills the kinetic energy of the wind is used to turn a turbine to generate electricity as opposed to moving water or turning a gristmill wheel. A site with an average wind speed of 5m/s or more is generally considered to be suitable for installing a wind turbine. The average wind speed at the Proposed Development is moderate, around 4.6 m/s at 10m AOD and is below the level required to generate significant carbon dioxide reductions or commercial take-up. The installation of a single, large wind turbine to serve the Proposed Development would also be controversial due to the nature of the locality. Even if space could be found within the Proposed Development to accommodate a very high (15-20m) turbine, the installation would then present a significant visual blight to neighbours.

Solar thermal and photovoltaic panels

- 2.16 Solar thermal heating panels contribute to the hot water demand of a dwelling. Water or glycol (heat transfer liquid) is circulated to roof level where it is heated using solar energy before being returned to a thermal store where heat is exchanged with water from the conventional system. Unfortunately, space constraints in smaller dwellings mean that there is rarely sufficient space to incorporate large hot water cylinders with dedicated solar hot water storage.

However, the proposed dwellings generally contain suitable attributes (orientation, available roof-space and limited shadowing) for solar photovoltaic installations to be designed-in. There is extensive roof space available, much of which is optimally orientated towards due south, and the worst available case is west-east orientation.

Summary of feasible options

- 2.17 The feasibility study determines that two technologies are technically suitable for deployment. These are ASHPs and mains gas boilers supplemented with solar photovoltaic panels to offset regulatory CO₂ emissions associated with the burning of fossil fuels. In order to deliver significant reductions in carbon dioxide emissions and provide much more than 10% of the development's future energy supply through renewable and low carbon energy sources, the Applicant intends to install both ASHPs (for space heating and hot water generation) and solar photovoltaic panels (for renewable electricity). Each dwelling will benefit from at least two solar photovoltaic panels, totaling at least 0.8 kWp per dwelling (at least 13.6 kWp across the Proposed Development), with the exact allocation to be determined at the detailed design stage following consultation with a solar engineer.
- 2.18 Overall, based on the specifications set out within this statement, the Proposed Development will reduce its regulated carbon dioxide emissions from **17,778 kgCO₂/year** to **5,693 kgCO₂/year** and regulated energy demand from **113,409 kWh/year** to **36,663 kWh/year**. This is a site-wide reduction in regulated carbon dioxide emissions and regulated energy demand of **12,085 kgCO₂/year (67.98%)** and **76,746 kWh/year (67.68%)**, respectively. Table 4, overleaf, summarises and aggregates the predicted reductions in regulated carbon dioxide emissions regulated and energy demand across the Proposed Development with respect to each proposed dwelling type.

Table 4: Carbon Dioxide Emissions and Energy Demand After Installations of ASHPs and Solar Photovoltaic Panels

Dwelling Type	No. of dwellings	Carbon dioxide emissions (kgCO ₂ /year)	Total carbon dioxide emissions (kgCO ₂ /year)	Energy demand (kWh/year)	Total energy demand (kWh/year)
Open Market Dwellings					
4B.1	2	361	722	2,360	4,720
4B.2	4	417	1,668	2,729	10,916
4B.3	3	398	1,194	2,398	7,194
3B.1	1	274	274	1,788	1,788
Private subtotal	10		3,858		24,618
Affordable Dwellings					
3B5P	3	289	867	1,887	5,661
2B4P	4	242	968	1,596	6,384
Affordable subtotal	7		1,835		12,045
TOTAL	17		5,693		36,663

2.19 The Appendix to this Statement provides detailed examples of SAP calculations for three of the proposed dwelling types: Types 2B4P, 3B5P, and 4B.1. SAP calculations pertaining to other dwelling types are available upon request.

3.0 Layout, Permeability and Landscaping

3.1 The proposed dwellings are massed to enable them to be articulated in a sensitive manner with respect to the street scene and density of nearby residential areas, whilst enabling the potential of the land to be maximised with respect to its capacity to provide a variety of much needed housing in the local area, especially affordable accommodation. Careful consideration has been given to the design and location of the proposed dwellings to prevent over-shading and the subsequent desire for lopping and felling of any mature trees or removal of hedgerows, all of which will be retained by the Applicant during construction.

- 3.2 The Applicant's commitment to inclusivity will be demonstrated through their attitude towards movement and equality. The Applicant will ensure that the Proposed Development is scaled appropriately so as to respond to the needs of all of its users. They will incorporate the requirements of the Equality Act (2010) into their design, making reasonable adjustments to enable disabled access, and providing necessary design adjustments where it is practicable to do so.
- 3.3 It is important that future residents feel secure and free from the fear of crime. At detailed design stage AD Part Q of the Building Regulations will be integrated within the design of the proposed dwellings. The design proposals also integrate sound urban design principles in locating circulation routes so that they are overlooked by ground floor active windows from habitable rooms, maximising the surveillance of the public realm.
- 3.4 The proposed dwellings have been afforded generous set-backs from the road and are open and largely laid to lawn with shrub planting. Extensive soft landscaping will be used throughout the Proposed Development to provide 'defensible' areas to the front and flanks of the proposed dwellings, and this approach will contribute to the sustainable management of surface water runoff on site.
- 3.5 As stated in the Transport Assessment by DHA (October 2025), all proposed dwellings will be provided with secure cycle storage facilities in either garden sheds, garages or communal stores. Provision will be in accordance with the principle of one space per bedroom, thus totaling 52 cycle storage spaces across the Proposed Development. In addition, all proposed dwellings will be provided with at least two allocated parking spaces, and there will be nine spaces for visitors, thus totaling 43 spaces across the Proposed Development. Each dwelling will also be provided with one electric vehicle charging point.
- 3.6 All proposed dwellings will be provided with home office infrastructure, enabling working from home, an issue that has become more prevalent in recent years following the COVID-19 crisis. Future residents will benefit from high-speed broadband. All proposed dwellings will have the ability to 'house' home office facilities, with sufficient space for a desk, office chair and filing cabinet, as well as

the necessary electrical infrastructure located in a suitable position within the property (2 double power sockets, telephone / CAT5 cabling point, for example.).

3.7 All proposed dwellings will be provided with fully accessible private spaces in the form of rear gardens. Access to all private and communal spaces will be facilitated in accordance with the principles of inclusive design. The following measures will be introduced to ensure that those with mobility difficulties can access all areas of the development:

- A pedestrian friendly environment
- Step free entrance access from all dwellings to bin store areas and private gardens
- Pavements with tactile surfacing
- Carefully designed landscaping

3.8 The Proposed Development has been the subject of ecological studies by Adonis Blue Environmental Consultants, including a Preliminary Ecological Assessment (PEA) (June 2025) and Biodiversity Net Gain Assessment (BNG) (July 2025). The PEA report assessed the presence of particular species at and in the vicinity of the Proposed Development:

- Flora: No protected or notable plant species were found; all recorded plants are common.
- Invertebrates: No rare species recorded; common invertebrates were observed.
- Birds: Over 100 bird species recorded locally; nesting birds may use the site.
- Bats: Various bat species recorded within 5 km; the site offers negligible foraging habitat.
- Hedgehogs: Limited foraging habitat; presence cannot be entirely ruled out.
- Great Crested Newt: Unlikely to be present; no recent records within 1 km.

3.9 The eventual developer of the scheme will be required to protect the few features of ecological value through various mitigation measures, including conducting nest checks for birds if any vegetation clearing is conducted during the breeding season

of March to August. In addition, an array of ecological enhancement measures were proposed in the PEA, which should be adopted by the eventual developer of the scheme. These include installation of bird boxes on trees and buildings to support local bird populations, placing bat roost boxes on new buildings to provide suitable habitat for bats, and wildflower planting in public spaces to enhance pollinator habitats and biodiversity. The adoption of such measures and additional planting of native hedgerows has been accounted for in the BNG Assessment, which can lead to a biodiversity net gain of at least 20%.

4.0 Materials

- 4.1 Given the rural character of the Proposed Development, a major consideration in materials selection is maintaining a locally-influenced architectural style (e.g., red brick exteriors and red clay roof tiles) that is common to the local area. However, from a sustainability perspective, the Applicant is equally committed to minimising the environmental impact of the materials used over the lifetime of the building – from manufacture, to eventual demolition, to disposal. For building materials, the eventual developer should, in the main, seek to specify ‘A+’ or ‘A’ rated materials using the online BRE Green Guide to Housing Specification, with all materials rated at least ‘E’.
- 4.2 The eventual developer should avoid the specification of peat and natural weathered limestone in buildings or landscaping.
- 4.3 Timber used in the Proposed Development for both basic and finishing elements will be sourced from sustainable European sources (e.g. PEFC or FSC accredited).
- 4.4 Wherever feasible, the future developer should commit to using materials that are locally sourced, from renewable sources and recycled e.g. secondary aggregates.

5.0 Noise and Dust Pollution

- 5.1 Mitigation measures will be investigated during the M&E design and construction phase to ensure that the baseline ambient noise levels are not overtly increased by the Proposed Development.
- 5.2 In order to best mitigate the Proposed Development's contribution to local air pollution, best practice mitigation procedures should be adopted on-site during the construction phase, which will include the following measures:
- Dampening and sweeping roadways
 - Covering vehicles and skips when loaded with material
 - Locating stock piles to take into account the prevailing wind
 - Sealing and replanting completed earthworks as early as practicable
 - Using low emission vehicles and plant equipment
- 5.3 Air intakes and outlets within the proposed dwellings will all avoid any sources of external pollution in order to avoid internal air pollution.

6.0 Recycling and Waste Management

- 6.1 The Applicant's proposals have allocated sufficient space within external storage areas to satisfy the Maidstone Borough Council's waste bin specification for the deposition of general refuse, recyclable waste and garden waste, respectively.
- 6.2 All proposed dwellings will be provided with segregated internal recycling bins in the kitchen to facilitate the recycling of various waste streams. In addition, all proposed dwellings will be provided with small internal caddy bins for the transfer of compostable waste, and private gardens will be provided with composting bins.
- 6.3 The eventual developer should adhere to the waste hierarchy in order to ensure that the generation of waste is reduced, while re-use is increased across the site during the construction phase. They will:

- Ensure the accurate specification of materials and volumes.
- Recycle and re-use waste generated on site.
- Arrange take-back schemes with suppliers.
- Instruct a licensed waste contractor to segregate site waste for recycling.

7.0 Avoiding Flooding and Minimising Water Use

- 7.1 The Proposed Development has a generally low risk of flooding from fluvial, tidal, groundwater, surface runoff, sewer and other artificial sources. This is because the Proposed Development lies within Flood Zone 1, as per the UK Government Flood Risk maps. Nevertheless, the eventual developer must ensure, through integration of a SuDS pond and extensive soft landscaping that surface water runoff rates at the Proposed Development do not exceed Greenfield rates for all storm incidences up to the 1 in 100 year event, inclusive of a 45% markup for climate change.
- 7.2 During the construction phase, the eventual developer will adopt best practice procedures on site in relation to the potential for water pollution. Detailed procedural guidance will be disseminated to site operatives having been prepared in accordance with Environment Agency advice.
- 7.3 In terms of internal potable water consumption, The Applicant is committed to delivering performance of not more than 110 litres per person per day in all dwellings (see Part G calculation in the Appendix), which is considerably lower than the 125 litres per person per day requirement under Approved Document G of the Building Regulations. In order to meet these targets, a combination of reduced-flow taps and showers, dual-flush toilets and moderately sized baths will be installed. Flow rates and volumes will not exceed the following:
- Toilets = 4/2.6 litre dual flush
 - Kitchen taps = 6 litres per minute
 - Wash hand basin taps = 5 litres per minute
 - Showers = 8 litres per minutes
 - Baths = 193 litres

- 7.4 In addition, all proposed dwellings will be provided with water butts in private gardens to help conserve supplies, especially for the purposes of irrigating gardens during the increasingly dry summers in the south-east of England.

