



Energy Statement

The Drapers' Almshouse Charity

Edmansons Close

Final

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Executive Summary

The energy strategy for the proposed development at Edmansons Close in the London Borough of Haringey has been formulated following the London Plan energy hierarchy: **Be Lean**, **Be Clean** and **Be Green**. The overriding objective is the formulation of a strategy which effectively balances a number of key elements, including CO₂ emissions, affordability of heat, and the provision of high-quality buildings. These elements need to work with the regulatory and planning requirements for the development.

The proposed development will apply appropriate treatment to 44 existing almshouses and convert them to provide 26 houses. These are listed buildings and there are sensitive heritage conditions to consider. In addition the development will include a new apartment building comprising of 16 flats, two corner pavilion buildings with an additional four apartments, and one new build house.

The proposed development will be built to the updated Part L 2021 Building Regulations. The new Part O of building regulations will also influence the energy strategy. Updated assessment software does not yet provide reliable results to assess new development against the updated requirements in Part L. Therefore, energy demand and CO₂ emissions have been estimated against the Part L 2013 baseline within this report. The calculations have been adjusted to use SAP 10.2 carbon emission factors to estimate CO₂ performance, which are more up to date than factors used in SAP 2012 methodology.

For the refurbished dwellings there are limitations to the improvements that can be made due to the listed status of the buildings. A baseline assessment has been undertaken based on the expected construction of the existing building. Improvements are then proposed where possible to estimate the CO₂ reduction achieved over the existing building. The proposed improvements include draught proofing, insulating the roof and upgrading the performance of the glazing, as well as installing new gas boilers to each dwelling. A **25.2%** reduction in CO₂ emissions is estimated over the baseline.

For the new build development, a range of **Be Lean** energy efficiency measures are proposed. They allow the new build part of the development to achieve a **21%** reduction in site wide regulated CO₂ emissions, over a Part L 2013 baseline.

In line with the London Plan, the feasibility of decentralised energy production has been considered at the **Be Clean** stage. There are no existing heat networks in close proximity to the development. Due to the small scale of the development it is not proposed to install a site wide heat network as it would result in high running costs to the residents. An individual heating system for each dwelling is proposed.

A range of **Be Green** renewable energy technologies has been considered. It is proposed that the heating and hot water demand for the new build dwellings will be provided by individual air source heat pumps. The available roof space on the apartment building will also be used to provide 5 kWp of solar PV. This delivers a further CO₂ reduction of **50%** for the new build dwellings.

Tables *i* and *ii*, below, summarise the anticipated site wide CO₂ emissions for the Proposed Development. The combination of the **Be Lean** and **Be Green** measures as outlined above result in an overall **71%**

reduction over the Part L 2013 baseline for the new build development. It is expected this would be approximately 45-50%% CO₂ reduction over Part L 2021. A **25.2%** reduction is expected over the baseline for the refurbished development.

In line with the GLA guidance, the new build development will commit to offset the remaining CO₂ emissions through a payment to the London Borough of Haringey. The remaining CO₂ emissions to be offset are estimated as **6.1 Tonnes CO₂ per annum**, resulting in the estimated offset payment of **£17,385**.

Table i: New Build Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)	
	Regulated	Unregulated
Baseline	21.4	5.9
After <i>Be Lean</i> Measures	16.9	5.9
After <i>Be Clean</i> Measures	16.9	5.9
After <i>Be Green</i> Measures	6.1	5.9
Stage	Regulated Carbon Dioxide Savings	
	Tonnes CO ₂ per Annum	Percentage
Savings from <i>Be Lean</i> Measures	4.5	21%
Savings from <i>Be Clean</i> Measures	0.0	0%
Savings from <i>Be Green</i> Measures	10.8	50%
Cumulative On-Site Savings	15.3	71%

Table ii: Refurbishment Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)	
	Regulated	
Baseline (Existing structures)	136.5	-
After <i>Be Lean</i> Measures	102.1	-
Stage	Regulated Carbon Dioxide Savings	
	Tonnes CO ₂ per Annum	Percentage
Savings from <i>Be Lean</i> Measures	34.4	25.2%
Cumulative On-Site Savings	34.4	25.2%

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1. INTRODUCTION

- 1.1** This document has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development in support of the planning application for Edmansons Close located in the London Borough of Haringey.
- 1.2** The energy strategy for the site has been formulated to address a number of key objectives:
- > To provide comfortable, high-quality homes that people aspire to live in;
 - > To address energy policy;
 - > To adapt to climate change;
 - > To take account of specific site characteristics that link to the energy strategy, for instance acoustics and air quality;
 - > To provide a resilient supply of reasonably priced heat to residents;
 - > To take into consideration the heritage of the existing buildings and ensure any improvements are not to the detriment of the character of the building.
- 1.3** This statement first establishes a baseline assessment of the energy demands and associated CO₂ emissions. The report will then follow The London Plan Energy Hierarchy approach of **Be Lean, Be Clean** and **Be Green** to demonstrate CO₂ reductions at each step.

2. DEVELOPMENT OVERVIEW

Site Location

- 2.1** The proposed development site at Edmansons Close in the London Borough of Haringey is located at Edmansons Close, Bruce Grove, Tottenham, N17 6XD, as shown in Figure 1.

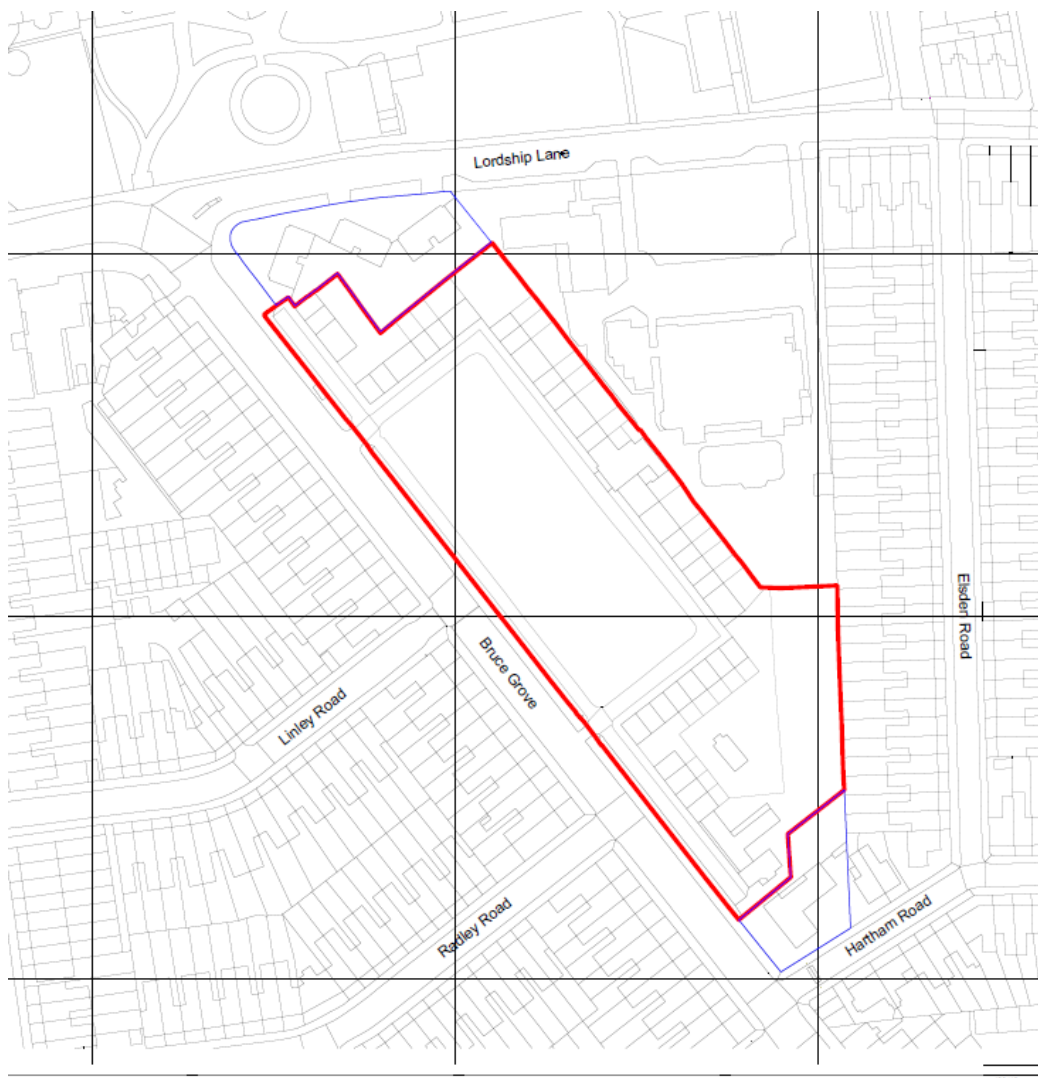


Figure 1: Site Location Plan (d+b studios, 2022)

- 2.2** The site occupies an area of c. 1ha and is located to the north of Tottenham. It consists of a series of terraced almshouses built around a central green, with several additional detached surrounding buildings.

Proposed Development

2.3 The proposed development is described as follows:

“Demolition of existing laundry building and 1970s infill building; alterations and extensions to 44 existing almshouses to create 8 x 1 bed, 12 x 2 bed and 6 x 3 bed units; alterations to existing Gatehouse to provide 1 x 2 bed unit; construction of 1 x new build 3 bed almshouse to replace 1970s infill building; construction of a new apartment building comprising 7 x studio units and 9 x 1 bed units; construction of 4 x new build 2 bed units within two new pavilions (2 units in each pavilion, 4 units in total); with landscaping; improvements to access; car parking; and ancillary development thereto.”

2.4 Figure 2, below, shows the proposed site layout.

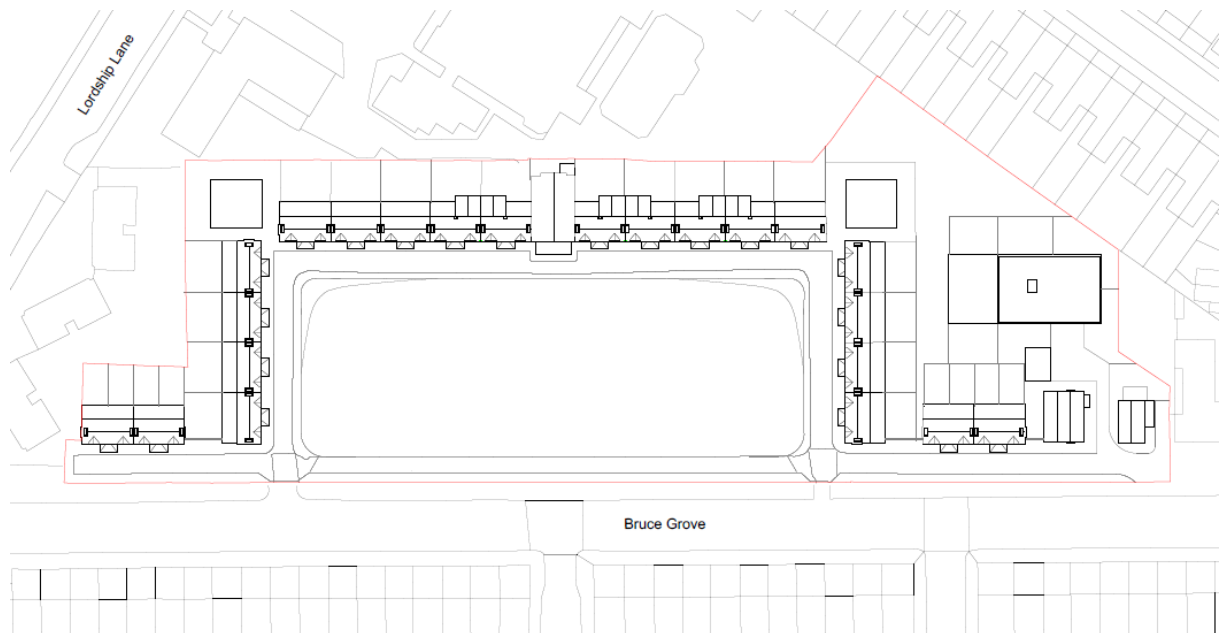


Figure 2: Proposed Block Plan, d+b studios, 2022

3. RELEVANT PLANNING POLICY

- 3.1 The following planning policies and requirements will inform the energy strategy for the proposed development.

National Policy: NPPF

- 3.2 The revised National Planning Policy Framework (NPPF) was published on the 20th July 2021 and sets out the Government's planning policies for England.
- 3.3 The NPPF provides a framework for achieving sustainable development, which has been summarised as "*meeting the needs of the present without compromising the ability of future generations to meet their own needs*" (Resolution 42/187 of the United National General Assembly). At the heart of the framework is a **presumption in favour of sustainable development**.
- 3.4 The document states that the planning system has three overarching objectives which are interdependent and need to be pursued in mutually supportive ways:
- a) **An economic objective** – 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) **A social objective** – 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 a 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; and
 - c) **An environmental objective** – 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.

Regional Policy: London Plan (2021)

3.5 The London Plan sets out an integrated economic, environmental, transport and social framework for the development of London. The following policies are considered relevant to this energy strategy:

3.6 Policy SI2 Minimising Greenhouse Gas Emissions, states:

‘Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation, and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

- 1) Be lean: use less energy and manage demand during operation;
- 2) Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly;
- 3) Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site;
- 4) Be seen: monitor, verify and report on energy performance through the Mayor’s post construction monitoring platform.

A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures.’

Any residual on-site emissions (Regulated CO₂) are to be offset up to a standard of Zero Carbon.

3.7 Policy SI3 Energy Infrastructure, states:

‘Major development proposals within Heat Network Priority Areas should have a communal low-temperature heating system. The heat source for the communal heating system should be selected in accordance with the following heating hierarchy:

- a) Connect to local existing or planned heat networks;
- b) Use zero-emission or local secondary heat sources (in conjunction with heat pump, if required);
- c) Use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network);
- d) Use ultra-low NO_x gas boilers.’

- 3.8 Policy SI4 Managing Heat Risk** seeks for energy strategies to demonstrate how they intend to reduce the risk of internal overheating, in line with the cooling hierarchy.

Local Policy: London Borough of Haringey

Strategic Policies

- 3.9** The London Borough of Haringey's Local Plan was adopted in 2013. The following policies are considered relevant to this Statement:

- 3.10 Policy SP4- Working towards a low carbon Haringey** indicates that the following measures will be promoted to reduce carbon emissions from new and existing buildings.

- > All new residential development will achieve a minimum 25% reduction in total (regulated) CO₂ emissions in line with Code for Sustainable Homes Level 4 energy standards, and should aim to achieve Level 6. All new residential development shall be zero carbon from 2016 onwards;
- > All developments should identify and implement, where viable, site-wide and area-wide decentralised energy facilities including the potential to link into a wider network;
- > Establish local networks of decentralised heat and energy facilities by requiring developers to prioritise connection to existing or planned networks where feasible;
- > Work with neighbouring boroughs and other partners to explore ways of implementing sub-regional decentralised energy networks;
- > All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on-site renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.

- 3.11 Policy SP11- Design** requires all new development to enhance and enrich Haringey's built environment and create places and buildings that are high quality, attractive, sustainable, safe and easy to use. The development should:

- > Be of the highest standard of design that respects its local character and historic significance;
- > Ensure impacts on health, climate change, natural resources and biodiversity are minimised by adopting and improving sustainable design and construction techniques;
- > Incorporate solutions to reduce crime and the fear of crime and apply the principles set out in 'Secured by Design' and Safer Places;
- > Promote high quality landscaping on and off site, seek the highest standards of access in all buildings and places, and be designed to be adaptable;

- > Applications for tall buildings should include an assessment supporting tall buildings in a Characterisation Study; comply with the Development Management Policies criteria for Tall and Large Buildings siting and design; and comply with relevant recommendations as set out in CABE / English Heritage "Guidance on Tall Buildings", 2007.

3.12 Policy SP12- Conservation indicates that the historic significance of Haringey's assets, their setting, and the wider environment should be conserved. Where archaeological excavation is required, findings should be published, disseminated, and used as the basis for archaeological interpretation on site. Where possible, development should help increase accessibility to the historic environment.

Development Management DPD

3.13 This document gives effect to Haringey's spatial strategy and the key objectives of the Strategic Policies Local Plan by supporting proposals that contribute to the delivery of sustainable development in accordance with the strategy. The following are the relevant policies:

3.14 Policy DM9- Management of the Historic Environment states that a development that conserves and enhances the significance of a heritage asset and its setting will be supported.

3.15 Policy DM21- Sustainable Design, Layout and Construction states that all new development will be expected to consider and implement sustainable design, layout and construction techniques. Proposal should apply the energy and cooling hierarchies to minimize energy use, maximise opportunities to enhance biodiversity on-site, use building materials with high environmental performance ratings; and seek opportunities for locally sourced labour. The Council will support appropriate measures to sustainably retrofit existing homes and non-residential buildings. Consideration will be given to the use of carbon offset payments.

3.16 Policy DM22- Decentralised Energy states that subject to other policy requirements, proposals that contribute to the provision and use of Decentralised Energy network infrastructure will be supported.

4. BASELINE EMISSIONS

- 4.1** This statement first establishes a baseline assessment of the energy demands and associated CO₂ emissions for the development. The report will then follow the GLA hierarchy approach of *Be Lean*, *Be Clean* and *Be Green*.

New Build

- 4.2** The estimated energy demand for dwellings has been calculated using Standard Assessment Procedure (SAP) methodology. SAP calculates the Regulated energy demands associated with hot water, space heating and fixed electrical items. The unregulated energy demands for appliances and cooking are taken from BRE standard occupancy calculations.
- 4.3** Calculations have been completed on representative dwelling types. These differ in orientation and take into the account of ground floors, mid floors and top floors in apartments as well as houses. The selected dwellings therefore represent a fair aggregation of the proposed unit mix.

Refurbishment

- 4.4** SAP assessments are also completed for the refurbished dwellings. A baseline assessment is first undertaken, using performance U-values that reflect the current state of the building. An improved specification is then applied and compared to the baseline to establish the improvement that is achieved by the proposed measures.
- 4.5** Only a visual survey has been undertaken of the building to date, so the specifics of the construction are not yet known. The properties date from the 1800s, so the dwellings fall under property band A in SAP methodology (pre 1900), and it is assumed there is no insulation within the building envelope. Table 1 summarises the assumed U-values and the source of the assumptions.

Table 1: Baseline specification for refurbished dwellings

Element	Baseline U-value	Source
External Walls	2.1 W/m ² K	SAP 9.92, Table S6 (solid wall)
Party Walls	0.0 W/m ² K	SAP 9.92, Table S8B (solid masonry)
Roofs	2.3 W/m ² K	SAP 9.92, Table S10 (Age band A, no insulation)
Floors	0.50-0.70 W/m ² K, (depending on perimeter/area ratio)	SAP 9.92, Table S11 (Age band A, suspended timber floor)
Glazing	4.8 W/m ² K , 0.85 g-value	SAP 9.92, Table S14 (single glazing)
Doors	3.0 W/m ² K	SAP 9.92, Table S15A (Age band A)

- 4.6** The heating and hot water provision for approximately 30% of the existing dwellings is currently supplied by electric water heating systems. The remaining dwellings are supplied by a gas heating system. This has been confirmed by the development team and has been reflected within the baseline assessments.

SAP CO₂ Emission Factors

- 4.7** The development will be built under Part L 2021 Building Regulations. This has significantly improved baseline targets compared to Part L 2013, as follows:
- > 31% improvement on the baseline for CO₂ emissions.
 - > Approximately 15% improvement on fabric efficiency requirements.
- 4.8** Updated SAP software to assess dwellings under these new regulations has recently been released. However, it is not yet fully reliable and does not provide the outputs required to be able to extrapolate results to estimate energy performance. Therefore, for this report the dwellings have been assessed against the Part L 2013 baseline, and results extrapolated to estimate CO₂ reductions using updated carbon emission factors.

Baseline Emissions

- 4.9** Table 2, below, shows the baseline CO₂ emission rates for both the new build and refurbished parts of the development. TER Worksheets supporting these calculations can be found in appendix A for the new build dwellings, and Appendix B for the refurbished dwellings.

Table 2: Carbon Dioxide Emissions Baseline	
	Regulated [T CO ₂ /year]
New Build	21.4
Refurbishment	136.5
Total	157.9

5. BE LEAN – ENERGY EFFICIENCY

New Build

- 5.1** The new build portion of the development will target a 10% reduction in CO₂ emissions from the **Be Lean** stage alone, as required in London Plan policy.
- 5.2** This section sets out the potential measures to be implemented to allow these targets to be achieved, thereby locking in significant CO₂ reductions through a reduction in energy demands.

Insulation Standards

- 5.3** All new build dwellings will incorporate enhanced insulation in the building envelope (walls, roofs, floors and glazing) to achieve U-values such as the following:
- > External wall U-value of 0.18 W/m²K;
 - > Corridor wall U-value of 0.18 W/m²K (no active heating in the corridors);
 - > Party walls will be fully insulated and sealed (achieving an effective U-value of 0.0 W/m²K);
 - > Exposed floor U-value of 0.13 W/m²K;
 - > Roof U-value of 0.10 W/m²K;
 - > Glazing U-value of 0.90 W/m²K.

Air Tightness and Ventilation

- 5.4** Air tightness standards will conform to and exceed, Approved Document Part L requirements. By reducing air leakage loss and convective bypass of insulation, an improvement of design air permeability rate from 10m³/h.m² to 3m³/h.m² or less will further reduce space heating requirements.
- 5.5** A mechanical ventilation system with heat recovery (MVHR) system is proposed for all new build dwellings. These systems will remove stale air and odours from kitchens and wet rooms, whilst retaining the heat within the home, as shown in Figure 3, below. In this way substantial energy savings will be made.

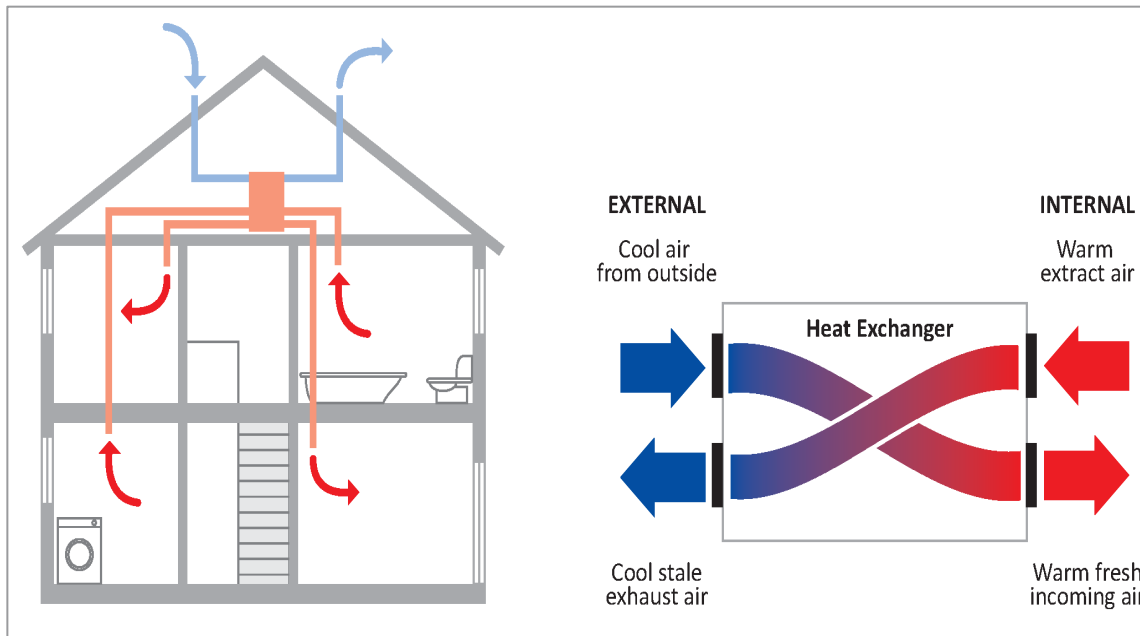


Figure 3: MVHR in operation

- 5.6** The selected MVHR units have heat recovery efficiencies of at least 90%, with the specific fan power (SFP) targets as follows:
- > < 0.56 for units with a kitchen and 1 wet room;
 - > < 0.58 for units with a kitchen and 2 wet rooms.
- 5.7** Additionally, all homes will have openable windows and therefore the ability to naturally ventilate should the occupant desire. Convective ventilation and night purging of heat will therefore be facilitated.

Thermal Bridging

- 5.8** In well insulated buildings, as much as 30% of heat loss can occur through thermal bridges, which occur when highly conductive elements (e.g. metal studs) in the wall construction enable a low resistance escape route for heat. The Applicant is committed to delivering a development which prioritises the conservation of energy through lean design and has therefore placed particular importance on the development of construction details which minimise the effect of thermal bridges.
- 5.9** Figure 4 below illustrates the benefits of reducing thermal bridges.

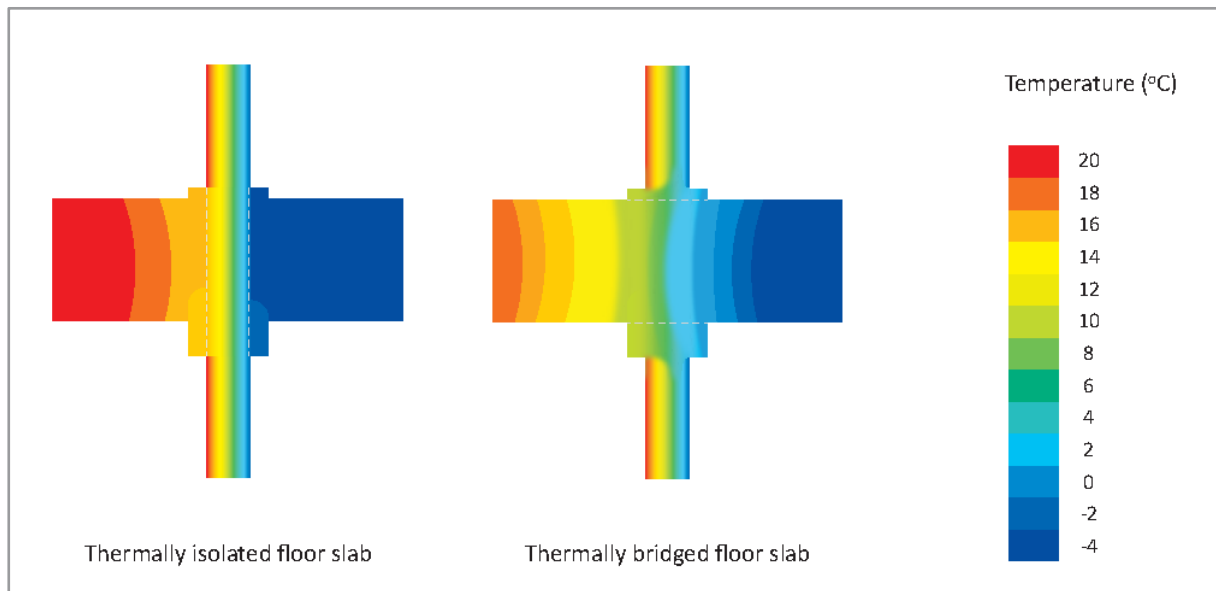


Figure 4: Thermal Bridging

- 5.10** Detailed modelling of all major junctions is likely to be undertaken at design stage. The results of initial assessments will be used to inform the design process and further modelling will take place to identify areas for further improvement.
- 5.11** The following psi values have been used in the initial modelling, based on calculated psi values achieved on similar schemes:
- > Ground floor - 0.16 W/m.K;
 - > Exposed floor (over unheated spaces) – 0.32 W/m.K;
 - > Intermediate floor – 0.10 W/m.K;
 - > Balcony junction to wall – 0.25 W/m.K;
 - > Flat roof – 0.08 W/m.K;
 - > Flat roof with parapet – 0.40 W/m.K;
 - > Corner (normal) – 0.09 W/m.K;
 - > Corner (inverted) – -0.09 W/m.K;
 - > Party wall between dwellings – 0.06 W/m.K;
 - > Lintels – 0.15 W/m.K;

- > Sills – 0.04 W/m.K;
- > Jambs – 0.05 W/m.K.

5.12 Further details will be determined during the detailed design stage when bespoke calculations are expected to be undertaken on the targeted junctions.

Space Heating and Hot Water

- 5.13** The space heating requirement will be reduced by the fabric, air tightness and ventilation measures outlined above.
- 5.14** In line with GLA energy assessment guidance, a gas boiler has been assumed within the baseline assessment to provide the heating and hot water demand. The gas boiler assumed has an efficiency of 89.5%.
- 5.15** As outlined at the **Be Green** stage, the final heating strategy for the new build development is individual air source heat pumps.

Lighting and Appliances

- 5.16** Energy efficient lighting will be installed in 100% of internal fittings in the homes.
- 5.17** It is very difficult to design and construct homes to reduce the unregulated electricity demands, because this is almost entirely dependent on the occupant of a home and can vary substantially. However, the Applicant is committed to ensuring that all efforts are made to enable the residents to minimise their unregulated electricity consumption.

Limiting the Risk of Summer Overheating

- 5.18** Minimising the risk of summer overheating is important so as to ensure that homes are adapted to climate change and remain comfortable to occupy in the future. Accordingly, dynamic thermal modelling has been undertaken on a selection of unit types to ensure that the development does not cause an unacceptable risk of summer overheating within the dwellings.
- 5.19** The following overheating measures are to be adopted for the development to mitigate overheating risk:
- > Solar control glazing to reduce uncomfortable solar heat gains whilst maximising energy efficiency. A g-value of 0.40 has been applied to all new build dwellings. These have been used in the dynamic overheating assessment.
 - > High performance MVHR systems to all dwellings to assist in background ventilation;

- > Openable windows used as the primary means of ventilation for overheating.

5.20 Full details of the residential overheating modelling and applied strategy are presented in the accompanying Dynamic Overheating Report.

Refurbishment

5.21 The dwellings to be refurbished are listed buildings and therefore there is a limit to changes that can be made to the fabric specification. No changes should be made that would significantly alter the character of the building. A summary of proposed changes is outlined below.

Fabric Performance

5.22 External walls: The existing walls will be repaired where required to improve draught proofing of the dwelling. However, it is not proposed to install any additional insulation to the walls as both external and internal insulation would alter the character of the building. Internal insulation would also reduce the floor area of the dwellings and could lead to increased condensation risk in some areas.

5.23 Floor: It is assumed that the floor is a solid floor and therefore would be challenging to add any additional insulation. Covering the original floor with insulation would significantly alter the character of the building and potentially reduce the room heights.

5.24 Roofs: It is proposed to insulate the roofs well with mineral wool insulation to achieve a target U-value of $0.11 \text{ W/m}^2\text{K}$. The roof space is not intended to be used as a habitable space, and therefore this will have no visual impact. However, care will be taken whilst installing the insulation to cause no lasting damage to the existing structure of the dwelling.

5.25 Glazing: It is proposed to retain the existing single glazed windows that are currently present to the front facades of the buildings, because these are an important feature of these listed buildings, and add secondary glazing behind so that the appearance of the façade does not change. The secondary glazing will improve the thermal performance to a similar standard of installing new double-glazed panes that retain the current characteristics. There are a range of manufacturers that provide secondary glazing with U-values in the range of $2.5 \text{ W/m}^2\text{K}$ to $2.9 \text{ W/m}^2\text{K}$. This is compared to upgrading to double glazing within the existing frame which can provide $2.4 \text{ W/m}^2\text{K}$ to $2.8 \text{ W/m}^2\text{K}$. Secondary glazing can also offer better acoustic performance than double glazing, due to the larger gap between the panes of glass.

5.26 The new windows and doors to be installed to the rear elevations as part of the refurbishment will be double glazed units, which will be installed to meet current new build standards. A new glazing U-value of $1.4 \text{ W/m}^2\text{K}$ is assumed.

Ventilation

- 5.27** There is no requirement for a mechanical ventilation system to mitigate overheating risk and there is good cross ventilation within the dwellings. Therefore, a natural ventilation system is proposed with extract fans present within wet rooms. Adding in centralised ducting will significantly impact on ceiling structures and room heights.

Space Heating and Hot Water

- 5.28** It is proposed that the refurbished dwellings will have new modern, efficient gas fired boilers installed to provide heating and hot water demand.
- 5.29** Due to the limited improvements that can be made on the fabric performance of the buildings, it is expected that energy demands will still be high. Gas prices remain much lower than electricity, and therefore installing gas boilers would result in lower running costs to residents compared to an electric heating strategy. This is shown in Table 3 below.

Table 3: Heat Cost Comparison		
	Gas Boiler	Electric Heating
Variable Costs	£1,257	£4,500
Fixed Costs	£399	£125
Total (£/dwelling/yr)	£1,656	£4,625

- 5.30** Heat pumps work most efficiently in dwellings with good fabric performance. They would not run efficiently in these dwellings, resulting in further costs to the residents. It also would not be appropriate for a listed building for the external unit to be located outside the building as it would have a visual impact on the character of the building.

Lighting

- 5.31** Low energy light bulbs will be provided in all fittings where possible.

CO₂ Emissions at *Be Lean* Stage

- 5.32** Table 4, below, shows the site wide estimated Regulated CO₂ emissions following the *Be Lean* measures outlined above. As shown, these result in a CO₂ emissions reduction of 21% over a Part L 2013 baseline for the new build development and 25.2% for the refurbished dwellings. SAP DER Worksheets supporting this are in Appendix A for new builds and appendix C for the refurbishment.

Table 4: Regulated Carbon Dioxide Emissions at <i>Be Lean</i> Stage		
Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)	
	New Build	Refurbishment
Baseline	21.4	136.5
After <i>Be Lean</i> Measures	16.9	102.1
Total Emissions Reduction	4.5	34.4
Percentage Reduction	21%	25.2%

- 5.33** Table 5, below, shows the total energy demand (MWh/year) for each building use of the new build development.

Table 5: Energy demand following energy efficiency measures (MWh/year)							
Building Use	Space Heating	Hot Water	Lighting	Auxiliary	Cooling	Unregulated electricity	Unregulated gas
New Build Total	36.6	34.2	5.0	3.8	0	5.9	0

6. **BE CLEAN: DECENTRALISED ENERGY**

- 6.1 In line with Policy SI3 of the London Plan, the application of decentralised heating networks as a *Be Clean* measure has been evaluated. This is the next step in the Energy Hierarchy after *Be Lean*.

Policy Context

- 6.2 Policy SI3 of the London Plan outlines the following order of preference for the selection of a heat source:

- > Connect to local existing or planned heat networks;
- > Use zero-emission or local secondary heat sources (in conjunction with heat pump, if required);
- > Use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network);
- > Use ultra-low NOx gas boilers.

Area Wide Networks

- 6.3 Figure 5 below shows the location of the site (blue circle) on the London Heat Map.

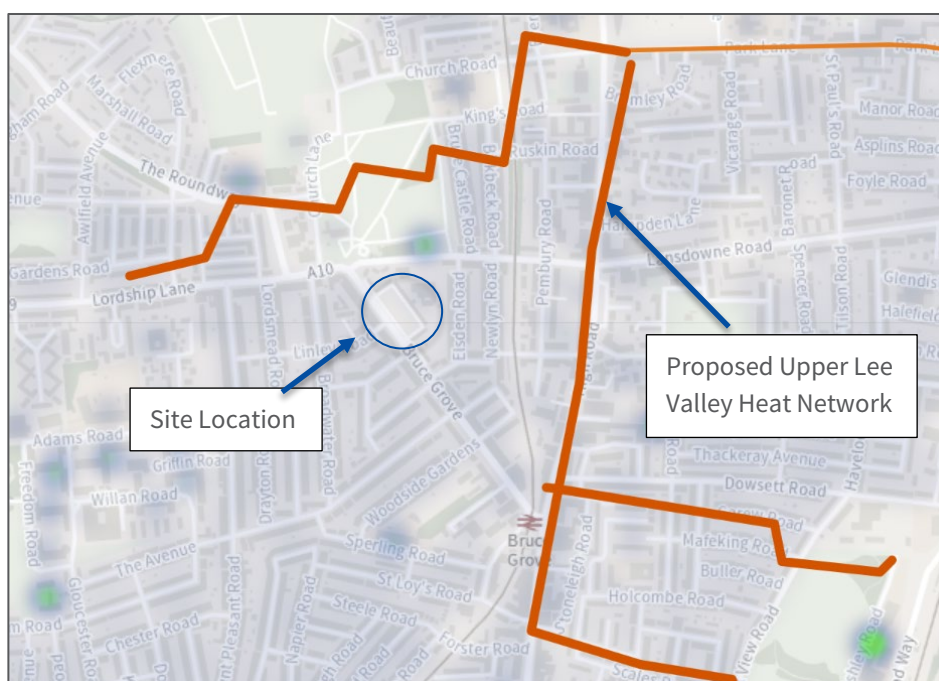


Figure 5: Site on London Heat Map (2022)

- 6.4** Existing networks are shown in red, with proposed networks in orange. There are no existing heat networks within proximity of the site, however, there is the proposed Upper Lee Valley Heat Network surrounding the development site.
- 6.5** Although plans are progressing to develop a decentralised heat network in the area, it is still in early stages and there is no clear information that suggests a network will be completed soon. There is also quite a significant distance from the development site to the proposed network route, and it would be costly to provide connection should the network become available in the future, especially to connect a small number of dwellings. The proposed development will therefore not be able to connect to an existing heat network.

Site Wide Heat Network

- 6.6** The feasibility of providing a site-wide heat network has been considered. Heat networks are generally feasible where there is a high concentration of demand from medium-high density development. This concentration can allow greater efficiency due to larger, more efficient plant installed, and provides economies of scale for the customers (fixed capital costs and management costs are spread across a larger number of dwellings).
- 6.7** The installation of communal heat networks also has high upfront costs and it is not recommended to install for low-density development. Additionally, low, intermitted heat demands from a small development can result in additional heat losses and inefficiencies from the distribution system.
- 6.8** Due to the small scale of the development it is not proposed to install a site-wide heat network to supply heating and hot water demand.
- 6.9** Therefore, it is proposed for the heating and hot water demand in the new build development to be supplied by an individual air source heat pump to each dwelling. Further details of this are included in the **Be Green** stage of the energy hierarchy.

7. ***BE GREEN*: RENEWABLE ENERGY TECHNOLOGIES**

- 7.1 The final part of the Energy Hierarchy is ***Be Green*** which seeks for renewable energy technologies to be specified to provide, where feasible, a reduction in expected CO₂ emissions. This section provides a summary of potential renewable energy sources for the development. These are only considered for the new build part of the development.

Solar Thermal Panels

- 7.2 Solar thermal panels generate heat for hot water. However, they conflict with available roof space for air source heat pump units that are proposed to provide heat and hot water demand, so therefore are not proposed.