8.0 Conclusion

- 8.1 This Statement has set out the Applicant's comprehensive response to the various sustainability policies set by the NPPF (2024) and Maidstone Borough Council's Local Plan Review 2021-2038 (2024), which, together, require the efficient and sustainable use of energy, water, materials and waste across the Proposed Development. The Applicant's proposals deliver a sustainable development by providing a range of accommodation for individuals of all ages – from first-time buyers to families. The design of the proposed dwellings will reflect the character of other rural communities in the local area, while the provision of communal areas of green space for leisure and relaxation will encourage the community to integrate and flourish, and help to advance the ecological prosperity and vibrancy of the area.
- 8.2 The Applicant has specified a range of best practice energy efficiency measures to enable all proposed dwellings to meet or better the standard for carbon dioxide emissions set by Building Regulations (2021). A combination of energy efficient fabric, ventilation and heating systems will lead to this level of performance, together with the specification of low energy lighting throughout and the delivery of an air-tight build. In addition, air source heat pumps and solar photovoltaic panels will be provided across the Proposed Development to ensure that each proposed dwelling reduces its carbon dioxide emissions and energy demand to levels significantly below the regulatory baseline standard. **Projected reductions for emissions and energy demand are 67.98% and 67.68%, respectively.** Furthermore, by virtue of being an all-electric scheme for space heating, hot water and electricity generation, this accords with 'zero carbon readiness' ahead of the introduction of the Future Homes Standard, expected to be announced at the end of this year and come into force in 2027. Therefore, the only barrier to full decarbonisation of regulated carbon dioxide emissions across the Proposed Development constitutes

the level of renewables integration into the UK's electricity grid, which is expected to be 100% by 2030.

8.3 The Applicant has also committed to an array of additional measures which will help to promote the sustainability of the Proposed Development. These include:

- Provision of internal recycling bins for recyclable waste in every kitchen;
- Ensuring internal potable water consumption of not more than 110 litres per person per day in every dwelling (see strategy in Appendix);
- Supply of water butts to all houses ensure recycling of rainwater;
- Adoption of all ecological enhancement measures outlined in the studies by Blue Adonis Environmental Consultants and ensuing ecological designations, landscaping and management plans;
- Integration of sustainable drainage techniques across the Proposed Development, such as a SuDS pond, to further reduce the already low risk of flooding;
- Specification of materials for main build and finishing elements that have the lowest environmental impact;
- Provision of cycle storage facilities to serve every proposed dwelling.

APPENDIX

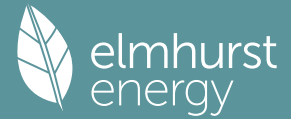
1.00 Example SAP Calculations:

- 1a. Type 2B4P with energy efficiency measures, ASHP and solar PV
- 1b. Type 3B5P with energy efficiency measures, ASHP and solar PV
- 1c. Type 4B.1 with energy efficiency measures, ASHP and solar PV

2.00 ASHP and Solar PV Layout Plan

3.00 Part G Water Efficiency Calculation

Full SAP Calculation Printout



Property Reference	2B4P		Issued on Date	05/11/2025	
Assessment Reference	ASHP and solar PV	Prop Type Ref	Sem Br Ga Ea		
Property	2B4P, Eyhorne Street, Hollingbourne, Kent, ME17				
SAP Rating	88 B	DER	3.06	TER	11.06
Environmental	97 A	% DER < TER			72.33
CO ₂ Emissions (t/year)	0.21	DFEE	32.52	TFEE	34.17
Compliance Check	See BREL	% DFEE < TFEE			4.84
% DPER < TPER	45.10	DPER	31.71	TPER	57.76
Assessor Details	Mr. Stephen Smith			Assessor ID	D168-0001
Client	Cantium Land and Development , Cantium Land and Development				

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	39.9800 (1b)	x 2.3200 (2b)	= 92.7536 (1b) - (3b)
First floor	39.9800 (1c)	x 2.5500 (2c)	= 101.9490 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	194.7026 (5)

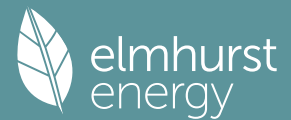
2. Ventilation rate

	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) =											0.1541 (8)
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50												4.0000 (17)
Infiltration rate												0.3541 (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) =											0.3010 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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	0.3837	0.3762	0.3687	0.3311	0.3235	0.2859	0.2859	0.2784	0.3010	0.3235	0.3386	0.3536 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.6337	0.6262	0.6187	0.5811	0.5735	0.5359	0.5359	0.5284	0.5510	0.5735	0.5886	0.6036 (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							
Opening Type 2			10.7200	1.2357	13.2471		(27)
Opening Type 4			2.1500	1.3000	2.7950		(26a)
Beam & Block			39.9800	0.1200	4.7976		(28a)
Wall 1	87.5626	12.8700	74.6926	0.2400	17.9262		(29a)
Plane Roof	39.9800		39.9800	0.0900	3.5982		(30)
Total net area of external elements Aum(A, m ²)			167.5226				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.3642	(33)
Main dwelling							
Party Wall 1			38.9600	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (User defined value 0.045 * total exposed area)							7.5385 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 49.9027 (37)

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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	40.7187	40.2352	39.7518	37.3346	36.8511	34.4339	34.4339	33.9504	35.4008	36.8511	37.8180	38.7849 (38)
Heat transfer coeff	90.6214	90.1379	89.6545	87.2373	86.7538	84.3366	84.3366	83.8531	85.3035	86.7538	87.7207	88.6876 (39)
Average = Sum(39)m / 12 =												87.1164
HLP	1.1333	1.1273	1.1212	1.0910	1.0850	1.0547	1.0547	1.0487	1.0668	1.0850	1.0971	Dec 1.1091 (40)
HLP (average)												1.0895
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4621 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	28.2908	27.8707	27.2790	26.1881	25.3712	24.4654	23.9761	24.5637	25.2034	26.1726	27.2860	28.1952 (42b)
Hot water usage for other uses	39.8444	38.3955	36.9466	35.4977	34.0488	32.6000	32.6000	34.0488	35.4977	36.9466	38.3955	39.8444 (42c)
Average daily hot water use (litres/day)												62.4522 (43)
Daily hot water use	68.1352	66.2662	64.2256	61.6858	59.4200	57.0653	56.5761	58.6125	60.7011	63.1192	65.6815	68.0396 (44)
Energy conte	107.9095	94.3621	98.7124	84.4448	79.9908	70.1685	68.4239	72.5745	74.8505	85.6522	93.5753	106.5335 (45)
Energy content (annual)												Total = Sum(45)m = 1037.1979
Distribution loss (46)m = 0.15 x (45)m	16.1864	14.1543	14.8069	12.6667	11.9986	10.5253	10.2636	10.8862	11.2276	12.8478	14.0363	15.9800 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6480 (55)
Total storage loss	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880 (56)
If cylinder contains dedicated solar storage												
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	151.2599	133.5173	142.0628	126.3968	123.3412	112.1205	111.7743	115.9249	116.8025	129.0026	135.5273	149.8839 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	151.2599	133.5173	142.0628	126.3968	123.3412	112.1205	111.7743	115.9249	116.8025	129.0026	135.5273	149.8839 (64)
Total per year (kWh/year)												1547.6139 (64)
Electric shower(s)												1548 (64)
50.7633	45.2305	49.3900	47.1323	48.0167	45.8033	47.3301	48.0167	47.1323	49.3900	48.4613	50.7633 (64a)	577.4298 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month	83.2511	74.0072	79.8497	73.4226	73.2814	68.3434	69.2638	70.8155	70.2325	75.5072	76.7907	82.7935 (65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.8282	132.6669	119.8282	123.8224	119.8282	123.8224	119.8282	119.8282	123.8224	119.8282	123.8224	119.8282 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.3569	221.6332	215.8971	203.6857	188.2711	173.7835	164.1049	161.8286	167.5647	179.7761	195.1907	209.6783 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841 (71)
Water heating gains (Table 5)	111.8966	110.1298	107.3248	101.9758	98.4965	94.9214	93.0965	95.1822	97.5451	101.4881	106.6538	111.2816 (72)
Total internal gains	511.0132	524.3613	502.9816	489.4155	466.5273	452.4589	436.9610	436.7705	448.8637	461.0239	485.5984	500.7196 (73)

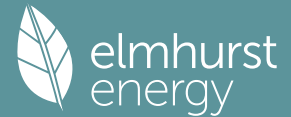
6. Solar gains

[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						
Northeast	3.3800	11.2829	0.7600	0.0000	0.7700	22.3174 (75)						
Southwest	6.7400	36.7938	0.7600	0.0000	0.7700	145.1240 (79)						
Northwest	0.6000	11.2829	0.7600	0.0000	0.7700	3.9617 (81)						
Solar gains	171.4031	300.6916	434.6048	577.3586	682.1614	692.8311	661.4700	580.8970	483.6658	338.5797	206.8910	145.6567 (83)
Total gains	682.4162	825.0530	937.5864	1066.7741	1148.6887	1145.2900	1098.4310	1017.6675	932.5295	799.6036	692.4894	646.3763 (84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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)												
tau	24.5098	24.6413	24.7741	25.4606	25.6025	26.3363	26.3363	26.4881	26.0378	25.6025	25.3203	25.0442
alpha	2.6340	2.6428	2.6516	2.6974	2.7068	2.7558	2.7558	2.7659	2.7359	2.7068	2.6880	2.6696
util living area												

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	0.9287	0.8888	0.8318	0.7257	0.5923	0.4380	0.3264	0.3625	0.5506	0.7727	0.8922	0.9361 (86)
Living	18.7436	19.1545	19.6602	20.2673	20.6702	20.8994	20.9669	20.9556	20.8028	20.2579	19.4374	18.7109
Non living	17.9390	18.3397	18.8278	19.4117	19.7714	19.9778	20.0235	20.0225	19.9012	19.4219	18.6389	17.9207
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	19.8457	19.1545	19.6602	20.2673	20.6702	20.8994	20.9669	20.9556	20.8028	20.2579	19.4374	19.0311 (87)
Th 2	19.9737	19.9786	19.9835	20.0082	20.0131	20.0380	20.0380	20.0430	20.0280	20.0131	20.0032	19.9934 (88)
util rest of house												
	0.9190	0.8746	0.8108	0.6936	0.5472	0.3805	0.2590	0.2926	0.4905	0.7379	0.8761	0.9274 (89)
MIT 2	18.9328	18.3397	18.8278	19.4117	19.7714	19.9778	20.0235	20.0225	19.9012	19.4219	18.6389	18.2106 (90)
Living area fraction										FLA = Living area / (4) =		0.2110 (91)
MIT	19.1254	18.5116	19.0034	19.5922	19.9611	20.1722	20.2226	20.2193	20.0914	19.5983	18.8074	18.3837 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1254	18.5116	19.0034	19.5922	19.9611	20.1722	20.2226	20.2193	20.0914	19.5983	18.8074	18.3837 (93)