Wind Turbines

- 7.3 Small rooftop wind turbines are designed to generate electricity from the wind for use within each dwelling. However, urban rooftop wind turbines do not generally perform sufficiently well to warrant their installation, due to the low and turbulent wind conditions present. They are therefore likely to remain technically unfeasible.

Air Source Heat Pumps (Proposed)

- 7.4 Air Source Heat Pumps (ASHPs) generate heat via compression of a refrigerant which has extracted ambient heat from the external air. The compressive action raises the temperature of the refrigerant and allows it to provide heating.
- 7.5 It is proposed that the heating and hot water demand of the new build development is supplied by individual air source heat pumps to each dwelling. For the apartments, it is likely that the heat pump units will be located on the roof of the buildings, so that outdoor amenity space for each apartment is not compromised. Each apartment will be connected to one of the heat pump units. For the new build house, the external unit will be located outside the dwelling. Space will be reserved within each dwelling for hot water cylinders.
- 7.6 It is expected that the air source heat pump units will provide a seasonal coefficient of performance (SCOP) of at least 3.00.

Photovoltaic (PV) Panels (Proposed)

- 7.7 PV panels generate electricity from solar radiation. The generating potential of PV panels is dependent on the availability of roof space and ensuring they are not overshadowed.

- 7.8** A large portion of the available roof space will be required for the proposed air source heat pump units. However, available roof space on the apartment building will be used to supply solar PV. It is estimated that approximately 5 kWp of solar PV will be provided.
- 7.9** Panels are to be positioned at an angle of 5-10 degrees towards a southerly direction.

CO₂ Emissions at *Be Green* Stage

- 7.10** Table 6, below, shows the Regulated CO₂ reductions for the new build development following the application of the *Be Green* measures. SAP DER worksheets supporting this are in Appendix D.

Table 6: Regulated Carbon Dioxide Emissions at <i>Be Green</i> Stage	
Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)
After <i>Be Clean</i> Measures	16.9
After <i>Be Green</i> Measures	6.1
Total Emissions Reduction	10.8
Percentage Reduction	50%

8. ZERO CARBON

- 8.1** The London Plan and the London Borough of Haringey planning policies require a minimum reduction in Regulated CO₂ emissions of 35% beyond the calculated baseline.
- 8.2** In addition to this, the new build development is also subject to an additional offsetting contribution to meet a total 100% reduction in Regulated CO₂ emissions in order to achieve a standard of *Zero Carbon*.
- 8.3** Table 7, below, shows the calculated carbon offsetting cost of the new build development, should the **Be Lean** and **Be Green** measures outlined in this report be adopted.

Table 7: Carbon Offset Payment		
Stage	Residual CO ₂ (Tonnes)	Offset Payment (£95/tonne/30yrs)
Residential	6.1	£17,385

- 8.4** The £95/tonne/year price as set out in the London Plan has been used, for a period of 30 years.

9. SUMMARY

- 9.1** The energy strategy for the proposed development at Edmansons Close in the London Borough of Haringey has been formulated following the London Plan energy hierarchy: **Be Lean**, **Be Clean** and **Be Green**. The overriding objective is the formulation of a strategy which effectively balances a number of key elements, including CO₂ emissions, affordability of heat, and the provision of high-quality buildings. These elements need to work with the regulatory and planning requirements for the development.
- 9.2** The proposed development will apply appropriate treatment to 44 existing almshouses and convert them to provide 26 houses. These are listed buildings and there are sensitive heritage conditions to consider. In addition the development will include a new apartment building comprising of 16 flats, two corner pavilion buildings with an additional four apartments, and one new build house.
- 9.3** The proposed development will be built to the updated Part L 2021 Building Regulations. The new Part O of building regulations will also influence the energy strategy. Updated assessment software does not yet provide reliable results to assess new development against the updated requirements in Part L. Therefore, energy demand and CO₂ emissions have been estimated against the Part L 2013 baseline within this report. The calculations have been adjusted to use SAP 10.2 carbon emission factors to estimate CO₂ performance, which are more up to date than factors used in SAP 2012 methodology.
- 9.4** For the refurbished dwellings there are limitations to the improvements that can be made due to the listed status of the buildings. A baseline assessment has been undertaken based on the expected construction of the existing building. Improvements are then proposed where possible to estimate the CO₂ reduction achieved over the existing building. The proposed improvements include draught proofing, insulating the roof and upgrading the performance of the glazing, as well as installing new gas boilers to each dwelling. A **25.2%** reduction in CO₂ emissions is estimated over the baseline.
- 9.5** For the new build development, a range of **Be Lean** energy efficiency measures are proposed. They allow the new build part of the development to achieve a **21%** reduction in site wide regulated CO₂ emissions, over a Part L 2013 baseline.
- 9.6** In line with the London Plan, the feasibility of decentralised energy production has been considered at the **Be Clean** stage. There are no existing heat networks in close proximity to the development. Due to the small scale of the development it is not proposed to install a site wide heat network as it would result in high running costs to the residents. An individual heating system for each dwelling is proposed.
- 9.7** A range of **Be Green** renewable energy technologies has been considered. It is proposed that the heating and hot water demand for the new build dwellings will be provided by individual air source

heat pumps. The available roof space on the apartment building will also be use to provide 5 kWp of solar PV. This delivers a further CO₂ reduction of **50%** for the new build dwellings.

- 9.8** Tables 9 and 10, below, summarise the anticipated site wide CO₂ emissions for the Proposed Development. The combination of the **Be Lean** and **Be Green** measures as outlined above result in an overall **71%** reduction over the Part L 2013 baseline for the new build development. A **25.2%** reduction is expected over the baseline for the refurbished development.
- 9.9** In line with the GLA guidance, the new build development will commit to offset the remaining CO₂ emissions through a payment to the London Borough of Haringey. The remaining CO₂ emissions to be offset are estimated as **6.1 Tonnes CO₂ per annum**, resulting in the estimated offset payment of **£17,385**.

Table 8: New Build Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)	
	Regulated	Unregulated
Baseline	21.4	5.9
After <i>Be Lean</i> Measures	16.9	5.9
After <i>Be Clean</i> Measures	16.9	5.9
After <i>Be Green</i> Measures	6.1	5.9
Stage	Regulated Carbon Dioxide Savings	
	Tonnes CO ₂ per Annum	Percentage
Savings from <i>Be Lean</i> Measures	4.5	21%
Savings from <i>Be Clean</i> Measures	0.0	0%
Savings from <i>Be Green</i> Measures	10.8	50%
Cumulative On-Site Savings	15.3	71%

Table 9: Refurbishment Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)	
	Regulated	
Baseline	136.5	-
After <i>Be Lean</i> Measures	102.1	-
Stage	Regulated Carbon Dioxide Savings	
	Tonnes CO ₂ per Annum	Percentage
Savings from <i>Be Lean</i> Measures	34.4	25.2%
Cumulative On-Site Savings	34.4	25.2%

APPENDICES

Appendix A

SAP TER/DER Worksheets – *New Build, Be Lean*

Appendix B

SAP TER/DER Worksheets – *Refurbishment, Baseline*

Appendix C

SAP TER/DER Worksheets – *Refurbishment, Be Lean*

Appendix D

SAP TER/DER Worksheets – *New Build, Be Green*

Appendix A

SAP TER/DER Worksheets – *New Build, Be Lean*

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P End GF - Apt				Issued on Date	23/08/2022
Assessment Reference	1B2P End GF Be Lean	Prop Type Ref				
Property	Apartment, 1B2P End GF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	84 B	DER	16.60	TER	19.61	
Environmental	90 B	% DER<TER	15.34			
CO ₂ Emissions (t/year)	0.68	DFEE	41.61	TFEE	47.84	
General Requirements Compliance	Pass	% DFEE<TFEE	13.02			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Ground-floor flat, total floor area 50 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 19.61 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 16.60 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)47.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)41.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof (no roof)	-	-	-
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 40 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 85.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation

Continuous supply and extract system
Specific fan power: 0.53
Maximum 1.5 OK
MVHR efficiency: 90%
Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overshading: Average
Windows facing South East: 2.88 m², No overhang
Windows facing South West: 8.16 m², No overhang
Windows facing North West: 0.44 m², No overhang
Air change rate: 3.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Door U-value 1.00 W/m²K
Window U-value 0.30 W/m²K
Air permeability 3.0 m³/m²h

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

		Area (m2)	Storey height (m)	Volume (m3)
Ground floor		50.2000 (1b)	x 2.5000 (2b)	= 125.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 125.5000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans	0	+	0	=	0 * 10 = 0.0000 (7a)
Number of passive vents	0	+	0	=	0 * 10 = 0.0000 (7b)
Number of fuelless gas fires	0	+	0	=	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.0000
Infiltration rate					0.1500 (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) =		0.1275 (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	(22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation with heat recovery												76.5000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2801	0.2769	0.2737	0.2578	0.2546	0.2386	0.2386	0.2354	0.2450	0.2546	0.2609	0.2673 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Door to corridor			1.2000	1.0000	1.2000		(26)
Window (Uw = 0.90)			11.4800	0.8687	9.9730		(27)
Ground Floor			50.2000	0.1300	6.5260		(28a)
External Wall	41.7500	11.4800	30.2700	0.1800	5.4486		(29a)
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274		(29b)
Total net area of external elements Aum(A, m2)			96.0800				(31)
Fabric heat loss, W/K = Sum (A x U)						23.6750	(32)
Party Wall 1			30.1300	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss (33) + (36) = 10.8325 (36)
34.5075 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	11.5988	11.4668	11.3348	10.6747	10.5427	9.8827	9.8827	9.7506	10.1467	10.5427	10.8067	11.0707 (38)
Heat transfer coeff	46.1063	45.9743	45.8422	45.1822	45.0502	44.3901	44.3901	44.2581	44.6541	45.0502	45.3142	45.5782 (39)
Average = Sum(39)m / 12 =												45.1492 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.9185	0.9158	0.9132	0.9000	0.8974	0.8843	0.8843	0.8816	0.8895	0.8974	0.9027	0.9079 (40)	0.8994 (40)
HLP (average)												
Days in month	31	28	31	30	31	30	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

												1.6960 (42)
Assumed occupancy												74.4798 (43)
Average daily hot water use (litres/day)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)
Energy content (annual)	121.4965	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629 (45)
Energy content (annual)												Total = Sum(45)m = 1171.8569 (45)
Distribution loss (46)m = 0.15 x (45)m												
	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494 (46)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	20.7916	18.7537	20.7218	20.0067	20.4397	19.9349	20.5750	20.6170	19.9740	20.6878	20.0745	(61)
Total heat required for water heating calculated for each month	142.2881	125.0153	130.3743	115.6044	112.3680	99.0894	93.9233	104.7852	105.1475	119.9493	128.4262	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Output from w/h	142.2881	125.0153	130.3743	115.6044	112.3680	99.0894	93.9233	104.7852	105.1475	119.9493	128.4262	(64)
Heat gains from water heating, kWh/month	45.5955	40.0204	41.6399	36.7879	35.6596	31.3026	29.5321	33.1402	33.3137	38.1764	41.0456	(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	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1723	11.6995	9.5147	7.2032	5.3845	4.5458	4.9119	6.3847	8.5695	10.8810	12.6997	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.7534	149.2866	145.4229	137.1977	126.8147	117.0562	110.5370	109.0038	112.8674	121.0927	131.4756	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	(71)
Water heating gains (Table 5)	61.2843	59.5542	55.9676	51.0943	47.9295	43.4758	39.6936	44.5433	46.2690	51.3124	57.0077	(72)
Total internal gains	273.6498	271.9802	262.3451	246.9351	231.5686	216.5177	206.5824	211.3716	219.1458	234.7259	252.6229	(73)

6. Solar gains

[Jan]	Area m2	Solar Flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
South	2.8800	36.7938	0.4000	0.8000	0.7700	23.4991 (77)						
Southwest	8.1600	36.7938	0.4000	0.8000	0.7700	66.5807 (79)						
Northwest	0.4400	11.2829	0.4000	0.8000	0.7700	1.1009 (81)						
Solar gains	91.1807	155.6802	213.9797	266.7593	300.2787	298.7609	287.7654	262.6585	232.2428	172.3216	109.2801	77.9886 (83)
Total gains	364.8305	427.6603	476.3248	513.6944	531.8473	515.2786	494.3477	474.0300	451.3886	407.0475	361.9030	343.7674 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilization factor for gains for living area, n1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	75.6104	75.8275	76.0458	77.1568	77.3828	78.5335	78.5335	78.7677	78.0691	77.3828	76.9320	76.4863
alpha	6.0407	6.0552	6.0697	6.1438	6.1589	6.2356	6.2356	6.2512	6.2046	6.1589	6.1288	6.0991
util living area	0.9942	0.9844	0.9586	0.8853	0.7408	0.5452	0.3944	0.4282	0.6609	0.9131	0.9855	0.9958 (86)
MIT	20.2045	20.3763	20.5931	20.8198	20.9510	20.9938	20.9993	20.9988	20.9808	20.8100	20.4647	20.1714 (87)
Th 2	20.1518	20.1541	20.1563	20.1675	20.1697	20.1809	20.1809	20.1831	20.1764	20.1697	20.1652	20.1608 (88)
util rest of house	0.9924	0.9799	0.9468	0.8561	0.6885	0.4782	0.3214	0.3529	0.5907	0.8838	0.9804	0.9945 (89)
MIT 2	19.4315	19.6025	19.8140	20.0316	20.1396	20.1783	20.1807	20.1828	20.1671	20.0297	19.7005	19.4061 (90)
Living area fraction	0.9924	0.9799	0.9468	0.8561	0.6885	0.4782	0.3214	0.3529	0.5907	0.8838	0.9804	0.9945 (89)
MIT	19.9027	20.0742	20.2889	20.5121	20.6342	20.6754	20.6797	20.6802	20.6631	20.5054	20.1663	19.8726 (92)
Temperature adjustment	19.7527	19.9242	20.1389	20.3621	20.4842	20.5254	20.5297	20.5302	20.5131	20.3554	20.0163	19.7226 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9914	0.9784	0.9465	0.8635	0.7090	0.5067	0.3525	0.3850	0.6201	0.8910	0.9793	0.9937 (94)
Useful gains	361.6791	418.4103	450.8381	443.5674	377.0844	261.0689	174.2687	182.5054	279.9093	362.6928	354.4033	341.5892 (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	712.4664	690.7244	625.2385	517.8820	395.7287	263.0283	174.4393	182.7963	286.3724	439.4814	585.2931	707.4925 (97)
Month factor	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	260.9857	182.9951	129.7538	53.5065	13.8713	0.0000	0.0000	0.0000	0.0000	57.1307	166.2407	272.2321 (98)
Space heating per m2												1136.7160 (98)
										(98) / (4) =		22.6437 (99)

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %)												90.0000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1263.0178 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	260.9857	182.9951	129.7538	53.5065	13.8713	0.0000	0.0000	0.0000	0.0000	57.1307	166.2407	272.2321 (98)
Space heating efficiency (main heating system 1)	90.0000	90.0000	90.0000	90.0000	90.0000	0.0000	0.0000	0.0000	0.0000	90.0000	90.0000	90.0000 (210)
Space heating fuel (main heating system)	289.9842	203.3279	144.1709	59.4517	15.4126	0.0000	0.0000	0.0000	0.0000	63.4786	184.7119	302.4801 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	142.2881	125.0153	130.3743	115.6044	112.3680	99.0894	93.9233	104.7852	105.1475	119.9493	128.4262	138.4410 (64)
Efficiency of water heater	88.8074	88.6308	88.3153	87.7176	87.0507	86.7000	86.7000	86.7000	86.7000	87.7379	88.5314	86.7000 (216)
Fuel for water heating, kWh/month	160.2211	141.0518	147.6237	131.7915	129.0833	114.2899	108.3314	120.8595	121.2774	136.7132	145.0629	155.7970 (219)
Annual totals kWh/year	1922.6532	1692.6224	1771.4844	1581.4980	1548.9960	1371.5188	1300.0000	1512.0000	1512.0000	1640.5588	1740.7644	1612.1027 (219)
Space heating fuel - main system	1263.0178	900.0000	616.5152	244.1709	61.6515	0.0000	0.0000	0.0000	0.0000	69.3286	196.2119	322.4801 (211)
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)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery; Database: in-use factor = 1.2500, SFP = 0.6625)												
mechanical ventilation fans (SFP = 0.6625)												101.4354 (230a)
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												176.4354 (231)
Electricity for lighting (calculated in Appendix L)												232.6273 (232)
Total delivered energy for all uses												3284.1831 (238)

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

Space heating - main system 1	1263.0178	0.2160	272.8118	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1612.1027	0.2160	348.2182	(264)
Space and water heating			621.0260	(265)
Pumps and fans	176.4354	0.5190	91.5700	(267)
Energy for lighting	232.6273	0.5190	120.7336	(268)
Total CO2, kg/year			833.3296	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			16.6000	(273)
DER			16.6000	ZC1
Total Floor Area			50.2000	
Assumed number of occupants			1.6960	
CO2 emission factor in Table 12 for electricity displaced from grid			0.5190	
CO2 emissions from appliances, equation (L14)			17.4413	ZC2
CO2 emissions from cooking, equation (L16)			3.1814	ZC3
Total CO2 emissions			37.2227	ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000	ZC5
Additional allowable electricity generation, kWh/m²/year			0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	ZC7
Net CO2 emissions			37.2227	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

Ground floor	Area (m2)	Storey height (m)	Volume (m3)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000	2.5000	125.5000
Dwelling volume			125.5000

2. Ventilation rate

Number of chimneys	main heating	secondary heating	other	total	m3 per hour
Number of open flues	0	0	0	0	0.0000 (6a)
Number of intermittent fans	0	0	0	0	0.0000 (6b)
Number of passive vents	0	0	0	0	20.0000 (7a)
Number of fuelless gas fires	0	0	0	0	0.0000 (7b)
Infiltration due to chimneys, flues and fans					0.0000 (7c)
Pressure test					20.0000 / (5) = 0.1594 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4094 (18)
Shelter factor					2 (19)
Infiltration rate adjusted to include shelter factor					0.8500 (20)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Adj infiltr rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
Effective ac	0.4436	0.4349	0.4262	0.3828	0.3741	0.3306	0.3306	0.3219	0.3480	0.3741	0.3915	0.4089
	0.5984	0.5946	0.5908	0.5733	0.5700	0.5546	0.5546	0.5518	0.5605	0.5700	0.5766	0.5836

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.2000	1.0000	1.2000		(26)
TER Opening Type (Uw = 1.40)			11.3600	1.3258	15.0606		(27)
Ground Floor			50.2000	0.1300	6.5260		(28a)
External Wall	41.7500	11.3600	30.3900	0.1800	5.4702		(29a)
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274		(29b)
Total net area of external elements Aum(A, m2)			96.0800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	28.7842	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.2290 (36)
Total fabric heat loss							(33) + (36) = 36.0132 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	24.7832	24.6249	24.4698	23.7412	23.6048	22.9702	22.9702	22.8527	23.2147	23.6048	23.8806	24.1689
Heat transfer coeff	60.7964	60.6381	60.4830	59.7544	59.6180	58.9834	58.9834	58.8659	59.2279	59.6180	59.8938	60.1822
Average = Sum(39)m / 12 =												
HLP	1.2111	1.2079	1.2048	1.1903	1.1876	1.1750	1.1750	1.1726	1.1798	1.1876	1.1931	1.1988
HLP (average)												
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6960 (42)
Average daily hot water use (litres/day)												74.4798 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)
Energy content (annual)	121.4965	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629 (45)
Distribution loss (46)m = 0.15 x (45)m												
	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494 (46)
Water storage loss:												
Total storage loss:												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	41.7495	36.3380	38.7132	35.9952	35.6768	33.0568	34.1587	35.6768	35.9952	38.7132	38.9335	41.7495	(61)
Total heat required for water heating	163.2460	142.5996	148.3656	131.5928	127.4051	112.2113	107.5069	119.8451	121.1686	137.9746	147.2852	159.4124	(62)
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	(63)
Output from w/h	163.2460	142.5996	148.3656	131.5928	127.4051	112.2113	107.5069	119.8451	121.1686	137.9746	147.2852	159.4124	(64)
Heat gains from water heating, kWh/month	50.8350	44.4165	46.1377	40.7850	39.4188	34.5831	32.9280	36.9051	37.3190	42.6827	45.7603	49.5603	(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	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1698	11.6973	9.5129	7.2019	5.3835	4.5450	4.9110	6.3835	8.5679	10.8789	12.6973	13.5359	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.7534	149.2866	145.4229	137.1977	126.8147	117.0362	110.5370	109.0038	112.8674	121.0927	131.4756	141.2341	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	(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)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	(71)
Water heating gains (Table 5)	68.3266	66.0959	62.0131	56.6459	52.9823	48.0320	44.2580	49.6037	51.8319	57.3693	63.5560	66.6133	(72)
Total internal gains	280.6896	278.5197	268.3888	252.4853	236.6204	221.0731	211.1459	216.4308	224.7071	240.7807	259.1688	272.8231	(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	
Southeast	2.8500	36.7938	0.6300	0.7000	0.7700	32.0473	(77)
Southwest	8.0700	36.7938	0.6300	0.7000	0.7700	90.7445	(79)
Northwest	0.4400	11.2829	0.6300	0.7000	0.7700	1.5172	(81)
Solar gains	124.3090	212.2483	291.7459	363.7310	409.4570	407.3969	392.3992
Total gains	404.9987	490.7680	560.1347	616.2163	646.0774	628.4700	603.5450

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nilm (see Table 9a)	57.3407	57.4904	57.6379	58.3407	58.4741	59.1032	59.1032	59.2212	58.8593	58.4741	58.2048	57.9260	
tau	4.8227	4.8327	4.8425	4.8894	4.8983	4.9402	4.9402	4.9481	4.9240	4.8983	4.8803	4.8617	
util living area	0.9928	0.9818	0.9556	0.8891	0.7614	0.5803	0.4262	0.4652	0.6978	0.9196	0.9840	0.9947	(86)
MIT	19.8654	20.0846	20.3669	20.6748	20.8838	20.9762	20.9957	20.9935	20.9424	20.6608	20.2002	19.8245	(87)
Th 2	19.9111	19.9137	19.9161	19.9277	19.9299	19.9401	19.9401	19.9420	19.9362	19.9299	19.9255	19.9209	(88)
util rest of house	0.9905	0.9761	0.9419	0.8568	0.7003	0.4928	0.3255	0.3613	0.6113	0.8883	0.9781	0.9929	(89)
MIT 2	18.4262	18.7440	19.1460	19.5714	19.8260	19.9257	19.9386	19.9396	19.8959	19.5662	18.9224	18.3738	(90)
Living area fraction	19.3035	19.5612	19.8902	20.2440	20.4708	20.5661	20.5830	20.5820	20.5338	20.2334	19.7013	19.2581	(92)
MIT	19.3035	19.5612	19.8902	20.2440	20.4708	20.5661	20.5830	20.5820	20.5338	20.2334	19.7013	19.2581	(92)
Temperature adjustment	19.3035	19.5612	19.8902	20.2440	20.4708	20.5661	20.5830	20.5820	20.5338	20.2334	19.7013	19.2581	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9888	0.9738	0.9415	0.8672	0.7325	0.5454	0.3870	0.4247	0.6616	0.8983	0.9765	0.9915
Useful gains	400.4716	477.9182	527.3638	534.3841	473.2725	342.7840	233.6888	244.0397	358.1787	427.3254	398.5650	376.8382
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	912.1585	889.0268	809.8814	677.8523	522.8957	351.8988	234.9304	246.1762	381.0631	574.3242	754.7380	906.2269
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000
Space heating kWh	380.6951	276.2650	210.1931	103.2971	36.9197	0.0000	0.0000	0.0000	0.0000	109.3671	256.4446	394.5348
Space heating												1767.7164
Space heating per m2										(98) / (4) =		35.2135

8c. Space cooling requirement

Not applicable

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)													93.4000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													1892.6300	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	380.6951	276.2650	210.1931	103.2971	36.9197	0.0000	0.0000	0.0000	0.0000	109.3671	256.4446	394.5348	(98)	
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)	
Space heating fuel (main heating system)	407.5964	295.7869	225.0461	110.5965	39.5285	0.0000	0.0000	0.0000	0.0000	117.0954	274.5659	422.4142	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	163.2460	142.5996	148.3656	131.5928	127.4051	112.2113	107.5069	119.8451	121.1686	137.9746	147.2852	159.4124	(64)	
Efficiency of water heater	87.1117	86.6880	85.9279	84.4493	82.3676	80.3000	80.3000	80.3000	80.3000	84.4731	86.4339	87.2422	(216)	
Fuel for water heating, kWh/month	187.3985	164.4975	172.6629	155.8247	154.6787	139.7401	133.8816	149.2466	150.8949	163.3355	170.4020	182.7239	(219)	
Water heating fuel used												1925.2870	(219)	
Annual totals kWh/year												1892.6300	(211)	
Space heating fuel - main system												0.0000	(215)	
Space heating fuel - secondary												30.0000	(230c)	
Electricity for pumps and fans:												45.0000	(230e)	
central heating pump												75.0000	(231)	
main heating flue fan												232.5833	(232)	
Total electricity for the above, kWh/year												4125.5003	(238)	
Electricity for lighting (calculated in Appendix L)														
Total delivered energy for all uses														

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	0.2160	408.8081
Space heating - secondary	0.0000	0.0000
Water heating (other fuel)	0.2160	415.8620
Space and water heating		824.6701
Pumps and fans		38.9250
Energy for lighting	0.5190	120.7107
Total CO2, kg/m2/year		984.3058
Emissions per m2 for space and water heating		16.4277
Fuel factor (main gas)		1.0000
Emissions per m2 for lighting		2.4046
Emissions per m2 for pumps and fans		0.7754
Target Carbon Dioxide Emission Rate (TER) = (16.4277 * 1.00) + 2.4046 + 0.7754, rounded to 2 d.p.		19.6100

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P End MF - Apt				Issued on Date	23/08/2022
Assessment Reference	1B2P End MF Be Lean	Prop Type Ref				
Property	Apartment, 1B2P End MF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	85 B	DER	14.24	TER	17.23	
Environmental	91 B	% DER<TER	17.37			
CO ₂ Emissions (t/year)	0.61	DFEE	31.20	TFEE	35.93	
General Requirements Compliance	Pass	% DFEE<TFEE	13.14			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-floor flat, total floor area 50 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 17.23 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.24 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)35.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)31.2 kWh/m²/yrOK

2 Fabric U-values
Element Average Highest
External wall 0.18 (max. 0.30) 0.18 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK
Floor (no floor)
Roof (no roof)
Openings 0.91 (max. 2.00) 1.00 (max. 3.30) OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability
Air permeability at 50 pascals: 3.00 (design value)
Maximum 10.0 OK

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 40 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation
Hot water storage No cylinder

6 Controls
Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls: No cylinder

Boiler interlock Yes OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Continuous supply and extract system
Specific fan power: 0.53
Maximum 1.5 OK
MVHR efficiency: 90%
Minimum: 70% OK

9 Summertime temperature
Overheating risk (Thames Valley): Medium OK

Based on:
Overshading: Average
Windows facing South East: 2.88 m², No overhang
Windows facing South West: 8.16 m², No overhang
Windows facing North West: 0.44 m², No overhang
Air change rate: 3.00 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K
Door U-value 1.00 W/m²K
Window U-value 0.30 W/m²K
Air permeability 3.0 m³/m²h

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.2000 (1b)	x 2.5000 (2b)	= 125.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	125.5000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0	0 * 40 = 0.0000 (6a)
Number of open flues	0	0	0	0	0 * 20 = 0.0000 (6b)
Number of intermittent fans	0	0	0	0	0 * 10 = 0.0000 (7a)
Number of passive vents	0	0	0	0	0 * 10 = 0.0000 (7b)
Number of fuelless gas fires	0	0	0	0	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.0000
Infiltration rate					0.1500 (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) =		0.1275 (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 infilrt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												76.5000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2801	0.2769	0.2737	0.2578	0.2546	0.2386	0.2386	0.2354	0.2450	0.2546	0.2609	0.2673 (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
Door to corridor			1.2000	1.0000	1.2000		(26)
Window (Uw = 0.90)			11.4800	0.8687	9.9730		(27)
External Wall	41.7500	11.4800	30.2700	0.1800	5.4486		(29a)
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274		(29a)
Total net area of external elements Aum(A, m ²)			45.8800				(33)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		17.1490		(33)
Party Wall 1			30.1300	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.3780 (36)
Total fabric heat loss						(33) + (36) =	25.5270 (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
	11.5988	11.4668	11.3348	10.6747	10.5427	9.8827	9.8827	9.7506	10.1467	10.5427	10.8067	11.0707 (38)
Heat transfer coeff	37.1258	36.9938	36.8617	36.2017	36.0697	35.4096	35.4096	35.2776	35.6736	36.0697	36.3337	36.5977 (39)
Average = Sum(39)m / 12 =												36.1687 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.7396	0.7369	0.7343	0.7211	0.7185	0.7054	0.7054	0.7027	0.7106	0.7185	0.7238	0.7220 (40)
HLP (average)												0.7205 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6960 (42)
Average daily hot water use (litres/day)												74.4798 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)
Energy conte	121.4965	106.2616	109.6525	95.5977	91.7282	79.1345	73.3483	84.1682	85.1735	99.2615	108.3516	117.6429 (45)
Energy content (annual)												Total = Sum(45)m = 1171.8569 (45)
Distribution loss (46)m = 0.15 x (45)m												
	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494 (46)
Water storage loss:												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Combi loss	20.7916	18.7537	20.7218	20.0067	20.6397	19.9349	20.5750	20.6170	19.9740	20.6878	20.0745	20.7781 (61)
Total heat required for water heating calculated for each month	142.2881	125.0153	130.3743	115.6044	112.3680	99.0894	93.9233	104.7852	105.1475	119.9493	128.4262	138.4410 (62)
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 (63)
Output from w/h	142.2881	125.0153	130.3743	115.6044	112.3680	99.0894	93.9233	104.7852	105.1475	119.9493	128.4262	138.4410 (64)
Heat gains from water heating, kWh/month	45.5955	40.0204	41.6399	36.7879	35.6596	31.3026	29.5321	33.1402	33.3137	38.1764	41.0456	44.3174 (65)
Total per year (kWh/year) = Sum(64)m =												1415.4118 (64)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1723	11.6995	9.5147	7.2032	5.3845	4.5458	4.9119	6.3847	8.5695	10.8810	12.6997	13.5384 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.7534	149.2866	145.4229	137.1977	126.8147	110.5370	109.0038	112.8678	121.0927	131.4756	141.2341	141.2341 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800 (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)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396 (71)
Water heating gains (Table 5)	61.2843	59.5542	55.9676	51.0943	47.9295	43.4758	39.6936	44.5433	46.2690	51.3124	57.0077	59.5664 (72)
Total internal gains	273.6498	271.9802	262.3451	246.9351	231.5686	216.5177	206.5824	211.3716	219.1458	234.7259	252.6229	265.7788 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	FF Specific data or Table 6c	Access Factor Table 6d	Gains W
Southeast	2.8800	36.7938	0.4000	0.8000	0.7700	23.4991 (77)
Southwest	8.1600	36.7938	0.4000	0.8000	0.7700	66.5400 (78)
Northwest	0.4400	11.2829	0.4000	0.8000	0.7700	1.1009 (81)

Solar gains	91.1807	155.6803	213.9797	266.7593	300.2787	298.7609	287.7654	262.6585	232.2428	172.3216	109.2801	77.9886 (83)
Total gains	364.8305	427.6603	476.3248	513.6944	531.8473	515.2786	494.3477	474.0300	451.3886	407.0475	361.9030	343.7674 (84)

7. Mean internal temperature (heating season)

Utilisation factor for gains for living area from Table 9, Th1 (C)													21.0000 (85)
tau	93.9001	94.2351	94.5726	96.2969	96.6494	98.4509	98.4509	98.8193	97.7223	96.6494	95.9470	95.2549	
alpha	7.2600	7.2823	7.3048	7.4198	7.4433	7.5634	7.5634	7.5880	7.5148	7.4433	7.3965	7.3503	
util living area	0.9911	0.9730	0.9238	0.8006	0.6230	0.4393	0.3151	0.3423	0.5427	0.8426	0.9743	0.9938 (86)	
MIT	20.4775	20.6369	20.8088	20.9456	20.9917	20.9995	21.0000	20.9999	20.9976	20.9347	20.6908	20.4464 (87)	
Th 2	20.3060	20.3083	20.3106	20.3222	20.3245	20.3361	20.3361	20.3384	20.3315	20.3245	20.3199	20.3153 (88)	
util rest of house	0.9886	0.9660	0.9067	0.7676	0.5804	0.3940	0.2676	0.2931	0.4913	0.8067	0.9665	0.9920 (89)	
MIT 2	19.8338	19.9910	20.1544	20.2832	20.3196	20.3359	20.3361	20.3384	20.3303	20.2790	20.0551	19.8112 (90)	
Living area fraction									FIA = Living area / (4) =			0.6096 (91)	
MIT	20.2262	20.3847	20.5533	20.6870	20.7293	20.7404	20.7408	20.7416	20.7371	20.6787	20.4426	20.1984 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	20.0762	20.2347	20.4033	20.5370	20.5793	20.5904	20.5908	20.5916	20.5871	20.5287	20.2926	20.0484 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9876	0.9652	0.9092	0.7784	0.5966	0.4114	0.2858	0.3119	0.5110	0.8181	0.9662	0.9912 (94)
Useful gains	360.3141	412.7778	433.0847	399.8457	317.3099	211.9655	141.3035	147.8565	230.6707	333.0118	349.6539	340.7341 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.6000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	585.7021	567.2878	512.5006	421.2790	320.2729	212.1172	141.3113	147.8172	231.4175	358.1255	479.3369	580.0163 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	167.6887	103.8307	59.0854	15.4320	2.2044	0.0000	0.0000	0.0000	0.0000	18.6846	93.3718	178.0260 (98)
Space heating												638.3236 (98)
Space heating per m ²										(98) / (4) =		12.7156 (99)

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %)											90.0000 (206)	
Efficiency of secondary/supplementary heating system, %											0.0000 (208)	
Space heating requirement											709.2484 (211)	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	167.6887	103.8307	59.0854	15.4320	2.2044	0.0000	0.0000	0.0000	0.0000	18.6846	93.3718	178.0260 (98)
Space heating efficiency (main heating system 1)												
90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	0.0000	0.0000	0.0000	90.0000	90.0000	90.0000 (210)	
Space heating fuel (main heating system)												
186.3208	115.3675	65.6505	17.1466	2.4494	0.0000	0.0000	0.0000	0.0000	20.7607	103.7464	197.8066 (211)	
Water heating requirement												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating requirement												
142.2881	125.0153	130.3743	115.6044	112.3680	99.0894	93.9233	104.7852	105.1475	119.9493	128.4262	138.4410 (64)	
Efficiency of water heater												
(217)%	88.4546	88.1668	87.7029	87.0760	86.7612	86.7000	86.7000	86.7000	87.1306	88.0593	88.5260 (217)	
Fuel for water heating, kWh/month												
160.8601	141.7941	148.6545	132.7626	129.5141	114.2899	108.3314	120.8595	121.2774	137.6661	145.8406	156.3846 (219)	
Water heating fuel used												
Annual totals kWh/year											1618.2349 (219)	
Space heating fuel - main system												
Space heating fuel - secondary											709.2484 (211)	
											0.0000 (215)	
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6625)												
mechanical ventilation fans (SFP = 0.6625)											101.4354 (230a)	
central heating pump											30.0000 (230c)	
main heating flue fan											43.0000 (230e)	
Total electricity for the above, kWh/year											176.4354 (231)	
Electricity for lighting (calculated in Appendix L)											232.6273 (232)	
Total delivered energy for all uses											2736.5460 (238)	

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

	Energy	Emission factor	Emissions									
	kWh/year	kg CO2/kWh	kg CO2/year									
Space heating - main system 1	709.2484	0.2160	153.1977 (261)									
Space heating - secondary	0.0000	0.0000	0.0000 (263)									
Water heating (other fuel)	1618.2349	0.2160	349.5387 (264)									
Space and water heating			502.7364 (265)									
Pumps and fans	176.4354	0.5190	91.5700 (267)									
Energy for lighting	232.6273	0.5190	120.7336 (268)									
Total CO2, kg/year			715.0399 (272)									
Dwelling Carbon Dioxide Emission Rate (DER)			14.2400 (273)									

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES												
DER												
Total Floor Area		TFA	50.2000									
Assumed number of occupants		N	1.6960									
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190									
CO2 emissions from appliances, equation (L14)			17.4413 ZC2									
CO2 emissions from cooking, equation (L16)			3.1814 ZC3									
Total CO2 emissions			34.8627 ZC4									
Residual CO2 emissions offset from biofuel CHP			0.0000 ZC5									
Additional allowable electricity generation, kWh/m ² /year			0.0000 ZC6									
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000 ZC7									
Net CO2 emissions			34.8627 ZC8									

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)												
CALCULATION OF TARGET EMISSIONS 09 Jan 2014												

1. Overall dwelling dimensions												

Ground floor						Area	Storey height				Volume	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000					50.2000 (1b)	x	2.5000 (2b)	=	125.5000 (1b) - (3b)	(4)	
Dwelling volume						(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =				125.5000 (5)		

2. Ventilation rate												

Number of chimneys	main heating					secondary heating		other		total		m3 per hour
Number of open flues	0 + 0					0 + 0		0 = 0		0 + 40 = 0.0000 (6a)		
Number of intermittent fans	0 + 0					0 + 0		0 = 0		0 + 20 = 0.0000 (6b)		
Number of passive vents										2 x 10 = 20.0000 (7a)		
Number of fuelless gas fires										0 + 10 = 0.0000 (7b)		
										0 + 40 = 0.0000 (7c)		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =										20.0000 / (5) = 0.1594 (8)		
Pressure test										Yes		
Measured/design AP50										5.0000		
Infiltration rate										0.4094 (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) =		0.3480 (21)		
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infilrt rate	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)
Effective ac	0.4436	0.4349	0.4262	0.3828	0.3741	0.3306	0.3306	0.3219	0.3480	0.3741	0.3915	0.4089 (22b)
	0.5984	0.5946	0.5908	0.5733	0.5700	0.5546	0.5546	0.5518	0.5605	0.5700	0.5766	0.5836 (25)