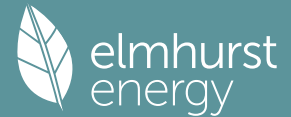
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9097	0.8499	0.7874	0.6789	0.5447	0.3888	0.2722	0.3058	0.4946	0.7214	0.8526	0.9100 (94)
Useful gains	620.7711	701.1718	738.2620	724.2509	625.6730	445.2762	298.9749	311.1805	461.2456	576.8359	590.4355	588.1981 (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	1343.5003	1226.9227	1120.9894	932.7567	716.6781	469.9433	305.5148	320.2643	511.0886	780.6330	1026.9780	1257.9205 (97)
Space heating kWh	537.7105	353.3046	284.7492	150.1241	67.7078	0.0000	0.0000	0.0000	0.0000	151.6250	314.3106	498.2735 (98a)
Space heating requirement - total per year (kWh/year)												2357.8054
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	537.7105	353.3046	284.7492	150.1241	67.7078	0.0000	0.0000	0.0000	0.0000	151.6250	314.3106	498.2735 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2357.8054
Space heating per m2										(98c) / (4) =		29.4873 (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 %)												254.7363 (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	537.7105	353.3046	284.7492	150.1241	67.7078	0.0000	0.0000	0.0000	0.0000	151.6250	314.3106	498.2735 (98)
Space heating efficiency (main heating system 1)	254.7363	254.7363	254.7363	254.7363	254.7363	0.0000	0.0000	0.0000	0.0000	254.7363	254.7363	254.7363 (210)
Space heating fuel (main heating system)	211.0851	138.6942	111.7819	58.9331	26.5796	0.0000	0.0000	0.0000	0.0000	59.5223	123.3867	195.6036 (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	151.2599	133.5173	142.0628	126.3968	123.3412	112.1205	111.7743	115.9249	116.8025	129.0026	135.5273	149.8839 (64)
Efficiency of water heater (217)m	287.9412	287.9412	287.9412	287.9412	287.9412	287.9412	287.9412	287.9412	287.9412	287.9412	287.9412	287.9412 (216)
Fuel for water heating, kWh/month	52.5315	46.3697	49.3374	43.8967	42.8355	38.9387	38.8184	40.2599	40.5647	44.8017	47.0677	52.0537 (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	2.3201	2.0955	2.3201	2.2452	2.3201	2.2452	2.3201	2.3201	2.2452	2.3201	2.2452	2.3201 (231)
Lighting	23.0991	18.5310	16.6851	12.2242	9.4423	7.7145	8.6136	11.1963	14.5429	19.0811	21.5520	23.7411 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.5312	-29.8294	-51.9480	-70.2081	-86.1949	-84.0457	-82.8409	-72.5075	-56.4926	-38.2846	-20.8869	-14.5664 (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	-0.1014	-0.3981	-1.3203	-3.2090	-5.8466	-6.8910	-6.7136	-4.9235	-2.7958	-0.8771	-0.1947	-0.0719 (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												925.5866 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												287.9412
Water heating fuel used												537.4758 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 3.3350, total flow = 29.0000, SFP = 0.1150)												
mechanical ventilation fans (SFP = 0.1150)												27.3168 (230a)
Total electricity for the above, kWh/year												27.3168 (231)
Electricity for lighting (calculated in Appendix L)												186.4232 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-658.6795 (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												

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Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1595.5527 (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	925.5866	0.1558	144.2463 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	537.4758	0.1406	75.5864 (264)
Energy for instantaneous electric shower(s)	577.4298	0.1391	80.3333 (264a)
Space and water heating			219.8328 (265)
Pumps, fans and electric keep-hot	27.3168	0.1387	3.7892 (267)
Energy for lighting	186.4232	0.1443	26.9066 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-625.3364	0.1312	-82.0246
PV Unit electricity exported	-33.3431	0.1156	-3.8534
Total			-85.8780 (269)
Total CO2, kg/year			244.9839 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0600 (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	925.5866	1.5769	1459.5701 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	537.4758	1.5200	816.9595 (278)
Energy for instantaneous electric shower(s)	577.4298	1.5143	874.4217 (278a)
Space and water heating			2276.5296 (279)
Pumps, fans and electric keep-hot	27.3168	1.5128	41.3248 (281)
Energy for lighting	186.4232	1.5338	285.9422 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-625.3364	1.4846	-928.3609
PV Unit electricity exported	-33.3431	0.4235	-14.1214
Total			-942.4823 (283)
Total Primary energy kWh/year			2535.7360 (286)
Dwelling Primary energy Rate (DPER)			31.7100 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	39.9800 (1b)	x 2.3200 (2b)	= 92.7536 (1b) - (3b)
First floor	39.9800 (1c)	x 2.5500 (2c)	= 101.9490 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	79.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 194.7026 (5)

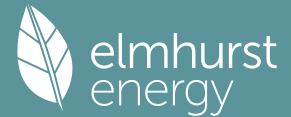
2. Ventilation rate

	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) =	0.1541 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50			5.0000 (17)
Infiltration rate			0.4041 (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) =		0.3435 (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	0.4379	0.4293	0.4207	0.3778	0.3692	0.3263	0.3263	0.3177	0.3435	0.3692	0.3864	0.4036 (22b)
Effective ac	0.5959	0.5922	0.5885	0.5714	0.5682	0.5532	0.5532	0.5505	0.5590	0.5682	0.5747	0.5814 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Semi-glazed door			2.1500	1.0000	2.1500		(26a)
TER Opening Type			10.7200	1.1450	12.2748		(27)
Beam & Block			39.9800	0.1300	5.1974		(28a)
Wall 1	87.5626	12.8700	74.6926	0.1800	13.4447		(29a)
Plane Roof	39.9800		39.9800	0.1100	4.3978		(30)
Total net area of external elements Aum(A, m2)			167.5226				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	37.4647	(33)
Main dwelling							
Party Wall 1			38.9600	0.0000	0.0000		(32)

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)	8.9800	0.0500	0.4490
E3 Sill	7.9500	0.0500	0.3975
E4 Jamb	24.6000	0.0500	1.2300
E5 Ground floor (normal)	18.4900	0.1600	2.9584
E6 Intermediate floor within a dwelling	18.4900	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	10.2400	0.0600	0.6144
E12 Gable (insulation at ceiling level)	8.2000	0.0600	0.4920
E16 Corner (normal)	9.7400	0.0900	0.8766
E18 Party wall between dwellings	9.7400	0.0600	0.5844
P1 Party wall - Ground floor	8.2000	0.0800	0.6560
P2 Party wall - Intermediate floor within a dwelling	8.2000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.2000	0.1200	0.9840

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	46.7070 (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	38.2869	38.0477	37.8132	36.7117	36.5057	35.5463	35.5463	35.3687	35.9159	36.5057	36.9226	37.3584 (38)
Average = Sum(39)m / 12 =	84.9939	84.7547	84.5202	83.4187	83.2126	82.2533	82.2533	82.0757	82.6228	83.2126	83.6295	84.0654 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0630	1.0600	1.0570	1.0433	1.0407	1.0287	1.0287	1.0265	1.0333	1.0407	1.0459	1.0513 (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	2.4621 (42)											
Hot water usage for mixer showers	65.5011	64.5167	63.0823	60.3379	58.3125	56.0539	54.7701	56.1936	57.7541	60.1792	62.9826	65.2501 (42a)
Hot water usage for baths	28.2908	27.8707	27.2790	26.1881	25.3712	24.4654	23.9761	24.5637	25.2034	26.1726	27.2860	28.1952 (42b)
Hot water usage for other uses	39.8444	38.3955	36.9466	35.4977	34.0488	32.6000	32.6000	34.0488	35.4977	36.9466	38.3955	39.8444 (42c)
Average daily hot water use (litres/day)												122.8420 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	133.6363	130.7829	127.3079	122.0236	117.7325	113.1192	111.3461	114.8061	118.4552	123.2984	128.6641	133.2897 (44)
Energy content (annual)	211.6472	186.2331	195.6675	167.0443	158.4906	139.0933	134.6635	142.1539	146.0671	167.3147	183.3055	208.6994 (45)
Distribution loss (46)m = 0.15 x (45)m	31.7471	27.9350	29.3501	25.0566	23.7736	20.8640	20.1995	21.3231	21.9101	25.0972	27.4958	31.3049 (46)

Water storage loss:

Store volume 200.0000 (47)

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

Temperature factor from Table 2b 1.6525 (48)

Enter (49) or (54) in (55) 0.5400 (49)

Total storage loss 0.8924 (55)

If cylinder contains dedicated solar storage 27.6637 (56)

Primary loss 27.6637 (57)

Combi loss 22.5120 (59)

Total heat required for water heating calculated for each month 0.0000 (61)

WWHRS 262.5733 (62)

FV diverter -29.9443 (63a)

Solar input 0.0000 (63b)

FGHRS 0.0000 (63c)

Output from w/h 232.6289 (64)

Total per year (kWh/year) = Sum(64)m = 2361.7631 (64)

Electric shower(s) 0.0000 (64a)

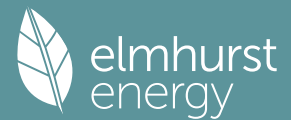
Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 111.1135 (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	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051	123.1051 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.8282	132.6669	119.8282	123.8224	119.8282	123.8224	119.8282	119.8282	123.8224	119.8282	123.8224	119.8282 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.3569	221.6332	215.8971	203.6857	188.2711	173.7835	164.1049	161.8286	167.5647	179.7761	195.1907	209.6783 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105	35.3105 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841	-98.4841 (71)

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Water heating gains (Table 5)	149.3462	146.9058	142.2047	131.9012	125.5900	118.9933	114.9415	118.2890	122.2138	129.5336	139.4107	148.0288 (72)
Total internal gains	551.4628	564.1374	540.8615	522.3409	496.6208	476.5307	458.8061	459.8773	473.5324	492.0693	521.3554	540.4668 (73)

6. Solar gains

[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				
Northeast	3.3800	11.2829	0.6300	0.7000	0.7000	0.7700	11.6550 (75)					
Southwest	6.7400	36.7938	0.6300	0.7000	0.7700	75.7891 (79)						
Northwest	0.6000	11.2829	0.6300	0.7000	0.7700	2.0689 (81)						
Solar gains	89.5130	157.0323	226.9666	301.5179	356.2498	361.8219	345.4440	303.3658	252.5881	176.8188	108.0461	76.0673 (83)
Total gains	640.9758	721.1696	767.8281	823.8588	852.8706	838.3526	804.2500	763.2432	726.1205	668.8881	629.4015	616.5341 (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	26.1326	26.2064	26.2791	26.6261	26.6920	27.0033	27.0033	27.0618	26.8825	26.6920	26.5589	26.4212
alpha	2.7422	2.7471	2.7519	2.7751	2.7795	2.8002	2.8002	2.8041	2.7922	2.7795	2.7706	2.7614
util living area	0.9347	0.9100	0.8753	0.8046	0.6987	0.5514	0.4222	0.4574	0.6421	0.8216	0.9070	0.9402 (86)
MIT	18.8429	19.1354	19.5415	20.0825	20.5283	20.8292	20.9405	20.9242	20.7240	20.1628	19.4348	18.8014 (87)
Th 2	20.0312	20.0337	20.0361	20.0474	20.0496	20.0595	20.0595	20.0613	20.0557	20.0496	20.0453	20.0408 (88)
util rest of house	0.9259	0.8982	0.8586	0.7779	0.6562	0.4879	0.3411	0.3757	0.5821	0.7917	0.8930	0.9322 (89)
MIT 2	17.5223	17.8891	18.3966	19.0652	19.5901	19.9227	20.0246	20.0144	19.8190	19.1762	18.2780	17.4761 (90)
Living area fraction	17.8009	18.1521	18.6382	19.2798	19.7880	20.1140	20.2178	20.2063	20.0100	19.3844	18.5221	17.7557 (92)
Temperature adjustment	17.8009	18.1521	18.6382	19.2798	19.7880	20.1140	20.2178	20.2063	20.0100	19.3844	18.5221	17.7557 (93)
adjusted MIT	17.8009	18.1521	18.6382	19.2798	19.7880	20.1140	20.2178	20.2063	20.0100	19.3844	18.5221	17.7557 (93)

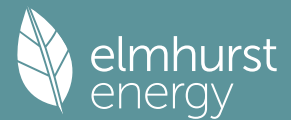
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8992	0.8691	0.8290	0.7531	0.6435	0.4918	0.3553	0.3889	0.5790	0.7671	0.8645	0.9066 (94)
Useful gains	576.3649	626.8001	636.5544	620.4532	548.7804	412.2803	285.7240	296.8095	420.4034	513.1266	544.1321	558.9341 (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	1147.4941	1123.1757	1025.9206	865.8718	673.0245	453.5424	297.5783	312.4051	488.2992	730.9727	955.2226	1139.5649 (97)
Space heating kWh	424.9202	333.5644	289.6884	176.7014	92.4376	0.0000	0.0000	0.0000	0.0000	162.0775	295.9851	431.9893 (98a)
Space heating requirement - total per year (kWh/year)												2207.3638
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	424.9202	333.5644	289.6884	176.7014	92.4376	0.0000	0.0000	0.0000	0.0000	162.0775	295.9851	431.9893 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2207.3638
Space heating per m2												27.6059 (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	424.9202	333.5644	289.6884	176.7014	92.4376	0.0000	0.0000	0.0000	0.0000	162.0775	295.9851	431.9893 (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)	460.3686	361.3915	313.8553	191.4424	100.1491	0.0000	0.0000	0.0000	0.0000	175.5986	320.6772	468.0274 (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	232.6289	205.7478	218.8621	193.3648	188.0162	170.0640	168.4245	174.8266	176.4035	195.9045	207.2846	230.2356 (64)
Efficiency of water heater (217)m	85.3928	85.1369	84.6894	83.8582	82.5579	79.8000	79.8000	79.8000	79.8000	83.6379	84.8582	79.8000 (216)
Fuel for water heating, kWh/month	272.4221	241.6671	258.4291	230.5853	227.7386	213.1128	211.0582	219.0810	221.0570	234.2294	244.2718	269.4408 (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	24.8979	19.9740	17.9844	13.1761	10.1776	8.3152	9.2844	12.0682	15.6754	20.5669	23.2303	25.5899 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-37.2966	-52.5173	-75.3906	-84.6461	-91.1671	-85.0517	-84.0054	-79.3692	-71.1533	-60.0098	-40.9835	-32.2530 (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)												

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(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	-21.2420	-44.6759	-88.7829	-133.3261	-176.2729	-177.1104	-175.0205	-148.1882	-108.6202	-63.8753	-28.3560	-16.7976	(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												2391.5101	(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												2843.0933	(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)												200.9405	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1976.1117	(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												3545.4323	(238)

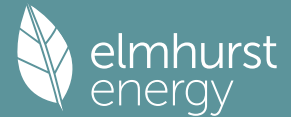
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2391.5101	0.2100	502.2171 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2843.0933	0.2100	597.0496 (264)
Space and water heating			1099.2667 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	200.9405	0.1443	29.0019 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.8436	0.1346	-106.8633
PV Unit electricity exported	-1182.2681	0.1259	-148.8484
Total			-255.7116 (269)
Total CO2, kg/year			884.4863 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0600 (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	2391.5101	1.1300	2702.4064 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2843.0933	1.1300	3212.6954 (278)
Space and water heating			5915.1019 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	200.9405	1.5338	308.2092 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.8436	1.4975	-1188.7935
PV Unit electricity exported	-1182.2681	0.4621	-546.3761
Total			-1735.1695 (283)
Total Primary energy kWh/year			4618.2424 (286)
Target Primary Energy Rate (TPER)			57.7600 (287)

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Property Reference	3B5P		Issued on Date	05/11/2025	
Assessment Reference	ASHP and solar PV	Prop Type Ref	Sem Br Ga Ea		
Property	3B5P, Eyhorne Street, Hollingbourne, Kent, ME17				
SAP Rating	87 B	DER	2.98	TER	9.96
Environmental	97 A	% DER < TER			70.08
CO ₂ Emissions (t/year)	0.25	DFEE	31.56	TFEE	32.68
Compliance Check	See BREL	% DFEE < TFEE			3.43
% DPER < TPER	40.55	DPER	30.86	TPER	51.91
Assessor Details	Mr. Stephen Smith			Assessor ID	D168-0001
Client	Cantium Land and Development , Cantium Land and Development				

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	47.5000 (1b)	x 2.3200 (2b)	= 110.2000 (1b) - (3b)
First floor	47.5000 (1c)	x 2.5500 (2c)	= 121.1250 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	231.3250 (5)

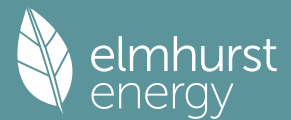
2. Ventilation rate

	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) =											0.1297 (8)
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50	4.0000											(17)
Infiltration rate	0.3297											(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) =											0.2802 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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	0.3573	0.3503	0.3433	0.3083	0.3013	0.2662	0.2662	0.2592	0.2802	0.3013	0.3153	0.3293 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.6073	0.6003	0.5933	0.5583	0.5513	0.5162	0.5162	0.5092	0.5302	0.5513	0.5653	0.5793 (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							
Opening Type 2			10.7200	1.2357	13.2471		(27)
Opening Type 4			2.1500	1.3000	2.7950		(26a)
Beam & Block			47.5000	0.1200	5.7000		(28a)
Wall 1	96.4260	12.8700	83.5560	0.2400	20.0534		(29a)
Plane Roof	47.5000		47.5000	0.0900	4.2750		(30)
Total net area of external elements Aum(A, m ²)			191.4260				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	46.0706	(33)
Main dwelling							
Party Wall 1			39.9300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (User defined value 0.045 * total exposed area)							8.6142 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 54.6848 (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	46.3595	45.8247	45.2899	42.6159	42.0811	39.4070	39.4070	38.8722	40.4766	42.0811	43.1507	44.2203 (38)
Average = Sum(39)m / 12 =	101.0443	100.5095	99.9747	97.3006	96.7658	94.0918	94.0918	93.5570	95.1614	96.7658	97.8354	98.9051 (39)
												97.1669
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0636	1.0580	1.0524	1.0242	1.0186	0.9904	0.9904	0.9848	1.0017	1.0186	1.0298	1.0411 (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													2.6882 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	29.9208	29.4765	28.8507	27.6969	26.8330	25.8750	25.3576	25.9789	26.6555	27.6806	28.8581	29.8197	29.8197 (42b)
Hot water usage for other uses	42.1595	40.6265	39.0934	37.5603	36.0272	34.4942	34.4942	36.0272	37.5603	39.0934	40.6265	42.1595	42.1595 (42c)
Average daily hot water use (litres/day)													66.0682 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	72.0804	70.1029	67.9441	65.2572	62.8602	60.3692	59.8517	62.0062	64.2158	66.7740	69.4846	71.9792	71.9792 (44)
Energy content (annual)	114.1577	99.8257	104.4276	89.3339	84.6219	74.2309	72.3855	76.7766	79.1845	90.6116	98.9935	112.7021	112.7021 (45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 1097.2516
Distribution loss	17.1237	14.9738	15.6641	13.4001	12.6933	11.1346	10.8578	11.5165	11.8777	13.5917	14.8490	16.9053	16.9053 (46)
Water storage loss:													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.2000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6480 (55)
Total storage loss	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880 (56)
If cylinder contains dedicated solar storage													
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	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	0.0000 (61)
Total heat required for water heating calculated for each month													
WWHRS	157.5081	138.9809	147.7780	131.2859	127.9723	116.1829	115.7359	120.1270	121.1365	133.9620	140.9455	156.0525	156.0525 (62)
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	-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	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	0.0000 (63d)
Output from w/h	157.5081	138.9809	147.7780	131.2859	127.9723	116.1829	115.7359	120.1270	121.1365	133.9620	140.9455	156.0525	156.0525 (64)
Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 1607.6676 (64)
Electric shower(s)	53.7009	47.8480	52.2482	49.8598	50.7954	48.4539	50.0690	50.7954	49.8598	52.2482	51.2657	53.7009	53.7009 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													610.8450 (64a)
Heat gains from water heating, kWh/month	86.0630	76.4782	82.4645	75.7301	75.5160	70.3569	71.2657	72.9074	72.3554	77.8707	79.2934	85.5790	85.5790 (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	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	140.7269	155.8048	140.7269	145.4178	140.7269	145.4178	140.7269	140.7269	145.4178	140.7269	145.4178	140.7269	140.7269 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	247.9820	250.5553	244.0707	230.2658	212.8396	196.4615	185.5198	182.9466	189.4311	203.2360	220.6622	237.0404	237.0404 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268 (71)
Water heating gains (Table 5)	115.6761	113.8068	110.8394	105.1807	101.4999	97.7179	95.7873	97.9938	100.4936	104.6650	110.1297	115.0255	115.0255 (72)
Total internal gains	567.7075	583.4894	558.9596	544.1868	518.3890	502.9196	485.3566	484.9898	498.6651	511.9504	539.5323	556.1154	556.1154 (73)

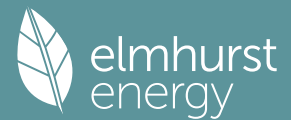
6. Solar gains

[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								
Northeast	3.3800	11.2829	0.7600	0.0000	0.7700	22.3174 (75)							
Southwest	6.7400	36.7938	0.7600	0.0000	0.7700	145.1240 (79)							
Northwest	0.6000	11.2829	0.7600	0.0000	0.7700	3.9617 (81)							
Solar gains	171.4031	300.6916	434.6048	577.3586	682.1614	692.8311	661.4700	580.8970	483.6658	338.5797	206.8910	145.6567	145.6567 (83)
Total gains	739.1106	884.1811	993.5644	1121.5454	1200.5504	1195.7508	1146.8265	1065.8868	982.3309	850.5301	746.4232	701.7721	701.7721 (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)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	26.1162	26.2551	26.3956	27.1210	27.2709	28.0459	28.0459	28.2062	27.7307	27.2709	26.9727	26.6810	26.6810 (86)
util living area	2.7411	2.7503	2.7597	2.8081	2.8181	2.8697	2.8697	2.8804	2.8487	2.8181	2.7982	2.7787	2.7787 (87)