3. Heat losses and heat loss parameter												

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K					
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opaque door			1.2000	1.0000	1.2000			(26)				
TER Opening Type (Uw = 1.40)			11.3600	1.3258	15.0606			(27)				
External Wall	41.7500	11.3600	30.3900	0.1800	5.4702			(29a)				
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274			(29a)				
Total net area of external elements Aum(A, m2)			45.8800					(31)				
Fabric heat loss, W/K = Sum (A x U)						(26)...(30) + (32) =	22.2582	(33)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								4.3560 (36)				
Total fabric heat loss								(33) + (36) = 26.6142 (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	24.7832	24.6249	24.4698	23.7412	23.6048	22.9702	22.9702	22.8527	23.2147	23.6048	23.8806	24.1689 (38)
Average = Sum(39)m / 12 =	51.3974	51.2391	51.0840	50.3554	50.2190	49.5844	49.5844	49.4669	49.8289	50.2190	50.4948	50.7832 (39)
	50.3547 (39)											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0239	1.0207	1.0176	1.0031	1.0004	0.9877	0.9877	0.9854	0.9926	1.0004	1.0059	1.0116 (40)
Days in month												1.0031 (40)
	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)												

Assumed occupancy	1.6960 (42)											
Average daily hot water use (litres/day)	74.4798 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)
Energy content (annual)	121.4965	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629 (45)
Distribution loss (46)m = 0.15 x (45)m	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	41.7495	36.3380	38.7132	35.9952	35.6768	33.0568	34.1587	35.6768	35.9952	38.7132	38.9335	41.7495 (61)

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Total heat required for water heating calculated for each month													
	163.2460	142.5996	148.3656	131.5928	127.4051	112.2113	107.5069	119.8451	121.1686	137.9746	147.2852	159.4124 (62)	
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 (63)	
								Solar input (sum of months) =	Sum(63)=			0.0000 (63)	
Output from w/h	163.2460	142.5996	148.3656	131.5928	127.4051	112.2113	107.5069	119.8451	121.1686	137.9746	147.2852	159.4124 (64)	
								Total per year (kWh/year) =					Sum(64)=
Heat gains from water heating, kWh/month	50.8350	44.1465	46.1377	40.7850	39.4188	34.5831	32.9280	36.9051	37.3190	42.6827	45.7603	49.5603 (65)	

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995
Lighting gains (calculated in Appendix L, equation 15 or L9a), also see Table 5	1.1698	1.1693	9.5109	7.2019	5.3835	4.9110	4.9110	6.3835	8.5679	10.8789	12.6973	13.3559 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.7534	149.2866	15.4229	137.1977	126.8147	117.0562	110.5370	109.0038	112.8674	121.0927	131.4756	141.2341 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800 (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)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396 (71)
Water heating gains (Table 5)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396 (72)
Total internal gains	68.3266	66.0959	62.0131	56.6459	52.9823	48.0320	44.2580	49.6037	51.8139	57.3693	63.5566	66.6133 (73)
280.6896	278.5197	268.3888	252.4853	236.6204	221.0731	211.1459	216.4038	224.7071	240.7807	259.1688	272.8283 (74)	

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
-----	-----	-----	-----	-----	-----	-----
Southeast	2.8500	36.7938	0.6300	0.7000	0.7700	32.0473 (77)
Southwest	0.8700	36.7938	0.6300	0.7000	0.7700	90.7465 (79)
Northwest	0.4000	11.2829	0.6300	0.7000	0.7700	1.5172 (81)

Solar gains	124.3090	212.2483	291.7459	363.7310	409.4570	407.3969	392.3992	358.1478	316.6543	234.9405	148.9854	106.3233 (83)
Total gains	404.9987	490.7680	560.1347	616.2163	646.0774	628.4700	603.5450	574.5786	541.3614	475.7212	408.1542	379.1463 (84)

Utilization factor for gains for living area, $n_{l,m}$ (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	68.0361	65.537	2302	69.1022	69.4181	70.1046	68.7136	68.9617	68.4181	68.0390	66.4470	5.765	
alpha	5.5218	5.5357	5.5495	5.6153	5.6279	5.6871	5.6871	5.6982	5.6641	5.6279	5.6026	5.5678	
util living area													
	0.9916	0.9764	0.9384	0.8440	0.6864	0.4998	0.3608	0.3948	0.6165	0.8858	0.9794	0.9939 (86)	
MIT	0.12054	0.23375	0.58877	0.8285	0.9546	0.9937	0.9992	0.9986	0.9806	0.8059	0.4195	0.20359 (87)	
TH 2	0.20635	0.20661	0.20687	0.20808	0.20830	0.20936	0.20936	0.20955	0.20895	0.20830	0.20784	0.20737 (88)	
util rest of house													
	0.9890	0.9696	0.9218	0.8080	0.6300	0.4313	0.2868	0.3178	0.5426	0.8496	0.9722	0.9921 (89)	
MIT 2	18.9146	19.2297	19.5722	19.8975	20.0436	20.0898	20.0933	20.0950	20.0763	19.8800	19.3509	18.8650 (90)	
living area fraction													
	0.9890	0.9696	0.9218	0.8080	0.6300	0.4313	0.2868	0.3178	0.5426	0.8496	0.9722	0.9921 (91)	
MIT	19.6527	19.9014	20.1912	20.4650	20.5989	20.6408	20.6455	20.6458	20.6275	20.4444	20.0023	19.0092 (92)	
Temperature adjustment													
adjusted MIT 19.6527	19.9014	20.1912	20.4650	20.5989	20.6408	20.6455	20.6458	20.6275	20.4444	20.0023	19.0092 (93)		

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9876	0.9681	0.9242	0.8238	0.6624	0.4729	0.3319	0.3648	0.5870	0.8650	0.9715	0.9805 (94)
Unful gain	336,454	475,137	571,694	427,940	297,183	209,677	209,677	209,668	411,473	376,524	375,083 (93)	375,083 (93)
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.0000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate	789.0872	768.6611	699.4022	582.3598	446.8966	299.5292	200.5927	210.0280	325.2588	494.3777	651.4985	782.5273 (97)
Space heating	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	289.4984	279.1350	251.1302	53.7772	14.1036	0.0000	0.0000	0.0000	0.0000	61.6764	138.5812	302.6493 (98)
Space heating per m2												312.7727 (98)
												(98) / (94) = 24.6568 (99)

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(20)
Fraction of space heat from main system(s)	1.0000	(20)
Efficiency of main space heating system 1 (in %)	93.4000	(20)
Efficiency of secondary/supplementary heating system, %	0.0000	(20)
Space heating requirement	1325.2384	(21)

[illegible][illegible]

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	km ³ /year	mmBtu/kWh	kg CO ₂ /kWh	kg CO ₂ /kWh
Space heating - main system 1	1325.2384	0.2160	286.2515	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(262)
Water heating (other fuel)	1940.9189	0.2160	419.2385	(264)
Space and water heating			705.4900	(265)
Pumps and fans	75.0000	0.5190	38.8250	(267)
Energy for lighting	232.5833	0.5190	120.1707	(268)
Total CO ₂ , kg/m ² /year			865.1257	(270)
Emissions per m ² for space and water heating			14.0536	(272)
fuel factor (main gas)			1.0000	
Emissions per m ² for lighting			2.4046	(272)
Emissions per m ² for pumps and fans			0.7754	(272)
Target Carbon Dioxide Emission Rate (TER) = (14.0536 * 1.00) + 2.4046 + 0.7754, rounded to 2 d.p.			17.2336	(273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P End TF - Apt				Issued on Date	23/08/2022
Assessment Reference	1B2P End TF Be Lean	Prop Type Ref				
Property	Apartment, 1B2P End TF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	83 B	DER	18.19	TER	22.90	
Environmental	89 B	% DER<TER	20.57			
CO ₂ Emissions (t/year)	0.73	DFEE	48.43	TFEE	64.21	
General Requirements Compliance	Pass	% DFEE<TFEE	24.57			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Top-floor flat, total floor area 50 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 22.90 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 18.19 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)64.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)48.4 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor (no floor)			
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 40 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%

Minimum 75% OK

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power: 0.53

Maximum 1.5 OK

MVHR efficiency: 90%

Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Slight OK

Based on:

Overshading: Average

Windows facing North East: 8.16 m², No overhang

Windows facing South East: 2.88 m², No overhang

Windows facing North West: 0.44 m², No overhang

Air change rate: 3.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Roof U-value 0.10 W/m²K

Door U-value 1.00 W/m²K

Window U-value 0.90 W/m²K

Air permeability 3.0 m³/m²h

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014



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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %)												90.0000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1635.4264 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	307.5891	237.6466	187.5905	87.7955	25.0466	0.0000	0.0000	0.0000	0.0000	98.8494	211.9513	315.4147 (98)
Space heating efficiency (main heating system 1)	90.0000	90.0000	90.0000	90.0000	90.0000	0.0000	0.0000	0.0000	0.0000	90.0000	90.0000	90.0000 (210)
Space heating fuel (main heating system)	341.7657	264.0518	208.4339	97.5506	27.8296	0.0000	0.0000	0.0000	0.0000	109.8327	235.5014	350.4608 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	142.2881	125.0153	130.3743	115.6044	112.3680	99.0894	93.9233	104.7852	105.1475	119.9493	128.4262	138.4410 (64)
Efficiency of water heater (217)m	88.9294	88.8344	88.6170	88.0942	87.2833	86.7000	86.7000	86.7000	86.7000	88.1604	88.7258	88.9671 (217)
Fuel for water heating, kWh/month	160.0011	140.7284	147.1211	131.2281	128.7393	114.2899	108.3314	120.8595	121.2774	136.0580	144.7450	155.6092 (219)
Water heating fuel used	1608.9884											1608.9884 (219)
Annual totals kWh/year												
Space heating fuel - main system												1635.4264 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery; Database: in-use factor = 1.2500, SFP = 0.6625)												
mechanical ventilation fans (SFP = 0.6625)												101.4354 (230a)
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												176.4354 (231)
Electricity for lighting (calculated in Appendix L)												232.6273 (232)
Total delivered energy for all uses												3653.4775 (238)

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

Space heating - main system 1	1635.4264	0.2160	353.2521	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1608.9884	0.2160	347.5415	(264)
Space and water heating			700.7936	(265)
Pumps and fans	176.4354	0.5190	91.5700	(267)
Energy for lighting	232.6273	0.5190	120.7336	(268)
Total CO2, kg/year			913.0971	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			18.1900	(273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER	18.1900	ZC1
Total Floor Area	50.2000	TFA
Assumed number of occupants	1.6960	N
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190	EF
CO2 emissions from appliances, equation (L14)	17.4413	ZC2
CO2 emissions from cooking, equation (L16)	3.1814	ZC3
Total CO2 emissions	38.8127	ZC4
Residual CO2 emissions offset from biofuel CHP	0.0000	ZC5
Additional allowable electricity generation, kWh/m ² /year	0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation	0.0000	ZC7
Net CO2 emissions	38.8127	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

Ground floor	Area (m2)	Storey height (m)	Volume (m3)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000	2.5000	125.5000
Dwelling volume			125.5000

2. Ventilation rate

Number of chimneys	main heating	secondary heating	other	total	m3 per hour
Number of open flues	0	0	0	0	0.0000 (6a)
Number of intermittent fans	0	0	0	0	0.0000 (6b)
Number of passive vents	0	0	0	0	20.0000 (7a)
Number of fuelless gas fires	0	0	0	0	0.0000 (7b)
Infiltration due to chimneys, flues and fans					0.0000 (7c)
Pressure test					20.0000 / (5) = 0.1594 (8)
Measured/design AP50					Yes
Infiltration rate					5.0000
Number of sides sheltered					0.4094 (18)
Shelter factor					2 (19)
Infiltration rate adjusted to include shelter factor					(20) = 1 - [0.075 x (19)] = 0.8500 (20)
					(21) = (18) x (20) = 0.3480 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Adj infiltr rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
Effective ac	0.4436	0.4349	0.4262	0.3828	0.3741	0.3306	0.3306	0.3219	0.3480	0.3741	0.3915	0.4089
	0.5984	0.5946	0.5908	0.5733	0.5700	0.5546	0.5546	0.5518	0.5605	0.5700	0.5766	0.5836

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.2000	1.0000	1.2000		(26)
TER Opening Type (Uw = 1.40)			11.3600	1.3258	15.0606		(27)
External Wall	41.7500	11.3600	30.3900	0.1800	5.4702		(29a)
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274		(29a)
External Roof 1	50.2000		50.2000	0.1300	6.5260		(30)
Total net area of external elements Aum(A, m2)			96.0800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 28.7842		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.2590 (36)
Total fabric heat loss							(33) + (36) = 43.0432 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	24.7832	24.6249	24.4698	23.7412	23.6048	22.9702	22.9702	22.8527	23.2147	23.6048	23.8806	24.1689
Heat transfer coeff	67.8264	67.6681	67.5130	66.7844	66.6480	66.0134	66.0134	65.8959	66.2579	66.6480	66.9238	67.2122
Average = Sum(39)m / 12 =												
HLP	1.3511	1.3480	1.3449	1.3304	1.3277	1.3150	1.3150	1.3127	1.3199	1.3277	1.3331	1.3389
HLP (average)												
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6960	(42)
Average daily hot water use (litres/day)													74.4798	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278	(44)	
Energy content (annual)	121.4965	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629	(45)	
Energy content (annual)													(45)	
Distribution loss (46)m = 0.15 x (45)m	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494	(46)	
Water storage loss:														
Total storage loss:														
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	41.7495	36.3380	38.7132	35.9952	35.6768	33.0568	34.1587	35.6768	35.9952	38.7132	38.9335	41.7495	(61)
Total heat required for water heating	163.2460	142.5996	148.3656	131.5928	127.4051	112.2113	107.5069	119.8451	121.1686	137.9746	147.2852	159.4124	(62)
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	(63)
Output from w/h	163.2460	142.5996	148.3656	131.5928	127.4051	112.2113	107.5069	119.8451	121.1686	137.9746	147.2852	159.4124	(64)
Heat gains from water heating, kWh/month	50.8350	44.4165	46.1377	40.7850	39.4188	34.5831	32.9280	36.9051	37.3190	42.6827	45.7603	49.5603	(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	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1698	11.6973	9.5129	7.2019	5.3835	4.5450	4.9110	6.3835	8.5679	10.8789	12.6973	13.5359	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.7534	149.2866	145.4229	137.1977	126.8147	117.0562	110.5370	109.0038	112.8674	121.0927	131.4756	141.2341	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	(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)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	(71)
Water heating gains (Table 5)	68.3266	66.0959	62.0131	56.6459	52.9823	48.0320	44.2580	49.6037	51.8319	57.3693	63.5560	66.6133	(72)
Total internal gains	280.6896	278.5197	268.3888	252.4853	236.6204	221.0731	211.1459	216.4308	224.7071	240.7807	259.1688	272.8231	(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		8.0700	11.2829	0.6300	0.7000	0.7700	27.8271 (75)
Southeast		2.8500	36.7938	0.6300	0.7000	0.7700	32.0473 (77)
Northwest		0.4400	11.2829	0.6300	0.7000	0.7700	1.5172 (81)
Solar gains	61.3916	114.3196	182.3068	269.2822	341.2276	279.8095	212.0062
Total gains	342.0812	392.8393	450.6956	521.7675	577.8480	577.2559	547.2935
						496.2403	436.7133
						374.1088	334.4768
							324.2129 (84)
							51.3899 (83)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area (see Table 9a, Th) (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	51.3976	51.5178	51.6361	52.1995	52.3063	52.8091	52.8091	52.9033	52.6143	52.3063	52.0907	51.8673		
alpha	4.4265	4.4345	4.4424	4.4800	4.4871	4.5206	4.5206	4.5269	4.5076	4.4871	4.4727	4.4578		
util living area	0.9965	0.9930	0.9825	0.9451	0.8452	0.6736	0.5161	0.5835	0.8367	0.9701	0.9934	0.9973	(86)	
MIT	19.5710	19.7372	20.0314	20.4295	20.7618	20.9389	20.9854	20.9754	20.8334	20.4016	19.9174	19.5425	(87)	
Th 2	19.8010	19.8034	19.8058	19.8171	19.8192	19.8291	19.8291	19.8309	19.8253	19.8192	19.8150	19.8105	(88)	
util rest of house	0.9953	0.9906	0.9762	0.9244	0.7899	0.5730	0.3861	0.4484	0.7566	0.9548	0.9906	0.9963	(89)	
MIT 2	17.9219	18.1655	18.5929	19.1624	19.5945	19.7907	19.8242	19.8215	19.6952	19.1365	18.4372	17.8868	(90)	
Living area fraction	18.9271	19.1235	19.4698	19.9348	20.3061	20.4906	20.5320	20.5248	fLA = Living area / (4) =					0.6096 (91)
Temperature adjustment	18.9271	19.1235	19.4698	19.9348	20.3061	20.4906	20.5320	20.5248	20.3890	19.9076	19.3395	18.8961	(92)	
adjusted MIT	18.9271	19.1235	19.4698	19.9348	20.3061	20.4906	20.5320	20.5248	20.3890	19.9076	19.3395	18.8961	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9941	0.9888	0.9739	0.9268	0.8147	0.6321	0.4656	0.5309	0.7987	0.9562	0.9891	0.9933	(94)
Useful gains	340.0633	388.4342	438.9362	483.5746	470.7773	364.8766	254.8077	263.4526	348.8131	357.7339	330.8469	322.6915	(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	992.1050	862.4782	875.6283	736.9505	573.5773	388.8602	259.5676	271.8104	416.6963	620.3343	818.1114	987.7556	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	185.1190	385.7576	324.8989	182.4307	76.4833	0.0000	0.0000	0.0000	0.0000	195.3748	351.5505	494.8077	(98)
Space heating													
Space heating per m2										(98) / (4) =			49.7295 (99)

8c. Space cooling requirement

Not applicable

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)														93.4000	(206)
Efficiency of secondary/supplementary heating system, %														0.0000	(208)
Space heating requirement														2672.8291	(211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Space heating requirement	485.1190	385.7576	324.8989	182.4307	76.4833	0.0000	0.0000	0.0000	0.0000	195.3748	351.5505	494.8077	(98)		
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)		
Space heating fuel (main heating system)	519.3994	413.0167	347.8575	195.3219	81.8878	0.0000	0.0000	0.0000	0.0000	209.1807	376.3924	529.7727	(211)		
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)		
Water heating requirement	163.2460	142.5996	148.3656	131.5928	127.4051	112.2113	107.5069	119.8451	121.1686	137.9746	147.2852	159.4124	(64)		
Efficiency of water heater	87.6250	87.4320	86.9707	85.8738	83.8127	80.3000	80.3000	80.3000	80.3000	85.9266	87.1630	87.7118	(217)		
Fuel for water heating, kWh/month	186.3006	163.0977	170.5927	153.2398	152.0117	139.7401	133.8816	149.2466	150.8949	160.5726	168.9767	181.7456	(219)		
Water heating fuel used															
Annual totals kWh/year															
Space heating fuel - main system															
Space heating fuel - secondary															
Electricity for pumps and fans:															
central heating pump															
main heating flue fan															
Total electricity for the above, kWh/year															
Electricity for lighting (calculated in Appendix L)															
Total delivered energy for all uses															

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	2672.8291	0.2160	577.3311	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1910.3007	0.2160	412.6250	(264)
Space and water heating			989.9560	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	232.5833	0.5190	120.7107	(268)
Total CO2, kg/m2/year			1149.5918	(272)
Emissions per m2 for space and water heating			19.7202	(272a)
Fuel factor (main gas)			1.0000	
Emissions per m2 for lighting			2.4046	(272b)
Emissions per m2 for pumps and fans			0.7754	(272c)
Target Carbon Dioxide Emission Rate (TER) = (19.7202 * 1.00) + 2.4046 + 0.7754, rounded to 2 d.p.			22.9000	(273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B3P GF - Corner				Issued on Date	23/08/2022
Assessment Reference	2B3P GF Corner Be Lean		Prop Type Ref			
Property	Corner Pavillion, 2B3P GF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	83 B	DER	19.43	TER	21.71	
Environmental	87 B	% DER<TER	10.48			
CO ₂ Emissions (t/year)	0.95	DFEE	56.25	TFEE	63.18	
General Requirements Compliance	Pass	% DFEE<TFEE	10.97			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Ground-floor flat, total floor area 61 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating: Mains gas
Fuel factor: 1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 21.71 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 19.43 kgCO₂/m² OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 63.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 56.3 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	(no roof)		
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability		
Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 40 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 86.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100%
Minimum 75% OK

8 Mechanical ventilation

Continuous supply and extract system
Specific fan power: 0.53
Maximum 1.5 OK
MVR efficiency: 90%
Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overheating:
Average
Windows facing North: 10.92 m², No overhang
Windows facing East: 4.70 m², No overhang
Windows facing South: 2.76 m², No overhang
Windows facing West: 1.20 m², No overhang
Air change rate: 3.00 ach
Blinds/curtains: None

10 Key features

Door U-value: 1.00 W/m²K
Window U-value: 0.90 W/m²K
Air permeability: 3.0 m³/m²h

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)														
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014														

1. Overall dwelling dimensions														

				Area	Storey height	Volume								
				(m2)	(m)	(m3)								
Ground floor				60.8500	2.5000	152.1250	(1b) - (3b)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)							(4)							
Dwelling volume							(5)							
				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		152.1250	(4)							

2. Ventilation rate														

				main heating	secondary heating	other	total	m3 per hour						
Number of chimneys				0	0	0	0	0 * 40 =	0.0000	(6a)				
Number of open flues				0	0	0	0	0 * 20 =	0.0000	(6b)				
Number of intermittent fans				0	0	0	0	0 * 10 =	0.0000	(7a)				
Number of passive vents				0	0	0	0	0 * 10 =	0.0000	(7b)				
Number of fireless gas fires				0	0	0	0	0 * 40 =	0.0000	(7c)				
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =								Air changes per hour	0.0000 / (5) =	0.0000	(8)			
Pressure test								Yes		3.0000	(8)			
Measured/design AP50								No		0.1500	(18)			
Infiltration rate								2		0.1500	(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) =		0.1275	(21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind factor	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)	
Adj infiltr rate	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)	
Balanced mechanical ventilation with heat recovery														
If mechanical ventilation:														
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =														
Effective ac	0.2801	0.2769	0.2737	0.2578	0.2546	0.2386	0.2386	0.2354	0.2450	0.2546	0.2609	0.2673	(25)	

3. Heat losses and heat loss parameter														

Element				Gross	Openings	NetArea	U-value	A x U	K-value	A x K				
				m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K				
Door to corridor						1.2000	1.0000	1.2000			(26)			
Window (Uw = 0.90)						19.5800	0.8687	17.0097			(27)			
Ground Floor						60.8500	0.1300	7.9105			(28a)			
External Wall				69.7500	19.5800	50.1700	0.1800	9.0306			(28a)			
Corridor Wall				19.3800	1.2000	18.1800	0.1800	3.2724			(28a)			
Total net area of external elements Aum(A, m2)						149.9800					(31)			
Fabric heat loss, W/K = Sum (A x U)											(32)			
Party Ceilings 1						60.8500					(32b)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												250.0000	(35)	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												17.6544	(36)	
Total fabric heat loss												(33) + (36) =	56.0776	(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	14.0595	13.8995	13.7395	12.9394	12.7794	11.9793	11.9793	11.8193	12.2993	12.7794	13.0994	13.4194	(38)	
Average = Sum(39)m / 12 =	70.1370	69.9770	69.8170	69.0169	68.8569	68.0568	68.0568	67.8968	68.3769	68.8569	69.1769	69.4970	(39)	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.1526	1.1500	1.1474	1.1342	1.1316	1.1184	1.1184	1.1158	1.1237	1.1316	1.1368	1.1421	(40)	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirements (kWh/year)														

Assumed occupancy												2.0056	(42)	
Average daily hot water use (litres/day)												81.8321	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content	90.0153	86.7420	83.4688	80.1955	76.9222	73.6489	73.6489	76.9222	80.1955	83.4688	86.7420	90.0153	(44)	
Energy content (annual)	133.4901	116.7513	120.4769	105.0347	100.7833	86.9683	80.5889	92.4770	133.4901	116.7513	120.4769	133.4901	(45)	
Distribution loss (46)m = 0.15 x (45)m	20.0235	17.5127	18.0715	15.7552	15.1175	13.0452	12.0883	13.8715	14.0372	16.3590	17.8572	19.3917	(46)	



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:													
Total storage loss													

If cylinder contains dedicated solar storage													

Combi loss													
Total heat required for water heating calculated for each month													

Solar input				113.1464	113.6108	129.8152	139.1984	150.1420	161.8640	161.8640	161.8640	161.8640	(61)
Output from w/h				154.3704	135.5797	141.2729	125.1036	121.4802	106.9504	101.2077	101.2077	101.2077	(62)
Heat gains from water heating, kWh/month				49.6055	43.5269	45.2576	39.9413	38.6847	33.9125	31.9505	35.9160	36.1232	(63)
Heat loss rate W				1037.5410	1004.7609	909.6483	757.5084	579.8770	382.8020	247.8048	260.7113	415.1695	(64)
Month fracti				1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(65)
Space heating kWh				480.5637	370.7047	295.9063	147.2656	48.8231	0.0000	0.0000	0.0000	165.0831	(66)
Space heating per m2													(67)

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	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.0855	176.9023	172.3239	162.5771	150.2735								
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	(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)	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	(71)
Water heating gains (Table 5)	66.6741	64.7722	60.8301	55.4740	51.9955	47.1007	42.9442	48.2741	50.1711	55.7140	61.9737	64.7862	(72)
Total internal gains	313.4520	311.6217	300.5122	282.6702	264.7330	247.2807	235.8328	241.0911	250.1554	268.1843	288.9027	304.2727	(73)

6. Solar gains													

[Jan]			Area	Solar flux	g		FF		Access		Gains		
			m2	Table 6a	Specific data	Specific data			factor		W		
				Table 6a	or Table 6b	or Table 6c			Table 6d				
North			10.9200	10.6334	0.4000	0.4000	0.8000	0.7700			25.7500	(74)	
East			4.7000	19.6403	0.4000	0.4000	0.8000	0.7700			20.4705	(76)	
South			2.7600	46.7521	0.4000	0.4000	0.8000	0.7700			28.6150	(78)	
West			1.2000	19.6403	0.4000	0.4000	0.8000	0.7700			5.2265	(80)	

Solar gains	80.0620	146.3423	226.1010	322.5214	399.2094	412.8281	391.1556	331.5459	259.1802	168.7729	97.7256	37.3244	(83)
Total gains	393.5140	457.9640	526.6132	605.1917	663.9424	660.1807	626.9884	572.6371	593.5314	494.9572	386.6283	371.5794	(84)

7. Mean internal temperature (heating season)													

Temperature during heating periods in the living area from Table 9, Th1 (C)													
Utilisation factor for gains for living area, nL1,8 (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	60.2491	60.3869	60.5253	61.2269	61.3692	62.0907	62.0907	62.2370	61.8001	61.3692	61.0853	60.8040	(85)
alpha	5.0166	5.0258	5.0350	5.0818	5.0913	5.1394	5.1394	5.1491	5.1200	5.0913	5.0724	5.0536	
util living area	0.9972	0.9935	0.9818	0.9376	0.8204	0.6311	0.4719	0.5342	0.8030	0.9668	0.9941	0.9979	(86)
MIT	19.7985	19.9634	20.2351	20.5857	20.8518	20.9706	20.9945	20.9900	20.9026	20.5453	20.1070	19.7686	(87)
Th 2	19.9581	19.9602	19.9623	19.9730	19.9751	19.9858	19.9858	19.9879	19.9815	19.9751	19.9709	19.9666	(88)
util rest of house	0.9963	0.9914	0.9755	0.9161	0.7660	0.5429	0.3662	0.4224	0.7247	0.9512	0.9917	0.9972	(89)
MIT 2	18.8687	19.0344	19.3042	19.6483	19.8803	19.9372	19.9845	19.9853	19.9303	19.6191	19.1866	18.8457	(90)
Living area fraction	391.6220	511.9247	514.2545	512.2578	514.2545	514.2545	514.2545	514.2545	514.2545	514.2545	514.2545	514.2545	(91)
MIT	19.2431	19.4084	19.6790	20.0257	20.2715	20.3747	20.3911	20.3998	20.3218	19.9920	19.5572	19.2173	(92)
Temperature adjustment												-0.1500	
adjusted MIT	19.0931	19.2584	19.5290	19.8757	20.1215	20.2247	20.2441	20.2398	20.1718	19.8420	19.4072	19.0673	(93)

8. Space heating requirement													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9952	0.9894	0.9721	0.9137	0.7745	0.5646	0.3932	0.4509	0.7410	0.9486	0.9900	0.9963	(94)
Useful gains	391.6220	453.1717	511.9247	552.9728	514.2545	372.6695	246.5306	258.2211	377.4127	414.4882	382.7461	370.2390	(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	1037.5410	1004.7609	909.6483	757.5084	579.8770	382.8020	247.8048	260.7113	415.1695	636.3741	851.3714	1033.2321	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(98)
Space heating kWh	480.5637	370.7047	295.9063	147.2656	48.8231	0.0000	0.0000	0.0000	0.0000	165.0831	337.4102	493.2669	(99)
Space heating												2339.0236	(100)
Space heating per m2												38.4392	(101)

9c. Space cooling requirement													

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Not applicable

9a. Energy requirements - Individual heating systems, including micro-CHP
Fraction of space heat from secondary/supplementary system (Table 11)
Efficiency of main space heating system 1 (in %)
Efficiency of secondary/supplementary heating system, %
Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	480.5637	370.7047	295.9063	147.2656	48.8231	0.0000	0.0000	0.0000	0.0000	165.0831	337.4102	493.2669	(98)
Space heating efficiency (main heating system 1)	90.0000	90.0000	90.0000	90.0000	90.0000	0.0000	0.0000	0.0000	0.0000	90.0000	90.0000	90.0000	(210)
Space heating fuel (main heating system)	533.9597	411.8941	328.7848	163.6284	54.2479	0.0000	0.0000	0.0000	0.0000	183.4257	374.9002	548.0744	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	154.3704	135.5797	141.2729	125.1036	121.4802	106.9504	101.2077	113.1464	113.6108	129.8152	139.1984	150.1420	(64)
Efficiency of water heater (217)m	89.1748	89.0919	88.9065	88.4536	87.6210	86.7000	86.7000	86.7000	86.7000	88.5169	89.0105	86.7000	(216)
Fuel for water heating, kWh/month	173.1100	152.1796	158.9006	141.4341	138.6427	123.3569	116.7332	130.5034	131.0390	146.6558	156.3842	168.3062	(219)
Water heating fuel used												1737.2458	(219)
Annual totals kWh/year												2598.9152	(211)
Space heating fuel - main system												0.0000	(215)
Space heating fuel - secondary													
Electricity for pumps and fans:												122.9550	(230a)
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6625)												30.0000	(230c)
mechanical ventilation fans (SFP = 0.6625)												45.0000	(230e)
central heating pump												197.9550	(231)
main heating flue fan												275.6597	(232)
Total electricity for the above, kWh/year												4809.7758	(238)
Electricity for lighting (calculated in Appendix L)													
Total delivered energy for all uses													

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	2598.9152	0.2160	561.3657 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1737.2458	0.2160	375.2451 (264)
Space and water heating			936.6108 (265)
Pumps and fans	197.9550	0.5190	102.7387 (267)
Energy for lighting	275.6597	0.5190	143.0674 (268)
Total CO2, kg/year			1182.4168 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			19.4300 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES DER
Total Floor Area
Assumed number of occupants
CO2 emission factor in Table 12 for electricity displaced from grid
CO2 emissions from appliances, equation (L14)
CO2 emissions from cooking, equation (L16)
Total CO2 emissions
Residual CO2 emissions offset from biofuel CHP
Additional allowable electricity generation, kWh/m²/year
Resulting CO2 emissions offset from additional allowable electricity generation
Net CO2 emissions

	TFA	N	EF
19.4300	ZC1	60.8500	2.0056
0.5190			17.0504
2.7466	ZC2		2.7466
39.2271	ZC4		39.2271
0.0000	ZC5		0.0000
0.0000	ZC6		0.0000
0.0000	ZC7		0.0000
39.2271	ZC8		39.2271

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	60.8500 (1b)	x 2.5000 (2b)	= 152.1250 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.8500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 152.1250 (5)

2. Ventilation rate

	main heating		secondary heating		other		total		m3 per hour			
Number of chimneys	0		0		0	=	0 * 40 =	0.0000 (6a)				
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000 (6b)				
Number of intermittent fans							2 * 10 =	20.0000 (7a)				
Number of passive vents							0 * 10 =	0.0000 (7b)				
Number of fuelless gas fires							0 * 40 =	0.0000 (7c)				
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =									Air changes per hour			
Pressure test								20.0000 / (5) =	0.1315 (8)			
Measured/design AP50									Yes			
Infiltration rate									5.0000			
Number of sides sheltered									0.3815 (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) =	0.3243 (21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infiltr rate	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)
Effective ac	0.4134	0.4053	0.3972	0.3567	0.3486	0.3080	0.3080	0.2999	0.3243	0.3486	0.3648	0.3810 (22b)
	0.5855	0.5821	0.5789	0.5636	0.5608	0.5474	0.5474	0.5450	0.5526	0.5608	0.5665	0.5726 (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 x K							
TER Opaque door			1.2000	1.0000	1.2000		(26)							
TER Opening Type (Uw = 1.40)			14.0300	1.3258	18.6004		(27)							
Ground Floor			60.8500	0.1300	7.9105		(28a)							
External Wall	69.7500	14.0300	55.7200	0.1800	10.0296		(29a)							
Corridor Wall	19.3800	1.2000	18.1800	0.1800	3.2724		(29a)							
Total net area of external elements Aum(A, m ²)			149.9800				(31)							
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.0129		(33)							
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.8155 (36)							
Total fabric heat loss						(33) + (36) =	52.8284 (37)							
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	29.3907	29.2241	29.0608	28.2939	28.1504	27.4824	27.4824	27.3586	27.7397	28.1504	28.4407	28.7441	(38)	
Heat transfer coeff	82.2191	82.0525	81.8892	81.1222	80.9787	80.3107	80.3107	80.1870	80.5680	80.9787	81.2690	81.5725	(39)	
Average = Sum(39)m / 12 =							81.1215	(39)						
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP	1.3512	1.3484	1.3458	1.3332	1.3308	1.3198	1.3198	1.3178	1.3240	1.3308	1.3356	1.3406	(40)	
HLP (average)													1.3331	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)	

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.0153	86.7420	83.6488	80.1955	76.9222	73.6489	73.6489	76.9222	80.1955	83.6488	86.7420	90.0153	(44)
Energy content (annual)	133.4901	116.7513	120.4769	105.0347	100.7833	86.9683	80.5889	92.4770	93.5814	109.0601	119.0477	129.2781	(45)
Distribution loss (46)m = 0.15 x (45)m	20.0235	17.5127	18.0715	15.7552	15.1175	13.0452	12.0883	13.8715	14.0372	16.3590	17.8572	19.3917	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	45.8708	39.9251	42.5348	39.5485	39.1987	36.3200	37.5307	39.1987	39.5485	42.5348	42.7769	45.8708	(61)
Total heat required for water heating calculated for each month	179.3609	156.6764	163.0117	144.5831	139.9820	123.2883	118.1196	131.6757	133.1299	151.5949	161.8246	175.1489	(62)
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	(63)
Output from w/h	179.3609	156.6764	163.0117	144.5831	139.9820	123.2883	118.1196	131.6757	133.1299	151.5949	161.8246	175.1489	(64)
Heat gains from water heating, kWh/month	55.8532	48.8011	50.6923	44.8111	43.3101	37.9970	36.1785	40.5483	41.0029	46.8962	50.2776	54.4527	(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	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6090	13.8638	11.2748	8.5357	6.3806	5.3867	5.8206	7.5658	10.1548	12.8938	15.0490	16.0428	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.0855	176.9023	172.3239	162.5771	150.2735	138.7098	130.9846	129.1678	133.7461	143.4930	155.7966	167.3602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	(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)	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	(71)
Water heating gains (Table 5)	75.0715	72.6207	68.1348	62.2377	58.2125	52.7736	48.6270	54.5004	56.9485	63.0325	69.8300	73.1891	(72)
Total internal gains	321.8494	319.4702	307.8169	289.4340	270.9500	252.9536	241.5156	247.3173	256.9329	275.5027	296.7590	312.6755	(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	
North	7.8200	10.6334	0.6300	0.7000	0.7700	25.4127	(74)
East	3.3700	19.6403	0.6300	0.7000	0.7700	20.2278	(76)
South	1.9800	46.7521	0.6300	0.7000	0.7700	28.2903	(78)
West	0.8600	19.6403	0.6300	0.7000	0.7700	5.1620	(80)
Solar gains	79.0928	144.5650	223.3396	318.5530	394.2725	407.7121	386.3125
Total gains	400.9422	464.0352	531.1555	607.9669	665.2225	660.6656	627.8280

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, n11,m (see Table 9a)	tau	51.3955	51.4999	51.6026	52.0905	52.1828	52.6168	52.6168	52.6980	52.4488	52.1828	51.9964	51.8029
util living area	alpha	4.4264	4.4333	4.4402	4.4727	4.4789	4.5078	4.5078	4.5132	4.4966	4.4789	4.4664	4.4535
MIT	0.9970	0.9937	0.9843	0.9518	0.8643	0.7036	0.5436	0.6077	0.8494	0.9727	0.9941	0.9976	(86)
Th 2	19.5508	19.7191	20.0096	20.3983	20.7338	20.9265	20.9819	20.9707	20.8201	20.3843	19.8972	19.5201	(87)
util rest of house	0.9959	0.9915	0.9785	0.9331	0.8125	0.6026	0.4081	0.4690	0.7719	0.9586	0.9917	0.9968	(89)
MIT 2	17.8925	18.1390	18.5614	19.1191	19.5613	19.7781	19.8191	19.8155	19.6795	19.1111	18.4067	17.8532	(90)
Living area fraction	MIT	18.5602	18.7752	19.1445	19.6341	20.0334	20.2404	20.2873	20.2806	20.1387	19.6237	19.0069	18.5244
Temperature adjustment	adjusted MIT	18.5602	18.7752	19.1445	19.6341	20.0334	20.2404	20.2873	20.2806	20.1387	19.6237	19.0069	18.5244

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9943	0.9888	0.9742	0.9296	0.8233	0.6407	0.4631	0.5233	0.7958	0.9555	0.9893	0.9855	(94)
Ext temp.	398.6521	458.8534	517.4405	565.1999	547.6701	423.2890	290.7566	301.9129	408.1984	422.5533	389.0836	377.4769	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.4000	14.6000	14.1000	10.6000	7.1000	4.2000	(96)
Month fracti	1172.4613	1138.4944	1035.4459	870.7754	674.8247	452.9877	296.1295	311.1752	486.5281	730.7300	967.6586	1168.4737	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	(97a)
Space heating	575.7141	456.7188	385.3961	220.0144	94.6030	0.0000	0.0000	0.0000	0.0000	229.2835	416.5740	588.5016	(98)
Space heating												2966.8054	(98)
Space heating per m2										(98) / (4) =		48.7560	(99)