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	0.9387	0.9040	0.8537	0.7550	0.6247	0.4661	0.3484	0.3856	0.5791	0.7966	0.9062	0.9452 (86)
Living	18.8014	19.1843	19.6639	20.2581	20.6629	20.8980	20.9671	20.9558	20.8015	20.2605	19.4691	18.7731
Non living	18.0352	18.4104	18.8761	19.4515	19.8166	20.0289	20.0765	20.0750	19.9515	19.4705	18.7105	18.0205
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	19.8753	19.1843	19.6639	20.2581	20.6629	20.8980	20.9671	20.9558	20.8015	20.2605	19.4691	19.0846 (87)
Th 2	20.0307	20.0353	20.0399	20.0632	20.0679	20.0913	20.0913	20.0960	20.0819	20.0679	20.0585	20.0492 (88)
util rest of house												
	0.9304	0.8917	0.8352	0.7255	0.5814	0.4091	0.2807	0.3157	0.5208	0.7649	0.8922	0.9378 (89)
MIT 2	19.0099	18.4104	18.8761	19.4515	19.8166	20.0289	20.0765	20.0750	19.9515	19.4705	18.7105	18.3043 (90)
Living area fraction									FLA = Living area / (4) =			0.2632 (91)
MIT	19.2376	18.6141	19.0834	19.6638	20.0393	20.2576	20.3108	20.3068	20.1752	19.6784	18.9101	18.5097 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2376	18.6141	19.0834	19.6638	20.0393	20.2576	20.3108	20.3068	20.1752	19.6784	18.9101	18.5097 (93)

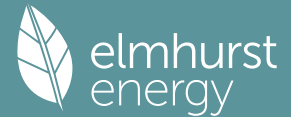
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9226	0.8696	0.8137	0.7117	0.5800	0.4199	0.2974	0.3324	0.5270	0.7499	0.8713	0.9228 (94)
Useful gains	681.8681	768.8922	808.4360	798.1625	696.3233	502.0545	341.0753	354.3236	517.7325	637.8118	650.3474	647.5709 (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	1509.3585	1378.3966	1258.0196	1047.3254	806.9619	532.3322	349.1585	365.5059	578.1210	878.4794	1155.4493	1415.2973 (97)
Space heating kWh	615.6529	409.5869	334.4902	179.3973	82.3151	0.0000	0.0000	0.0000	0.0000	179.0567	363.6734	571.1884 (98a)
Space heating requirement - total per year (kWh/year)												2735.3609
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	615.6529	409.5869	334.4902	179.3973	82.3151	0.0000	0.0000	0.0000	0.0000	179.0567	363.6734	571.1884 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2735.3609
Space heating per m2												(98c) / (4) = 28.7933 (99)

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

Fraction of space heat from secondary/supplementary system (Table 1)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												251.6810 (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	615.6529	409.5869	334.4902	179.3973	82.3151	0.0000	0.0000	0.0000	0.0000	179.0567	363.6734	571.1884 (98)
Space heating efficiency (main heating system 1)	251.6810	251.6810	251.6810	251.6810	251.6810	0.0000	0.0000	0.0000	0.0000	251.6810	251.6810	251.6810 (210)
Space heating fuel (main heating system)	244.6163	162.7405	132.9024	71.2796	32.7061	0.0000	0.0000	0.0000	0.0000	71.1443	144.4977	226.9493 (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	157.5081	138.9809	147.7780	131.2859	127.9723	116.1829	115.7359	120.1270	121.1365	133.9620	140.9455	156.0525 (64)
Efficiency of water heater (217)m	285.8918	285.8918	285.8918	285.8918	285.8918	285.8918	285.8918	285.8918	285.8918	285.8918	285.8918	285.8918 (216)
Fuel for water heating, kWh/month	55.0936	48.6131	51.6902	45.9215	44.7625	40.6388	40.4824	42.0183	42.3715	46.8576	49.3003	54.5845 (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	2.7564	2.4897	2.7564	2.6675	2.7564	2.6675	2.7564	2.6675	2.6675	2.7564	2.6675	2.7564 (231)
Lighting	27.1278	21.7629	19.5951	14.3562	11.0891	9.0599	10.1159	13.1490	17.0793	22.4089	25.3108	27.8817 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.5437	-29.8789	-52.1106	-70.5870	-86.8424	-84.7410	-83.5149	-73.0050	-56.7802	-38.3875	-20.9106	-14.5753 (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	-0.0888	-0.3487	-1.1578	-2.8300	-5.1991	-6.1957	-6.0396	-4.4260	-2.5083	-0.7742	-0.1710	-0.0630 (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												1086.8363 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												285.8918
Water heating fuel used												562.3343 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 3.3350, total flow = 29.0000, SFP = 0.1150)												
mechanical ventilation fans (SFP = 0.1150)												32.4549 (230a)
Total electricity for the above, kWh/year												32.4549 (231)
Electricity for lighting (calculated in Appendix L)												218.9366 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-658.6795 (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												

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Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1852.7276 (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	1086.8363	0.1557	169.2427 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	562.3343	0.1407	79.1022 (264)
Energy for instantaneous electric shower(s)	610.8450	0.1391	84.9821 (264a)
Space and water heating			248.3449 (265)
Pumps, fans and electric keep-hot	32.4549	0.1387	4.5019 (267)
Energy for lighting	218.9366	0.1443	31.5993 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-628.8772	0.1311	-82.4671
PV Unit electricity exported	-29.8023	0.1154	-3.4380
Total			-85.9051 (269)
Total CO2, kg/year			283.5230 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.9800 (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	1086.8363	1.5765	1713.3590 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	562.3343	1.5201	854.8187 (278)
Energy for instantaneous electric shower(s)	610.8450	1.5143	925.0235 (278a)
Space and water heating			2568.1777 (279)
Pumps, fans and electric keep-hot	32.4549	1.5128	49.0978 (281)
Energy for lighting	218.9366	1.5338	335.8122 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-628.8772	1.4844	-933.5351
PV Unit electricity exported	-29.8023	0.4227	-12.5983
Total			-946.1334 (283)
Total Primary energy kWh/year			2931.9777 (286)
Dwelling Primary energy Rate (DPER)			30.8600 (287)

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

1. Overall dwelling characteristics

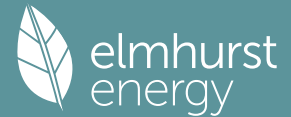
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	47.5000 (1b)	x 2.3200 (2b)	= 110.2000 (1b) - (3b)
First floor	47.5000 (1c)	x 2.5500 (2c)	= 121.1250 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	231.3250 (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) =
Pressure test		0.1297 (8)
Pressure Test Method		Yes
Measured/design AP50		Blower Door
Infiltration rate		5.0000 (17)
Number of sides sheltered		0.3797 (18)
		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3227 (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	0.4115	0.4034	0.3953	0.3550	0.3469	0.3066	0.3066	0.2985	0.3227	0.3469	0.3631	0.3792 (22b)
Effective ac	0.5847	0.5814	0.5782	0.5630	0.5602	0.5470	0.5470	0.5446	0.5521	0.5602	0.5659	0.5719 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Semi-glazed door			2.1500	1.0000	2.1500		(26a)
TER Opening Type			10.7200	1.1450	12.2748		(27)
Beam & Block			47.5000	0.1300	6.1750		(28a)
Wall 1	96.4260	12.8700	83.5560	0.1800	15.0401		(29a)
Plane Roof	47.5000		47.5000	0.1100	5.2250		(30)
Total net area of external elements Aum(A, m2)			191.4260				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	40.8649	(33)
Main dwelling							
Party Wall 1			39.9300	0.0000	0.0000		(32)

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)	8.9800	0.0500	0.4490
E3 Sill	7.9500	0.0500	0.3975
E4 Jamb	24.6000	0.0500	1.2300
E5 Ground floor (normal)	18.4900	0.1600	2.9584
E6 Intermediate floor within a dwelling	18.4900	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	10.2400	0.0600	0.6144
E12 Gable (insulation at ceiling level)	8.2000	0.0600	0.4920
E16 Corner (normal)	9.7400	0.0900	0.8766
E18 Party wall between dwellings	9.7400	0.0600	0.5844
P1 Party wall - Ground floor	8.2000	0.0800	0.6560
P2 Party wall - Intermediate floor within a dwelling	8.2000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.2000	0.1200	0.9840

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges	(36a) =	9.2423 (36)
Total fabric heat loss	(33) + (36) + (36a) =	50.1072 (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	44.6314	44.3804	44.1344	42.9790	42.7629	41.7566	41.7566	41.5702	42.1442	42.7629	43.2002	43.6574 (38)
Average = Sum(39)m / 12 =	94.7386	94.4876	94.2416	93.0862	92.8701	91.8637	91.8637	91.6774	92.2514	92.8701	93.3074	93.7646 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9972	0.9946	0.9920	0.9799	0.9776	0.9670	0.9670	0.9650	0.9711	0.9776	0.9822	0.9870 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

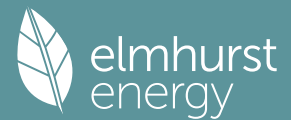
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6882 (42)
Hot water usage for mixer showers	69.2915	68.2502	66.7328	63.8295	61.6870	59.2976	57.9395	59.4455	61.0962	63.6617	66.6273	69.0260 (42a)	
Hot water usage for baths	29.9208	29.4765	28.8507	27.6969	26.8330	25.8750	25.3576	25.9789	26.6555	27.6806	28.8581	29.8197 (42b)	
Hot water usage for other uses	42.1595	40.6265	39.0934	37.5603	36.0272	34.4942	34.4942	36.0272	37.5603	39.0934	40.6265	42.1595 (42c)	
Average daily hot water use (litres/day)													129.9527 (43)
Daily hot water use	141.3719	138.3532	134.6769	129.0868	124.5472	119.6668	117.7913	121.4516	125.3120	130.4356	136.1119	141.0053 (44)	
Energy conte	223.8986	197.0131	206.9934	176.7133	167.6645	147.1443	142.4583	150.3825	154.5223	176.9999	193.9163	220.7802 (45)	
Energy content (annual)													Total = Sum(45)m = 2158.4867
Distribution loss (46)m = 0.15 x (45)m	33.5848	29.5520	31.0490	26.5070	25.1497	22.0716	21.3687	22.5574	23.1783	26.5500	29.0875	33.1170 (46)	
Water storage loss:													200.0000 (47)
Store volume													1.6525 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.8924 (55)
Enter (49) or (54) in (55)													
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)	
If cylinder contains dedicated solar storage													
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	274.8246	243.0108	257.9195	225.9966	218.5906	196.4276	193.3844	201.3086	203.8056	227.9260	243.1996	271.7063 (62)	
WWHRS	-31.6772	-28.0156	-29.3363	-24.2916	-22.6389	-19.3723	-18.1584	-19.3097	-20.0433	-23.6288	-26.7686	-31.0906 (63a)	
FV 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	243.1474	214.9952	228.5832	201.7050	195.9517	177.0553	175.2260	181.9989	183.7623	204.2971	216.4310	240.6157 (64)	
Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2463.7689 (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	115.1871	102.3050	109.5662	98.1838	96.4893	88.3521	88.1082	90.7430	90.8053	99.5933	103.9038	114.1503 (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	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085	134.4085 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	140.7269	155.8048	140.7269	145.4178	140.7269	145.4178	140.7269	140.7269	145.4178	140.7269	145.4178	140.7269 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	247.9820	250.5553	244.0707	230.2658	212.8396	196.4615	185.5198	182.9466	189.4311	203.2360	220.6622	237.0404 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408	36.4408 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268	-107.5268 (71)

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Water heating gains (Table 5)	154.8214	152.2396	147.2664	136.3664	129.6899	122.7113	118.4251	121.9664	126.1185	133.8620	144.3109	153.4278 (72)
Total internal gains	609.8529	624.9223	598.3865	578.3726	549.5790	527.9131	507.9943	508.9624	524.2899	544.1475	576.7134	597.5176 (73)

6. Solar gains

[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				
Northeast	3.3800	11.2829	0.6300	0.7000	0.7000	0.7700	11.6550 (75)					
Southwest	6.7400	36.7938	0.6300	0.7000	0.7700	75.7891 (79)						
Northwest	0.6000	11.2829	0.6300	0.7000	0.7700	2.0689 (81)						
Solar gains	89.5130	157.0323	226.9666	301.5179	356.2498	361.8219	345.4440	303.3658	252.5881	176.8188	108.0461	76.0673 (83)
Total gains	699.3659	781.9545	825.3532	879.8905	905.8288	889.7350	853.4383	812.3283	776.8780	720.9663	684.7595	673.5849 (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	27.8544	27.9284	28.0013	28.3489	28.4149	28.7261	28.7261	28.7845	28.6054	28.4149	28.2817	28.1438
alpha	2.8570	2.8619	2.8668	2.8899	2.8943	2.9151	2.9151	2.9190	2.9070	2.8943	2.8854	2.8763
util living area	0.9434	0.9216	0.8912	0.8264	0.7253	0.5773	0.4438	0.4793	0.6660	0.8400	0.9184	0.9484 (86)
MIT	18.9095	19.1838	19.5672	20.0893	20.5280	20.8298	20.9417	20.9257	20.7274	20.1776	19.4774	18.8696 (87)
Th 2	20.0856	20.0878	20.0900	20.1002	20.1021	20.1109	20.1109	20.1126	20.1075	20.1021	20.0982	20.0942 (88)
util rest of house	0.9359	0.9114	0.8765	0.8022	0.6855	0.5157	0.3638	0.3991	0.6088	0.8129	0.9062	0.9415 (89)
MIT 2	17.6398	17.9849	18.4661	19.1145	19.6352	19.9716	20.0756	20.0651	19.8690	19.2338	18.3660	17.5948 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.9739	18.3004	18.7558	19.3710	19.8702	20.1974	20.3035	20.2916	20.0949	19.4822	18.6584	17.9303 (92)
Temperature adjustment												
adjusted MIT	17.9739	18.3004	18.7558	19.3710	19.8702	20.1974	20.3035	20.2916	20.0949	19.4822	18.6584	17.9303 (93)

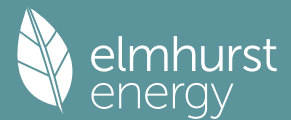
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9128	0.8860	0.8503	0.7796	0.6742	0.5221	0.3818	0.4160	0.6080	0.7909	0.8812	0.9195 (94)
Useful gains	638.4088	692.8110	701.7573	685.9856	610.7445	464.5038	325.8088	337.8985	472.3134	570.2300	603.4327	619.3434 (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	1295.4458	1266.1733	1155.0092	974.7101	758.7642	514.2019	340.2160	356.7672	553.0399	824.8863	1078.4885	1287.4154 (97)
Space heating kWh	488.8355	385.2994	337.2194	207.8817	110.1267	0.0000	0.0000	0.0000	0.0000	189.4643	342.0402	497.0455 (98a)
Space heating requirement - total per year (kWh/year)	2557.9127											
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	488.8355	385.2994	337.2194	207.8817	110.1267	0.0000	0.0000	0.0000	0.0000	189.4643	342.0402	497.0455 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2557.9127											
Space heating per m2	(98c) / (4) =											
	26.9254 (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	488.8355	385.2994	337.2194	207.8817	110.1267	0.0000	0.0000	0.0000	0.0000	189.4643	342.0402	497.0455 (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)	529.6159	417.4425	365.3514	225.2239	119.3139	0.0000	0.0000	0.0000	0.0000	205.2701	370.5744	538.5108 (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	243.1474	214.9952	228.5832	201.7050	195.9517	177.0553	175.2260	181.9989	183.7623	204.2971	216.4310	240.6157 (64)
Efficiency of water heater (217)m	85.5934	85.3524	84.9303	84.1275	82.8201	79.8000	79.8000	79.8000	79.8000	83.8911	85.0813	79.8000 (216)
Fuel for water heating, kWh/month	284.0727	251.8913	269.1422	239.7611	236.5991	221.8739	219.5814	228.0688	230.2786	243.5266	254.3815	280.9318 (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	29.2403	23.4576	21.1210	15.4741	11.9527	9.7654	10.9036	14.1730	18.4093	24.1539	27.2818	30.0529 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-43.7505	-61.3112	-87.5803	-97.8059	-104.8691	-97.6360	-96.4166	-91.3251	-82.2322	-69.8065	-47.9650	-37.8673 (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)												

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(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	-25.7988	-54.1634	-107.4733	-161.1655	-212.8748	-213.8373	-211.3306	-179.0345	-131.3556	-77.3806	-34.4170	-20.4095	(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												2771.3030	(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												2960.1090	(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)												235.9857	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2347.8065	(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												3705.5912	(238)

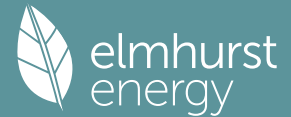
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2771.3030	0.2100	581.9736 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2960.1090	0.2100	621.6229 (264)
Space and water heating			1203.5965 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	235.9857	0.1443	34.0600 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-918.5657	0.1347	-123.7579
PV Unit electricity exported	-1429.2408	0.1259	-179.9988
Total			-303.7567 (269)
Total CO2, kg/year			945.8291 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9600 (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	2771.3030	1.1300	3131.5724 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2960.1090	1.1300	3344.9232 (278)
Space and water heating			6476.4956 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	235.9857	1.5338	361.9628 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-918.5657	1.4979	-1375.9616
PV Unit electricity exported	-1429.2408	0.4623	-660.7217
Total			-2036.6834 (283)
Total Primary energy kWh/year			4931.8758 (286)
Target Primary Energy Rate (TPER)			51.9100 (287)

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Property Reference	4B.1		Issued on Date	05/11/2025	
Assessment Reference	ASHP and solar PV	Prop Type Ref	Det Br Ga Ea		
Property	4B.1, Eyhome Street, Hollingbourne, Kent, ME17				
SAP Rating	86 B	DER	3.22	TER	9.84
Environmental	97 A	% DER < TER			67.28
CO ₂ Emissions (t/year)	0.32	DFEE	35.96	TFEE	35.99
Compliance Check	See BREL	% DFEE < TFEE			0.09
% DPER < TPER	35.39	DPER	33.24	TPER	51.44
Assessor Details	Mr. Stephen Smith			Assessor ID	D168-0001
Client	Cantium Land and Development , Cantium Land and Development				

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	56.0000 (1b)	x 2.3200 (2b)	= 129.9200 (1b) - (3b)
First floor	56.0000 (1c)	x 2.5500 (2c)	= 142.8000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	112.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	272.7200 (5)

2. Ventilation rate

	Value	Reference
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) =	0.1100 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.3100	(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) =	0.2635 (21)

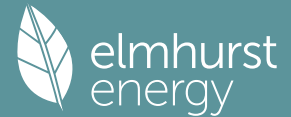
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3360	0.3294	0.3228	0.2899	0.2833	0.2503	0.2503	0.2437	0.2635	0.2833	0.2964	0.3096 (22b)
Mechanical extract ventilation - decentralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5860	0.5794	0.5728	0.5399	0.5333	0.5003	0.5003	0.5000	0.5135	0.5333	0.5464	0.5596 (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							
Opening Type 2			10.7200	1.2357	13.2471		(27)
Opening Type 4			2.1500	1.3000	2.7950		(26a)
Beam & Block			56.0000	0.1200	6.7200		(28a)
Wall 1	149.3629	12.8700	136.4929	0.2400	32.7583		(29a)
Plane Roof	56.0000		56.0000	0.0900	5.0400		(30)
Total net area of external elements Aum(A, m ²)			261.3629				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.5604		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (User defined value 0.032 * total exposed area)							8.3636 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	68.9241 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(38)m	52.7355	52.1426	51.5498	48.5855	47.9926	45.0283	45.0283	44.9988	46.2140	47.9926	49.1783	50.3640 (38)
Heat transfer coeff	121.6596	121.0667	120.4738	117.5095	116.9166	113.9523	113.9523	113.9229	115.1380	116.9166	118.1024	119.2881 (39)
Average = Sum(39)m / 12 =												117.4082
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0862	1.0810	1.0757	1.0492	1.0439	1.0174	1.0174	1.0172	1.0280	1.0439	1.0545	1.0651 (40)
HLP (average)												1.0483
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8263 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	30.9169	30.4578	29.8112	28.6190	27.7263	26.7364	26.2017	26.8438	27.5429	28.6021	29.8188	30.8124	(42b)
Hot water usage for other uses	43.5743	41.9897	40.4052	38.8207	37.2362	35.6517	35.6517	37.2362	38.8207	40.4052	41.9897	43.5743	(42c)
Average daily hot water use (litres/day)													68.2778 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	74.4912	72.4475	70.2164	67.4397	64.9624	62.3881	61.8534	64.0800	66.3636	69.0073	71.8086	74.3867	(44)
Energy conte	117.9758	103.1643	107.9200	92.3215	87.4519	76.7134	74.8063	79.3444	81.8329	93.6423	102.3045	116.4715	(45)
Energy content (annual)													Total = Sum(45)m = 1133.9488
Distribution loss (46)m = 0.15 x (45)m	17.6964	15.4746	16.1880	13.8482	13.1178	11.5070	11.2209	11.9017	12.2749	14.0463	15.3457	17.4707	(46)
Water storage loss:													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.2000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6480 (55)
Total storage loss	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(56)
If cylinder contains dedicated solar storage													
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	(57)
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	161.3262	142.3195	151.2704	134.2735	130.8023	118.6654	118.1567	122.6948	123.7849	136.9927	144.2565	159.8219	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	161.3262	142.3195	151.2704	134.2735	130.8023	118.6654	118.1567	122.6948	123.7849	136.9927	144.2565	159.8219	(64)
													Total per year (kWh/year) = Sum(64)m = 1644.3648 (64)
12Total per year (kWh/year)													1644 (64)
Electric shower(s)	55.4960	49.4474	53.9947	51.5265	52.4933	50.0736	51.7427	52.4933	51.5265	53.9947	52.9794	55.4960	(64a)
													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 631.2641 (64a)
Heat gains from water heating, kWh/month	87.7813	77.9881	84.0624	77.1401	76.8814	71.5872	72.4891	74.1857	73.6527	79.3150	80.8227	87.2811	(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	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	161.2815	178.5616	161.2815	166.6575	161.2815	166.6575	161.2815	161.2815	166.6575	161.2815	166.6575	161.2815	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	274.3987	277.2461	270.0707	254.7953	235.5127	217.3898	205.2826	202.4352	209.6106	224.8861	244.1686	262.2915	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	(71)
Water heating gains (Table 5)	117.9856	116.0538	112.9871	107.1391	103.3353	99.4267	97.4316	99.7119	102.2954	106.6062	112.2537	117.3133	(72)
Total internal gains	619.0605	637.2562	609.7340	593.9865	565.5241	548.8687	529.3904	528.8233	543.9582	558.1685	588.4746	606.2810	(73)