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

9a. Energy requirements - Individual heating systems, including micro-CHP													
Efficiency 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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3176.4511 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	575.7141	456.7188	385.3961	220.0144	94.6030	0.0000	0.0000	0.0000	0.0000	229.2835	416.5740	588.5016	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	616.3962	488.9922	412.6296	235.5614	101.2880	0.0000	0.0000	0.0000	0.0000	245.4855	446.0108	630.0874	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	179.3609	156.6764	163.0117	144.5831	139.9820	123.2883	118.1196	131.6757	133.1299	151.5949	161.8246	175.1489	(64)
Efficiency of water heater	87.7774	87.5861	87.1420	86.1052	84.0887	80.3000	80.3000	80.3000	80.3000	86.0902	87.3269	87.8652	(217)
Fuel for water heating, kWh/month	204.3361	178.8827	187.0644	167.9144	166.4693	153.5346	147.0979	163.9797	165.7906	176.0885	185.3089	199.3381	(219)
Water heating fuel used												2095.8051	(219)
Annual totals kWh/year													
Space heating fuel - main system													3176.4511 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													39.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													275.6597 (232)
Total delivered energy for all uses													5622.9160 (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	0.2160	686.1134 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	0.2160	452.6939 (264)
Space and water heating	0.2160	1138.8074 (265)
Pumps and fans	75.0000	38.9250 (267)
Energy for lighting	275.6597	143.0674 (268)
Total CO2, kg/m2/year		1320.7998 (272)
Emissions per m2 for space and water heating		18.7150 (272a)
Fuel factor (main gas)		1.0000
Emissions per m2 for lighting		2.3511 (272b)
Emissions per m2 for pumps and fans		0.6397 (272c)
Target Carbon Dioxide Emission Rate (TER) = (18.7150 * 1.00) + 2.3511 + 0.6397, rounded to 2 d.p.		21.7100 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B3P TF - Corner				Issued on Date	23/08/2022
Assessment Reference	2B3P TF Corner Be Lean	Prop Type Ref				
Property	Corner Pavillion, 2B3P TF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	82 B	DER	20.37	TER	23.81	
Environmental	86 B	% DER<TER	14.44			
CO ₂ Emissions (t/year)	0.99	DFEE	58.46	TFEE	74.11	
General Requirements Compliance	Pass	% DFEE<TFEE	21.11			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Top-floor flat, total floor area 61 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 23.81 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 20.37 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)74.1 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)58.5 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor (no floor)			
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 4.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 40 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 86.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power: 0.53
Maximum 1.5 OK
MVR efficiency: 90%
Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley):

Medium

OK

Based on:

Overshading:

Windows facing North: 10.92 m², No overhang

Windows facing East: 4.70 m², No overhang

Windows facing South: 2.76 m², No overhang

Windows facing West: 1.20 m², No overhang

Air change rate: 3.00 ach

Blinds/curtains: None

10 Key features

Roof U-value 0.10 W/m²K

Door U-value 1.00 W/m²K

Window U-value 0.90 W/m²K

HODKINSON

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0056 (42)
Average daily hot water use (litres/day)												81.8321 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	80.0153	86.7420	83.4688	80.1955	76.9222	73.6489	73.6489	76.9222	80.1955	83.4688	86.7420	90.0153 (44)
Energy cost	131.4901	116.7513	120.4769	105.0347	100.7833	86.9683	80.5889	92.4770	93.5814	109.0601	119.0477	129.2781 (45)
Energy cost												Total = Sum(45) = 1287.5378 (46)
Distribution loss (46) = 0.15 x (45m)												
	20.0235	17.5127	18.0715	15.7552	15.1175	13.0452	12.0883	13.8715	14.0372	16.3590	17.8572	19.3917 (46)
Water storage loss												



8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %)													90.0000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2865.0270 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	521.7307	406.2045	330.4506	171.2123	61.7300	0.0000	0.0000	0.0000	0.0000	186.6726	367.8316	532.6920	(98)
Space heating efficiency (main heating system 1)	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	(210)
Space heating fuel (main heating system)	579.7007	451.3384	367.1673	190.2359	68.5888	0.0000	0.0000	0.0000	0.0000	207.4141	408.7017	591.8800	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement													
Efficiency of water heater (217)m	154.3704	135.5797	141.2729	125.1036	121.4802	106.9504	101.2077	113.1464	113.6108	129.8152	139.1984	150.1420	(64)
Fuel for water heating, kWh/month	89.2246	89.1508	88.9857	88.5766	87.7845	86.7000	86.7000	86.7000	86.7000	88.6165	89.0693	89.2530	(217)
Water heating fuel used	173.0133	152.0790	158.7592	141.2377	138.3846	123.3569	116.7332	130.5034	131.0390	146.4910	156.2811	168.2207	(219)
Annual totals kWh/year													1736.0990 (219)
Space heating fuel - main system													2865.0270 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery; Database: in-use factor = 1.2500, SFP = 0.6625)													
mechanical ventilation fans (SFP = 0.6625)													122.9550 (230a)
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													197.9550 (231)
Electricity for lighting (calculated in Appendix L)													275.6597 (232)
Total delivered energy for all uses													5074.7408 (238)

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

Space heating - main system 1	2865.0270	0.2160	618.8458	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1736.0990	0.2160	374.9874	(264)
Space and water heating			993.8432	(265)
Pumps and fans	197.9550	0.5190	102.7387	(267)
Energy for lighting	275.6597	0.5190	143.0674	(268)
Total CO2, kg/year			1239.6493	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			20.3700	(273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER			20.3700	2C1
Total Floor Area	TFA		60.8500	
Assumed number of occupants	N		2.0056	
CO2 emission factor in Table 12 for electricity displaced from grid	EF		0.5190	
CO2 emissions from appliances, equation (L14)			17.0504	2C2
CO2 emissions from cooking, equation (L16)			2.7466	2C3
Total CO2 emissions			40.1671	2C4
Residual CO2 emissions offset from biofuel CHP			0.0000	2C5
Additional allowable electricity generation, kWh/m²/year			0.0000	2C6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	2C7
Net CO2 emissions			40.1671	2C8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

Ground floor	Area (m2)	60.8500	(1b)	x	Storey height (m)	2.5000	(2b)	=	Volume (m3)	152.1250	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)		60.8500									(4)
Dwelling volume									(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	152.1250	(5)

2. Ventilation rate

	main heating		secondary heating		other	total	m3 per hour					
Number of chimneys	0	+	0	+	0	=	0 * 40 = 0.0000 (6a)					
Number of open flues	0	+	0	+	0	=	0 * 20 = 0.0000 (6b)					
Number of intermittent fans							2 * 10 = 20.0000 (7a)					
Number of passive vents							0 * 10 = 0.0000 (7b)					
Number of fuelless gas fires							0 * 40 = 0.0000 (7c)					
						Air changes per hour						
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) =	0.1315 (8)					
Pressure test						Yes						
Measured/design AP50						5.0000						
Infiltration rate							0.3815 (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) =	0.3243 (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 infiltr rate												
Effective ac	0.4134	0.4053	0.3972	0.3567	0.3486	0.3080	0.3080	0.2999	0.3243	0.3486	0.3648	0.3810 (22b)
	0.5855	0.5821	0.5789	0.5636	0.5608	0.5474	0.5474	0.5450	0.5526	0.5608	0.5665	0.5726 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
TER Opaque door			1.2000	1.0000	1.2000		(26)						
TER Opening Type (Uw = 1.40)			14.0300	1.3258	18.6004		(27)						
External Wall	69.7500	14.0300	55.7200	0.1800	10.0296		(29a)						
Corridor Wall	19.3800	1.2000	18.1800	0.1800	3.2724		(29a)						
Main Roof	60.8500		60.8500	0.1300	7.9105		(30)						
Total net area of external elements Aum(A, m2)			149.9800				(31)						
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	41.0129		(33)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							22.2455 (36)						
Total fabric heat loss						(33) + (36) =	63.2584 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	29.3907	29.2241	29.0608	28.2939	28.1504	27.4824	27.4824	27.3586	27.7397	28.1504	28.4407	Dec	28.7441 (38)
Heat transfer coeff	92.6491	92.4825	92.3192	91.5522	91.4087	90.7407	90.7407	90.6170	90.9980	91.4087	91.6990	92.0025 (39)	91.5515 (39)
Average = Sum(39)m / 12 =													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.5226	1.5198	1.5172	1.5046	1.5022	1.4912	1.4912	1.4892	1.4954	1.5022	1.5070		1.5120 (40)
HLP (average)													1.5045 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30		31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0056	(42)
Average daily hot water use (litres/day)													81.8321	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content	90.0153	86.7420	83.6688	80.1955	76.9222	73.6489	73.6489	76.9222	80.1955	83.6688	86.7420	90.0153	(44)	
Energy content (annual)	133.4901	116.7513	120.4769	105.0347	100.7833	86.9683	80.5889	92.4770	93.5814	109.0601	119.0477	129.2781	(45)	
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m =	1287.5378 (45)
	20.0235	17.5127	18.0715	15.7552	15.1175	13.0452	12.0883	13.8715	14.0372	16.3590	17.8572	19.3917	(46)	
Water storage loss:														
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	45.8708	39.9251	42.5348	39.5485	39.1987	36.3200	37.5307	39.1987	39.5485	42.5348	42.7769	45.8708	(61)
Total heat required for water heating calculated for each month	179.3609	156.6764	163.0117	144.5831	139.9820	123.2883	118.1196	131.6757	133.1299	151.5949	161.8246	175.1489	(62)
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	(63)
Output from w/h	179.3609	156.6764	163.0117	144.5831	139.9820	123.2883	118.1196	131.6757	133.1299	151.5949	161.8246	175.1489	(64)
Heat gains from water heating, kWh/month	55.8532	48.8011	50.6923	44.8111	43.3101	37.9970	36.1785	40.5483	41.0029	46.8962	50.2776	54.4527	(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	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6090	13.8638	11.2748	8.5357	6.3806	5.3867	5.8206	7.5658	10.1548	12.8938	15.0490	16.0428	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.0855	176.9023	172.3239	162.5771	150.2735	138.7098	130.9846	129.1678	133.7461	143.4930	155.7966	167.3602	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	(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)	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	(71)
Water heating gains (Table 5)	75.0715	72.6207	68.1348	62.2377	58.2125	52.7736	48.6270	54.5004	56.9485	63.0325	69.8300	73.1891	(72)
Total internal gains	321.8494	319.4702	307.8169	289.4340	270.9500	252.9536	241.5156	247.3173	256.9329	275.5027	296.7590	312.6755	(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	
North	7.8200	10.6334	0.6300	0.7000	0.7700	25.4127	(74)
East	3.3700	19.6403	0.6300	0.7000	0.7700	20.2278	(76)
South	1.9800	46.7521	0.6300	0.7000	0.7700	28.2903	(78)
West	0.8600	19.6403	0.6300	0.7000	0.7700	5.1620	(80)
Solar gains	79.0928	144.5650	223.3386	318.5530	394.2725	407.7121	386.3125
Total gains	400.9422	464.0352	531.1555	607.9669	665.2225	660.6656	627.8280

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, n11,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	45.6097	45.6918	45.7726	46.1561	46.2286	46.5689	46.5689	46.6325	46.4372	46.2286	46.0822	45.9302		
alpha	4.0406	4.0461	4.0515	4.0771	4.0819	4.1046	4.1046	4.1088	4.0958	4.0819	4.0721	4.0620		
util living area	0.9968	0.9938	0.9856	0.9590	0.8878	0.7491	0.5958	0.6592	0.8757	0.9760	0.9942	0.9975		(86)
MIT	19.3414	19.5138	19.8208	20.2392	20.6236	20.8753	20.9634	20.9448	20.7405	20.2472	19.7195	19.3097		(87)
Th 2	19.6706	19.6726	19.6747	19.6841	19.6859	19.6941	19.6941	19.6956	19.6909	19.6859	19.6823	19.6785		(88)
util rest of house	0.9957	0.9916	0.9801	0.9418	0.8387	0.6418	0.4380	0.5020	0.8005	0.9628	0.9917	0.9966		(89)
MIT 2	17.5011	17.7537	18.2006	18.8035	19.3203	19.6127	19.6817	19.6741	19.4821	18.8260	18.0612	17.4599		(90)
Living area fraction	18.2421	18.4624	18.8529	19.3816	19.8450	20.1211	20.1978	20.1858	19.9888	19.3982	18.7289	18.2047		(91)
MIT	18.2421	18.4624	18.8529	19.3816	19.8450	20.1211	20.1978	20.1858	19.9888	19.3982	18.7289	18.2047		(92)
Temperature adjustment														0.0000
adjusted MIT	18.2421	18.4624	18.8529	19.3816	19.8450	20.1211	20.1978	20.1858	19.9888	19.3982	18.7289	18.2047		(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9939	0.9887	0.9753	0.9368	0.8457	0.6805	0.5023	0.5658	0.8209	0.9588	0.9891	0.9951	(94)
Useful gains	398.4881	458.7689	518.0409	569.5400	562.5568	449.5657	315.3723	325.1825	421.0846	424.0232	388.9985	377.3212	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.4000	14.6000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1291.7197	1254.2823	1140.4117	959.6119	744.5287	500.9874	326.4658	343.0541	535.8667	804.2359	1066.3593	1288.4651	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	664.5643	534.5850	463.0439	280.8518	135.3871	0.0000	0.0000	0.0000	0.0000	282.8782	487.6998	677.8910	(98)
Space heating												3526.9012	(98)
Space heating per m2										(98) / (4) =		57.9606	(99)

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)													93.4000	(206)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement													3776.1254	(211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
664.5643	534.5850	463.0439	280.8518	135.3871	0.0000	0.0000	0.0000	0.0000	0.0000	282.8782	487.6998	677.8910	(98)	
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	(210)	
Space heating fuel (main heating system)	711.5250	572.3608	495.7643	300.6978	144.9541	0.0000	0.0000	0.0000	0.0000	302.8675	522.1625	725.7934	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating	179.3609	156.6764	163.0117	144.5831	139.9820	123.2883	118.1196	131.6757	133.1299	151.5949	161.8246	175.1489	(64)	
Water heating requirement	88.0464	87.8943	87.5333	86.6942	84.9673	80.3000	80.3000	80.3000	80.3000	86.5995	87.6532	88.1242	(217)	
Efficiency of water heater	203.7120	178.2555	186.2282	166.7737	164.7480	153.5346	147.0979	163.9797	165.7906	175.0529	184.6191	198.7524	(219)	
Fuel for water heating, kWh/month	203.7120	178.2555	186.2282	166.7737	164.7480	153.5346	147.0979	163.9797	165.7906	175.0529	184.6191	198.7524	(219)	
Water heating fuel used	203.7120	178.2555	186.2282	166.7737	164.7480	153.5346	147.0979	163.9797	165.7906	175.0529	184.6191	198.7524	(219)	
Annual totals kWh/year														
Space heating fuel - main system													3776.1254	(211)
Space heating fuel - secondary													0.0000	(215)
Electricity for pumps and fans:														
central heating pump													39.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													75.0000	(231)
Electricity for lighting (calculated in Appendix L)													275.6597	(232)
Total delivered energy for all uses													6215.3297	(238)

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

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
3776.1254	0.2160	815.6431
0.0000	0.0000	0.0000
2088.5445	0.2160	451.1256
1266.7687	0.2160	273.6630
75.0000	0.5190	38.9250
275.6597	0.5190	143.0674
		1448.7611
		20.8179
		1.0000
		2.3511
		0.6397
		23.8100

Target Carbon Dioxide Emission Rate (TER) = (20.8179 * 1.00) + 2.3511 + 0.6397, rounded to 2 d.p.



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 5 - NEW				Issued on Date	23/08/2022
Assessment Reference	House Type 5 Be Lean	Prop Type Ref				
Property	House Type 5, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	85 B	DER	15.92	TER	18.69	
Environmental	87 B	% DER<TER	14.81			
CO ₂ Emissions (t/year)	1.30	DFEE	50.38	TFEE	60.77	
General Requirements Compliance	Pass	% DFEE<TFEE	17.11			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Detached House, total floor area 105 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 18.69 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 15.92 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 60.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 50.4 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 40 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 86.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%

Minimum 75% OK

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power: 0.58

Maximum 1.5 OK

MVHR efficiency: 90%

Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Slight OK

Based on:

Overshading: Average

Windows facing North: 8.65 m², No overhang

Windows facing South: 12.87 m², No overhang

Windows facing West: 1.61 m², No overhang

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Roof U-value 0.10 W/m²K

Door U-value 1.00 W/m²K

Window U-value 0.90 W/m²K

Air permeability 3.0 m³/m²h

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

[illegible]

8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)
Efficiency of main space heating system 1 (in %)
Efficiency of secondary/supplementary heating system, %
Space heating requirement

0.0000 (201)
1.0000 (202)
90.0000 (206)
0.0000 (208)
3930.0228 (211)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Space heating requirement 725.6822 550.9542 447.4405 240.4317 91.9186 0.0000 0.0000 0.0000 0.0000 235.9671 500.6807 743.9455 (98)
Space heating efficiency (main heating system 1) 90.0000 90.0000 90.0000 90.0000 90.0000 0.0000 0.0000 0.0000 0.0000 90.0000 90.0000 90.0000 (210)
Space heating fuel (main heating system) 806.3135 612.1714 497.1561 267.1464 102.1318 0.0000 0.0000 0.0000 0.0000 262.1857 556.3119 826.6061 (211)
Water heating requirement 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (215)

Water heating requirement 184.5503 161.9917 168.5447 148.8847 144.2917 126.6288 119.4427 134.0778 134.7988 154.5026 166.1299 179.3697 (64)
Efficiency of water heater 86.7000 (216)
Fuel for water heating, kWh/month 89.3108 89.2283 89.0724 88.7088 87.9550 86.7000 86.7000 86.7000 88.6647 89.1546 89.3394 (217)
Water heating fuel used 206.6384 181.5474 189.2222 167.8354 164.0517 146.0540 137.7655 154.6457 155.4773 174.2550 186.3392 200.7733 (219)
Annual total kWh/year 2064.6051 (219)
Space heating fuel - main system 3930.0228 (211)
Space heating fuel - secondary 0.0000 (215)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)
mechanical ventilation fans (SFP = 0.7250)
central heating pump
main heating flue fan
Total electricity for the above, kWh/year 305.0319 (231)
Electricity for lighting (calculated in Appendix L)
Total delivered energy for all uses 6715.0924 (238)

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

Energy Emission factor Emissions
kWh/year kg CO2/kWh kg CO2/year
Space heating - main system 1 3930.0228 0.2160 848.8849 (261)
Space heating - secondary 0.0000 0.0000 0.0000 (263)
Water heating (other fuel) 2064.6051 0.2160 445.9547 (264)
Space and water heating 1294.8396 (265)
Pumps and fans 158.3116 (267)
Energy for lighting 305.0319 0.5190 215.6095 (268)
Total CO2, kg/year 1466.7607 (272)
Dwelling Carbon Dioxide Emission Rate (DER) 15.9200 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER 15.9200 ZC1
Total Floor Area 104.8000
Assumed number of occupants 2.7797
CO2 emission factor in Table 12 for electricity displaced from grid N
CO2 emissions from appliances, equation (L14) EF 0.5190
CO2 emissions from cooking, equation (L16) 14.9198 ZC2
Total CO2 emissions 1.7721 ZC3
Residual CO2 emissions offset from biofuel CHP 32.6119 ZC4
Additional allowable electricity generation, kWh/m²/year 0.0000 ZC5
Resulting CO2 emissions offset from additional allowable electricity generation 0.0000 ZC6
Net CO2 emissions 0.0000 ZC7
32.6119 ZC8



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

Area (m2) Storey height (m) Volume (m3)
Ground floor 62.0500 (1b) x 2.4000 (2b) = 148.9200 (1b) - (3b)
First floor 42.7500 (1c) x 2.6000 (2c) = 111.1500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 104.8000
Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 260.0700 (5)

2. Ventilation rate

main secondary other total m3 per hour
heating heating
0 + 0 + 0 = 0 * 40 = 0.0000 (6a)
Number of chimneys 0 + 0 + 0 = 0 * 20 = 0.0000 (6b)
Number of open flues 0 + 0 + 0 = 4 * 10 = 40.0000 (7a)
Number of intermittent fans 0 * 10 = 0.0000 (7b)
Number of passive vents 0 * 40 = 0.0000 (7c)
Number of fuelless gas fires
Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.1538 (8)
Pressure test Yes
Measured/design APS0 5.0000
Infiltration rate 0.4038 (18)
Number of sides sheltered 0 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.4038 (21)

Wind speed Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)
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 infiltr rate
Effective ac 0.5149 0.5048 0.4947 0.4442 0.4341 0.3836 0.3836 0.3735 0.4038 0.4341 0.4543 0.4745 (22b)
0.6325 0.6274 0.6223 0.5987 0.5942 0.5736 0.5736 0.5698 0.5815 0.5942 0.6032 0.6126 (25)

3. Heat losses and heat loss parameter

Element Gross Openings NetArea U-value A x U K-value A x K
m2 m2 m2 W/m2K W/K kJ/m2K kJ/K
TER Opaque door 1.8900 1.0000 1.8900 30.6648 (26)
TER Opening Type (Uw = 1.40) 23.1300 1.3258 30.6648 (27)
Ground Floor 62.0500 0.1300 8.0665 (28a)
External Wall 123.9400 0.1800 22.3092 (29a)
1st Floor 42.7500 0.1300 5.5575 (30)
Ground Floor 19.3000 0.1300 2.5090 (30)
Total net area of external elements Aum(A, m2) 273.0605 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 70.9970 (33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.7090 (36)
Total fabric heat loss (33) + (36) = 85.7060 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(38)m 54.2862 53.8445 53.4115 51.3780 50.9976 49.2264 49.2264 48.8984 49.9086 50.9976 51.7672 52.5719 (38)
Heat transfer coeff 139.9922 139.5505 139.1175 137.0840 136.7035 134.9324 134.9324 134.6044 135.6146 136.7035 137.4732 138.2779 (39)
Average = Sum(39)m / 12 = 137.0822 (39)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
HLP 1.3358 1.3316 1.3275 1.3081 1.3044 1.2875 1.2875 1.2844 1.2940 1.3044 1.3118 1.3194 (40)
HLP (average) 1.3080 (40)
Days in month 31 28 31 30 31 30 31 31 30 31 30 31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7797 (42)
Average daily hot water use (litres/day) 100.2188 (43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Daily hot water use 110.2407 106.2319 102.2232 98.2144 94.2057 90.1969 90.1969 94.2057 98.2144 102.2232 106.2319 110.2407 (44)
Energy conte 163.4838 142.9840 147.5466 128.6347 123.4281 106.5091 98.6963 113.2554 114.6081 133.5647 145.7963 158.3253 (45)
Energy content (annual) Total = Sum(45)m = 1576.8323 (45)
Distribution loss (46)m = 0.15 x (45)m 24.5226 21.4476 22.1320 19.2952 18.5142 15.9764 14.8044 16.9883 17.1912 20.0347 21.8694 23.7488 (46)
Water storage loss:
Total storage loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)



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Cylinder contents dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combustion losses	30.9589	46.0274	48.4345	48.0062	44.8807	45.9634	48.0062	48.4345	50.9589	49.1511	50.9589	(61)
Total heat required for water heating calculated for each month					150.9897	144.6597	161.2616	163.0266	184.5236	195.1113	209.2842	(62)
Solar input	214.427	189.0113	198.5055	177.0692	171.4343	180.9897	214.427	204.0266	224.5236	235.1113	249.2842	(63)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Solar input (sum of months) = Sum(63)n=				0.0000	(63)
Output from w/h.	214.427	189.0113	198.5055	177.0692	171.4343	180.9897	214.427	204.0266	224.5236	235.1113	249.2842	(64)
Heat gains from water heating, kWh/month	67.0281	59.0430	61.7990	54.8797	53.0414	64.5344	49.6590	50.2158	57.1500	60.8060	65.3829	(65)

Stochastic gains (Table 5), Watts	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	23.5293	20.8986	16.9598	12.8669	9.6182	8.1201	8.7740	11.4048	15.3075	19.4364	22.6852
Appliances gains (calculated in Appendix L, equation 19b or 19b-a), also see Table 5	263.8623	266.6004	259.7005	245.0116	226.6499	209.2425	197.4001	194.6621	201.5619	216.2509	234.7930
Cooking gains	6.8987	6.8987	6.8987	6.8987	6.8987	6.8987	6.8987	6.8987	6.8987	6.8987	6.8987
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000
Losses ex. evaporators (negative \$!\$)	-11.1896	-11.1896	-11.1896	-11.1896	-11.1896	-11.1896	-11.1896	-11.1896	-11.1896	-11.1896	-11.1896
Water heating	90.1856	87.8706	83.0631	76.2218	71.2922	64.6312	59.5529	66.7459	69.7442	76.8145	84.4528
Total internal gains	333.3333	443.0555	427.4556	401.7364	375.0759	349.4898	333.4232	340.5089	354.3097	380.1978	429.6271

(Jan)		Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
North		8.6500	10.6334	0.6300	0.7000	0.7700	28.1099 (74)				
South		12.8700	46.7521	0.6300	0.7000	0.7700	183.8871 (78)				
West		1.6100	19.6403	0.6300	0.7000	0.7700	9.6637 (80)				
Solar gains	221.6607	373.7835	506.0392	625.4068	704.9861	615.7801	346.7004	411.2065	264.696	69.2562	
	666.9340	816.8490	333.4498	1027.4032	1080.0521	1032.7096	1009.9028	956.3891	901.7510	764.3222	120.2755 (84)

Temperature during heating periods in the living area (see Table 3, Th) (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	0.9870	0.521516	0.523139	0.53089	0.53277	0.53365	0.53365	0.54079	0.53651	0.52377	0.52936	0.52615	
alpha	0.4658	0.4768	0.4876	0.5393	0.4542	0.45958	0.45958	0.46045	0.45777	0.45492	0.45293	0.45088	
util living area	0.9974	0.9931	0.9828	0.9535	0.8796	0.7318	0.5657	0.6137	0.8359	0.9679	0.9942	0.9981	(86)
MIT	19.5501	19.7547	20.0453	20.4084	20.7200	20.9185	20.9804	20.9717	20.8405	20.4285	19.9202	19.5204	(87)
Th 2	19.8129	19.8129	19.8129	19.8129	19.8374	19.8374	19.8506	19.8531	19.8455	19.8374	19.8316	19.8256	(88)
util rest of house	0.9964	0.9907	0.9766	0.9354	0.8317	0.6330	0.4839	0.4769	0.7565	0.9518	0.9918	0.9984	(89)
MIT 2	18.8129	18.1997	18.6225	19.1482	19.5640	19.7967	19.8437	19.8418	19.7200	19.4628	19.1648	18.7528	(90)
Living area fraction									L5A = Living area / (4) =				
MIT 2	18.5405	18.8036	19.1751	19.6376	20.0129	20.2323	20.2851	20.2806	20.1556	19.6691	19.0227	18.5078	(92)
adjusted MIT	18.5405	18.8036	19.1751	19.6376	20.0129	20.2323	20.2851	20.2806	20.1556	19.6691	19.0227	18.5078	(93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9950	0.9879	0.9270	0.8616	0.8400	0.6684	0.4225	0.3304	0.0787	0.5488	0.9894	0.9963 (94)
Useful gases	663.5875	806.9661	907.3942	957.1524	907.2375	703.6040	487.3282	507.2004	703.4204	750.9090	667.1461	619.9364 (95)
Ext. temp.	4.3000	4.6000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat rate w/m ²	1993.5606	1940.2562	1763.3762	1471.9597	1136.4048	759.9857	497.2427	522.3511	821.2219	1239.7776	1639.0457	1978.4472 (97)
Month fractl	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating km	989.5000	761.5978	636.8144	370.6612	170.5005	0.0000	0.0000	0.0000	0.0000	363.7182	699.4758	1010.7334 (98)
Space heating per m ²												5003.2804 (98)
												477.3432 (99)
									(98) / (4)			

Not applicable

9a. Energy requirements - Individual heating systems, including micro-CHP		
Fraction of space heat from secondary/supplementary system (Table 11)		0.0000 (202)
Fraction of space heat from main system(s)		1.0000 (202)
Efficiency of main space heating system 1 (in %)		93.4000 (202)
Efficiency of secondary/supplementary heating system, %		0.0000 (202)
Space heating requirement		5356.8312 (21)

[illegible]

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating – main system 1	5356.832	0.2160	1157.0755 (26)
Space heating – secondary	0.0000		0.0000 (26)
Water heating (other fuel)	2531.4884	0.2160	546.8015 (26)
Space and water heating			1703.8770 (26)
Pumps and fans	75.0000	0.5190	38.9250 (26)
Energy for lighting	415.5353	0.5190	215.6628 (26)
Total CO ₂ kg/m ² /year			1958.4648 (27)
Emissions per m ² for space and water heating			16.2984 (27)
Fuel factor (mains gas)			1.0000
Emissions per m ² for lighting			2.0579 (27)
Emissions per m ² for pumps and fans			0.3714 (27)
Target Carbon Dioxide Emission Rate (TER) = (16.2984 + 1.00) + 2.0579 + 0.3714, rounded to 2 d.p.			18.6900 (27)

Target Carbon Dioxide Emission Rate (TER) = (16.2584 * 1.00) + 2.0579 + 0.3714, rounded to 2 d.p.

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	Studio Mid GF - Apt					Issued on Date	23/08/2022	
Assessment Reference	Studio Mid GF Be Lean				Prop Type Ref			
Property	Apartment, Studio Mid GF, Edmansons Close, Tottenham, N17 6XD							
SAP Rating	82 B		DER	22.24		TER	26.92	
Environmental	88 B		% DER<TER		17.39			
CO ₂ Emissions (t/year)	0.69		DFEE	60.25		TFEE	64.66	
General Requirements Compliance	Pass		% DFEE<TFEE		6.82			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com					Assessor ID	M976-0001	
Client								

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Ground-floor flat, total floor area 38 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 26.92 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 22.24 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 64.7 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 60.2 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof (no roof)	-	-	-
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 40 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 86.0% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%

Minimum 75% OK

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power: 0.50
Maximum 1.5 OK

MVHR efficiency: 90%
Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overshading: Average
Windows facing North East: 5.40 m², No overhang
Windows facing South East: 2.88 m², No overhang
Windows facing South West: 2.76 m², No overhang
Air change rate: 3.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Door U-value 1.00 W/m²K
Window U-value 0.80 W/m²K
Air permeability 3.0 m³/m²h

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)												1.3441 (42)
-----												6.1627 (43)
Assumed occupancy												
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	72.7349	70.0900	67.4451	64.8002	62.1553	59.5104	59.5104	62.1553	64.8002	67.4451	70.0900	72.7349 (44)
Energy cost	107.8058	94.3183	91.3487	84.8710	81.4337	78.1278	65.1181	74.7240	75.6164	88.1237	94.3183	104.4603 (45)
Energy content (annual)												Total + Sum(45)= = 1040.3668 (45)
Distribution loss (40mm = 0.15 x 45m)	6.1796	14.1508	14.6023	12.7306	12.2154	10.5409	9.7677	11.2086	11.5215	13.2185	14.4291	15.6690 (46)

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8c. Space cooling requirement

Not applicable

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

[illegible]

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	1624.3318	0.2160	350.8557 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1457.5704	0.2160	314.8352 (264)
Space and water heating			665.6909 (265)
Pumps and fans	146.6750	0.5190	76.1243 (267)
Energy for lighting	181.9226	0.5190	94.4178 (268)
Total CO ₂ kg/year			836.2330 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			22.2400 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

Total Floor Area	22,2400	ZC1
Assumed number of occupants	37,6000	TFA
CO2 emission factor in Table 12 for electricity displaced from grid	1,3441	N
CO2 emissions from appliances, equation (L14)	0,5190	EF
CO2 emissions from cooking, equation (L16)	18,2105	CC2
Total CO2 emissions	4,0228	CC3
Residual CO2 emissions offset from biofuel CHP	44,4733	CC4
Additional allowable electricity generation, kWh/m ² /year	0,0000	CC5
Resulting CO2 emissions offset from additional allowable electricity generation	0,0000	CC6
Net CO2 emissions	44,4733	CC7

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.6000	2.5000 (2b)	94.0000 (1b) - (3b)
Deepling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	94.0000 (4)

2. Ventilation rate

	main heating		secondary heating		other			total	m3 per hour			
Number of chimneys	0	+	0	+	0	=	0 * 40 =	0.0000 (6a)				
Number of open flues	0	+	0	+	0	=	0 * 20 =	0.0000 (6b)				
Number of intermittent fans							2 * 10 =	0.0000 (7a)				
Number of passive vents							0 * 10 =	0.0000 (7b)				
Number of fuelless gas fires							0 * 40 =	0.0000 (7c)				
								Air changes per hour				
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =						20.0000 / (5) =	0.2128 (8)				
Pressure test								see				
Measured/design AP50								5.0000				
Infiltration rate								0.4628 (18)				
Number of sides sheltered								3 (19)				
Shelter factor						(20) = 1 - [0.075 x (19)] =		0.7750 (20)				
Infiltration rate adjusted to include shelter factor						(21) = (18) x (20) =		0.3586 (21)				
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	1.2500	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Adj infiltr rate	0.4573	0.4483	0.4393	0.3948	0.3855	0.3407	0.3407	0.3317	0.3586	0.3855	0.4035	0.4214 (22b)
Effective ac	0.6045	0.6005	0.5965	0.5778	0.5743	0.5580	0.5580	0.5550	0.5643	0.5743	0.5814	0.5888 (22a)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U	K-value kJ/m2K	A x K					
TER Opaque door			1.2000	1.0000	1.2000		(26)					
TER Opening Type (Uw = 1.40)			8.2000	1.3258	10.8712		(27)					
Heat Loss Floor 1			37.6000	0.1300	4.8880		(28a)					
External Wall	32.0000	8.2000	23.8000	0.1800	4.2840		(28b)					
Corridor Wall	25.2500	1.2000	24.0500	0.1800	4.3290		(29)					
Total net area of external elements Aum (A, m2)			94.8500				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		25.5722		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.7755 (36)					
Total fabric heat loss						(33) + (36) =	33.3477 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 10.7531	Feb 16.6272	Mar 16.5037	Apr 17.9239	May 17.8154	Jun 17.3105	Jul 17.3105	Aug 17.2170	Sep 17.5050	Oct 17.8154	Nov 18.0349	Dec 18.2643
Heat transfer coeff	52.1008	51.9749	51.8514	51.2716	51.1632	50.6582	50.6582	50.5647	50.8527	51.1632	51.3826	51.6120
Average = Sum(39m) / 12 =												51.2711
	Jan 1.3857	Feb 1.3823	Mar 1.3790	Apr 1.3636	May 1.3607	Jun 1.3473	Jul 1.3473	Aug 1.3448	Sep 1.3525	Oct 1.3607	Nov 1.3666	Dec 1.3727
HLP (average)												1.3636
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

[illegible]

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Comb. loss	37.0649	32.2606	4.3693	31.9563	31.6737	29.3476	30.3258	31.6737	31.9563	34.3693	34.5649	37.0649 (61)
Total heat required for water heating calculated for each month	144.9287	126.5990	131.7180	116.8272	113.1094	99.6204	95.4440	106.3976	107.5727	122.4929	130.7588	141.5252 (62)
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 (63)
								Solar input (sum of months) =	Sum(63)m =	0.0000 (63)		
Output from w/h	144.9287	126.5990	131.7180	116.8272	113.1094	99.6204	95.4440	106.3976	107.5727	122.4929	130.7588	141.5252 (64)
								Total per year (kWh/year) =	Sum(64) =	1436.904 (64)		
Heat gains from water heating, kWh/month	45.1309	39.4327	40.9608	36.2087	34.9958	30.7026	29.2332	32.7641	33.1315	37.8934	40.6257	43.9993 (65)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts	66.056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056
Lighting gains (calculated in Appendix L, equation 19 or L9a), also see Table 5	105.0000	4.1555	7.4457	15.4310	3.3557	3.8438	4.9963	6.7061	8.5149	9.9382	10.5945	(67)
Appliances gains (calculated in Appendix L, equation 19 or L13a), also see Table 5	115.5483	116.7473	113.7258	107.2933	99.1735	91.2420	86.4437	85.2447	88.2662	94.6987	102.8185	110.4500 (68)
Cooking gains (calculated in Appendix L, equation 19 or L13a), also see Table 5	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206 (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 evaporative (negative values) (Table 5)	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645 (71)
Water heating gains (Table 5)	60.6599	58.6795	55.0548	50.2898	47.0374	42.6425	39.2920	44.0378	46.0160	50.9320	56.4246	59.1388 (72)
Total internal gains	778	230.740	222.3880	209.3817	196.5862	183.9036	175.7412	180.4406	187.1500	200.3073	215.3429	226.3449 (73)

[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		4.0100	11.2829	0.6300	0.7000	0.7700	13.8273 (75)
Southeast		2.1400	36.7938	0.6300	0.7000	0.7700	24.0636 (77)
Southwest		2.0500	36.7938	0.6300	0.7000	0.7700	23.0516 (79)
Total gains	60.9425	108.4005	160.5177	264.3407	237.5052	222.6798	180.6896
Total gains	293.6203	339.1445	382.9058	428.7194	460.9269	470.5424	333.2495

Temperature during heating periods in the living area (see Table 9a)												Dec	(85)
Utilisation factor for gains for living area, nil/m (see Table 9a)													
	Jan	Feb	Mar	Jun	Jul	Aug	Sep	Oct	Nov				
tau	50.1165	50.2380	50.3576	50.9270	51.0350	51.5437	51.5437	51.6390	51.3466	51.0350	50.8170	50.5911	
alpha	4.3411	4.3492	4.3572	4.3951	4.4023	4.4362	4.4362	4.4426	4.4231	4.4023	4.3878	4.3727	
util living area													
	0.9941	0.9882	0.9733	0.9295	0.8276	0.6589	0.5010	0.5547	0.7959	0.9530	0.9887	0.9953 (86)	
MIT	19.6152	19.7979	20.0909	20.4665	20.7730	20.9404	20.9859	20.9783	20.8600	20.4614	19.9707	19.5827 (87)	
util rest of house	20.3072	20.3088	20.3105	20.3182	20.3196	20.3264	20.3264	20.3276	20.3298	20.3196	20.3167	20.3127 (88)	
	0.9930	0.9861	0.9685	0.9164	0.7965	0.6037	0.4295	0.4819	0.7406	0.9417	0.9863	0.9845 (89)	
MIT	19.0081	19.1311	19.4827	19.8552	20.1419	20.2886	20.3198	20.3167	20.2256	19.8552	19.3702	18.9858 (90)	
Living area fraction									f _{LA}	= Living area / (a) = 0.8795 (91)			
MIT	19.5393	19.7220	20.0149	20.3901	20.6942	20.8590	20.9027	20.8956	20.7807	20.3858	19.8957	19.5075 (92)	
adjusted adjustment	20.1993											0.4600	
adjusted MIT	20.1993	20.3220	20.6149	20.9901	21.2942	21.4590	21.5027	21.4956	21.3807	20.9858	20.4957	20.1075 (93)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9927	0.9862	0.9707	0.9293	0.8396	0.6932	0.5515	0.6046	0.8182	0.9528	0.9870	0.9942 (94)
Heat gains W/m²	291.4809	334.5430	371.7039	398.4270	386.9884	315.0879	238.9238	243.7096	300.9839	308.1361	285.4070	276.3399 (95)
Heat loss rate W/m²	-2.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.8000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Meth fraction	825.2410	801.5569	731.8769	619.8803	490.8671	347.4625	248.3608	257.6581	370.2411	531.3683	688.3046	821.0176 (97a)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000 (97b)
Space heating per m²	397.1175	313.8932	267.9681	159.4664	77.2858	0.0000	0.0000	0.0000	0.0000	166.0847	290.0862	405.2401 (98)
										(98) / (4) =	55.2426	(99)

Not applicable

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[illegible]

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2349.8856	0.2160	507.3321 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1697.2066	0.2160	366.5966 (264)
Space and water heating			874.1287 (265)
Pumps and fans	84.0000	0.5190	43.5960 (267)
Energy for lighting	182.0402	0.5190	94.4798 (268)
Total CO2, kg/m2/year			1012.2045 (272)
Emissions per m2 for space and water heating			23.2481 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.5128 (272b)
Emissions per m2 for pumps and fans			1.1595 (272c)
Target Carbon Dioxide Emission Rate (TER) = (23.2481 * 1.000 + 2.5128 + 1.1595, rounded to 2 d.p.)			26.9200 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	Studio Mid MF - Apt				Issued on Date	23/08/2022
Assessment Reference	Studio Mid MF Be Lean	Prop Type Ref				
Property	Apartment, Studio Mid MF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	83 B	DER	19.34	TER	23.70	
Environmental	89 B	% DER<TER	18.39			
CO ₂ Emissions (t/year)	0.60	DFEE	48.18	TFEE	50.76	
General Requirements Compliance	Pass	% DFEE<TFEE	5.09			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-floor flat, total floor area 38 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 23.70 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 19.34 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)50.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)48.2 kWh/m²/yrOK

2 Fabric U-values
Element Average Highest
External wall 0.18 (max. 0.30) 0.18 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK
Floor (no floor)
Roof (no roof)
Openings 0.91 (max. 2.00) 1.00 (max. 3.30) OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability
Air permeability at 50 pascals: 3.00 (design value)
Maximum 10.0 OK

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Potterton Promax Ultra Combi 40 ErP
Combi boiler
Efficiency: 89.1% SEDBUK2009
Minimum: 85.0% OK

Secondary heating system: None

5 Cylinder insulation
Hot water storage No cylinder

6 Controls
Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls: No cylinder

Boiler interlock Yes OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Continuous supply and extract system
Specific fan power: 0.50
Maximum 1.5 OK
MVHR efficiency: 90%
Minimum: 70% OK

9 Summertime temperature
Overheating risk (Thames Valley): Medium OK

Based on:
Overshading: Average
Windows facing North East: 2.76 m², No overhang
Windows facing South West: 5.40 m², No overhang
Windows facing North West: 2.88 m², No overhang
Air change rate: 3.00 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K
Door U-value 1.00 W/m²K
Window U-value 0.80 W/m²K
Air permeability 3.0 m³/m²h

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	37.6000 (1b)	x 2.5000 (2b)	= 94.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.6000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	94.0000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans	0	+	0	=	0 * 10 = 0.0000 (7a)
Number of passive vents	0	+	0	=	0 * 10 = 0.0000 (7b)
Number of fuelless gas fires	0	+	0	=	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					0.0000 / (5) = 0.0000 (8)
Pressure test					Yes
Measured/design AP50					3.0000
Infiltration rate					0.1500 (18)
Number of sides sheltered					3 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.7750 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1163 (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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1163	0.1250	0.1308	0.1366 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation with heat recovery												76.5000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2657	0.2628	0.2599	0.2454	0.2425	0.2279	0.2279	0.2250	0.2338	0.2425	0.2483	0.2541 (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
Door to corridor				1.2000	1.2000		(26)
Window (Uw = 0.90)				11.0400	0.8687		(27)
External Wall	32.0000	11.0400	20.9600	0.1800	3.7728		(29a)
Corridor Wall	25.2500	1.2000	24.0500	0.1800	4.3290		(29a)
Total net area of external elements Aum(A, m ²)							(33)
Fabric heat loss, W/K = Sum (A x U)						18.8925	(33)
Party Wall 1			14.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.2640 (36)
Total fabric heat loss							(33) + (36) = 29.1565 (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	8.2426	8.1524	8.0623	7.6115	7.5214	7.0706	7.0706	6.9805	7.2509	7.5214	7.7017	7.8820 (38)
Average = Sum(39)m / 12 =	37.3991	37.3090	37.2188	36.7681	36.6779	36.2272	36.2272	36.1370	36.4075	36.6779	36.8582	37.0389 (39)
												36.7455 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9947	0.9923	0.9899	0.9779	0.9755	0.9635	0.9635	0.9611	0.9683	0.9755	0.9803	0.9881 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3441 (42)
Average daily hot water use (litres/day)												66.1227 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	72.7349	70.0900	67.4451	64.8002	62.1553	59.5104	59.5104	62.1553	64.8002	67.4451	70.0900	72.7349 (44)
Energy content (annual)	107.8638	94.3383	97.3487	84.8710	81.4357	70.2728	65.1181	74.7240	75.6164	88.1237	96.1939	104.4603 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	16.1796	14.1508	14.6023	12.7306	12.2154	10.5409	9.7677	11.2086	11.3425	13.2185	14.4291	15.6690 (46)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Combi loss	20.7009	18.6772	20.6459	19.9432	20.5812	19.8865	20.5302	20.5633	19.9174	20.6192	19.9966	20.6903 (57)
Total heat required for water heating calculated for each month	128.5647	113.0156	117.9946	104.8142	102.0170	90.1594	85.6483	95.2873	95.5338	108.7428	116.1905	125.1506 (62)
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 (63)
Output from w/h	128.5647	113.0156	117.9946	104.8142	102.0170	90.1594	85.6483	95.2873	95.5338	108.7428	116.1905	125.1506 (64)
Heat gains from water heating, kWh/month	41.0399	36.0368	37.5299	33.2054	32.2227	28.3373	26.7843	29.9866	30.1218	34.4559	36.9836	39.9056 (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	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	10.3012	9.1494	7.4408	5.6332	4.2109	3.5550	3.8413	4.9931	6.7017	8.5093	9.9316	10.5875 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.5483	116.7473	113.7258	107.2933	99.1735	91.5420	86.4437	85.2447	88.2662	94.6987	102.8185	110.4500 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206 (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)	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645 (71)
Water heating gains (Table 5)	55.1612	53.6262	50.4435	46.1186	43.3101	39.3574	36.0004	40.3045	41.8359	46.3117	51.3661	53.6366 (72)
Total internal gains	227.1724	225.6846	217.7717	205.2068	192.8561	180.6161	172.4472	176.7040	182.9654	195.6814	210.2779	220.8358 (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	2.7600	11.2829	0.4000	0.8000	0.7700	6.9058 (75)						
Southwest	5.4000	36.7938	0.4000	0.8000	0.7700	44.0608 (75)						
Northwest	2.8800	11.2829	0.4000	0.8000	0.7700	7.2061 (81)						
Solar gains	58.1726	103.7769	154.4427	212.2310	256.7647	263.2866	250.3495	215.8444	174.2531	118.0526	70.5310	49.2313 (83)
Total gains	285.3450	329.4615	372.2144	417.4378	449.6208	443.9027	422.7967	392.5484	357.2185	313.7340	280.8090	270.0671 (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, nli,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	69.8174	69.9861	70.1557	71.0157	71.1903	72.0761	72.0761	72.2559	71.7191	71.1903	70.8420	70.4972
alpha	5.6545	5.6657	5.6770	5.7344	5.7460	5.8051	5.8051	5.8171	5.7813	5.7460	5.7228	5.6998
util living area	0.9935	0.9847	0.9589	0.8772	0.7143	0.5165	0.3762	0.4218	0.6732	0.9212	0.9853	0.9951 (86)
MIT	20.1233	20.2896	20.5298	20.7970	20.9486	20.9933	20.9991	20.9983	20.9723	20.7615	20.3926	20.0897 (87)
Th 2	20.0878	20.0898	20.0918	20.1018	20.1038	20.1139	20.1139	20.1159	20.1098	20.1038	20.0998	20.0958 (88)
util rest of house	0.9915	0.9801	0.9469	0.8457	0.6588	0.4476	0.3009	0.3416	0.5980	0.8927	0.9800	0.9936 (89)
MIT 2	19.2973	19.4628	19.6970	19.9501	20.0728	20.1111	20.1137	20.1154	20.0965	19.9271	19.5741	19.2707 (90)
Living area fraction	20.1862	20.4257	20.6912	20.8391	20.8830	20.8884	20.8880	20.8880	20.8628	20.6572	20.2903	19.9873 (92)
MIT	20.0200	20.1862	20.4257	20.6912	20.8391	20.8830	20.8884	20.8880	20.8628	20.6572	20.2903	19.9873 (92)
Temperature adjustment	19.8700	20.0362	20.2757	20.5412	20.6891	20.7330	20.7384	20.7380	20.7128	20.5072	20.1403	19.8373 (93)
adjusted MIT	19.8700	20.0362	20.2757	20.5412	20.6891	20.7330	20.7384	20.7380	20.7128	20.5072	20.1403	19.8373 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9909	0.9798	0.9496	0.8620	0.6958	0.4960	0.3540	0.3982	0.6499	0.9066	0.9803	0.9931 (94)
Ext temp.	282.7445	322.7979	353.4440	359.8132	312.8286	220.1677	149.6877	156.3084	232.1430	284.4251	275.2708	268.1929 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	16.4000	16.4000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month fracti	582.3048	564.7169	512.7156	428.0235	329.7021	222.1827	149.9234	156.7609	240.7560	363.3750	480.6420	579.1833 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000 (97a)
Space heating	222.8729	162.5696	118.4981	49.1114	12.5539	0.0000	0.0000	0.0000	0.0000	58.7388	147.8673	231.3768 (98)
Space heating per m ²										(98) / (4) =		26.6912 (99)

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

9a. Energy requirements - Individual heating systems, including micro-CHP											
Fraction of space heat from secondary/supplementary system (Table 11)											0.0000 (201)
Efficiency of main space heating system 1 (in %)											1.0000 (202)
Efficiency of secondary/supplementary heating system, %											90.0000 (206)
Space heating requirement											0.0000 (208)
											1115.0985 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	222.8729	162.5696	118.4981	49.1114	12.5539	0.0000	0.0000	0.0000	0.0000	58.7388	147.8673
Space heating efficiency (main heating system 1)	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000
Space heating fuel (main heating system)	247.6365	180.6328	131.6645	54.5682	13.9488	0.0000	0.0000	0.0000	0.0000	65.2653	164.2970
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water heating requirement	128.5647	113.0156	117.9946	104.8142	102.0170	90.1594	85.6483	95.2873	95.5338	108.7428	116.1905
Efficiency of water heater	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000	90.0000
Fuel for water heating, kWh/month	88.7640	88.6168	88.3227	87.7263	87.0497	86.7000	86.7000	87.8295	88.5175	88.8134	88.8134
Water heating fuel used	144.8388	127.5330	133.5949	119.4786	117.1939	103.9900	98.7870	109.9046	110.1890	123.8113	131.2627
Annual totals kWh/year											
Space heating fuel - main system											1115.0985 (211)
Space heating fuel - secondary											0.0000 (215)
Electricity for pumps and fans:											
BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6250											71.6750 (230a)
mechanical ventilation fans (SFP = 0.6250)											30.0000 (230c)
central heating pump											48.0000 (230e)
main heating flue fan											146.0750 (231)
Total electricity for the above, kWh/year											181.9226 (232)
Electricity for lighting (calculated in Appendix L)											2905.1941 (238)
Total delivered energy for all uses											
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP											
Energy											
kWh/year											
Space heating - main system 1	1115.0985										
Space heating - secondary	0.0000										
Water heating (other fuel)	1461.4980										
Space and water heating											
Pumps and fans	146.6750										
Energy for lighting	181.9226										
Total CO2, kg/year											
Dwelling Carbon Dioxide Emission Rate (DER)											
16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES											
DER											
Total Floor Area	37.6000										
Assumed number of occupants	1.3441										
CO2 emission factor in Table 12 for electricity displaced from grid											
CO2 emissions from appliances, equation (L14)											
CO2 emissions from cooking, equation (L16)											
Total CO2 emissions											
Residual CO2 emissions offset from biofuel CHP											
Additional allowable electricity generation, kWh/m ² /year											
Resulting CO2 emissions offset from additional allowable electricity generation											
Net CO2 emissions											

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)											
CALCULATION OF TARGET EMISSIONS 09 Jan 2014											
1. Overall dwelling dimensions											
Ground floor											
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.6000										
Dwelling volume											
2. Ventilation rate											
Number of chimneys											
Number of open flues											
Number of intermittent fans											
Number of passive vents											
Number of fuelless gas fires											
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =											
Pressure test											
Measured/design AP50											
Infiltration rate											
Number of sides sheltered											
Shelter factor											
Infiltration rate adjusted to include shelter factor											
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250
Adj infiltr rate	0.4573	0.4483	0.4393	0.3945	0.3855	0.3407	0.3407	0.3317	0.3586	0.3855	0.4035
Effective ac	0.6045	0.6005	0.5965	0.5778	0.5743	0.5580	0.5580	0.5550	0.5643	0.5743	0.5814
3. Heat losses and heat loss parameter											
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K				
TER Opaque door			1.2000	1.0000	1.2000						
TER Opening Type (Uw = 1.40)			8.2000	1.3258	10.8712						
External Wall	32.0000	8.2000	23.8000	0.1800	4.2840						
Corridor Wall	25.2500	1.2000	24.0500	0.1800	4.3290						
Total net area of external elements Aum(A, m2)			57.2500								
Fabric heat loss, W/K = Sum (A x U)											
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											
Total fabric heat loss											
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)											
(38)m	18.7531	18.6272	18.5037	17.9239	17.8154	17.3105	17.3105	17.2170	17.5050	17.8154	18.0349
Heat transfer coeff	44.4303	44.3044	44.1809	43.6011	43.4927	42.9877	42.9877	42.8942	43.1822	43.4927	43.7121
Average = Sum(39)m / 12 =											
HLP	1.1817	1.1783	1.1750	1.1596	1.1567	1.1433	1.1433	1.1408	1.1485	1.1567	1.1626
HLP (average)											
Days in month	31	28	31	30	31	30	31	31	30	31	30
4. Water heating energy requirements (kWh/year)											
Assumed occupancy											
Average daily hot water use (litres/day)											
Daily hot water use	72.7349	70.0900	67.4451	64.8002	62.1553	59.5104	59.5104	62.1553	64.8002	67.4451	70.0900
Energy conte	107.8638	94.3383	97.3487	84.8710	81.4357	70.2728	70.2728	81.4357	94.3383	97.3487	107.8638
Energy content (annual)											
Distribution loss (46)m = 0.15 x (45)m	16.1796	14.1508	14.6023	12.7306	12.2154	10.5409	10.5409	12.2154	14.1508	14.6023	16.1796
Water storage loss:											
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	37.0649	32.2606	34.3693	31.9563	31.6737	29.3476	29.3476	31.6737	34.3693	34.5649	37.0649

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Total heat required for water heating calculated for each month												
	144,9287	126,5990	131,7180	116,8272	113,1094	99,6204	95,4440	106,3976	107,5727	122,4929	130,7588	141,5252 (62)
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 (63)
	Solar input (sum of months) = Sum(63)*n = 0.0000 (63)											
Output from w/h												
	144,9287	126,5990	131,7180	116,8272	113,1094	99,6204	95,4440	106,3976	107,5727	122,4929	130,7588	141,5252 (64)
	Total per year (kWh/year) = Sum(64)*n = 1436,9940 (64)											
Heat gains from water heating, kWh/month												
	45,1309	39,4327	40,9608	36,2087	34,9958	30,7026	29,2332	32,7641	33,1315	37,8934	40,6257	43,3993 (65)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66 m)	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	1.0000	9.1515	7.7143	7.7143	5.0000	5.0000	3.8438	4.9963	6.7061	8.5149	9.9382	10.5945
Appliances gains (calculated in Appendix L, equation 113 or 113a), also see Table 5	115.5483	116.7473	113.7258	107.2993	99.1735	91.2420	86.4437	85.2447	88.2662	94.6987	102.8185	110.4500
Cooking gains (calculated in Appendix L, equation 115a or 115b), also see Table 5	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206
Pumps, fans and other equipment (negative) (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
Cooling gains (calculated in Appendix L, equation 116a or 116b), also see Table 5	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645
Water heating gains (calculated in Appendix L, equation 117a or 117b), also see Table 5	60.5959	58.6795	55.5048	50.2898	47.0374	42.6425	39.2920	40.0378	46.0160	50.9320	56.4246	59.1388
Total internal gains	230.7448	230.7448	222.3880	209.2831	196.5862	183.9036	175.1842	180.4066	187.1500	203.3219	215.2349	226.3493

Jan		Area m ²	Solar flux Table 6a W/m ²	g Table 6b	FF Table 6c	Access factor Table 6d	Gains W					
Northeast		2.0500	11.2829	0.6300	0.7000	0.7700	7.0688 (75)					
Southwest		4.0100	36.7938	0.6300	0.7000	0.7700	45.0911 (79)					
Northwest		2.1400	11.4300	0.6300	0.7000	0.7700	7.3792 (81)					
Total gains	59.5392	106.2162	158.0768	217.2310	226.8188	256.2535	220.9315	178.3555	120.8285	72.1881	50.3876 (83)	
Solar gains	292.2169	336.9602	380.4648	426.6127	459.4050	453.4001	431.9948	401.3721	365.0095	321.1358	287.5310	276.7623 (84)

Temperature during heating periods in the living area from Table 9, t_{hi} (°C)											21.0000 (85)	
Utilisation factor for gains for living areas, $u_{li,m}$ (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	0.9388	0.9867	1.0004	0.9873	0.9863	0.9863	0.9863	0.9863	0.9863	0.9863	0.9863	0.9863
alpha	4.9179	4.9291	4.9400	4.9924	5.0024	5.0494	5.0494	5.0582	5.0312	5.0024	4.9823	4.9615
util living areas	0.9938	0.9868	0.9676	0.9080	0.7763	0.5867	0.4340	0.4846	0.7391	0.9401	0.9872	0.9952 (86)
MIT	19.8785	20.0537	20.3225	20.6504	20.8806	20.9772	20.9959	20.9930	20.9305	20.6247	20.1932	19.8479 (87)
T _{h,2}	20.4092	20.4108	20.4125	20.4202	20.4216	20.4284	20.4284	20.4296	20.4258	20.4216	20.4187	20.4157 (88)
util rest of house	0.9927	0.9846	0.9622	0.8932	0.7449	0.5399	0.4291	0.4272	0.6946	0.9273	0.9847	0.9944 (89)
MIT 2	19.3521	19.9276	17.7944	20.1179	20.3290	20.4139	20.4364	20.3776	20.0891	20.1735	19.3265	19.0750 (90)
Living area fraction	0.9927	0.9846	0.9622	0.8932	0.7449	0.5399	0.4291	0.4272	0.6946	0.9273	0.9847	0.9944 (91)
adjusted MIT	19.8127	19.9880	20.2564	20.5838	20.8116	20.9068	20.9247	20.9221	20.8614	20.5950	20.1282	19.7608 (92)
Temperature adjustment	0.9927	0.9846	0.9622	0.8932	0.7449	0.5399	0.4291	0.4272	0.6946	0.9273	0.9847	0.9944 (93)
adjusted MIT	19.8127	19.9880	20.2564	20.5838	20.8116	20.9068	20.9247	20.9221	20.8614	20.5950	20.1282	19.7608 (94)
MIT	19.8127	19.9880	20.2564	20.5838	20.8116	20.9068	20.9247	20.9221	20.8614	20.5950	20.1282	19.7608 (95)
adjusted MIT	19.8127	19.9880	20.2564	20.5838	20.8116	20.9068	20.9247	20.9221	20.8614	20.5950	20.1282	19.7608 (96)
MIT	19.8127	19.9880	20.2564	20.5838	20.8116	20.9068	20.9247	20.9221	20.8614	20.5950	20.1282	19.7608 (97)
adjusted MIT	19.8127	19.9880	20.2564	20.5838	20.8116	20.9068	20.9247	20.9221	20.8614	20.5950	20.1282	19.7608 (98)
MIT	19.8127	19.9880	20.2564	20.5838	20.8116	20.9068	20.9247	20.9221	20.8614	20.5950	20.1282	19.7608 (99)
adjusted MIT	19.8127	19.9880	20.2564	20.5838	20.8116	20.9068	20.9247	20.9221	20.8614	20.5950	20.1282	19.7608 (100)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9927	0.9853	0.9663	0.9122	0.7965	0.6260	0.4831	0.5353	0.7711	0.9431	0.9861	0.9943 (94)
Useful gains	290.0972	331.9981	367.5091	389.1474	365.9356	283.8099	208.7152	214.8648	282.8612	302.8769	283.5237	275.1622 (95)
Heat loss rate	4.3900	4.9000	6.6500	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month factor	715.8924	695.0450	634.2812	535.5872	422.3850	296.9064	211.7006	219.7095	317.8820	459.2378	595.7138	711.0961 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating per m ²	36.7916	243.9675	198.3669	105.4367	41.9983	0.0000	0.0000	0.0000	0.0000	116.3393	224.7473	324.3348 (98)
										(98) (4)	= 41.0087 (99)	

Not applicable

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Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(20)
Fraction of space heat from main system(s)	1.0000	(20)
Efficiency of main space heating system 1 (in %)	88.4000	(20)
Efficiency of secondary/supplementary heating system, %	0.0000	(20)
Space heating requirement	1778.2905	(21)

[illegible]

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	1778.2905	0.2160	384.1107 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (261)
Water heating (other fuel)	1707.6011	0.2160	368.8418 (264)
Space and water heating			752.9526 (265)
Emps and fans	84.0000	0.5190	43.5960 (265)
Energy for lighting	182.0420	0.5190	94.4798 (266)
Total CO ₂ , kg/m ² /year			891.0284 (272)
Emissions per m ² for space and water heating			20.0253 (274)
Fuel factor (main gas)			1.0000
Emissions per m ² for Lighting			2.5128 (272)
Emissions per m ² for pumps and fans			1.1595 (271)
Target Carbon Dioxide Emission Rate (TER) = $(20.0253 \times 1.00) + 2.5128 + 1.1595$, rounded to 2 d.p.			23.7000 (273)

Appendix B

SAP TER/DER Worksheets – *Refurbishment, Baseline*

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 1 End - Refurb	Issued on Date	23/08/2022
Assessment Reference	House Type 1 End Baseline	Prop Type Ref	
Property	House Type 1, Edmansons Close, Tottenham, N17 6XD		
SAP Rating	7 G	DER	151.41
Environmental	21 F	% DER<TER	-360.92
CO ₂ Emissions (t/year)	6.09	DFEE	285.76
General Requirements Compliance	Fail	% DFEE<TFEE	-376.46
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com	Assessor ID	M976-0001
Client			

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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DWELLING AS DESIGNED

End-Terrace House, total floor area 48 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Electricity
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 32.85 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER)151.41 kgCO₂/m²Fail
Excess emissions =118.56 kgCO₂/m² (361.0%)

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)60.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)285.8 kWh/m²/yrFail
Excess energy =225.8 kWh/m²/yr (376.0%)

2 Fabric U-values
Element Average Highest
External wall 2.10 (max. 0.30) 2.10 (max. 0.70) Fail
Party wall 0.00 (max. 0.20) - OK
Floor 0.68 (max. 0.25) 0.68 (max. 0.70) Fail
Roof 2.30 (max. 0.20) 2.30 (max. 0.35) Fail
Openings 4.46 (max. 2.00) 4.80 (max. 3.30) Fail

2a Thermal bridging
Thermal bridging calculated using default y-value of 0.15

3 Air permeability
Air permeability at 50 pascals: 15.00 (design value)
Maximum 10.0 Fail

4 Heating efficiency
Main heating system: Room heaters with radiators or underfloor - Electric
Panel, convector or radiant heaters

Secondary heating system: None

5 Cylinder insulation
Hot water storage Measured cylinder loss: 1.20 kWh/day
Permitted by BS6075 2.03 OK
Primary pipework insulated: No primary pipework

6 Controls
Space heating controls: Programmer and appliance thermostats OK

Hot water controls: Cylinderstat OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Not applicable

9 Summertime temperature
Overheating risk (Thames Valley): Not significant OK
Based on:
Overshading: Average
Windows facing North East: 4.74 m², No overhang
Windows facing South West: 3.39 m², No overhang
Air change rate: 0.80 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	84.3033	81.2377	78.1721	75.1065	72.0410	68.9754	68.9754	72.0410	75.1065	78.1721	81.2377	84.3033 (44)
Energy content	125.0193	109.3427	112.8319	98.3696	94.3879	81.4496	75.4750	86.6087	87.6431	102.1396	111.4933	121.0745 (45)
Energy content (annual)	Total = Sum (45) = 1205.352 (46)											
Distribution loss (46) = 0.15 x (45)												
	18.7529	16.0414	16.9248	14.7554	14.1582	12.2174	11.3213	12.9913	13.1465	15.3209	16.7240	18.1612 (46)
Water storage loss ¹												

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8c. Space cooling requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)
Efficiency of main space heating system 1 (in %)
Efficiency of secondary/supplementary heating system, %
Space heating requirement

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Space heating requirement 2046.4436 1742.7705 1667.7503 1235.6698 861.9447 0.0000 0.0000 0.0000 0.0000 1084.1589 1559.9896 2048.0690 (98)
Space heating efficiency (main heating system 1) 100.0000 100.0000 100.0000 100.0000 100.0000 0.0000 0.0000 0.0000 0.0000 100.0000 100.0000 100.0000 (210)
Space heating fuel (main heating system) 2046.4436 1742.7705 1667.7503 1235.6698 861.9447 0.0000 0.0000 0.0000 0.0000 1084.1589 1559.9896 2048.0690 (211)
Water heating requirement 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (215)

Water heating requirement 147.3393 129.5027 135.1519 119.9696 116.7079 103.0496 97.7950 108.9287 109.2431 124.4596 133.0933 143.3945 (64)
Efficiency of water heater 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 (217)
Fuel for water heating, kWh/month 147.3393 129.5027 135.1519 119.9696 116.7079 103.0496 97.7950 108.9287 109.2431 124.4596 133.0933 143.3945 (219)
Water heating fuel used 1468.6352 (219)
Annual total kWh/year 12246.7964 (211)
Space heating fuel - main system 0.0000 (215)
Space heating fuel - secondary 0.0000 (215)

Electricity for pumps and fans:
Total electricity for the above, kWh/year 229.7862 (232)
Electricity for lighting (calculated in Appendix L)
Total delivered energy for all uses 13945.2178 (238)

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

Energy Emission factor Emissions
kWh/year kg CO2/kWh kg CO2/year
Space heating - main system 1 12246.7964 0.5190 6356.0873 (261)
Space heating - secondary 0.0000 0.0000 0.0000 (263)
Water heating (other fuel) 1468.6352 0.5190 762.2217 (264)
Space and water heating 1468.6352 0.5190 7118.3090 (265)
Pumps and fans 0.0000 0.0000 0.0000 (267)
Energy for lighting 119.2590 (268)
Total CO2, kg/year 7237.5680 (272)
Dwelling Carbon Dioxide Emission Rate (DER) 151.4100 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER 151.4100 ZC1
Total Floor Area 47.8000 TFA
Assumed number of occupants 1.6256 N
CO2 emission factor in Table 12 for electricity displaced from grid 0.5190 EF
CO2 emissions from appliances, equation (L14) 17.5446 ZC2
CO2 emissions from cooking, equation (L16) 3.3057 ZC3
Total CO2 emissions 172.2604 ZC4
Residual CO2 emissions offset from biofuel CHP 0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year 0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation 0.0000 ZC7
Net CO2 emissions 172.2604 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

Ground floor Area (m²) Storey height (m) Volume (m³)
First floor 30.0000 (1b) x 2.4000 (2b) = 72.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 17.8000 (1c) x 2.6000 (2c) = 46.2800 (1c) - (3c)
Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 118.2800 (5)

2. Ventilation rate

main secondary other total m³ per hour
heating heating
0 + 0 + 0 = 0 * 40 = 0.0000 (6a)
Number of chimneys 0 + 0 = 0 * 20 = 0.0000 (6b)
Number of open flues 0 + 0 = 2 * 10 = 20.0000 (7a)
Number of intermittent fans 0 + 0 = 0 * 10 = 0.0000 (7b)
Number of passive vents 0 * 40 = 0.0000 (7c)
Number of fuelless gas fires
Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1691 (8)
Pressure test Yes
Measured/design APS0 5.0000
Infiltration rate 0.4191 (18)
Number of sides sheltered 1 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3877 (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 infiltr rate 0.4943 0.4846 0.4749 0.4264 0.4167 0.3683 0.3683 0.3586 0.3877 0.4167 0.4361 0.4555 (22b)
Effective ac 0.6221 0.6174 0.6128 0.5909 0.5868 0.5678 0.5678 0.5643 0.5751 0.5868 0.5951 0.6037 (25)

3. Heat losses and heat loss parameter

Element Gross Openings NetArea U-value A x U K-value A x K
m² m² m² W/m²K W/K kJ/m²K kJ/K
TER Opaque door 1.8900 1.0000 1.8900 10.7784 (26)
TER Opening Type (Uw = 1.40) 8.1300 1.3258 10.7784 (27)
Ground Floor 30.0000 0.1300 3.9000 (28a)
External Wall 61.4600 0.1800 11.0628 (28a)
1st Floor 17.8000 0.1300 2.3140 (30)
Ground Floor 12.2000 0.1300 1.5860 (30)
Total net area of external elements Aum(A, m²) 131.4800 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 31.5312 (33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 250.0000 (35)
Thermal bridges (User defined value 0.050 x total exposed area) 6.5740 (36)
Total fabric heat loss (33) + (36) = 38.1052 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(38)m 24.2840 24.0988 23.9173 23.0650 22.9055 22.1631 22.1631 22.0256 22.4491 22.9055 23.2281 23.5654 (38)
Heat transfer coeff 62.3892 62.2040 62.0226 61.1702 61.0107 60.2683 60.2683 60.1309 60.5543 61.0107 61.3333 61.6706 (39)
Average = Sum(39)m / 12 = 61.1694 (39)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
HLP 1.3052 1.3013 1.2975 1.2797 1.2764 1.2608 1.2608 1.2580 1.2668 1.2764 1.2831 1.2902 (40)
HLP (average) 1.2797 (40)
Days in month 31 28 31 30 31 30 31 31 30 31 30 31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6256 (42)
Average daily hot water use (litres/day) 72.8074 (43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Daily hot water use 80.0881 77.1758 74.2635 71.3512 68.4389 65.5266 65.5266 68.4389 71.3512 74.2635 77.1758 80.0881 (44)
Energy conte 118.7683 103.8756 107.1903 93.4511 89.6685 77.3771 71.7013 82.2783 83.2609 97.0326 105.9187 115.0208 (45)
Energy content (annual) Total = Sum(45)m = 1145.5434 (45)
Distribution loss (46)m = 0.15 x (45)m 17.8153 15.5813 16.0785 14.0177 13.4503 11.6066 10.7552 12.3417 12.4891 14.5549 15.8878 17.2531 (46)
Water storage loss:
Store volume 170.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.5003 (48)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Temperature factor from Table 2b	0.5400 (49)
Enter (49) or (54) in (55)	0.8102 (55)
Total storage loss	
25.1153 22.6848 25.1153 24.3051 25.1153 24.3051 25.1153 25.1153 24.3051 25.1153 24.3051 25.1153 (56)	
If cylinder contains dedicated solar storage	
25.1153 22.6848 25.1153 24.3051 25.1153 24.3051 25.1153 25.1153 24.3051 25.1153 24.3051 25.1153 (57)	
Primary loss	23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 23.2624 (59)
Total heat required for water heating calculated for each month	
167.1460 147.5715 155.5680 140.2682 138.0462 124.1943 120.0790 130.6560 130.0781 145.4103 152.7358 163.3985 (62)	
Solar input	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63)
Output from w/h	167.1460 147.5715 155.5680 140.2682 138.0462 124.1943 120.0790 130.6560 130.0781 145.4103 152.7358 163.3985 (64)
Heat gains from water heating, kWh/month	78.1926 69.4954 74.3429 68.5262 68.5169 63.1816 62.5428 66.0597 65.1380 70.9655 72.6717 76.9466 (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 81.2787 81.2787 81.2787 81.2787 81.2787 81.2787 81.2787 81.2787 81.2787 81.2787 81.2787 (66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
13.0114 11.5567 9.3985 7.1153 5.3187 4.4903 4.8519 6.3067 8.4649 10.7481 12.5446 13.3731 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
141.5228 142.9913 139.2906 131.4122 121.4671 112.1201 105.8757 104.4072 108.1079 115.9863 125.9314 135.2784 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
31.1279 31.1279 31.1279 31.1279 31.1279 31.1279 31.1279 31.1279 31.1279 31.1279 31.1279 31.1279 (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 (70)
Losses e.g. evaporation (negative values) (Table 5)	
-65.0229 -65.0229 -65.0229 -65.0229 -65.0229 -65.0229 -65.0229 -65.0229 -65.0229 -65.0229 -65.0229 (71)	
Water heating gains (Table 5)	
105.0976 103.4158 99.9233 95.1753 92.0927 87.7522 84.0630 88.7899 90.4694 95.3837 100.9329 103.4228 (72)	
Total internal gains	310.0154 308.3474 308.9960 284.0863 269.2621 254.7462 245.1742 249.8874 257.4258 272.5018 289.7925 302.4579 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	PF	Access	Gains
	m2	Table 6a	Specific data	Specific data	Table 6d	W
		W/m2	or Table 6b	or Table 6c		
Northeast	4.7400	11.2829	0.6300	0.7000	0.7700	16.3445 (75)
Southwest	3.3900	36.7938	0.6300	0.7000	0.7700	38.1194 (79)
Solar gains	54.4640	98.2013	148.7837	208.5209	255.6228	263.4786
Total gains	364.4794	406.5487	447.7797	492.6072	524.8849	518.2248

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
Utilization factor for gains for living area, nil,m (see Table 9a)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
tau 53.2055 53.3638 53.5200 54.2657 54.4076 55.0778 55.0778 55.2037 54.8177 54.4076 54.1214 53.8254	
alpha 4.5470 4.5576 4.5680 4.6177 4.6272 4.6719 4.6719 4.6802 4.6545 4.6272 4.6081 4.5884	
util living area	
0.9945 0.9902 0.9788 0.9432 0.8527 0.6854 0.5217 0.5743 0.8144 0.9586 0.9895 0.9955 (86)	
MIT 19.7018 19.8548 20.1179 20.4711 20.7699 20.9412 20.9868 20.9797 20.8647 20.4900 20.0404 19.6796 (87)	
Th 2 19.8368 19.8398 19.8428 19.8568 19.8594 19.8716 19.8739 19.8739 19.8669 19.8594 19.8541 19.8485 (88)	
util rest of house	
0.9927 0.9869 0.9713 0.9223 0.7998 0.5874 0.3949 0.4449 0.7322 0.9390 0.9853 0.9940 (89)	
MIT 2 18.1366 18.3608 18.7425 19.2498 19.6400 19.8340 19.8671 19.8660 19.7632 19.2870 18.6419 18.1124 (90)	
Living area fraction	
MIT 18.7211 18.9187 19.2561 19.7059 20.0620 20.2475 20.2852 20.2819 fLA = Living area / (4) = 0.3734 (91)	
Temperature adjustment	
adjusted MIT 18.7211 18.9187 19.2561 19.7059 20.0620 20.2475 20.2852 20.2819 20.1745 19.7362 19.1641 18.6976 (92)	
	0.0000
	18.6976 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9902	0.9833	0.9664	0.9189	0.8104	0.6220	0.4426	0.4936	0.7572	0.9363	0.9819	0.9919 (94)
Useful gains	360.8934	399.7515	432.7134	452.6709	425.3675	322.3116	219.1775	228.6418	323.0606	360.3959	349.5650	345.5962 (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	899.7183	872.0215	791.1657	660.9975	510.1687	340.3636	222.1016	233.4226	367.8381	557.4077	739.9330	894.0783 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	0.0000 (97a)
Space heating kWh	400.8857	317.3654	266.6885	149.9952	63.0920	0.0000	0.0000	0.0000	0.0000	146.5768	281.0649	408.0707 (98)
Space heating per m2												2033.7392 (98)
										(98)	(4)	= 42.5468 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)	93.5000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Space heating requirement	2175.1221 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	400.8857	317.3654	266.6885	149.9952	63.0920	0.0000	0.0000	0.0000	0.0000	146.5768	281.0649	408.0707 (98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000 (210)
Space heating fuel (main heating system)	428.7548	339.4282	285.2284	160.4226	67.4781	0.0000	0.0000	0.0000	0.0000	156.7666	300.6042	436.4392 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	167.1460	147.5715	155.5680	140.2682	138.0462	124.1943	120.0790	130.6560	130.0781	145.4103	152.7358	163.3985 (64)
Efficiency of water heater	191.9788	170.0022	180.3900	165.0354	166.5747	155.6319	150.4749	163.7293	163.0051	171.4033	176.7364	187.4729 (219)
Water heating fuel used												2042.4349 (219)
Annual totals kWh/year												2175.1221 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												
Electricity for pumps and fans:												30.0000 (230c)
central heating pump												45.0000 (230e)
main heating flue fan												75.0000 (231)
Total electricity for the above, kWh/year												229.7862 (232)
Electricity for lighting (calculated in Appendix L)												4522.3433 (238)
Total delivered energy for all uses												

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	0.2160	469.8264 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	0.2160	441.1659 (264)
Space and water heating		910.9923 (265)
Pumps and fans	0.5190	38.9520 (267)
Energy for lighting	0.5190	119.2590 (268)
Total CO2, kg/m2/year		1069.1764 (272)
Emissions per m2 for space and water heating		19.0584 (272a)
Fuel factor (electricity)		1.5500
Emissions per m2 for lighting		2.4950 (272b)
Emissions per m2 for pumps and fans		0.8143 (272c)
Target Carbon Dioxide Emission Rate (TER) = (19.0584 * 1.55) + 2.4950 + 0.8143, rounded to 2 d.p.		32.8500 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 1 Mid - Refurb	Issued on Date	23/08/2022
Assessment Reference	Type 1 Mid Baseline	Prop Type Ref	
Property	House Type 1, Edmansons Close, Tottenham, N17 6XD		
SAP Rating	18 G	DER	124.31
Environmental	30 F	% DER<TER	-312.43
CO ₂ Emissions (t/year)	4.96	DFEE	226.38
General Requirements Compliance	Fail	% DFEE<TFEE	-345.75
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com	Assessor ID	M976-0001
Client			