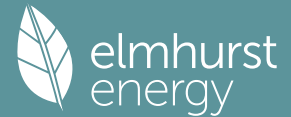
6. Solar gains

[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						
Northeast		6.7400	11.2829	0.7600	0.0000	0.7700	44.5027	(75)					
Southeast		0.6000	36.7938	0.7600	0.0000	0.7700	12.9191	(77)					
Southwest		3.3800	36.7938	0.7600	0.0000	0.7700	72.7773	(79)					
Solar gains	130.1991	236.5592	362.9343	515.5051	637.4787	659.2915	624.6314	529.5941	415.1329	272.0348	158.6404	109.6814	(83)
Total gains	749.2596	873.8154	972.6683	1109.4916	1203.0028	1208.1602	1154.0218	1058.4174	959.0910	830.2033	747.1150	715.9624	(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	25.5723	25.6975	25.8240	26.4754	26.6097	27.3019	27.3019	27.3089	27.0207	26.6097	26.3425	26.0806	
alpha	2.7048	2.7132	2.7216	2.7650	2.7740	2.8201	2.8201	2.8206	2.8014	2.7740	2.7562	2.7387	
util living area	0.9564	0.9341	0.8985	0.8177	0.6969	0.5362	0.4100	0.4582	0.6642	0.8558	0.9344	0.9608	(86)

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Living	18.5515	18.8866	19.3685	20.0291	20.5293	20.8445	20.9462	20.9254	20.7008	20.0445	19.2232	18.5310
Non living	17.7786	18.1101	18.5834	19.2299	19.6899	19.9721	20.0443	20.0329	19.8582	19.2608	18.4603	17.7701
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	19.7474	18.8866	19.3685	20.0291	20.5293	20.8445	20.9462	20.9254	20.7008	20.0445	19.2232	18.8764 (87)
Th 2	20.0121	20.0164	20.0208	20.0425	20.0469	20.0688	20.0688	20.0691	20.0601	20.0469	20.0382	20.0295 (88)
util rest of house	0.9502	0.9249	0.8839	0.7919	0.6542	0.4739	0.3314	0.3770	0.6048	0.8294	0.9237	0.9552 (89)
MIT 2	18.8695	18.1101	18.5834	19.2299	19.6899	19.9721	20.0443	20.0329	19.8582	19.2608	18.4603	18.0862 (90)
Living area fraction												FLA = Living area / (4) =
MIT	19.0263	18.2488	18.7236	19.3726	19.8398	20.1279	20.2053	20.1923	20.0087	19.4007	18.5965	18.2273 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0263	18.2488	18.7236	19.3726	19.8398	20.1279	20.2053	20.1923	20.0087	19.4007	18.5965	18.2273 (93)

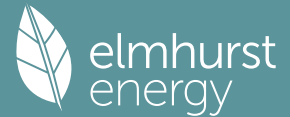
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9427	0.9036	0.8604	0.7712	0.6441	0.4780	0.3433	0.3882	0.6013	0.8082	0.9030	0.9416	(94)
Useful gains	706.3189	789.5442	836.8564	855.6394	774.8889	577.5208	396.1765	410.9165	576.6633	670.9349	674.6735	674.1569	(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	1791.5932	1616.0944	1472.6238	1230.6310	951.6798	629.9157	410.8345	432.0254	680.3139	1028.9502	1357.7696	1673.2870	(97)
Space heating kWh	807.4441	555.4417	473.0110	269.9939	131.5324	0.0000	0.0000	0.0000	0.0000	266.3634	491.8291	743.3529	(98a)
Space heating requirement - total per year (kWh/year)													3738.9684
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	807.4441	555.4417	473.0110	269.9939	131.5324	0.0000	0.0000	0.0000	0.0000	266.3634	491.8291	743.3529	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													3738.9684
Space heating per m2										(98c) / (4) =			33.3836 (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 %)													247.2106 (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	807.4441	555.4417	473.0110	269.9939	131.5324	0.0000	0.0000	0.0000	0.0000	266.3634	491.8291	743.3529	(98)
Space heating efficiency (main heating system 1)	247.2106	247.2106	247.2106	247.2106	247.2106	0.0000	0.0000	0.0000	0.0000	247.2106	247.2106	247.2106	(210)
Space heating fuel (main heating system)	326.6219	224.6836	191.3393	109.2162	53.2066	0.0000	0.0000	0.0000	0.0000	107.7475	198.9515	300.6962	(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	161.3262	142.3195	151.2704	134.2735	130.8023	118.6654	118.1567	122.6948	123.7849	136.9927	144.2565	159.8219	(64)
Efficiency of water heater (217)m	281.3988	281.3988	281.3988	281.3988	281.3988	281.3988	281.3988	281.3988	281.3988	281.3988	281.3988	281.3988	(216)
Fuel for water heating, kWh/month	57.3301	50.5757	53.7566	47.7165	46.4829	42.1698	41.9891	43.6017	43.9891	48.6827	51.2641	56.7955	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.2497	2.9352	3.2497	3.1449	3.2497	3.1449	3.2497	3.2497	3.1449	3.2497	3.1449	3.2497	(231)
Lighting	31.3267	25.1314	22.6281	16.5783	12.8056	10.4622	11.6817	15.1843	19.7228	25.8774	29.2285	32.1974	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.5586	-29.9361	-52.2981	-71.0068	-87.4902	-85.2607	-84.0189	-73.3769	-56.9950	-38.5023	-20.9376	-14.5855	(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	-0.0740	-0.2915	-0.9703	-2.4102	-4.5513	-5.6760	-5.5356	-4.0541	-2.2934	-0.6595	-0.1440	-0.0528	(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													1512.4628 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													281.3988
Water heating fuel used													584.3539 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans: (MEVDecentralised, Database: total watage = 3.3350, total flow = 29.0000, SFP = 0.1150) mechanical ventilation fans (SFP = 0.1150)													38.2626 (230a)
Total electricity for the above, kWh/year													38.2626 (231)
Electricity for lighting (calculated in Appendix L)													252.8244 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-658.6795 (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)

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Total delivered energy for all uses

2360.4883 (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	1512.4628	0.1553	234.8137 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	584.3539	0.1407	82.2115 (264)
Energy for instantaneous electric shower(s)	631.2641	0.1391	87.8228 (264a)
Space and water heating			317.0252 (265)
Pumps, fans and electric keep-hot	38.2626	0.1387	5.3075 (267)
Energy for lighting	252.8244	0.1443	36.4904 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-631.9667	0.1311	-82.8604
PV Unit electricity exported	-26.7128	0.1146	-3.0616
Total			-85.9220 (269)
Total CO2, kg/year			360.7239 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.2200 (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	1512.4628	1.5747	2381.7436 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	584.3539	1.5202	888.3357 (278)
Energy for instantaneous electric shower(s)	631.2641	1.5143	955.9449 (278a)
Space and water heating			3270.0793 (279)
Pumps, fans and electric keep-hot	38.2626	1.5128	57.8837 (281)
Energy for lighting	252.8244	1.5338	387.7905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-631.9667	1.4844	-938.0768
PV Unit electricity exported	-26.7128	0.4199	-11.2158
Total			-949.2926 (283)
Total Primary energy kWh/year			3722.4058 (286)
Dwelling Primary energy Rate (DPER)			33.2400 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	56.0000 (1b)	x 2.3200 (2b)	= 129.9200 (1b) - (3b)
First floor	56.0000 (1c)	x 2.5500 (2c)	= 142.8000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	112.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	272.7200 (5)

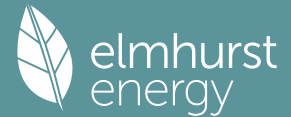
2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1467 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3967 (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) =	0.3372 (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	0.4299	0.4215	0.4130	0.3709	0.3625	0.3203	0.3203	0.3119	0.3372	0.3625	0.3793	0.3962 (22b)
Effective ac	0.5924	0.5888	0.5853	0.5688	0.5657	0.5513	0.5513	0.5486	0.5568	0.5657	0.5719	0.5785 (25)

3. Heat losses and heat loss parameter

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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 Semi-glazed door			2.1500	1.0000	2.1500		(26a)
TER Opening Type			10.7200	1.1450	12.2748		(27)
Beam & Block			56.0000	0.1300	7.2800		(28a)
Wall 1	149.3629	12.8700	136.4929	0.1800	24.5687		(29a)
Plane Roof	56.0000		56.0000	0.1100	6.1600		(30)
Total net area of external elements Aum(A, m2)			261.3629				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	52.4335	(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)	8.9800	0.0500	0.4490
E3 Sill	7.9500	0.0500	0.3975
E4 Jamb	24.6000	0.0500	1.2300
E5 Ground floor (normal)	18.4900	0.1600	2.9584
E6 Intermediate floor within a dwelling	18.4900	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	10.2400	0.0600	0.6144
E12 Gable (insulation at ceiling level)	8.2000	0.0600	0.4920
E16 Corner (normal)	9.7400	0.0900	0.8766
E18 Party wall between dwellings	9.7400	0.0600	0.5844
P1 Party wall - Ground floor	8.2000	0.0800	0.6560
P2 Party wall - Intermediate floor within a dwelling	8.2000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.2000	0.1200	0.9840
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.2423 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 61.6758 (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	53.3149	52.9920	52.6754	51.1887	50.9105	49.6157	49.6157	49.3759	50.1144	50.9105	51.4733	52.0616 (38)
Average = Sum(39)m / 12 =	114.9907	114.6678	114.3513	112.8645	112.5864	111.2915	111.2915	111.0517	111.7903	112.5864	113.1491	113.7374 (39)
												112.8632

HLP (average)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0267	1.0238	1.0210	1.0077	1.0052	0.9937	0.9937	0.9915	0.9981	1.0052	1.0103	1.0155 (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 2.8263 (42)

Hot water usage for mixer showers 71.6078 70.5317 68.9635 65.9632 63.7490 61.2798 59.8763 61.4326 63.1385 65.7897 68.8545 71.3334 (42a)

Hot water usage for baths 30.9169 30.4578 29.8112 28.6190 27.7263 26.7364 26.2017 26.8438 27.5429 28.6021 29.8188 30.8124 (42b)

Hot water usage for other uses 43.5743 41.9897 40.4052 38.8207 37.2362 35.6517 35.6517 37.2362 38.8207 40.4052 41.9897 43.5743 (42c)