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



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DWELLING AS DESIGNED

Mid-Terrace House, total floor area 48 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Electricity
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 30.14 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER)124.31 kgCO₂/m²Fail
Excess emissions =94.17 kgCO₂/m² (312.0%)

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)50.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)226.4 kWh/m²/yrFail
Excess energy =175.6 kWh/m²/yr (346.0%)

2 Fabric U-values
Element Average Highest
External wall 2.10 (max. 0.30) 2.10 (max. 0.70) Fail
Party wall 0.00 (max. 0.20) - OK
Floor 0.50 (max. 0.25) 0.50 (max. 0.70) Fail
Roof 2.30 (max. 0.20) 2.30 (max. 0.35) Fail
Openings 4.46 (max. 2.00) 4.80 (max. 3.30) Fail

2a Thermal bridging
Thermal bridging calculated using default y-value of 0.15

3 Air permeability
Air permeability at 50 pascals: 15.00 (design value)
Maximum 10.0 Fail

4 Heating efficiency
Main heating system: Room heaters with radiators or underfloor - Electric
Panel, convector or radiant heaters

Secondary heating system: None

5 Cylinder insulation
Hot water storage Measured cylinder loss: 1.20 kWh/day
Permitted by BS600 2.03 OK
Primary pipework insulated: No primary pipework

6 Controls
Space heating controls: Programmer and appliance thermostats OK

Hot water controls: Cylinderstat OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Not applicable

9 Summertime temperature
Overheating risk (Thames Valley): Slight OK
Based on:
Overshading: Average
Windows facing North East: 4.74 m², No overhang
Windows facing South West: 3.39 m², No overhang
Air change rate: 0.80 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	84.3033	81.2377	78.1721	75.1065	72.0410	68.9754	68.9754	72.0410	75.1065	78.1721	81.2377	84.3033 (44)
Energy content	125.0193	109.3427	112.8319	98.3696	94.3879	81.4496	75.4750	86.6087	87.6431	102.1396	111.4933	121.0745 (45)
Energy content (annual)	Total = Sum (45) = 1205.352 (46)											
Distribution loss (46) = 0.15 x (45)												
	18.7529	16.0414	16.9248	14.7554	14.1582	12.2174	11.3213	12.9913	13.1465	15.3209	16.7240	18.1612 (46)
Water storage loss ¹												

8c. Space cooling requirement

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Not applicable

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)

Efficiency of main space heating system 1 (in %)

Efficiency of secondary/supplementary heating system, %

Space heating requirement

	Jan	Feb	Mar	Apr	May	June
Space heating requirement	1648.6212	1397.0336	1326.2228	967.2297	658.3132	0
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0
Space heating fuel (main heating system)	1648.6212	1397.0336	1326.2228	967.2297	658.3132	0
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Water heating					
Water heating requirement	147.3393	129.5027	135.1519	119.9696	116.7079
Efficiency of water heater (217m)	100.0000	100.0000	100.0000	100.0000	100.0000
Fuel for water heating, kWh/month	147.3393	129.5027	135.1519	119.9696	116.7079
Water heating fuel used					
Annual totals kWh/year					
Space heating fuel - main system					
Space heating fuel - secondry					

Electricity for pumps and fans:
Total electricity for the above, kWh/year
Electricity for lighting (calculated in Appendix L)
Total delivered energy for all uses

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

Space heating - main system 1
Space heating - secondary
Water heating (other fuel)
Space and water heating
Pumps and fans
Energy for lighting
Total CO₂ kg/year
Dwelling Carbon Dioxide Emission Rate (DER)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES DER

Total Floor Area	
Assumed number of occupants	
CO2 emission factor in Table 12 for electricity displaced from grid	
CO2 emissions from appliances, equation (L14)	
CO2 emissions from cooking, equation (L16)	
Total CO2 emissions	
Residual CO2 emissions offset from biofuel CHP	
Additional allowable electricity generation, kWh/m ² /year	
Resulting CO2 emissions offset from additional allowable electricity generation	
Net CO2 emission	

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions					
	Area (m ²)		Storey height (m)		Volume (m ³)
Ground floor	30.0000 (1b)	x	2.4000 (2b)	=	72.0000 (1b) - (3b)
First floor	17.8000 (1c)	x	2.6000 (2c)	=	46.2800 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.8000				(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		118.2800 (5)

2. Ventilation rate										total		m3 per hour	
main heating				secondary heating				other					
Number of chimneys	0	+		0	+		0	=	0	+	40	=	0.0000 (6a)
Number of open flues	0	+		0	+		0	=	0	+	20	=	0.0000 (6b)
Number of intermittent fans	0	+		0	+		0	=	2	+	10	=	20.0000 (7a)
Number of passive vents	0	+		0	+		0	=	0	+	10	=	0.0000 (7b)
Number of fuelless gas fires	0	+		0	+		0	=	0	+	40	=	0.0000 (7c)
										Air changes per hour			
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =										20.0000 / (5) =		0.1691 (8)	
Pressure test										Yes			
Measured/design AP50										5.0000			
Infiltration rate										0.4191 (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) =		0.3562 (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
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
Adj infail rate												
Effective ac	0.4542	0.4493	0.4364	0.3918	0.3829	0.3384	0.3384	0.3295	0.3562	0.3829	0.4008	0.4186
	0.6031	0.5951	0.5852	0.5768	0.5733	0.5573	0.5573	0.5543	0.5634	0.5733	0.5803	0.5876

1. Heat losses and heat loss parameter												
Element	Gross		Openings		NetArea	U-value	A x U		K-value	A x K		
	m2		m2		m2	W/m2K	k2/m2K		k2/m2K	k2/m2K		
TER Opaque door					1.8900	1.0000	1.8900			(26)		
TER Opening Type (Uw = 1.40)					8.1300	1.3258	10.7784			(27)		
Ground Floor					30.0000	0.1300	3.9000			(28)		
External Wall	45.0000		10.0200		34.9800	0.1800	6.2964			(29)		
1st Floor	17.8000				17.8000	0.1300	2.3140			(30)		
Ground floor	12.2000				12.2000	0.1300	1.5860			(31)		
Total net area of external elements Aum(A, m2)					105.0000					(32)		
Fabric heat loss, W/K = Sum (A x U)							26.7648			(33)		
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K										250.0000 (35)		
Thermal bridges (User defined value 0.050 * total exposed area)										5.2500 (36)		
Total fabric heat loss										(33) + (36) = 32.0148 (37)		
Ventilation heat loss calculated monthly (38m) = 0.33 x (25m) x (5)												
(38m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	23.5422	23.3858	23.2326	22.5128	22.3782	21.7513	21.7513	21.6352	21.9928	22.3782	22.6506	22.9354 (38)
Average = Sum(39m) / 12 =	55.5070	55.2474	54.5276	54.3930	53.7661	53.7661	53.6500	54.0076	54.3930	54.6654	54.9502 (39)	54.5270 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1623	1.1590	1.1558	1.1407	1.1379	1.1248	1.1248	1.1224	1.1299	1.1379	1.1436	1.1496 (40)
HLP (average)												1.1407 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Temperature factor from Table 2b																			0.5400 (49)
Enter (49) or (54) in (55)																			0.8102 (55)
Total storage loss	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	(56)
If cylinder contains dedicated solar storage	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Total heat required for water heating calculated for each month	167.1460	147.5715	155.5680	140.2682	138.0462	124.1943	120.0790	130.6560	130.0781	145.4103	152.7358	163.3985	163.3985	145.4103	152.7358	163.3985	163.3985	163.3985	(62)
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	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Output from w/h	167.1460	147.5715	155.5680	140.2682	138.0462	124.1943	120.0790	130.6560	130.0781	145.4103	152.7358	163.3985	163.3985	145.4103	152.7358	163.3985	163.3985	163.3985	(64)
Heat gains from water heating, kWh/month	78.1926	69.4954	74.3429	68.5262	68.5169	63.1816	62.5428	66.0597	65.1380	70.9655	72.6717	76.9466	76.9466	70.9655	72.6717	76.9466	76.9466	76.9466	(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	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	13.0114	11.5567	9.3985	7.1153	5.3187	4.4903	4.8519	6.3067	8.4649	10.7481	12.5446	13.3731	13.3731	12.5446	10.7481	8.4649	6.3067	4.8519	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	(68)
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	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	(71)
Water heating gains (Table 5)	105.0976	103.4158	99.9233	95.1753	92.0927	87.7522	84.0630	88.7899	90.4694	95.3837	100.9329	103.4228	103.4228	95.3837	90.4694	88.7899	87.7522	84.0630	(72)
Total internal gains	310.0154	308.3474	298.9960	284.0863	269.2621	254.7462	245.1742	249.8874	257.4258	272.5018	289.7925	302.4579	302.4579	272.5018	257.4258	249.8874	245.1742	254.7462	(73)

6. Solar gains																			
[Jan]		Area	Solar flux	g	PF	Access	Gains												
		m2	Table 6a	Specific data	Specific data	Table 6d	W												
			W/m2	or Table 6b	or Table 6c														
Northeast		4.7400	11.2829	0.6300	0.7000	0.7700	16.3445 (75)												
Southwest		3.3900	36.7938	0.6300	0.7000	0.7700	38.1194 (79)												
Solar gains	54.4640	98.2013	148.7837	208.5209	255.6228	263.4786	249.9830	213.3593	169.2369	112.4215	66.2240	45.9701 (83)							
Total gains	364.4794	406.5487	447.7797	492.6072	524.8849	518.2248	495.1572	463.2467	426.6627	384.9232	356.0165	348.4280 (84)							

7. Mean internal temperature (heating season)																			
Temperature during heating periods in the living area from Table 9, Th1 (C)																			
Utilization 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	59.7485	59.9171	60.0833	60.8764	61.0271	61.7386	61.7386	61.8722	61.4626	61.0271	60.7230	60.4082	60.4082	60.4082	60.4082	60.4082	60.4082	60.4082	(85)
util living area	0.9942	0.9891	0.9753	0.9303	0.8194	0.6341	0.4720	0.5227	0.7747	0.9497	0.9883	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	(86)
MIT	19.8915	20.0392	20.2848	20.6035	20.8508	20.9694	20.9944	20.9908	20.9170	20.6060	20.1975	19.8675	19.8675	19.8675	19.8675	19.8675	19.8675	19.8675	(87)
Th 2	19.9503	19.9529	19.9555	19.9677	19.9700	19.9806	19.9806	19.9826	19.9765	19.9700	19.9654	19.9605	19.9605	19.9605	19.9605	19.9605	19.9605	19.9605	(88)
util rest of house	0.9923	0.9856	0.9670	0.9070	0.7648	0.5454	0.3657	0.4122	0.6934	0.9279	0.9839	0.9938	0.9938	0.9938	0.9938	0.9938	0.9938	0.9938	(89)
MIT 2	18.4923	18.7083	19.0633	19.5160	19.8304	19.9614	19.9786	19.9790	19.9143	19.5302	18.9483	18.4647	18.4647	18.4647	18.4647	18.4647	18.4647	18.4647	(90)
Living area fraction																			
MIT	19.0148	19.2053	19.5194	19.9221	20.2115	20.3378	20.3579	20.3568	20.2887	19.9319	19.4148	18.9885	18.9885	18.9885	18.9885	18.9885	18.9885	18.9885	(91)
Temperature adjustment																			
adjusted MIT	19.0148	19.2053	19.5194	19.9221	20.2115	20.3378	20.3579	20.3568	20.2887	19.9319	19.4148	18.9885	18.9885	18.9885	18.9885	18.9885	18.9885	18.9885	(92)

8. Space heating requirement																			
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec							
Useful gains	0.9900	0.9823	0.9626	0.9058	0.7787	0.5776	0.4056	0.4537	0.7202	0.9269	0.9807	0.9919	0.9919	0.9919	0.9919	0.9919	0.9919	0.9919	(94)
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	4.2000	4.2000	4.2000	4.2000	4.2000	4.2000	(96)
Heat loss rate W																			
Month fractl	817.5093	792.5216	719.2897	601.0100	462.9638	308.4987	202.0500	212.2836	334.2388	507.5896	673.1917	812.6338	812.6338	673.1917	507.5896	334.2388	202.0500	162.9638	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(97a)
Space heating	339.7591	264.2061	214.4530	111.4501	40.3382	0.0000	0.0000	0.0000	0.0000	112.2022	233.3161	347.4789	347.4789	233.3161	112.2022	40.3382	11.4501	0.0000	(98)
Space heating per m2																			(98)

8c. Space cooling requirement																			
Not applicable																			



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)																		93.5000 (206)
Efficiency of secondary/supplementary heating system, %																		0.0000 (208)
Space heating requirement																		1778.8275 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Space heating requirement	339.7591	264.2061	214.4530	111.4501	40.3382	0.0000	0.0000	0.0000	0.0000	112.2022	233.3161	347.4789	(98)					
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)					
Space heating fuel (main heating system)	363.3787	282.5734	229.3615	119.1980	43.1424	0.0000	0.0000	0.0000	0.0000	120.0024	249.5359	371.6352	(211)					
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)					
Water heating requirement																		
Water heating requirement	167.1460	147.5715	155.5680	140.2682	138.0462	124.1943	120.0790	130.6560	130.0781	145.4103	152.7358	163.3985	(64)					
Efficiency of water heater	86.6681	86.3506	85.6705	84.2081	81.9921	79.8000	79.8000	79.8000	79.8000	84.1324	85.9409	86.7784	(217)					
Fuel for water heating, kWh/month	192.8576	170.8981	181.5888	166.5732	168.3652	155.6319	150.4749	163.7293	163.0051	172.8350	177.7218	188.2939	(219)					
Water heating fuel used													(219)					
Annual totals kWh/year																		
Space heating fuel = main system													1778.8275 (211)					
Space heating fuel = secondary													0.0000 (215)					
Electricity for pumps and fans:																		
central heating pump													30.0000 (230c)					
main heating flue fan													45.0000 (230e)					
Total electricity for the above, kWh/year													75.0000 (231)					
Electricity for lighting (calculated in Appendix L)													229.7862 (232)					
Total delivered energy for all uses													4135.5884 (238)					

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 2 End - Refurb				Issued on Date	23/08/2022
Assessment Reference	House Type 2 End Baseline	Prop Type Ref				
Property	House Type 2, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	48 E	DER	72.56	TER	18.02	
Environmental	40 E	% DER<TER	-302.59			
CO ₂ Emissions (t/year)	5.90	DFEE	238.00	TFEE	55.88	
General Requirements Compliance	Fail	% DFEE<TFEE	-325.94			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

End-Terrace House, total floor area 98 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 18.02 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 72.56 kgCO₂/m²Fail
Excess emissions =54.54 kgCO₂/m² (303.0%)

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)55.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)238.0 kWh/m²/yrFail
Excess energy =182.1 kWh/m²/yr (326.0%)

2 Fabric U-values
Element Average Highest
External wall 2.10 (max. 0.30) 2.10 (max. 0.70) Fail
Party wall 0.00 (max. 0.20) - OK
Floor 0.50 (max. 0.25) 0.50 (max. 0.70) Fail
Roof 2.30 (max. 0.20) 2.30 (max. 0.35) Fail
Openings 4.63 (max. 2.00) 4.80 (max. 3.30) Fail

2a Thermal bridging
Thermal bridging calculated using default y-value of 0.15

3 Air permeability
Air permeability at 50 pascals: 15.00 (design value)
Maximum 10.0 Fail

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer

-- --
Combi boiler
Efficiency: 78.0% SEDBUK2009
Minimum: 88.0% Fail

Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Programmer and room thermostat Fail

Hot water controls: No cylinder

Boiler interlock: Yes OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Not applicable

9 Summer time temperature
Overheating risk (Thames Valley): Slight OK
Based on:
Overshading: Average
Windows facing South East: 8.67 m², No overhang
Windows facing North West: 9.48 m², No overhang
Air change rate: 0.80 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Vers 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.1500 (1b)	x 2.4000 (2b)	= 146.7600 (1b) - (3b)
First floor	36.5000 (1c)	x 2.6000 (2c)	= 94.9000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	97.6500		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 241.6600 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans	0	+	0	=	3 * 10 = 30.0000 (7a)
Number of passive vents	0	+	0	=	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0	+	0	=	0 * 40 = 0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1241 (8)
Pressure test					Yes
Measured/design APS0					15.0000
Infiltration rate					0.8741 (18)
Number of sides sheltered					1 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.8086 (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	1.0309	1.0107	0.9905	0.8894	0.8692	0.7682	0.7682	0.7479	0.8086	0.8692	0.9097	0.9501 (22b)
Effective ac	1.0309	1.0107	0.9906	0.8956	0.8778	0.7950	0.7950	0.7797	0.8269	0.8778	0.9137	0.9513 (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
Front door			1.8900	3.0000	5.6700		(26)
Window (Uw = 4.80)			18.1500	4.0268	73.0872		(27)
Ground Floor			61.1500	0.5000	30.5750		(28a)
External Wall	118.8600	20.0400	98.8200	2.1000	207.5220		(28b)
1st Floor	36.5000		36.5000	2.3000	83.9500		(30)
Ground Floor	24.6500		24.6500	2.3000	56.6950		(30)
Total net area of external elements Aum(A, m ²)			241.1600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		457.4992		(33)
Party Wall			25.9800	0.0000	0.0000		(32)
Party Ceilings 1			60.8500				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Default value 0.150 * total exposed area)							36.1740 (36)
Total fabric heat loss							(33) + (36) = 493.6732 (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	82.2152	80.6032	78.9947	71.4182	70.0007	63.4018	63.4018	62.1798	65.9436	70.0007	72.8683	75.8663 (38)
Average = Sum(39)m / 12 =	375.8885	574.2764	572.6679	565.0914	563.6739	557.0750	557.0750	555.8530	559.6168	563.6739	566.5416	569.5396 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	5.8975	5.8810	5.8645	5.7869	5.7724	5.7048	5.7048	5.6923	5.7308	5.7724	5.8018	5.8252 (40)
Days in month		31	28	31	30	31	30	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Average daily hot water use (litres/day)												2.7167 (42)
												103.9170 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	114.3087	110.1520	105.9953	101.8387	97.6820	93.5253	93.5253	97.6820	101.8387	105.9953	110.1520	114.3087 (44)
Energy content (annual)	169.5165	148.2602	152.9913	133.3815	127.9827	110.4394	102.3383	117.4347	118.8372	138.4933	151.1763	164.1677 (45)
Distribution loss (46)m = 0.15 x (45)m												
25.4275	22.2390	22.9487	20.0072	19.1974	16.5659	15.3507	17.6152	17.8256	20.7740	22.6764	24.6252 (46)	
Water storage loss:												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.9589	46.0274	50.9589	49.3151	49.7777	46.1221	47.6595	49.7777	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	220.4754	194.2876	203.9502	182.6966	177.7604	156.5614	149.9978	167.2124	168.1523	189.4522	200.4914	215.1266 (62)
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 (63)
Output from w/h	220.4754	194.2876	203.9502	182.6966	177.7604	156.5614	149.9978	167.2124	168.1523	189.4522	200.4914	215.1266 (64)
Heat gains from water heating, kWh/month	69.1040	60.8034	63.6093	56.6781	54.9987	48.2516	45.9424	51.4915	51.8421	58.7888	62.5949	67.3255 (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	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.8764	20.3187	16.5242	12.5099	9.3513	7.8948	8.5306	11.0884	14.8828	18.8971	22.0557	23.5123 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	252.4717	255.0916	248.4896	234.4348	216.6931	200.0184	188.8787	186.2598	192.8608	206.9156	224.6573	241.3320 (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)	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672 (71)
Water heating gains (Table 5)	92.8817	90.4812	85.4964	78.7196	73.9229	67.0161	61.7505	69.2089	72.0030	79.0172	86.9373	90.4912 (72)
Total internal gains	434.9800	432.6416	417.2604	392.4145	366.7175	341.6795	325.9099	333.3063	346.4967	371.5801	400.4006	422.0857 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a	Specific data g or Table 6b	Specific data FF or Table 6c	Access Factor Table 6d	Gains W
South-east	8.6700	36.7938	0.8500	0.7000	0.7000	131.5359 (77)
North-west	9.4800	11.2829	0.8500	0.7000	0.7000	44.1043 (81)
Solar gains	175.6402	313.8299	468.3079	645.4789	782.5224	803.0498
Total gains	610.6202	746.4715	885.5683	1037.8933	1149.2399	1144.7293

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)												
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	11.7753	11.8083	11.8415	12.0003	12.0304	12.1730	12.1730	12.1997	12.1177	12.0304	11.9696	11.9065
alpha	1.7850	1.7872	1.7894	1.8000	1.8020	1.8115	1.8115	1.8133	1.8078	1.8020	1.7980	1.7938
util living area	0.9932	0.9898	0.9837	0.9714	0.9486	0.9096	0.8576	0.8821	0.9463	0.9795	0.9906	0.9940 (86)
MIT	16.4049	16.6541	17.1961	17.9912	18.8536	19.6855	20.2099	20.1221	19.4250	18.3386	17.2552	16.3773 (87)
Th 2	18.0513	18.0595	18.0678	18.1065	18.1138	18.1476	18.1476	18.1476	18.1339	18.1346	18.0991	18.0838 (88)
util rest of house	0.9905	0.9856	0.9763	0.9555	0.9099	0.8006	0.5673	0.6395	0.8813	0.9650	0.9860	0.9917 (89)
MIT 2	14.3213	14.5747	15.1199	15.9332	16.7854	17.5956	18.0204	17.9757	17.3627	16.2880	15.1997	14.3134 (90)
Living area fraction	14.5987	14.8515	15.3963	16.2072	17.0608	17.8738	18.3119	18.2615	17.6373	16.5610	15.4734	14.5882 (92)
Temperature adjustment												-0.1500
adjusted MIT	14.4487	14.7015	15.2463	16.0572	16.9108	17.7238	18.1619	18.1115	17.4873	16.4110	15.3234	14.4382 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	600.9019	609.9054	609.9054	609.9054	609.9054	609.9054	609.9054	609.9054	609.9054	609.9054	609.9054	609.9054 (94)
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	5844.5155	5628.7603	5008.7373	4044.4618	2937.1673	1740.2139	870.0829	951.3200	1895.5826	3275.4815	4658.8885	5831.0393 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (98)
Space heating kWh	3901.2485	3292.7024	3092.2532	2213.8373	1433.6271	0.0000	0.0000	0.0000	0.0000	1923.1797	2922.7693	3919.6479 (98)
Space heating												22699.2655 (98)
Space heating per m ²												232.4554 (99)

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %) 78.8000 (206)
Efficiency of secondary/supplementary heating system, % 0.0000 (208)
Space heating requirement 28806.1745 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	3901.2485	3292.7024	3092.2532	2213.8373	1433.6271	0.0000	0.0000	0.0000	0.0000	1923.1797	2922.7693	3919.6479 (98)
Space heating efficiency (main heating system 1)	78.8000	78.8000	78.8000	78.8000	78.8000	0.0000	0.0000	0.0000	0.0000	78.8000	78.8000	(210)
Space heating fuel (main heating system)	4950.8229	4178.5564	3924.1792	2809.4383	1819.3237	0.0000	0.0000	0.0000	0.0000	2440.5833	3709.0981	4974.1725 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Water heating requirement	220.4754	194.2876	203.9502	182.6966	177.7604	156.5614	149.9978	167.2124	168.1523	189.4522	200.4914	215.1266 (64)
Efficiency of water heater (217)m	78.2400	78.2168	78.1529	78.0043	77.6537	69.5000	69.5000	69.5000	69.5000	77.8656	78.1289	69.5000 (216)
Fuel for water heating, kWh/month	281.7938	248.3962	260.9629	234.2135	228.9142	225.2682	215.8241	240.5933	241.9458	243.3066	256.6162	274.9040 (219)
Water heating fuel used												2952.7389 (219)
Space heating fuel - main system												28806.1745 (211)
Space heating fuel - secondary												0.0000 (215)

Electricity for pumps and fans:
central heating pump 30.0000 (230c)
Total electricity for the above, kWh/year 30.0000 (231)
Electricity for lighting (calculated in Appendix L) 404.0052 (232)
Total delivered energy for all uses 32192.9186 (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	28806.1745	0.2160	6222.1337 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2952.7389	0.2160	637.7916 (264)
Space and water heating			6859.9053 (265)
Pumps and fans	30.0000	0.5190	15.5700 (267)
Energy for lighting	404.0052	0.5190	209.6787 (268)
Total CO2, kg/year			7085.1740 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			72.5600 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES DER

	TFA	72.5600 ZC1
Total Floor Area	97.6500	
Assumed number of occupants	2.7167	
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190	
CO2 emissions from appliances, equation (L14)	15.3210	ZC2
CO2 emissions from cooking, equation (L16)	1.4863	ZC3
Total CO2 emissions	89.7673	ZC4
Residual CO2 emissions offset from biofuel CHP	0.0000	ZC5
Additional allowable electricity generation, kWh/m ² /year	0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation	0.0000	ZC7
Net CO2 emissions	89.7673	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	61.1500 (1b)	x 2.4000 (2b)	= 146.7600 (1b) - (3b)
First floor	36.5000 (1c)	x 2.6000 (2c)	= 94.9000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6500		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 241.6600 (5)
Dwelling volume			

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans	0	0	0	3 * 10 =	30.0000 (7a)
Number of passive vents	0	0	0	0 * 10 =	0.0000 (7b)
Number of fuelless gas fires	0	0	0	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1241 (8)
Pressure test Yes
Measured/design APS0 5.0000
Infiltration rate 0.3741 (18)
Number of sides sheltered 1 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3461 (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 infiltr rate	0.4413	0.4326	0.4239	0.3807	0.3720	0.3288	0.3288	0.3201	0.3461	0.3720	0.3893	0.4066 (22b)
Effective ac	0.5974	0.5936	0.5899	0.5725	0.5692	0.5540	0.5540	0.5512	0.5599	0.5692	0.5758	0.5827 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door	1.8900		1.8900	1.0000	1.8900	24.0625	(26)
TER Opening Type (Uw = 1.40)	18.1500		1.3258	1.3258	24.0625	(27)	
Ground Floor	61.1500		0.1300	7.9495	(28a)		
External Wall	118.8600	20.0400	98.8200	0.1800	17.7876	(29a)	
1st Floor	36.5000		0.1300	4.7450	(30)		
Ground Floor	24.6500		0.1300	3.2045	(30)		
Total net area of external elements Aum(A, m2)			241.1600		(31)		
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	59.6391	(33)		
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						250.0000 (35)	
Thermal bridges (User defined value 0.050 x total exposed area)						12.0580 (36)	
Total fabric heat loss					(33) + (36) =	71.6971 (37)	

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(38)m 47.6375 47.3360 47.0405 45.6526 45.3929 44.1840 44.1840 43.9602 44.6497 45.3929 45.9182 46.4675 (38)
Heat transfer coeff 119.3346 119.0331 118.7376 117.3497 117.0900 115.8811 115.8811 115.6573 116.3468 117.0900 117.6153 118.1646 (39)
Average = Sum(39)m / 12 = 117.3484 (39)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
HLP 1.2221 1.2190 1.2160 1.2017 1.1991 1.1867 1.1867 1.1844 1.1915 1.1991 1.2045 1.2101 (40)
HLP (average) 1.2017 (40)
Days in month 31 28 31 30 31 30 31 31 30 31 30 31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.7167 (42)
Average daily hot water use (litres/day)												98.7212 (43)
Daily hot water use	108.5933	104.6444	100.6956	96.7467	92.7979	88.8490	88.8490	92.7979	96.7467	100.6956	104.6444	108.5933 (44)
Energy conte	161.0407	140.8472	145.3417	126.7124	121.5836	104.9174	97.2214	111.5630	112.8954	131.5687	143.6175	155.9593 (45)
Energy content (annual)										Total = Sum(45)m =	1553.2682 (45)	
Distribution loss (46)m = 0.15 x (45)m	24.1561	21.1271	21.8013	19.0069	18.2375	15.7376	14.5832	16.7344	16.9343	19.7353	21.5426	23.3939 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

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Cylinder contains dedicated solar storage														
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 (57)	
Conb loss	46.02774	50.9889	47.7107	47.2888	43.8160	45.2765	47.2888	47.7107	50.9889	49.3151	50.9889	50.9889 (61)		
Total heat required for water heating calculated for each month														
Solar input	211.9996	186.8746	196.3006	174.4231	168.8734	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182 (62)		
Combi input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Solar input (sum of months) = Sum(63m) =					0.0000 (63)	
Output from w/h	211.9996	186.8746	196.3006	174.4231	168.8734	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182 (64)		
Heat gains from water heating, kWh/month														
	66.2598	58.3385	61.0658	54.0956	52.2487	45.8390	43.6452	48.9169	49.4654	56.4863	60.0816	64.5962 (65)		
Total per year (kWh/year) = Sum(64m) =														2131.5377 (66)

Stochastic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66 m) 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 (66)												
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	20.1387	18.5242	8.9322	7.9322	7.9322	7.9322	7.9322	8.5306	11.0884	14.8828	18.8971	22.0557
Appliances gains (calculated in Appendix L, equation 13 or 13a), also see Table 5	252.4717	255.0196	248.4458	234.3448	216.6933	200.0184	188.8787	186.2538	192.8680	206.9156	224.6573	241.3302
Cooking gains (calculated in Appendix L, equation 13 or 13a), also see Table 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pumps, fans	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834
Losses e.g. evaporation (negative values) (Table 5)	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672
Water heating gains (Table 5)	89.0938	86.1133	82.0777	75.0827	70.2268	63.6553	58.6629	65.7485	68.7019	75.9225	83.4466	86.8228
Total internal gains (Table 5)	421.2222	428.9738	413.8418	388.7776	363.0214	338.3287	322.8224	329.4585	343.1957	368.4554	396.9095	418.4173

[Jan]		Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W

Southeast		8.6700	36.7938	0.6300	0.7000	0.7700	97.4913 (77)
Northwest		9.4800	11.2829	0.6300	0.7000	0.7700	32.6891 (81)

Total gains	130.1804	232.6033	347.0988	478.4137	595.2016	487.0153	392.1060
Total gains	561.3725	661.5771	760.9406	867.1913	943.0085	933.5303	888.5833
						816.8612	735.3017
						633.3378	554.8133
							528.5451 (84)

Temperature during heating periods in the living area and Th, °C (1)	21,0000 (85)											
Utilization factor for gains for living area, nil/m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	56.8255	56.9694	57.1112	57.7867	57.9149	58.5190	58.5190	58.6323	58.2848	57.9149	57.6562	57.3882
alpha	4.7884	4.7980	4.8074	4.8524	4.8610	4.9013	4.9013	4.9088	4.8857	4.8610	4.8437	4.8259
util living area	0.9983	0.9960	0.9889	0.9623	0.8831	0.7233	0.5571	0.6212	0.8644	0.9796	0.9965	0.9988 (86)
MIT	19.6402	19.8036	20.0789	20.4422	20.7558	20.9365	20.9858	20.9765	20.8404	20.4306	19.9696	19.6136 (87)
Th 2	19.8024	19.9048	19.9073	19.9386	19.9207	19.9307	19.9307	19.9355	19.9268	19.9207	19.9164	19.9119 (88)
util rest of house	0.9978	0.9946	0.9848	0.9475	0.8378	0.6293	0.4302	0.4917	0.7947	0.9689	0.9950	0.9883 (89)
MIT 2	18.0024	18.3355	18.7344	19.2609	19.6799	19.8893	19.9355	19.9228	19.8747	19.7929	19.6602	19.5819
Living area fraction	0.9984	0.9982	0.9984	0.9981	0.9983	0.9983	0.9983	0.9983	0.9983	0.9983	0.9983	0.9983 (91)
adjusted MIT	18.2984	18.5312	18.9134	19.4181	19.8231	20.0279	20.0667	20.0631	19.9350	19.4104	18.7684	18.2670 (92)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (93)
adjusted MIT	18.2984	18.5312	18.9134	19.4181	19.8231	20.0279	20.0667	20.0631	19.9350	19.4104	18.7684	18.2670 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9964	0.9920	0.9794	0.9386	0.8329	0.6386	0.4470	0.5085	0.7953	0.9618	0.9926	0.9973 (94)
Heat loss gains	559.3568	656.2548	745.2172	813.2929	785.4499	596.1639	397.1818	415.3645	584.8188	609.1291	550.6808	527.1128 (95)
Useless rate	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)
Month factor	1670.4987	1622.6597	1473.9413	1234.3005	951.1334	628.9867	401.7194	423.6622	678.8871	1031.6155	1372.3775	1662.2236 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (97a)
Space heating m2	826.6896	649.3636	542.1305	302.6673	123.2692	0.0000	0.0000	0.0000	0.0000	314.3299	591.6216	844.5224 (98)
Space heating per m2												42.94.5942 (98)
												42.95.544 (98) / (4) = 42.95.544 (99)

Not applicable

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 %)	93.4000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Space heating requirement	449,0002 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	626.6896	649.3636	342.1305	302.6673	123.2692	0.0000	0.0000	0.0000	0.0000	314.3299	591.6216	844.5224	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	889.1545	695.2501	580.4396	324.0549	131.9798	0.0000	0.0000	0.0000	0.0000	336.5416	633.4279	904.1996	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	211.9996	186.8746	196.3006	174.4231	168.8724	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182	(64)
Efficiency of water heater (217)μ	88.1374	87.9285	87.4752	86.4258	84.2728	80.3000	80.3000	80.3000	80.3000	86.4074	87.6878	88.2164	(217)
Fuel for water heating, kWh/month	212.5301		224.4073	201.8184	200.3876	185.2221	177.4569	197.8228	200.0076	211.2406	220.0222	234.5575	(219)
Water heating fuel used												2506.0064	(219)
Annual totals kWh/year												4491.0002	(211)
Space heating fuel - main system												0.0000	(215)
Space heating fuel - secondary													
Electricity for pumps and fans:													
central heating pump												30.0000	(230)
main heating fuel fan												45.0000	(230)
Total electricity for the above, kWh/year												75.0000	(231)
Electricity for lighting (calculated in Appendix L)												404.0052	(232)
Total delivered energy for all uses												7476.0117	(238)

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	4491.0002	0.2160	970.0560 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2506.0064	0.2160	541.2974 (264)
Space and water heating			1511.3534 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	404.0052	0.5190	209.6787 (268)
Total CO ₂ , kg/m ² /year			1759.9571 (272)
Emissions per m ² for space and water heating			15.4772 (273)
Fuel factor (mains gas)			1.0000
Emissions per m ² for lighting			2.1472 (272)
Emissions per m ² for pumps and fans			0.3986 (272)
Target Carbon Dioxide Emission Rate (TER) = (15.4772 * 1.00) + 2.1472 + 0.3986, rounded to 2 d.p.			18.0200 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 2 Mid - Refurb				Issued on Date	23/08/2022
Assessment Reference	House Type 2 Mid Baseline	Prop Type Ref				
Property	House Type 2, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	52 E	DER	67.17	TER	17.17	
Environmental	43 E	% DER<TER	-291.30			
CO ₂ Emissions (t/year)	5.47	DFEE	212.95	TFEE	51.36	
General Requirements Compliance	Fail	% DFEE<TFEE	-314.58			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-Terrace House, total floor area 98 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 17.17 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 67.17 kgCO₂/m²Fail
Excess emissions =50.00 kgCO₂/m² (291.0%)

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)51.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)212.9 kWh/m²/yrFail
Excess energy =161.5 kWh/m²/yr (314.0%)

2 Fabric U-values
Element Average Highest
External wall 2.10 (max. 0.30) 2.10 (max. 0.70) Fail
Party wall 0.00 (max. 0.20) - OK
Floor 0.50 (max. 0.25) 0.50 (max. 0.70) Fail
Roof 2.30 (max. 0.20) 2.30 (max. 0.35) Fail
Openings 4.63 (max. 2.00) 4.80 (max. 3.30) Fail

2a Thermal bridging
Thermal bridging calculated using default y-value of 0.15

3 Air permeability
Air permeability at 50 pascals: 15.00 (design value)
Maximum 10.0 Fail

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
Combi boiler
Efficiency: 78.0% SEDBUK2009
Minimum: 88.0% Fail

Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Programmer and room thermostat Fail

Hot water controls: No cylinder

Boiler interlock: Yes OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Not applicable

9 Summer time temperature
Overheating risk (Thames Valley): Slight OK
Based on:
Overshading:
Average
Windows facing North East: 9.48 m², No overhang
Windows facing South West: 8.67 m², No overhang
Air change rate: 0.80 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Vers 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	61.1500 (1b)	x 2.4000 (2b)	= 146.7600 (1b) - (3b)
First floor	36.5000 (1c)	x 2.6000 (2c)	= 94.9000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6500		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.6600 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans	0	+	0	=	3 * 10 = 30.0000 (7a)
Number of passive vents	0	+	0	=	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0	+	0	=	0 * 40 = 0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000 / (5) = 0.1241 (8)
Pressure test					Yes
Measured/design APS0					15.0000
Infiltration rate					0.8741 (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) = 0.7430 (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	0.9474	0.9288	0.9102	0.8173	0.7987	0.7059	0.7059	0.6873	0.7430	0.7987	0.8359	0.8730 (22b)
Effective ac	0.9487	0.9313	0.9142	0.8340	0.8190	0.7491	0.7491	0.7362	0.7760	0.8190	0.8494	0.8811 (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
Front door			1.8900	3.0000	5.6700		(26)
Window (Uv = 4.80)			18.1500	4.0268	73.0872		(27)
Ground Floor			61.1500	0.5000	30.5750		(28a)
External Wall	93.0000	20.0400	72.9600	2.1000	153.2160		(28a)
1st Floor	36.5000		36.5000	2.3000	83.9500		(30)
Ground Floor	24.6500		24.6500	2.3000	56.6950		(30)
Total net area of external elements Aum(A, m ²)			215.3000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		403.1932		(33)
Party Wall			51.9600	0.0000	0.0000		(32)
Party Ceilings 1			60.8500				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Default value 0.150 * total exposed area)							32.2950 (36)
Total fabric heat loss							(33) + (36) = 435.4882 (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	75.4597	74.2701	72.9080	66.5103	65.3133	59.7411	59.7411	58.7092	61.8874	65.3133	67.7348	70.2663 (38)
Average = Sum(39)m / 12 =	31.1479	309.7583	508.3962	501.9985	500.8015	495.2294	495.2294	494.1975	497.3757	500.8015	503.2230	505.7546 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	5.2345	5.2203	5.2063	5.1408	5.1285	5.0715	5.0715	5.0609	5.0935	5.1285	5.1533	5.1793 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7167 (42)
Average daily hot water use (litres/day)												103.9170 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	114.3087	110.1520	105.9953	101.8387	97.6820	93.5253	93.5253	97.6820	101.8387	105.9953	110.1520	114.3087 (44)
Energy content (annual)	169.5165	148.2602	132.9913	133.3815	127.9827	110.4394	102.3383	117.4347	118.8372	138.4933	151.1763	164.1677 (45)
Distribution loss (46)m = 0.15 x (45)m												
25.4275	22.2390	22.9487	20.0072	19.1974	16.5659	15.3507	17.6152	17.8256	20.7740	22.6764	24.6252 (46)	
Water storage loss:												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.9589	46.0274	50.9589	49.3151	49.7777	46.1221	47.6595	49.7777	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	220.4754	194.2876	203.9502	182.6966	177.7604	156.5614	149.9978	167.2124	168.1523	189.4522	200.4914	215.1266 (62)
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 (63)
Output from w/h	220.4754	194.2876	203.9502	182.6966	177.7604	156.5614	149.9978	167.2124	168.1523	189.4522	200.4914	215.1266 (64)
Heat gains from water heating, kWh/month	69.1040	60.8034	63.6093	56.6781	54.9987	48.2516	45.9424	51.4915	51.8421	58.7888	62.5949	67.3255 (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	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.8764	20.3187	16.5242	12.5099	9.3513	7.8948	8.5306	11.0884	14.8828	18.8971	22.0557	23.5123 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.4717	255.0916	248.4896	234.4348	216.6931	200.0184	188.8787	186.2598	192.8608	206.9156	224.6573	241.3320 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834 (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)	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672 (71)
Water heating gains (Table 5)	92.8817	90.4812	85.4964	78.7196	73.9229	67.0161	61.7505	69.2089	72.0030	79.0172	86.9373	90.4912 (72)
Total internal gains	434.9800	432.6416	417.2604	392.4145	366.7175	341.6795	325.9099	333.3063	346.4967	371.5801	400.4006	422.0857 (73)

6. Solar gains

[Jan]		Area m ²	Solar flux Table 6a	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast		9.4800	11.2829	0.8500	0.7000	0.7000	44.1043 (75)
Southwest		8.6700	36.7938	0.8500	0.7000	0.7000	131.5359 (79)
Solar gains	175.6402	313.8299	468.3079	645.4789	782.5224	803.0498	763.3282
Total gains	610.6202	746.4715	885.5683	1037.8933	1149.2399	1144.7293	1089.2381
					990.3905	875.5286	728.9207
						613.4449	570.6708 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)												
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	13.2667	13.3029	13.3385	13.3085	13.3408	13.6931	13.6931	13.7217	13.6341	13.5408	13.4756	13.4082
alpha	1.8844	1.8869	1.8892	1.9006	1.9027	1.9129	1.9129	1.9148	1.9089	1.9027	1.8984	1.8939
util living area	0.9936	0.9901	0.9839	0.9710	0.9465	0.9040	0.8469	0.8738	0.9440	0.9795	0.9910	0.9944 (86)
MIT	16.6476	16.8943	17.4206	18.1894	19.0170	19.8064	20.2974	20.2118	19.5469	18.5033	17.4619	16.6204 (87)
Th 2	18.3828	18.3898	18.3968	18.4296	18.4357	18.4643	18.4643	18.4695	18.4533	18.4357	18.4233	18.4104 (88)
util rest of house	0.9912	0.9865	0.9773	0.9566	0.9111	0.8063	0.6013	0.6674	0.8861	0.9667	0.9870	0.9924 (89)
MIT 2	14.7639	15.0142	15.5430	16.3265	17.1435	17.9103	18.3142	18.2670	17.6783	16.6472	15.6022	14.7536 (90)
Living area fraction	15.0147	15.2645	15.7929	16.5745	17.3929	18.1627	18.5783	18.5259	17.9271	16.8943	15.8498	15.0021 (92)
Temperature adjustment												-0.1500
adjusted MIT	14.8647	15.1145	15.6429	16.4245	17.2429	18.0127	18.4283	18.3759	17.7771	16.7443	15.6998	14.8521 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	601.6956	730.0386	854.0414	971.7141	1012.9307	886.3669	647.7022	646.0057	748.8106	692.4544	600.4975	563.3947 (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	5400.1174	5206.9154	4648.2281	3777.3013	2775.8907	1690.0802	905.4097	976.5049	1828.8834	3077.0718	4327.5998	5387.3581 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (98)
Space heating kWh	3570.0258	3008.4612	2822.8749	2020.0228	1311.6422	0.0000	0.0000	0.0000	0.0000	1774.1554	2683.5137	3589.0288 (98)
Space heating												20779.7248 (98)
Space heating per m ²												212.7980 (99)

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %) 78.8000 (206)
Efficiency of secondary/supplementary heating system, % 0.0000 (208)
Space heating requirement 26370.2091 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	3570.0258	3008.4612	2822.8749	2020.0228	1311.6422	0.0000	0.0000	0.0000	0.0000	1774.1554	2683.5137	3589.0288 (98)
Space heating efficiency (main heating system 1)	78.8000	78.8000	78.8000	78.8000	78.8000	0.0000	0.0000	0.0000	0.0000	78.8000	78.8000	78.8000 (210)
Space heating fuel (main heating system)	4530.4896	3817.8442	3582.3285	2563.4807	1664.5206	0.0000	0.0000	0.0000	0.0000	2251.4662	3405.4742	4554.6051 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	220.4754	194.2876	203.9502	182.6966	177.7604	156.5614	149.9978	167.2124	168.1523	189.4522	200.4914	215.1266 (64)
Efficiency of water heater (217)m	78.1914	78.1655	78.0959	77.9350	77.5613	69.5000	69.5000	69.5000	69.5000	77.7956	78.0737	78.2082 (217)
Fuel for water heating, kWh/month	281.9688	248.5593	261.1536	234.4216	229.1870	225.2682	215.8241	240.5933	241.9458	243.5256	256.7975	275.0692 (219)
Water heating fuel used												2954.3141 (219)
Space heating fuel - main system												26370.2091 (211)
Space heating fuel - secondary												0.0000 (215)

Electricity for pumps and fans:
central heating pump 30.0000 (230c)
Total electricity for the above, kWh/year 30.0000 (231)
Electricity for lighting (calculated in Appendix L) 404.0052 (232)
Total delivered energy for all uses 29758.5284 (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	26370.2091	0.2160	5695.9652 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2954.3141	0.2160	638.1318 (264)
Space and water heating			6334.0970 (265)
Pumps and fans	30.0000	0.5190	15.5700 (267)
Energy for lighting	404.0052	0.5190	209.6787 (268)
Total CO2, kg/year			6559.3457 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			67.1700 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES DER

Total Floor Area TFA 67.1700 ZC1
Assumed number of occupants N 2.7167
CO2 emission factor in Table 12 for electricity displaced from grid EF 0.5190
CO2 emissions from appliances, equation (L14) 15.3210 ZC2
CO2 emissions from cooking, equation (L16) 1.8863 ZC3
Total CO2 emissions 84.3773 ZC4
Residual CO2 emissions offset from biofuel CHP 0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year 0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation 0.0000 ZC7
Net CO2 emissions 84.3773 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	61.1500 (1b)	x 2.4000 (2b)	= 146.7600 (1b) - (3b)
First floor	36.5000 (1c)	x 2.6000 (2c)	= 94.9000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6500		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 241.6600 (5)
Dwelling volume			

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans	0	0	0	3 * 10 =	30.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of fuelless gas fires				0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1241 (8)
Pressure test Yes
Measured/design APS0 5.0000
Infiltration rate 0.3741 (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) = 0.3180 (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 Infiltr rate	0.4055	0.3975	0.3896	0.3498	0.3419	0.3021	0.3021	0.2942	0.3180	0.3419	0.3578	0.3737 (22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5506	0.5584	0.5640	0.5698 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door	1.8900		1.8900	1.0000	1.8900	24.0625	45.7493 (26)
TER Opening Type (Uw = 1.40)			18.1500	1.3258	24.0625		582.1250 (27)
Ground Floor			61.1500	0.1300	7.9495		102.8863 (28a)
External Wall			72.9600	0.1800	13.1328		169.8863 (28b)
1st Floor	93.0000	20.0400	36.5000	0.1300	4.7450		61.3125 (29a)
Ground Floor	24.6500		24.6500	0.1300	3.2045		42.0438 (30)
Total net area of external elements Aum(A, m2)			215.3000				843.7733 (31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	54.9843	721.212 (32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.0000 (35)
Thermal bridges (User defined value 0.050 x total exposed area) 10.7650 (36)
Total fabric heat loss (33) + (36) = 721.212 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	46.4296	46.1750	45.9255	44.7535	44.5342	43.5134	43.5134	43.3244	43.9066	44.5342	44.9778	45.4416 (38)
Heat transfer coeff	112.1789	111.9243	111.6748	110.5028	110.2835	109.2627	109.2627	109.0737	109.6559	110.2835	110.7271	111.1909 (39)
Average = Sum(39)m / 12 =												110.5017 (39)
HLP	1.1488	1.1462	1.1436	1.1316	1.1294	1.1189	1.1189	1.1170	1.1229	1.1294	1.1339	1.1387 (40)
HLP (average)												1.1316 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7167 (42)
Average daily hot water use (litres/day)												98.7212 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	108.5933	104.6444	100.6956	96.7467	92.7979	88.8490	88.8490	92.7979	96.7467	100.6956	104.6444	108.5933 (44)
Energy content (annual)	161.0407	140.8472	145.3417	126.7124	121.5836	104.9174	97.2214	111.5630	112.8954	131.5687	143.6175	155.9593 (45)
Distribution loss (46)m = 0.15 x (45)m	24.1561	21.1271	21.8013	19.0069	18.2375	15.7376	14.5832	16.7344	16.9343	19.7353	21.5426	23.3939 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

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Cylinder contains dedicated solar storage													
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 (57)
Conduct loss	46.02774	50.9889	47.7107	47.2888	43.8160	45.2765	47.2888	47.7107	50.9889	49.3151	50.9889	50.9889 (61)	
Total heat required for water heating calculated for each month													
Solar input	211.9996	186.8746	196.3006	174.4231	168.8734	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182 (62)	
Conduct loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Solar input (sum of months) = Sum(63)=m					0.0000 (63)
Output from w/h	211.9996	186.8746	196.3006	174.4231	168.8734	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182 (64)	
Heat gains from water heating, kWh/month													
	66.2598	58.3385	61.0658	54.0956	52.2487	45.8390	43.6452	48.9169	49.4654	56.4863	60.0816	64.5962 (65)	
Total per year (kWh/year) = Sum(64)=m													

Stochastic gains (Table 5),	Watts	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66 m)	135,8340	135,8340	135,8340	135,8340	135,8340	135,8340	135,8340	135,8340	135,8340	135,8340	135,8340	135,8340 (66)
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	20,1387	18,5242	18,5242	18,5242	18,5242	18,5242	18,5242	18,5242	18,5242	18,5242	18,5242	18,5242 (66)
Appliances gains (calculated in Appendix L, equation 13 or 13a), also see Table 5	8,5306	11,0884	14,8828	18,8971	22,0557	23,5123	67					
Cooking gains (calculated in Appendix L, equation 13 or 13a), also see Table 5	188,6258	186,2580	192,8600	206,9156	224,6573	241,3302	260,1844	277,8877	292,8600	306,9156	319,3302	330,1844 (68)
Pumps, fans	36,5834	36,5834	36,5834	36,5834	36,5834	36,5834	36,5834	36,5834	36,5834	36,5834	36,5834	36,5834 (69)
Losses e.g. evaporation (negative values) (Table 5)	-108,6672	-108,6672	-108,6672	-108,6672	-108,6672	-108,6672	-108,6672	-108,6672	-108,6672	-108,6672	-108,6672	-108,6672 (71)
Water heating gains (Table 5)	89,0938	86,1833	82,0777	75,0827	70,2268	63,6553	58,6629	53,7485	48,7019	43,7525	38,4466	86,2822 (72)
Total internal gains (Table 5)	421,2142	428,9738	433,8418	438,7786	463,0214	438,3287	422,8224	429,4588	434,1957	468,4554	496,9098	491,4173 (73)

[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		9.4800	11.2829	0.7000	0.7000		32.6891 (75)					
Southwest		8.6700	36.7938	0.6300	0.7000		97.4913 (79)					

Solar gains	130.1804	232.6033	347.0988	478.4137	595.2016	556.7609	487.0153	392.1060	264.8524	157.9034	110.1278 (83)	
Total gains	561.3725	661.5771	760.9406	867.1913	934.0085	933.5303	888.5833	816.8612	735.3017	633.3378	554.8133	528.5451 (84)

Temperature during heating periods in the living area and Th, °C (1)	Temperature factor for gains for living area, nil/m ² (see Table 9)											21,000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	6.0400	6.0378	6.0732	6.1367	6.1489	6.2603	6.2603	6.2173	6.1842	6.1489	6.1249	6.0875
alpha	0.5050	0.5092	0.5082	0.5091	0.5093	0.5136	0.5136	0.5148	0.5127	0.5093	0.5082	0.5068
util living area	0.9984	0.9959	0.9882	0.9582	0.8691	0.6978	0.5302	0.5939	0.8484	0.9777	0.9964	0.9988 (86)
MIT	19.7370	19.8998	20.1648	20.5116	20.8010	20.9537	20.9907	20.9839	20.8716	20.4906	20.4886	19.7085 (87)
Th 2	19.8612	19.9633	19.9654	19.9751	19.9769	19.9854	19.9854	19.9870	19.9821	19.9769	19.9732	19.9654 (88)
util rest of house	0.9978	0.9945	0.9839	0.9425	0.8221	0.6072	0.4136	0.4732	0.7774	0.9665	0.9949	0.9848 (89)
MIT	18.2751	18.5142	18.9005	19.4006	19.7825	19.9548	19.9820	19.9804	19.8792	18.7392	18.7393	18.2952 (90)
Living area fraction	0.184697	0.184697	0.186688	0.193485	0.191811	0.200878	0.21163	0.21140	0.20105	0.195281	0.19136	0.184348 (92)
Th 2	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
adjusted MIT	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIT	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
Th 2	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
adjusted MIT	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIT	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
Th 2	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
adjusted MIT	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIT	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
Th 2	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
adjusted MIT	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIT	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
Th 2	18.4697	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136
adjusted MIT	18.4697	18.4697	18.6987	19.0688	19.5485							

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9965	0.9920	0.9787	0.9341	0.8190	0.6170	0.4290	0.4891	0.7797	0.9597	0.9926	0.9974 (94)
Heat loss %	559.4352	656.6827	744.6993	810.0665	772.3415	575.9092	381.2459	399.4874	573.3284	607.7918	550.7064	527.1833 (95)
Useful power	4.3000	4.9000	6.5900	8.9000	11.7000	14.6000	16.2600	16.4800	14.1200	10.6000	7.1000	4.2000 (96)
Month factor	1589.5431	1544.4087	1403.6122	1176.6855	906.3174	599.6129	384.1995	405.0696	648.1212	984.6170	1308.0864	1582.7817 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating m2	766.3989	596.8301	490.2379	263.9697	99.6780	0.0000	0.0000	0.0000	0.0000	280.3580	545.3136	785.3652 (98)
Space heating per m2												3228.1513 (98)
												(98) / (4) = 39.2028 (99)

Not applicable

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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 %)	93.4000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Space heating requirement	4098.6631 (211)

[illegible]

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	4098.6631	0.2160	885.3112 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2510.7285	0.2160	542.3174 (264)
Space and water heating			1427.6286 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	404.0052	0.5190	209.6787 (268)
Total CO ₂ , kg/m ² /year			1676.2323 (272)
Emissions per m ² for space and water heating			14.6139 (272a)
Fuel factor (main gas)			1.0000
Emissions per m ² for lighting			2.1472 (272b)
Emissions per m ² for pumps and fans			0.3986 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.6199 * 1.00) + 2.1472 + 0.3986, rounded to 2 d.p.			17.1700 (272d)

Appendix C

SAP TER/DER Worksheets – *Refurbishment, Be Lean*

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 1 End - Refurb				Issued on Date	23/08/2022
Assessment Reference	Type 1 End - Improved	Prop Type Ref				
Property	House Type 1, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	62 D	DER	62.97	TER	22.37	
Environmental	58 D	% DER<TER	-181.49			
CO ₂ Emissions (t/year)	2.51	DFEE	214.87	TFEE	59.98	
General Requirements Compliance	Fail	% DFEE<TFEE	-258.27			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

End-Terrace House, total floor area 48 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 22.37 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 62.97 kgCO₂/m²Fail
Excess emissions =40.60 kgCO₂/m² (181.0%)

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 60.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 214.9 kWh/m²/yrFail
Excess energy =154.9 kWh/m²/yr (258.0%)

2 Fabric U-values
Element Average Highest
External wall 2.10 (max. 0.30) 2.10 (max. 0.70) Fail
Party wall 0.00 (max. 0.20) - OK
Floor 0.68 (max. 0.25) 0.68 (max. 0.70) Fail
Roof 0.11 (max. 0.20) 0.11 (max. 0.35) OK
Openings 2.28 (max. 2.00) 3.00 (max. 3.30) Fail

2a Thermal bridging
Thermal bridging calculated using default y-value of 0.15

3 Air permeability
Air permeability at 50 pascals: 15.00 (design value)
Maximum 10.0 Fail

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
-- --

Combi boiler
Efficiency: 90%
Minimum: 88% OK

Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Programmer and room thermostat Fail

Hot water controls: No cylinder

Boiler interlock: Yes OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Not applicable

9 Summer time temperature
Overheating risk (Thames Valley): Slight OK
Based on:
Overshading: Average
Windows facing North East: 4.74 m², No overhang
Windows facing South West: 3.39 m², No overhang
Air change rate: 0.80 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Roof U-value 0.11 W/m²K

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014



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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													89.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													11542.3559 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1749.8932	1482.1142	1406.1343	1023.6758	694.9487	0.0000	0.0000	0.0000	0.0000	901.2634	1322.2059	1750.1730	(98)
Space heating efficiency (main heating system 1)	89.5000	89.5000	89.5000	89.5000	89.5000	0.0000	0.0000	0.0000	0.0000	89.5000	89.5000	89.5000	(210)
Space heating fuel (main heating system)	1955.1879	1655.9935	1571.0997	1143.7719	776.4790	0.0000	0.0000	0.0000	0.0000	1006.9982	1477.3250	1955.5006	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	159.5804	139.3976	145.0341	128.6380	124.5443	109.6916	105.0929	117.1540	118.4478	134.8765	143.9780	155.8328	(64)
Efficiency of water heater (217)m	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	(217)
Fuel for water heating, kWh/month	178.3021	155.7515	162.0493	143.7296	139.1556	122.5605	117.4223	130.8983	132.3439	150.7000	160.8692	174.1149	(219)
Water heating fuel used												1767.8972	(219)
Annual totals kWh/year													
Space heating fuel - main system												11542.3559	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans: central heating pump												30.0000	(230c)
Total electricity for the above, kWh/year												30.0000	(231)
Electricity for lighting (calculated in Appendix L)												229.7862	(232)
Total delivered energy for all uses												13570.0392	(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	11542.3559	0.2160
Space heating - secondary	0.0000	0.0000
Water heating (other fuel)	1767.8972	0.2160
Space and water heating		2875.0147
Pumps and fans	30.0000	0.5190
Energy for lighting	229.7862	0.5190
Total CO2, kg/year		3009.8437
Dwelling Carbon Dioxide Emission Rate (DER)		62.9700

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER		62.9700	(231)
Total Floor Area	TFA	47.8000	
Assumed number of occupants	N	1.6256	
CO2 emission factor in Table 12 for electricity displaced from grid	N	0.5190	
CO2 emissions from appliances, equation (L14)	EF	17.5446	(232)
CO2 emissions from cooking, equation (L16)		3.3057	(233)
Total CO2 emissions		83.8204	(234)
Residual CO2 emissions offset from biofuel CHP		0.0000	(235)
Additional allowable electricity generation, kWh/m ² /year		0.0000	(236)
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000	(237)
Net CO2 emissions		83.8204	(238)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	30.0000 (1b)	x 2.4000 (2b)	= 72.0000 (1b) - (3b)
First floor	17.8000 (1c)	x 2.6000 (2c)	= 46.2800 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	47.8000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 118.2800 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0	0.0000 (6a)
Number of open flues	0	0	0	0	0.0000 (6b)
Number of intermittent fans	0	0	0	0	2.0000 (7a)
Number of passive vents	0	0	0	0	0.0000 (7b)
Number of fuelless gas fires	0	0	0	0	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) = 0.1691 (8)
Pressure test					Yes
Measured/design APS0					5.0000
Infiltration rate					0.4191 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3877 (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
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
Adj infiltr rate	0.4943	0.4846	0.4749	0.4264	0.4167	0.3683	0.3683	0.3586	0.3877	0.4167	0.4361	0.4555
Effective ac	0.6221	0.6174	0.6128	0.5909	0.5868	0.5678	0.5678	0.5643	0.5751	0.5868	0.5951	0.6037

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			8.1300	1.3258	10.7784		(27)
Ground Floor			30.0000	0.1300	3.9000		(28a)
External Wall	71.4800	10.0200	61.4600	0.1800	11.0628		(28b)
1st Floor	17.8000		0.1300	2.3140			(30)
Ground Floor	12.2000		0.1300	1.5860			(30)
Total net area of external elements Aum(A, m2)			131.4800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.5312	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							6.5740 (36)
Total fabric heat loss					(33) + (36) =	38.1052	(37)

Ventilation heat loss calculated monthly (38) m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	24.2840	24.0988	23.9173	23.0650	22.9055	22.1631	22.1631	22.0256	22.4491	22.9055	23.2281	23.5654
Heat transfer coeff	62.3892	62.2040	62.0226	61.1702	61.0107	60.2683	60.2683	60.1309	60.5543	61.0107	61.3333	61.6706
Average = Sum(39)m / 12 =	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3052	1.3013	1.2975	1.2797	1.2764	1.2608	1.2608	1.2580	1.2668	1.2764	1.2831	1.2902
HLP (average)												1.2797
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

												1.6256 (42)
Assumed occupancy												72.8074 (43)
Average daily hot water use (litres/day)												
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	80.0881	77.1758	74.2635	71.3512	68.4389	65.5266	65.5266	68.4389	71.3512	74.2635	77.1758	80.0881 (44)
Energy content (annual)	118.7683	103.8756	107.1903	93.4511	89.6685	77.3771	71.7013	82.2783	83.2609	97.0326	105.9187	115.0208 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =	1145.5434 (45)	
	17.8153	15.5813	16.0785	14.0177	13.4503	11.6066	10.7552	12.3417	12.4891	14.5549	15.8878	17.2531 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)



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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts												
(66 m)	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787 (66)
Lighting gains (calculated in Appendix L, equation L9 or L10a), also see Table 5	13.0127	13.5567	13.3985	13.5567	13.5567	13.5567	13.5567	4.8519	6.3067	8.4649	10.7481	12.5446
Appliances gains (calculated in Appendix L, equation L10 or L13a), also see Table 5	141.5228	142.9579	139.2678	134.4222	121.4677	112.1201	105.8757	104.4072	108.1079	115.9663	125.9314	135.2784 (68)
Cooking gains (calculated in Appendix L, equation L13a or L14a), also see Table 5	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279 (69)
Pumps, fans, etc.	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)												
	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229 (71)
Water heating gains (Table 5)												
(66.923)	64.6118	60.6206	55.3739	51.7926	46.9535	43.2642	48.4899	50.6680	56.0811	62.1289	65.1175	65.1175 (72)
Total internal gains	71.01	269.5434	259.6933	244.2884	228.9621	213.9475	204.3755	209.5874	217.6244	233.0911	250.8885	264.1526 (73)

[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	4.7400	11.2829	0.6300	0.7000	0.7700	16.3445 (75)
Southwest	3.3900	36.7938	0.6300	0.7000	0.7700	38.1194 (79)

Temperature during heating periods in the living area (see Table 9), Tl (°C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	51.2055	51.3638	51.5280	54.2657	54.4072	55.0778	55.0778	55.2037	54.8177	54.4076	54.1214	53.8254
alpha	4.5470	4.5576	4.5680	4.6717	4.6772	4.6719	4.6719	4.6802	4.6545	4.6272	4.6081	4.5884
util living area	0.9965	0.9934	0.9850	0.9571	0.8805	0.7263	0.5630	0.6199	0.8533	0.9717	0.9934	0.9972 (86)
MIT	19.6302	19.7836	20.0491	20.4112	20.7297	20.9249	20.9820	20.9722	20.8312	20.2642	19.9691	19.6076 (87)
Tl 2	19.8368	19.8398	19.8428	19.8568	19.8594	19.8716	19.8716	19.8739	19.8669	19.8594	19.8541	19.8485 (88)
util rest of house	0.9953	0.9911	0.9795	0.9404	0.8332	0.6286	0.4289	0.4845	0.7786	0.9573	0.9907	0.9863 (89)
MIT 2	18.0126	18.2580	18.4648	19.1696	19.5948	19.8220	19.8652	19.8627	19.7375	19.0075	18.5392	18.2544 (90)
Living area fraction	0.18292	0.18277	0.19162	0.19633	0.20186	0.20339	0.2822	0.2770	0.1423	0.16586	0.17332	0.16050 (92)
adjusted MIT	18.6292	18.8277	19.1692	19.6333	20.0186	20.2339	20.2822	20.2770	20.1423	19.6586	19.0732	18.6050 (92)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIT 1	18.6292	18.8277	19.1692	19.6333	20.0186	20.2339	20.2822	20.2770	20.1423	19.6586	19.0732	18.6050 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9935	0.9883	0.9752	0.9363	0.8408	0.6623	0.4795	0.5354	0.7995	0.9540	0.9880	0.9948 (94)
Heat inputs	324,0514	363,4470	398,3341	423,9563	407,4195	316,2140	217,8601	226,4633	309,2785	329,7358	313,4217	308,5041 (95)
Useful inputs	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												
Month factor	893.9858	866.3578	785.7873	656.5359	507.5239	339.5433	221.9223	233.1301	365.8845	552.6727	734.3538	888.3668 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating m2	424.0311	337.9560	288.2585	167.4716	74.4775	0.0000	0.0000	0.0000	0.0000	165.8651	303.0776	431.4178 (98)
Space heating per m2												2192.5552 (98)
												(98) / (4) = 45.8694 (99)

Not applicable

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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 %)	93.4000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Space heating requirement	2347.4896 (211)

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2347.4896	0.2160	507.0577 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1870.6912	0.2160	404.0693 (264)
Space and water heating			911.1270 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	229.7862	0.5190	119.2590 (268)
Total CO2, kg/m2/year			1069.3111 (272)
Emissions per m2 for space and water heating			19.0612 (272)
Fuel factor (main gas)			1.0000
Emissions per m2 for pumps			2.4950 (272)
Emissions per m2 for lighting and fans			0.8143 (272)
Target Carbon Dioxide Emission Rate (TER) = (19.0612 * 1.00) + 2.4950 + 0.8143, rounded to 2 d.p.			22.3700 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 1 Mid - Refurb				Issued on Date	23/08/2022
Assessment Reference	Type 1 Mid Improved	Prop Type Ref				
Property	House Type 1, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	69 C	DER	49.26	TER	20.60	
Environmental	68 D	% DER<TER	-139.15			
CO ₂ Emissions (t/year)	1.94	DFEE	155.91	TFEE	50.79	
General Requirements Compliance	Fail	% DFEE<TFEE	-206.99			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-Terrace House, total floor area 48 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 20.60 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 49.26 kgCO₂/m²Fail
Excess emissions =28.66 kgCO₂/m² (139.0%)

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)50.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)155.9 kWh/m²/yrFail
Excess energy =105.1 kWh/m²/yr (207.0%)

2 Fabric U-values
Element Average Highest
External wall 2.10 (max. 0.30) 2.10 (max. 0.70) Fail
Party wall 0.00 (max. 0.20) - OK
Floor 0.50 (max. 0.25) 0.50 (max. 0.70) Fail
Roof 0.11 (max. 0.20) 0.11 (max. 0.35) OK
Openings 2.28 (max. 2.00) 3.00 (max. 3.30) Fail

2a Thermal bridging
Thermal bridging calculated using default y-value of 0.15

3 Air permeability
Air permeability at 50 pascals: 15.00 (design value)
Maximum 10.0 Fail

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
-- --
Combi boiler
Efficiency: 90%
Minimum: 88% OK

Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Programmer and room thermostat Fail

Hot water controls: No cylinder

Boiler interlock: Yes OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Not applicable

9 Summer time temperature
Overheating risk (Thames Valley): Medium OK
Based on:
Overshading: Average
Windows facing North East: 4.74 m², No overhang
Windows facing South West: 3.39 m², No overhang
Air change rate: 0.80 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Roof U-value 0.11 W/m²K

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014



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Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66 m	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787	81.2787 (66)
Lighting gains (calculated in Appendix L, equation 19 or L9a), also see Table 5	13.0141	13.0141	13.0141	13.0141	13.0141	13.0141	13.0141	13.0141	13.0141	13.0141	13.0141	13.0141 (66)
Appliances gains (calculated in Appendix L, equation 13 or L13a), also see Table 5	141.5228	142.9913	139.2906	131.4122	121.4671	112.1201	105.8757	104.4072	106.4699	115.9863	125.9314	135.2784 (68)
Cooking gains (calculated in Appendix L, equation 15 or L15a), also see Table 5	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279	31.1279 (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)	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229	-65.0229 (71)
Water heating gains (Table 5)	66.7923	64.6118	60.6206	55.3739	51.7926	46.9535	43.2642	40.5894	50.6680	56.0811	62.1289	65.1175 (72)
Total internal gains	269.5434	269.5434	259.6933	244.2884	228.9621	213.9475	204.3756	204.3756	208.5874	217.2464	233.1994	250.8885
	269.5434	269.5434	259.6933	244.2884	228.9621	213.9475	204.3756	204.3756	208.5874	217.2464	233.1994	250.8885

[Jan]	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a	W/m2	Specific data	or Table 6b	Specific data	or Table 6c	factor	Table 6d		W
Northeast	4.7400		11.2829		0.6300		0.7000				16.3445 (75)	
Southwest	3.3900		36.7938		0.6300		0.7000				38.1194 (79)	

Solar gains	54.4640	98.2013	148.7837	208.5209	255.4228	263.4786	249.9830	213.3593	169.2369	112.4215	66.2240	45.9701 (83)
Total gains	326.1741	367.7447	408.4770	452.8059	484.5848	477.4261	454.3585	422.9466	386.8614	345.6205	317.2125	310.1226 (84)

Temperatures during heating periods in the living areas of Th1 (C)												21.0000 (85)
Utilization factor for gains for living area, nil/m (see Table 9)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	9.7485	9.9171	10.0833	10.2574	10.4281	10.5986	11.7386	61.8722	61.4626	61.0271	60.7230	60.4082
alpha	4.9832	4.9945	5.0053	5.0684	5.0875	5.1159	5.1399	5.1248	5.0975	5.0685	5.0482	5.0272
util living area	0.9964	0.9929	0.9829	0.9480	0.8526	0.6772	0.5116	0.5675	0.8200	0.9663	0.9929	0.9972 (86)
MIT	19.8183	19.9666	20.2157	20.5463	20.8175	20.9589	20.9919	20.9867	20.8907	20.5437	20.1249	19.7937 (87)
Th 2	19.9503	19.9529	19.9555	19.9677	19.9700	19.9806	19.9806	19.9826	19.9765	19.9700	19.9654	19.9605 (88)
util rest of house	0.9953	0.9906	0.9769	0.9292	0.8026	0.5866	0.3978	0.4501	0.7438	0.9504	0.9901	0.9963 (89)
MIT	18.3859	18.6036	18.9556	19.4409	19.7944	19.9440	19.9777	19.9702	19.9440	19.8774	19.8440	19.8374 (90)
Living area fraction	0.9925	0.9912	0.9834	0.9537	0.9060	0.8378	0.7438	0.7438	0.7438	0.9901	0.9901	0.9734 (91)
adjusted MIT	18.9208	19.1126	19.4324	19.8537	20.1765	20.3293	20.3564	20.3542	20.2642	19.8568	19.3223	18.9398 (92)
temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MIT	18.9208	19.1126	19.4324	19.8537	20.1765	20.3293	20.3564	20.3542	20.2642	19.8568	19.3223	18.9398 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9936	0.9880	0.9730	0.9267	0.8138	0.6191	0.4406	0.4942	0.7675	0.9481	0.9876	0.9950 (94)
Useful gains	324.0960	363.3248	397.4047	419.6184	394.3235	295.5696	200.1842	209.0165	296.9170	327.6939	313.2919	326.6222 (95)
End loss rate	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	14.0000	10.6000	7.1000	4.2000 (96)
Heat loss rate												
Month factor	812.2867	787.3686	714.4835	597.7864	461.0595	308.0399	201.9691	212.1420	332.9159	503.5046	668.1369	807.4246 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating	363.2139	284.9697	235.8799	127.9153	49.6448	0.0000	0.0000	0.0000	0.0000	130.8009	255.4884	371.1536 (98)
Space heating per m2												1819.2645 (98)
												(98) / (4) = 38.0558 (99)

Not applicable

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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 %)	93.4000	(206)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)
Space heating requirements	1947.6087	(211)

[illegible]

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	1947.6087	0.2160	420.6835 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1878.3155	0.2160	405.7161 (264)
Space and water heating			826.3996 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	229.7862	0.5190	119.2590 (268)
Total CO ₂ , kg/m ² /year			984.5837 (272)
Emissions per m ² for space and water heating			17.2887 (272a)
Fuel factor (main gas)			1.0000
Emissions per m ² for pumps			2.4950 (272b)
Emissions per m ² for lighting and fans			0.8143 (272c)
Parent Carbon Dioxide Emission Rate (TER) = (17.2887 * 1.00) + 2.4950 + 0.8143, rounded to 2 d.p.			20.6000 (272d)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 2 End - Refurb				Issued on Date	23/08/2022
Assessment Reference	Type 2 End Improved	Prop Type Ref				
Property	House Type 2, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	63 D	DER	50.33	TER	18.02	
Environmental	55 D	% DER<TER	-179.25			
CO ₂ Emissions (t/year)	4.05	DFEE	173.02	TFEE	55.88	
General Requirements Compliance	Fail	% DFEE<TFEE	-209.66			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

End-Terrace House, total floor area 98 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 18.02 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 50.33 kgCO₂/m²Fail
Excess emissions =32.31 kgCO₂/m² (179.0%)

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)55.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)173.0 kWh/m²/yrFail
Excess energy =117.1 kWh/m²/yr (209.0%)

2 Fabric U-values

Element	Average	Highest	
External wall	2.10 (max. 0.30)	2.10 (max. 0.70)	Fail
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.50 (max. 0.25)	0.50 (max. 0.70)	Fail
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	2.25 (max. 2.00)	3.00 (max. 3.30)	Fail

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

3 Air permeability

Air permeability at 50 pascals:	15.00 (design value)	
Maximum	10.0	Fail

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer

-- --

Combi boiler

Efficiency: 90%

Minimum: 88%

OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls:

Programmer and room thermostat

Fail

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%

Minimum

75%

OK

8 Mechanical ventilation

Not applicable

9 Summer time temperature

Overheating risk (Thames Valley):

Slight

OK

Based on:

Overshading:

Average

Windows facing South East:

8.67 m², No overhang

Windows facing North West:

9.48 m², No overhang

Air change rate:

0.80 ach

Blinds/curtains:

None

10 Key features

Party wall U-value

0.00 W/m²K

Roof U-value

0.11 W/m²K

Roof U-value

0.11 W/m²K

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7167 (42)
Average daily hot water use (litres/day)												98.7212 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	100.5907	104.6444	100.6956	96.7467	92.7979	88.8490	88.8490	92.7979	96.7467	100.6956	104.6444	108.5933 (44)
Energy content	161.0407	160.8472	159.3417	126.7124	121.3836	100.9574	97.5214	111.6630	112.8954	111.5667	110.6412	155.3933 (45)
Energy content (annual)												Total = Sum(45)= 1553.2682 (45)
Distribution loss (46%) = 0.15 x (45m)												
	24.1561	21.1271	21.8013	19.0069	18.2375	15.7376	14.5832	16.7344	16.9343	19.7353	21.5426	23.3939 (46)

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[illegible]

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													89.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													19326.6737 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	2985.0080	2505.4831	2344.6750	1666.5036	1084.7295	0.0000	0.0000	0.0000	0.0000	1483.2542	2237.6016	2990.1180	(98)
Space heating efficiency (main heating system 1)	89.5000	89.5000	89.5000	89.5000	89.5000	0.0000	0.0000	0.0000	0.0000	89.5000	89.5000	89.5000	(210)
Space heating fuel (main heating system)	3335.2044	2799.4225	2619.7486	1862.0152	1211.9883	0.0000	0.0000	0.0000	0.0000	1657.2673	2500.1136	3340.9140	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	211.9996	186.8746	196.3006	174.4231	168.8724	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182	(64)
Efficiency of water heater (217)m	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	(217)
Fuel for water heating, kWh/month	236.8710	208.7984	219.3303	194.8862	188.6842	166.1825	159.2155	177.4880	179.4481	203.9414	215.5671	231.1935	(219)
Water heating fuel used												2381.6064	(219)
Annual totals kWh/year												19326.6737	(211)
Space heating fuel - main system												0.0000	(215)
Space heating fuel - secondary												30.0000	(230c)
Electricity for pumps and fans: central heating pump												30.0000	(231)
Total electricity for the above, kWh/year												404.0052	(232)
Electricity for lighting (calculated in Appendix L)												22142.2853	(238)
Total delivered energy for all uses													