Average daily hot water use (litres/day) 134.2978 (43)

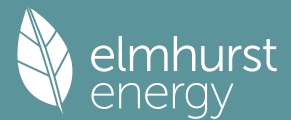
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	146.0990	142.9792	139.1799	133.4029	128.7115	123.6679	121.7297	125.5125	129.5021	134.7970	140.6631	145.7201 (44)
Energy conte	231.3851	203.6004	213.9144	182.6219	173.2704	152.0641	147.2215	155.4108	159.6891	182.9183	200.4003	228.1624 (45)
Energy content (annual)												Total = Sum(45)m = 2230.6585
Distribution loss (46)m = 0.15 x (45)m	34.7078	30.5401	32.0872	27.3933	25.9906	22.8096	22.0832	23.3116	23.9534	27.4377	30.0600	34.2244 (46)
Water storage loss:												200.0000 (47)
Store volume												1.6525 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8924 (55)
Enter (49) or (54) in (55)												
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)
If cylinder contains dedicated solar storage												
Primary loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624 (59)
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 (61)
WWHRS	282.3111	249.5982	264.8404	231.9052	224.1965	201.3474	198.1476	206.3368	208.9723	233.8443	249.6836	279.0885 (62)
PV diverter	-32.7361	-28.9521	-30.3169	-25.1036	-23.3957	-20.0198	-18.7654	-19.9551	-20.7133	-24.4187	-27.6634	-32.1299 (63a)
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 (63b)
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 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64)
Total per year (kWh/year)	249.5750	220.6461	234.5235	206.8015	200.8008	181.3275	179.3822	186.3817	188.2590	209.4256	222.0202	246.9586 (64)
Electric shower(s)												2526.1019 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												2526 (64)
Heat gains from water heating, kWh/month	117.6764	104.4953	111.8674	100.1484	98.3533	89.9879	89.6920	92.4149	92.5232	101.5612	106.0597	116.6049 (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	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156	141.3156 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	161.2815	178.5616	161.2815	166.6575	161.2815	166.6575	161.2815	161.2815	166.6575	161.2815	166.6575	161.2815 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	274.3987	277.2461	270.0707	254.7953	235.5127	217.3898	205.2826	202.4352	209.6106	224.8861	244.1686	262.2915 (68)
Pumps, fans	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316	37.1316 (69)
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 (70)
Water heating gains (Table 5)	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525	-113.0525 (71)
Total internal gains	158.1672	155.4990	150.3594	139.0950	132.1953	124.9833	120.5538	124.2136	128.5045	136.5070	147.3052	156.7270 (72)
Total internal gains	662.2421	679.7014	650.1063	628.9425	597.3841	574.4253	552.5126	553.3250	570.1673	591.0692	626.5260	648.6946 (73)

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6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	g Specific data or Table 6c	FF	Access factor Table 6d	Gains W		
Northeast				6.7400	11.2829	0.6300	0.7000	0.7700		23.2410 (75)		
Southeast				0.6000	36.7938	0.6300	0.7000	0.7700		6.7468 (77)		
Southwest				3.3800	36.7938	0.6300	0.7000	0.7700		38.0070 (79)		
Solar gains	67.9948	123.5399	189.5377	269.2157	332.9148	344.3063	326.2056	276.5735	216.7977	142.0666	82.8479	57.2797 (83)
Total gains	730.2368	803.2414	839.6440	898.1582	930.2990	918.7316	878.7181	829.8986	786.9650	733.1358	709.3739	705.9743 (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	27.0553	27.1315	27.2066	27.2650	27.6331	27.9546	27.9546	28.0150	27.8299	27.6331	27.4957	27.3535
alpha	2.8037	2.8088	2.8138	2.8377	2.8422	2.8636	2.8636	2.8677	2.8553	2.8422	2.8330	2.8236
util living area	0.9577	0.9431	0.9214	0.8697	0.7817	0.6410	0.5056	0.5461	0.7332	0.8816	0.9396	0.9612 (86)
MIT	18.6777	18.9272	19.3143	19.8805	20.3870	20.7625	20.9127	20.8889	20.6264	19.9945	19.2660	18.6469 (87)
Th 2	20.0611	20.0635	20.0659	20.0769	20.0790	20.0886	20.0886	20.0904	20.0849	20.0790	20.0748	20.0704 (88)
util rest of house	0.9518	0.9351	0.9098	0.8492	0.7449	0.5776	0.4170	0.4585	0.6779	0.8590	0.9299	0.9558 (89)
MIT 2	17.3341	17.6505	18.1402	18.8512	19.4630	19.8906	20.0347	20.0179	19.7506	19.0030	18.0898	17.3006 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	17.5741	17.8785	18.3498	19.0350	19.6280	20.0463	20.1915	20.1734	19.9070	19.1800	18.2999	17.5410 (92)
Temperature adjustment												0.0000
adjusted MIT	17.5741	17.8785	18.3498	19.0350	19.6280	20.0463	20.1915	20.1734	19.9070	19.1800	18.2999	17.5410 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9297	0.9100	0.8821	0.8211	0.7242	0.5744	0.4276	0.4670	0.6658	0.8316	0.9046	0.9349 (94)
Useful gains	678.9308	730.9319	740.6190	737.5204	673.7590	527.7266	375.7262	387.5687	523.9387	609.6530	641.7069	659.9919 (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	1526.3941	1488.2156	1355.0438	1143.8845	892.5877	606.1247	399.7009	419.0427	649.1618	965.9965	1267.2533	1517.3711 (97)
Space heating kWh	630.5127	508.8947	457.1320	292.5822	162.8085	0.0000	0.0000	0.0000	0.0000	265.1196	450.3934	637.8901 (98a)
Space heating requirement - total per year (kWh/year)												3405.3333
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	630.5127	508.8947	457.1320	292.5822	162.8085	0.0000	0.0000	0.0000	0.0000	265.1196	450.3934	637.8901 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3405.3333
Space heating per m2										(98c) / (4) =		30.4048 (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)

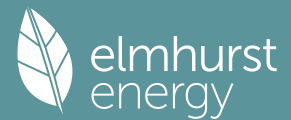
Efficiency of main space heating system 1 (in %) 92.3000 (206)

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	630.5127	508.8947	457.1320	292.5822	162.8085	0.0000	0.0000	0.0000	0.0000	265.1196	450.3934	637.8901 (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)	683.1124	551.3485	495.2676	316.9904	176.3906	0.0000	0.0000	0.0000	0.0000	287.2368	487.9669	691.1052 (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	249.5750	220.6461	234.5235	206.8015	200.8008	181.3275	179.3822	186.3817	188.2590	209.4256	222.0202	246.9586 (64)
Efficiency of water heater (217)m	86.0480	85.8709	85.5292	84.8377	83.5935	79.8000	79.8000	79.8000	79.8000	84.5897	85.6119	79.8000 (216)
Fuel for water heating, kWh/month	290.0418	256.9509	274.2028	243.7614	240.2109	227.2275	224.7897	233.5610	235.9136	247.5781	259.3333	286.8606 (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	33.5111	26.8839	24.2059	17.7343	13.6985	11.1918	12.4962	16.2431	21.0981	27.6819	31.2666	34.4425 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-50.7566	-70.7036	-100.3787	-111.3640	-118.7636	-110.3138	-108.9198	-103.4836	-93.6740	-80.1532	-55.4892	-43.9804 (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	-31.2384	-65.4349	-129.5792	-193.9497	-255.8397	-256.8968	-253.8979	-215.2561	-158.1347	-93.3727	-41.6348	-24.7249 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

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(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												3689.4185	(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												3020.4315	(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)												270.4538	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2767.9403	(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												4298.3635	(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	3689.4185	0.2100	774.7779	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3020.4315	0.2100	634.2906	(264)
Space and water heating			1409.0685	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	270.4538	0.1443	39.0348	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1047.9805	0.1349	-141.3403	
PV Unit electricity exported	-1719.9598	0.1260	-216.7052	
Total			-358.0455	(269)
Total CO2, kg/year			1101.9871	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.8400	(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	3689.4185	1.1300	4169.0429	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3020.4315	1.1300	3413.0876	(278)
Space and water heating			7582.1305	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	270.4538	1.5338	414.8311	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1047.9805	1.4985	-1570.3673	
PV Unit electricity exported	-1719.9598	0.4625	-795.4639	
Total			-2365.8312	(283)
Total Primary energy kWh/year			5761.2312	(286)
Target Primary Energy Rate (TPER)			51.4400	(287)

general notes:
 do not scale from the drawing, all dimensions shall be checked on site prior to commencing works.
 all works shall conform to the current edition of the building regulations and other relevant statutory requirements.
 all materials and workmanship shall conform with the relevant british standard specifications and codes of practice.
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revision	details	by	date
p1	updates following pre-application	TW	11.09.25
p2	locations updated	TW	03.10.25
a	planning issue	TW	17.09.25



- site application boundary
- - - pv panel
- EV charging port
- water butt

gdmarchitects

the master's house, college road, maidstone, kent ME15 6YF
 t: 01422 765970 e: info@gdmarchitects.co.uk w: gdmarchitects.co.uk

client: **Cantium Land & Development**

project: **Eyhome Street, Hollingbourne**

title: **sustainability strategy plan**

date: **11.09.25** drawn by: **tw**
 scale: **1:500@A1** checked: **gve**

PLANNING

project number	drawing number	revision
4500	p012	a

Job no:	3815
Date:	0 /1 2025
Calculated by:	S.R.Smith
Client:	Cantium Land
Development name:	Eyhorn Street

WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)

House Type:		Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Type 8	Type 9	Type 10										
Description:		All Plots																			
Installation Type	Unit of measure	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day	Capacity/flow rate	Litres/person/day		
Is a dual or single flush WC specified?		Dual		Dual		Select option:		Select option:		Select option:		Select option:		Select option:		Click to Select		Click to Select		Click to Select	
WC	Full flush volume	4	5.84		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
	Part flush volume	2.6	7.70		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	5	9.48		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Are both a Bath & Shower Present?		Bath & Shower		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:	
Bath	Capacity to overflow	193	21.23		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Shower	Flow rate (litres / minute)	8	34.96		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Kitchen sink taps	Flow rate (litres / minute)	6	13.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a washing machine been specified?		No		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:	
Washing Machine	Litres / kg		17.16		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a dishwasher been specified?		No		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:	
Dishwasher	Litres / place setting		4.50		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a waste disposal unit been specified?		No		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:		Select option:	
Water Softener	Litres / person / day		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Calculated Use		113.9		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Normalisation factor		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91	
Code for Sustainable Homes	Total Consumption	103.6		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	Mandatory level	Level 3/4		-		-		-		-		-		-		-		-		-	
Building Regulations 17.K	External use	5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0	
	Total Consumption	108.6		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	17.K Compliance?	Yes		-		-		-		-		-		-		-		-		-	

Southern Energy Consultants Ltd

Suite 36, Liberty House
The Enterprise Centre
Greenham Business Park
Newbury
Berkshire
RG19 6HS

T: 01635 261582

E: info@southernenergyconsultants.co.uk

W: www.southernenergyconsultants.co.uk



Southern Energy
Consultants
Energy & Sustainability Solutions