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	0.2160	4174.5615 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	0.2160	514.4270 (264)
Space and water heating		4688.9885 (265)
Pumps and fans	0.5190	15.5700 (267)
Energy for lighting	0.5190	209.6787 (268)
Total CO2, kg/year		4914.2372 (272)
Dwelling Carbon Dioxide Emission Rate (DER)		50.3300 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER		50.3300	EC1
Total Floor Area	TFA	97.6500	
Assumed number of occupants	N	2.7167	
CO2 emission factor in Table 12 for electricity displaced from grid	N	0.5190	
CO2 emissions from appliances, equation (L14)	EF	15.3210	EC2
CO2 emissions from cooking, equation (L16)		1.8863	EC3
Total CO2 emissions		67.5373	EC4
Residual CO2 emissions offset from biofuel CHP		0.0000	EC5
Additional allowable electricity generation, kWh/m²/year		0.0000	EC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000	EC7
Net CO2 emissions		67.5373	EC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	61.1500 (1b)	x 2.4000 (2b)	= 146.7600 (1b) - (3b)
First floor	36.5000 (1c)	x 2.6000 (2c)	= 94.9000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6500		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.6600 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0	0.0000 (6a)
Number of open flues	0	0	0	0	0.0000 (6b)
Number of intermittent fans	0	0	0	0	3.0000 (7a)
Number of passive vents	0	0	0	0	0.0000 (7b)
Number of fuelless gas fires	0	0	0	0	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) = 0.1241 (8)
Pressure test					Yes
Measured/design APS0					5.0000
Infiltration rate					0.3741 (18)
Number of sides sheltered					1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3461 (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 infiltr rate	0.4413	0.4326	0.4239	0.3807	0.3720	0.3288	0.3288	0.3201	0.3461	0.3720	0.3893	0.4066 (22b)
Effective ac	0.5974	0.5936	0.5899	0.5725	0.5692	0.5540	0.5540	0.5512	0.5599	0.5692	0.5758	0.5827 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			18.1500	1.3258	24.0625		(27)
Ground Floor			61.1500	0.1300	7.9495		(28a)
External Wall	118.8600	20.0400	98.8200	0.1800	17.7876		(28b)
1st Floor	36.5000		36.5000	0.1300	4.7450		(30)
Ground Floor	24.6500		24.6500	0.1300	3.2045		(30)
Total net area of external elements Aum(A, m2)			241.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	59.6391		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (User defined value 0.050 x total exposed area)							12.0580 (36)
Total fabric heat loss						(33) + (36) =	71.6971 (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	47.6375	47.3360	47.0405	45.6526	45.3929	44.1840	44.1840	43.9602	44.6497	45.3929	45.9182	46.4675 (38)
Average = Sum(39)m / 12 =	119.3346	119.0331	118.7376	117.3497	117.0900	115.8811	115.8811	115.6573	116.3468	117.0900	117.6153	118.1646 (39)
												117.3484 (39)
HLP	1.2221	1.2190	1.2160	1.2017	1.1991	1.1867	1.1867	1.1844	1.1915	1.1991	1.2045	1.2101 (40)
HLP (average)												1.2017 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

												2.7167 (42)
Assumed occupancy												98.7212 (43)
Average daily hot water use (litres/day)												
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	108.5933	104.6444	100.6956	96.7467	92.7979	88.8490	88.8490	92.7979	96.7467	100.6956	104.6444	108.5933 (44)
Energy content (annual)	161.0407	140.8472	145.3417	126.7124	121.5836	104.9174	97.2214	111.5630	112.8954	131.5687	143.6175	155.9593 (45)
Energy content (annual)	Total = Sum(45)m =											1553.2682 (45)
Distribution loss (44)m = 0.15 x (45)m	24.1561	21.1271	21.8013	19.0069	18.2375	15.7376	14.5832	16.7344	16.9343	19.7353	21.5426	23.3939 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

If cylinder contains dedicated solar storage													0.0000 (57)
Combi loss	50.9589	46.0274	50.9589	47.7107	47.2888	43.8160	45.2765	0.0000	47.2888	47.7107	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month													0.0000 (62)
Solar input	211.9996	186.8746	196.3006	174.4231	168.8724	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182	0.0000 (63)
Output from w/h													0.0000 (64)
Heat gains from water heating, kWh/month	66.2858	58.3385	61.0658	54.0596	52.2487	45.8390	43.6452	48.9169	49.4654	56.4863	60.0816	64.5962	0.0000 (65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m	22.8764	20.3187	16.5242	12.5099	9.3513	7.8948	8.5306	11.0884	14.8828	18.8971	22.0557	23.5123	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m	252.4717	255.0916	248.4896	234.4348	216.6931	200.0184	188.8787	186.2588	192.8608	206.9156	224.6573	241.3320	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	(69)
Pumps, fans													
(70)m	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)													
(71)m	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	(71)
Water heating gains (Table 5)													
(72)m	89.0938	86.8133	82.0777	75.0827	70.2268	63.6653	58.6629	65.7485	68.7019	75.9225	83.4466	86.8228	(72)
Total internal gains													
(73)m	431.1921	428.9738	413.8418	388.7776	363.0214	338.3287	322.8224	329.8458	343.1957	368.4854	396.9099	418.4173	(73)

6. Solar gains													
[Jan]		Area m ²	Solar Flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
South-east		8.6700	36.7938	0.6300	0.7000	0.7700	97.4913 (77)						
North-west		9.4800	11.2829	0.6300	0.7000	0.7700	32.6891 (81)						
Solar gains	130.1804	232.6033	347.0988	478.4137	579.9878	595.2016	565.7609	487.0153	392.1060	264.8524	157.9034	110.1278	(83)
Total gains	561.3725	661.5771	760.9406	867.1913	943.0085	933.5303	888.5833	816.8612	735.3017	633.3378	554.8133	528.5451	(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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	56.8255	56.9694	57.1112	57.7867	57.9149	58.5190	58.5190	58.6323	58.2848	57.9149	57.6562	57.3882	
alpha	4.7884	4.7980	4.8074	4.8524	4.8610	4.9013	4.9013	4.9088	4.8857	4.8610	4.8437	4.8259	
util living area	0.9983	0.9960	0.9889	0.9623	0.8831	0.7233	0.5571	0.6212	0.8644	0.9796	0.9965	0.9988	(86)
MIT	19.6402	19.8056	20.0789	20.4422	20.7558	20.9365	20.9858	20.9765	20.8404	20.4306	19.9696	19.6136	(87)
Th 2	19.9024	19.9048	19.9073	19.9186	19.9207	19.9307	19.9307	19.9325	19.9268	19.9207	19.9164	19.9119	(88)
util rest of house	0.9978	0.9946	0.9848	0.9475	0.8378	0.6293	0.4917	0.7947	0.9689	0.9950	0.9983	0.9983	(89)
MIT 2	18.0924	18.3355	18.7344	19.2609	19.6799	19.8883	19.9255	19.9228	19.7960	19.2538	18.5839	18.0602	(90)
Living area fraction									fLA = Living area / (4) =			0.1331	(91)
MIT	18.2984	18.5312	18.9134	19.4181	19.8231	20.0279	20.0667	20.0631	19.9350	19.4104	18.7684	18.2670	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.2984	18.5312	18.9134	19.4181	19.8231	20.0279	20.0667	20.0631	19.9350	19.4104	18.7684	18.2670	(93)

8. Space heating requirement													
Utilisation	0.9964	0.9920	0.9794	0.9386	0.8329	0.6386	0.4470	0.5085	0.7953	0.9618	0.9926	0.9973	(94)
Useful gains	559.3568	656.2548	745.2712	813.9293	785.4490	596.1693	397.1818	415.3655	584.8188	609.1291	550.6808	527.1128	(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	1670.4987	1622.5697	1473.9413	1234.3005	951.1334	628.9867	401.7194	423.6622	678.8871	1031.6155	1372.3775	1662.2236	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating	826.6896	649.3636	542.1305	302.6673	123.2692	0.0000	0.0000	0.0000	0.0000	314.3299	591.6216	844.5224	(98)
Space heating												4194.5942	(98)
Space heating per m ²										(98) / (4) =		42.9554	(99)

8c. Space cooling requirement
Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													4491.0002 (211)
Space heating requirement	826.6896	649.3636	542.1305	302.6673	123.2692	0.0000	0.0000	0.0000	0.0000	314.3299	591.6216	844.5224	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	885.1066	695.2501	580.4396	324.0549	131.9798	0.0000	0.0000	0.0000	0.0000	336.5416	633.4279	904.1996	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	211.9996	186.8746	196.3006	174.4231	168.8724	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182	(64)
Efficiency of water heater	88.1374	87.9285	87.4752	86.4258	84.2728	80.3000	80.3000	80.3000	80.3000	86.4074	87.6878	88.2164	(217)
Fuel for water heating, kWh/month	240.5332	212.5301	224.4073	201.8184	200.3876	185.2221	177.4569	197.8228	200.0076	211.2406	220.0222	234.5575	(219)
Water heating fuel used	240.5332	212.5301	224.4073	201.8184	200.3876	185.2221	177.4569	197.8228	200.0076	211.2406	220.0222	234.5575	(219)
Annual totals kWh/year													
Space heating fuel - main system													4491.0002 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													404.0052 (232)
Total delivered energy for all uses													7476.0117 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP													
Energy kWh/year	4491.0002	0.2160											
Space heating - main system 1	4491.0002	0.2160											
Space heating - secondary	0.0000	0.0000											
Water heating (other fuel)	2506.0064	0.2160											
Space and water heating													
Pumps and fans	75.0000	0.5190											
Energy for lighting	404.0052	0.5190											
Total CO ₂ , kg/m ² /year													
Emissions per m ² for space and water heating													15.4772 (272a)
Fuel factor (main gas)													1.0000
Emissions per m ² for lighting													2.1472 (272b)
Emissions per m ² for pumps and fans													0.3986 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.4772 * 1.00) + 2.1472 + 0.3986, rounded to 2 d.p.													18.0200 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 2 Mid - Refurb				Issued on Date	23/08/2022
Assessment Reference	Type 2 Mid Improved	Prop Type Ref				
Property	House Type 2, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	67 D	DER	44.31	TER	17.17	
Environmental	61 D	% DER<TER	-158.13			
CO ₂ Emissions (t/year)	3.55	DFEE	147.95	TFEE	51.36	
General Requirements Compliance	Fail	% DFEE<TFEE	-188.05			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-Terrace House, total floor area 98 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 17.17 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 44.31 kgCO₂/m²Fail
Excess emissions =27.14 kgCO₂/m² (158.0%)

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)51.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)148.0 kWh/m²/yrFail
Excess energy =96.6 kWh/m²/yr (188.0%)

2 Fabric U-values
Element Average Highest
External wall 2.10 (max. 0.30) 2.10 (max. 0.70) Fail
Party wall 0.00 (max. 0.20) - OK
Floor 0.50 (max. 0.25) 0.50 (max. 0.70) Fail
Roof 0.11 (max. 0.20) 0.11 (max. 0.35) OK
Openings 2.25 (max. 2.00) 3.00 (max. 3.30) Fail

2a Thermal bridging
Thermal bridging calculated using default y-value of 0.15

3 Air permeability
Air permeability at 50 pascals: 15.00 (design value)
Maximum 10.0 Fail

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer: -- --

Combi boiler
Efficiency: 90%
Minimum: 88% OK

Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Programmer and room thermostat Fail

Hot water controls: No cylinder

Boiler interlock: Yes OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings:100%
Minimum 75% OK

8 Mechanical ventilation
Not applicable

9 Summer time temperature
Overheating risk (Thames Valley): Medium OK
Based on:
Overshading: Average
Windows facing North East: 9.48 m², No overhang
Windows facing South West: 8.67 m², No overhang
Air change rate: 0.80 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K
Roof U-value 0.11 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	61.1500 (1b)	x 2.4000 (2b)	= 146.7600 (1b) - (3b)
First floor	36.5000 (1c)	x 2.6000 (2c)	= 94.9000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.6600 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans	0	+	0	=	3 * 10 = 30.0000 (7a)
Number of passive vents	0	+	0	=	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0	+	0	=	0 * 40 = 0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) = 0.1241 (8)
Pressure test					Yes
Measured/design APMO					15.0000
Infiltration rate					0.8741 (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) =				0.7430 (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 (22a)
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 infiltr rate	0.9474	0.9288	0.9102	0.8173	0.7987	0.7059	0.7059	0.6873	0.7430	0.7987	0.8359	0.8730 (22b)
Effective ac	0.9487	0.9313	0.9142	0.8340	0.8190	0.7491	0.7491	0.7362	0.7760	0.8190	0.8494	0.8811 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Front door			1.8900	3.0000	5.6700		(26)
Refurb (Uw = 2.70)			10.7900	2.4368	26.2933		(27)
New (Uw = 1.40)			7.3600	1.3258	9.7576		(27)
Ground Floor			61.1500	0.5000	30.5750		(28a)
External Wall	93.0000	20.0400	72.9600	2.1000	153.2160		(29a)
1st Floor	36.5000		36.5000	0.1100	4.0150		(30)
Ground Floor	24.6500		24.6500	0.1100	2.7115		(30)
Total net area of external elements Aum(A, m2)			215.3000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	232.2384		(32)
Party Wall			51.9600	0.0000	0.0000		(32b)
Party Ceilings 1			60.8500				(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
Thermal bridges (Default value 0.150 * total exposed area)
Total fabric heat loss (33) + (36) = 264.5334 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m 75.6597 74.2701 72.9080 66.5103 65.3133 59.7411 59.7411 58.7092 61.8874 65.3133 67.7348 70.2663 (38)
Heat transfer coeff 340.1931 338.8035 337.4414 331.0437 329.8467 324.2745 324.2745 323.2426 326.4208 329.8467 332.2682 334.7997 (39)
Average = Sum(39)m / 12 = 331.0379 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	3.4838	3.4696	3.4556	3.3901	3.3778	3.3208	3.3208	3.3102	3.3428	3.3778	3.4026	3.4286 (40)
HLP (average)												3.3900 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7167 (42)
Average daily hot water use (litres/day)												98.7212 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	108.5933	104.6444	100.6956	96.7467	92.7979	88.8490	88.8490	92.7979	96.7467	100.6956	104.6444	108.5933 (44)
Energy content (annual)	161.0407	140.8472	145.3417	126.7124	121.5836	104.9174	97.2214	111.5630	112.8954	131.5687	143.6175	155.9593 (45)
Distribution loss (46)m = 0.15 x (45)m	24.1561	21.1271	21.8013	19.0069	18.2375	15.7376	14.5832	16.7344	16.9343	19.7353	21.5426	23.3939 (46)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.9589	46.0274	50.9589	47.7107	47.2888	43.8160	45.2765	47.2888	47.7107	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	211.9996	186.8746	196.3006	174.4231	168.8724	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182 (62)
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 (63)
Output from w/h	211.9996	186.8746	196.3006	174.4231	168.8724	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182 (64)
Heat gains from water heating, kWh/month	66.2858	58.3385	61.0658	54.0596	52.2487	45.8390	43.6452	48.9169	49.4654	56.4863	60.0816	64.5962 (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	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340	135.8340 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.8764	20.3187	16.5242	12.5099	9.3513	7.8948	8.5306	11.0884	14.8828	18.8971	22.0557	23.5123 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.4717	255.0916	248.4896	234.4348	216.6931	200.0184	188.8787	186.2588	192.8608	206.9156	224.6573	241.3320 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834 (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)	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672 (71)
Water heating gains (Table 5)	89.0938	86.8133	82.0777	75.0827	70.2268	63.6653	58.6629	65.7485	68.7019	75.9225	83.4466	86.8228 (72)
Total internal gains	431.1921	428.9738	413.8418	388.7776	363.0214	338.3287	322.8224	329.8458	343.1957	368.4854	396.9099	418.4173 (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	2.22829	11.2829	0.8500	0.7000	0.7000	9.8630 (75)
Southeast	8.6700	36.7938	0.8500	0.7000	0.7000	131.5359 (75)
Northeast	7.3600	11.2829	0.6300	0.7000	0.7000	25.3789 (75)

Solar gains	166.7777	295.7901	435.8059	592.1013	710.7725	726.5568	691.7706	600.0376	489.4277	335.2946	201.8931	141.3476 (83)
Total gains	597.9699	724.7638	849.6477	980.8789	1073.7938	1064.8855	1014.5929	929.8835	832.6234	703.7799	598.8029	559.7649 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area, Th1 (C)												21.0000 (85)
Utilization factor for gains for living area, n1,m (see Table 9a)												
tau	19.9335	20.0153	20.0961	20.4845	20.5588	20.9121	20.9121	20.9788	20.7746	20.5588	20.4090	20.2546
alpha	2.3289	2.3344	2.3397	2.3656	2.3706	2.3941	2.3941	2.3986	2.3850	2.3706	2.3606	2.3503
util living area	0.9953	0.9922	0.9862	0.9727	0.9444	0.8900	0.8137	0.8476	0.9392	0.9813	0.9930	0.9960 (86)
MIT	17.5675	17.7982	18.2535	18.9156	19.5951	20.2228	20.5856	20.5177	19.9895	19.1256	18.2559	17.5560 (87)
Th 2	19.2581	19.2652	19.2722	19.3049	19.3111	19.3396	19.3396	19.3449	19.3286	19.3111	19.2987	19.2857 (88)
util rest of house	0.9940	0.9900	0.9819	0.9628	0.9189	0.8208	0.6573	0.7140	0.8986	0.9729	0.9907	0.9949 (89)
MIT 2	16.2250	16.4597	16.9181	17.5972	18.2686	18.8828	19.1869	19.1461	18.6698	17.8137	16.9391	16.2314 (90)
Living area fraction	16.6379	17.0959	17.7727	18.4452	19.0612	19.3731	19.3287	18.8455	FLA = Living area / (4) =			0.1331 (91)
MIT	16.4037								17.9884	17.1144	16.4077	(92)
Temperature adjustment												-0.1500
adjusted MIT	16.2537	16.4879	16.9459	17.6227	18.2952	18.9112	19.2231	19.1787	18.6955	17.8384	16.9644	16.2577 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9902	0.9841	0.9726	0.9473	0.8953	0.7940	0.6411	0.6934	0.8735	0.9604	0.9852	0.9917 (94)
Ext temp.	592.0893	713.2750	826.3407	929.1550	961.4028	845.5643	650.4147	644.8097	727.2688	675.9017	589.9245	555.1188 (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	4066.5701	3926.0188	3524.8763	2887.6096	2175.4093	1397.9986	850.6107	898.1988	1500.0769	2387.5533	3277.6224	4036.9263 (97)
Month fraction	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	2585.0137	2158.9638	2007.7105	1410.0873	903.2209	0.0000	0.0000	0.0000	0.0000	1273.4688	1935.1425	2590.4648 (98)
Space heating												14864.0722 (98)
Space heating per m2										(98) / (4) =		152.2178 (99)

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													89.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													16607.9019 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	2585.0137	2158.9638	2007.7105	1410.0873	903.2209	0.0000	0.0000	0.0000	0.0000	1273.4688	1935.1425	2590.4648	(98)
Space heating efficiency (main heating system 1)	89.5000	89.5000	89.5000	89.5000	89.5000	0.0000	0.0000	0.0000	0.0000	89.5000	89.5000	89.5000	(210)
Space heating fuel (main heating system)	2888.2835	2412.2501	2243.2519	1575.5166	1009.1853	0.0000	0.0000	0.0000	0.0000	1422.8701	2162.1703	2894.3740	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	211.9996	186.8746	196.3006	174.4231	168.8724	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182	(64)
Efficiency of water heater (217)m	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	(217)
Fuel for water heating, kWh/month	236.8710	208.7984	219.3303	194.8862	188.6842	166.1825	159.2155	177.4880	179.4481	203.9414	215.5671	231.1935	(219)
Water heating fuel used												2381.6064	(219)
Annual totals kWh/year													
Space heating fuel - main system												16607.9019	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans: central heating pump												30.0000	(230c)
Total electricity for the above, kWh/year												30.0000	(231)
Electricity for lighting (calculated in Appendix L)												404.0052	(232)
Total delivered energy for all uses												19423.5135	(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	0.2160	3587.3068 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	0.2160	514.4270 (264)
Space and water heating	0.2160	4101.7338 (265)
Pumps and fans	0.5190	15.5700 (267)
Energy for lighting	0.5190	209.6787 (268)
Total CO2, kg/year		4326.9825 (272)
Dwelling Carbon Dioxide Emission Rate (DER)		44.3100 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER		44.3100	EC1
Total Floor Area	TFA	97.6500	
Assumed number of occupants	N	2.7167	
CO2 emission factor in Table 12 for electricity displaced from grid	N	0.5190	
CO2 emissions from appliances, equation (L14)	EF	15.3210	EC2
CO2 emissions from cooking, equation (L16)		1.8863	EC3
Total CO2 emissions		61.5173	EC4
Residual CO2 emissions offset from biofuel CHP		0.0000	EC5
Additional allowable electricity generation, kWh/m²/year		0.0000	EC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000	EC7
Net CO2 emissions		61.5173	EC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	61.1500 (1b)	x	2.4000 (2b) = 146.7600 (1b) - (3b)
First floor	36.5000 (1c)	x	2.6000 (2c) = 94.9000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.6500		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.6600 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0	0.0000 (6a)
Number of open flues	0	0	0	0	0.0000 (6b)
Number of intermittent fans	0	0	0	0	3 * 10 = 30.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of fuelless gas fires					0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) = 0.1241 (8)
Pressure test					Yes
Measured/design APS0					5.0000
Infiltration rate					0.3741 (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) =				0.3180 (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 infiltr rate	0.4055	0.3975	0.3896	0.3498	0.3419	0.3021	0.3021	0.2942	0.3180	0.3419	0.3578	0.3737 (22b)
Effective ac	0.5822	0.5790	0.5759	0.5612	0.5584	0.5456	0.5456	0.5433	0.5506	0.5584	0.5640	0.5698 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			18.1500	1.3258	24.0625		(27)
Ground Floor			61.1500	0.1300	7.9495		(28a)
External Wall	93.0000	20.0400	72.9600	0.1800	13.1328		(28b)
1st Floor	36.5000		36.5000	0.1300	4.7450		(30)
Ground Floor	24.6500		24.6500	0.1300	3.2045		(30)
Total net area of external elements Aum(A, m2)			215.3000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	54.9843		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (User defined value 0.050 x total exposed area)							10.7650 (36)
Total fabric heat loss						(33) + (36) =	65.7493 (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	46.4296	46.1750	45.9255	44.7535	44.5342	43.5134	43.5134	43.3244	43.9066	44.5342	44.9778	45.4416 (38)
Average = Sum(39)m / 12 =	112.1789	111.9243	111.6748	110.5028	110.2835	109.2627	109.2627	109.0737	109.6559	110.2835	110.7271	111.1909 (39)
HLP	1.1488	1.1462	1.1436	1.1316	1.1294	1.1189	1.1189	1.1170	1.1229	1.1294	1.1339	1.1387 (40)
HLP (average)												1.1316 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

												2.7167 (42)
Assumed occupancy												98.7212 (43)
Average daily hot water use (litres/day)												
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	108.5933	104.6444	100.6956	96.7467	92.7979	88.8490	88.8490	92.7979	96.7467	100.6956	104.6444	108.5933 (44)
Energy content (annual)	161.0407	140.8472	145.3417	126.7124	121.5836	104.9174	97.2214	111.5630	112.8954	131.5687	143.6175	155.9593 (45)
Distribution loss (44)m = 0.15 x (45)m	24.1561	21.1271	21.8013	19.0069	18.2375	15.7376	14.5832	16.7344	16.9343	19.7353	21.5426	23.3939 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)

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Cylinder contains dedicated solar storage														
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 (57)	
Conduct loss	46.02774	50.9889	47.7107	47.2888	43.8160	45.2765	47.2888	47.7107	50.9889	49.3151	50.9889	50.9889 (61)		
Total heat required for water heating calculated for each month														
Solar input	211.9996	186.8746	196.3006	174.4231	168.8734	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182 (62)		
Conduct loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Solar input (sum of months) = Sum(63m) =					0.0000 (63)	
Output from w/h	211.9996	186.8746	196.3006	174.4231	168.8734	148.7334	142.4979	158.8517	160.6061	182.5276	192.9326	206.9182 (64)		
Heat gains from water heating, kWh/month														
	66.2598	58.3385	61.0658	54.0956	52.2487	45.8390	43.6452	48.9169	49.4654	56.4863	60.0816	64.5962 (65)		
Total per year (kWh/year) = Sum(64m) =														2131.5377 (66)

Stochastic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66 m) 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340 135.8340												
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	20.1387	18.5242	8.9322	7.9322	7.9322	7.9322	7.9322	8.5306	11.0884	14.8828	18.8971	22.0557
Appliances gains (calculated in Appendix L, equation 13 or 13a), also see Table 5	252.4717	255.0196	248.4458	234.3448	216.6933	200.0184	188.8878	186.2538	192.8680	206.9156	224.6573	241.3302
Cooking gains (calculated in Appendix L, equation 13a or 13a), also see Table 5	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834	36.5834
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
Losses e.g. evaporation (negative values) (Table 5)	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672	-108.6672
Water heating gains (Table 5)	89.0938	86.1133	82.0777	75.0827	70.2268	63.6553	58.6629	65.7485	68.7019	75.9225	83.4466	86.8228
Total internal gains (Table 5)	428.9738	413.8418	388.7776	363.0214	338.3287	322.8224	329.8458	343.1957	368.4554	396.9095	418.4173	473.71

[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		9.4800	11.2829	0.7000	0.7000		32.6891 (75)					
Southwest		8.6700	36.7938	0.6300	0.7000		97.4913 (79)					

Solar gains	130.1804	232.6033	347.0988	478.4137	595.2016	556.7609	487.0153	392.1060	264.8524	157.9034	110.1278 (83)	
Total gains	561.3725	661.5771	760.9406	867.1913	934.0085	933.5303	888.5833	816.8612	735.3017	633.3378	554.8133	528.5451 (84)

Temperature during heating periods in the living area (see Table 9), Thl (°C)												21,000 (85)
Utilization factor for gains for living area, nltm (see Table 9)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	6.0400	6.5038	6.7232	6.1367	61.4892	62.6037	62.6037	62.1713	61.8412	61.4892	61.2429	60.9875
alpha	0.5050	0.5092	0.5082	0.5091	0.5093	0.5136	0.5136	0.5148	0.5127	0.5093	0.5082	0.5068
util living area	0.9984	0.9959	0.9882	0.9582	0.8691	0.6978	0.5302	0.5939	0.8484	0.9777	0.9964	0.9988 (86)
MIT	19.7370	19.8998	20.1648	20.5116	20.8010	20.9537	20.9907	20.9839	20.8716	20.4906	20.4886	19.7085 (87)
Th 2	19.8612	19.9633	19.9654	19.9751	19.9769	19.9854	19.9854	19.9870	19.9821	19.9769	19.9732	19.9654 (88)
util rest of house	0.9978	0.9945	0.9839	0.9425	0.8221	0.6072	0.4136	0.4732	0.7774	0.9665	0.9949	0.9848 (89)
MIT	18.2751	18.5142	18.9005	19.4006	19.7825	19.9548	19.9820	19.9804	19.8792	19.8392	19.7953	19.7392 (90)
Living area fraction									fLA = Living area / (4			0.1331 (91)
MIT	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136	18.4348 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4697	18.6987	19.0688	19.5485	19.9181	20.0878	20.1163	20.1140	20.0105	19.5281	18.9136	18.4348 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9965	0.9920	0.9787	0.9341	0.8190	0.6170	0.4290	0.4891	0.7797	0.9597	0.9926	0.9974 (94)
Useful gains	559,4352	656,6687	744,6993	810,0609	772,3415	575,9092	381,2459	399,4874	573,3284	607,7194	550,7064	527,1833 (95)
Heat losses	4,3000	4,9000	6,5000	8,9000	11,7000	14,6000	16,2600	16,4800	14,1000	10,6000	7,1000	4,2000 (96)
Heat losses	1589,5413	1544,4087	1403,6122	1176,6855	906,3174	599,6129	384,1995	405,0966	648,1212	984,6170	1308,0864	1582,7817 (97a)
Month factor	1,0000	1,0000	1,0000	1,0000	1,0000	0,0000	0,0000	0,0000	0,0000	1,0000	1,0000	1,0000 (97b)
Space heating	766,3989	596,8301	490,2379	263,9697	99,6780	0,0000	0,0000	0,0000	0,0000	280,3580	545,3136	785,3652 (98)
Space heating												3826,1513 (98)
Space heating per m2												(98) / (4) = 39,2028 (99)

Not applicable

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 %)	93.4000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Space heating requirement	4098.6631 (211)

[illegible]

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	4098.6631	0.2160	885.3112 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2510.7285	0.2160	542.3174 (264)
Space and water heating			1427.6286 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	404.0052	0.5190	209.6787 (268)
Total CO ₂ , kg/m ² /year			1676.2323 (272)
Emissions per m ² for space and water heating			14.6139 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m ² for lighting			2.1472 (272b)
Emissions per m ² for pumps and fans			0.3986 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.6199 * 1.00) + 2.1472 + 0.3986, rounded to 2 d.p.			17.1700 (272d)

Appendix D

SAP TER/DER Worksheets – *New Build, Be Green*

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P End GF - Apt	Issued on Date	23/08/2022
Assessment Reference	1B2P End GF	Prop Type Ref	
Property	Apartment, 1B2P End GF, Edmansons Close, Tottenham, N17 6XD		
SAP Rating	85 B	DER	17.82
Environmental	88 B	% DER<TER	37.96
CO ₂ Emissions (t/year)	0.78	DFEE	41.61
General Requirements Compliance	Pass	% DFEE<TFEE	13.02
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com	Assessor ID	M976-0001
Client			

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Ground-floor flat, total floor area 50 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating: Electricity
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 28.72 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.82 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 47.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 41.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof (no roof)			
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Daikin Altherma ERWQ006BV3 + EKUBH008B

Secondary heating system: None

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.20 kWh/day	
Permitted by DBSCG 2.03	OK	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
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Hot water controls:

Cylinderstat	OK
Independent timer for DHW	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100%	
Minimum	75%

8 Mechanical ventilation

Continuous supply and extract system	
Specific fan power:	0.53
Maximum	1.5
MVHR efficiency:	90%
Minimum:	70%

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
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Based on:

Overheating:	Average
Windows facing South East:	2.88 m ² , No overhang
Windows facing South West:	8.16 m ² , No overhang
Windows facing North West:	0.44 m ² , No overhang
Air change rate:	3.00 ach
Blinds/curtains:	None

10 Key features

Party wall U-value	0.00 W/m ² K
Door U-value	1.00 W/m ² K
Window U-value	0.90 W/m ² K
Air permeability	3.0 m ³ /m ² h
Photovoltaic array	0.30 kW

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

3. Heat losses and heat loss parameter													
Element	Gross		Openings		Metres		U-value		A x U		K-value	A x K	
	m ²		m ²		m ²		W/m ² K		W/K		kJ/m ² K		
Door to corridor					1.2000		2.0000		1.2000				(26)
Window (Uw = 0.90)					11.4800		0.8687		9.9730				(27)
Ground Floor					50.2000		0.1300		6.5260				(28a)
External Wall	41.7500		11.4800		30.2700		0.1800		5.4486				(28a)
Corridor Wall		4.1300		1.2000		2.9300		0.1800		0.5274			(28b)
Total net area of external elements Aum(A, m ²)						96.0800							(31)
Fabric heat loss, W/K = Sum (A x U)						(26)...(30) + (32)			23.6750				(33)
Party Wall 1					30.1300		0.0000		0.0000				(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K													250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													10.8325 (36)
Total fabric heat loss											(33) + (36) =		34.5075 (37)
Ventilation heat loss calculated monthly (38m = 0.33 x 25)m x (5)													
(38m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	11.5988	11.4668	11.3348	10.6747	10.5427	9.8827	9.8827	9.7506	10.1467	10.5427	10.8067	11.0707	(38)
Heat transfer coeff													
	46.1063	45.9743	45.8422	45.1822	45.0502	44.3901	44.3901	44.2581	44.6541	45.0502	45.3142	45.5782	(39)
Average = Sum(39m) / 12 =													45.1492 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9185	0.9158	0.9132	0.9000	0.8974	0.8843	0.8843	0.8816	0.8895	0.8974	0.9027	0.9079	(40)
HLP (average)													0.8994 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)



HODKINSON

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating kWh	265.9409	183.0850	125.2467	48.2023	11.6714	0.0000	0.0000	0.0000	0.0000	50.5423	163.3224	277.7893 (98)
Space heating												1125.8002 (98)
Space heating per m2										(98) / (4) =		22.4263 (99)

8c. Space cooling requirement	
Not applicable	

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 %)	311.7176 (206)
Efficiency of secondary/supplementary heating system, %	100.0000 (208)
Space heating requirement	361.1603 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	265.9409	183.0850	125.2467	48.2023	11.6714	0.0000	0.0000	0.0000	0.0000	50.5423	163.3224	277.7893 (98)
Space heating efficiency (main heating system 1)	311.7176	311.7176	311.7176	311.7176	311.7176	0.0000	0.0000	0.0000	0.0000	311.7176	311.7176	311.7176 (210)
Space heating fuel (main heating system)	85.3147	58.7342	40.1795	15.4635	3.7442	0.0000	0.0000	0.0000	0.0000	16.2141	52.3943	89.1157 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	164.8469	145.4168	153.0029	137.5497	135.0786	121.1065	116.6987	127.5186	127.1255	142.6119	150.3036	161.0133 (64)
Efficiency of water heater	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550 (216)
(217)m	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550 (217)
Fuel for water heating, kWh/month	123.1533	108.6376	114.3049	102.7602	100.9142	90.4759	87.1829	95.2662	94.9725	106.5420	112.2884	120.2893 (219)
Water heating fuel used												1256.7875 (219)
Annual totals kWh/year												361.1603 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												0.0000 (215)

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6625)	
mechanical ventilation fans (SFP = 0.6625)	
Total electricity for the above, kWh/year	101.4354 (231)
Electricity for lighting (calculated in Appendix L)	232.6273 (232)

Energy saving/generation technologies (Appendices M, N and Q)	
FV Unit 0 (0.80 * 0.30 * 951 * 1.00) =	-228.1478 (233)
Total delivered energy for all uses	1723.8626 (238)

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP			
Space heating - main system 1	361.1603	0.5190	187.4422 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	1256.7875	0.5190	652.2727 (264)
Space and water heating			839.7149 (265)
Pumps and fans	101.4354	0.5190	52.6450 (267)
Energy for lighting	232.6273	0.5190	120.7336 (268)
Energy saving/generation technologies			
FV Unit	-228.1478	0.5190	-118.4087 (269)
Total CO2, kg/year			894.6847 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.8200 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES DER

Total Floor Area	TFA	50.2000	17.8200 ZC1
Assumed number of occupants	N	1.6960	1.6960
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	0.5190
CO2 emissions from appliances, equation (L14)			17.4413 ZC2
CO2 emissions from cooking, equation (L16)			3.1814 ZC3
Total CO2 emissions			38.4427 ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year			0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000 ZC7
Net CO2 emissions			38.4427 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.2000 (1b)	2.5000 (2b)	125.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	125.5000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of fuelless gas fires				0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1594 (8)
Pressure test		Yes
Measured/design AP50		5.0000
Infiltration rate		0.4094 (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) =	0.3480 (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 infiltr rate												
Effective ac	0.4436	0.4349	0.4262	0.3828	0.3741	0.3306	0.3306	0.3219	0.3480	0.3741	0.3915	0.4089 (22b)
Effective ac	0.5984	0.5946	0.5908	0.5733	0.5700	0.5546	0.5546	0.5518	0.5605	0.5700	0.5766	0.5836 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.2000	1.0000	1.2000		(26)
TER Opening Type (Uw = 1.40)			11.3600	1.3258	15.0606		(27)
Ground Floor			50.2000	0.1300	6.5260		(28a)
External Wall	41.7500	11.3600	30.3900	0.1800	5.4702		(29a)
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274		(29b)
Total net area of external elements Aum(A, m2)			96.0800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.7842		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K			250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.2290 (36)
Total fabric heat loss			(33) + (36) = 36.0132 (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	24.7832	24.6249	24.4698	23.7412	23.6048	22.9702	22.9702	22.8527	23.2147	23.6048	23.8806	24.1689 (38)
Average = Sum(39)m / 12 =	60.7964	60.6381	60.4830	59.7544	59.6180	58.9834	58.9834	58.8659	59.2279	59.6180	59.8938	60.1822 (39)
												59.7537 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2111	1.2079	1.2048	1.1903	1.1876	1.1750	1.1750	1.1726	1.1798	1.1876	1.1931	Dec 1.1988 (40)
HLP (average)												1.1903 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6960 (42)
Average daily hot water use (litres/day)												74.4798 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)
Energy content (annual)	121.4965	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629 (45)
Distribution loss (46)m = 0.15 x (45)m												1171.8569 (45)
Water storage loss:	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494 (46)
Store volume												170.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5003 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8102 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	(56)
If cylinder contains dedicated solar storage	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406	(62)
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	(63)
Output from w/h	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406	(64)
Heat gains from water heating, kWh/month	79.0997	70.2888	75.1616	69.2399	69.2018	63.7726	63.0905	66.6881	65.7739	71.7066	73.4806	77.8251	(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	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1698	11.6973	9.5129	7.2019	5.3835	4.5450	4.9110	6.3835	8.5679	10.8789	12.6973	13.5359	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.7534	149.2866	145.4229	137.1977	126.8147	117.0562	110.5370	109.0038	112.8674	121.0927	131.4756	141.2341	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	(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)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	(71)
Water heating gains (Table 5)	106.3169	104.5964	101.0237	96.1666	93.0132	88.5730	84.7990	89.6345	91.3526	96.3798	102.0564	104.6036	(72)
Total internal gains	318.6799	317.0202	307.3994	292.0060	276.6513	261.6141	251.6868	256.4617	264.2278	279.7913	297.6692	310.8134	(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					
Southeast		2.8500	36.7938	0.6300	0.7000	0.7700	32.0473	(77)				
Southwest		8.0700	36.7938	0.6300	0.7000	0.7700	90.7445	(79)				
Northwest		0.4400	11.2829	0.6300	0.7000	0.7700	1.5172	(81)				
Solar gains	124.3090	212.2483	291.7459	363.7310	407.3969	392.3992	358.1478	316.6543	234.9405	148.9854	106.3233	(83)
Total gains	442.9890	529.2684	599.1453	655.7370	686.1083	669.0110	644.0860	614.6095	580.8822	514.7318	446.6546	417.1367 (84)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, n1,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	57.3407	57.4904	57.6379	58.3407	58.4741	59.1032	59.1032	59.2212	58.8593	58.4741	58.2048	57.9260	
alpha	4.8227	4.8327	4.8425	4.8894	4.8983	4.9402	4.9402	4.9481	4.9240	4.8983	4.8803	4.8617	
util living area	0.9896	0.9756	0.9439	0.8680	0.7318	0.5492	0.4002	0.4363	0.6614	0.8976	0.9772	0.9920	(86)
MIT	19.9325	20.1485	20.4230	20.7143	20.9027	20.9812	20.9967	20.9951	20.9544	20.7064	20.2648	19.8925	(87)
Th 2	19.9111	19.9137	19.9161	19.9277	19.9299	19.9401	19.9401	19.9420	19.9362	19.9299	19.9255	19.9209	(88)
util rest of house	0.9863	0.9682	0.9274	0.8322	0.6694	0.4647	0.3053	0.3382	0.5755	0.8610	0.9690	0.9895	(89)
MIT 2	18.5232	18.8346	19.2222	19.6197	19.8445	19.9289	19.9390	19.9402	19.9051	19.6222	19.0138	18.4723	(90)
Living area fraction	$f_{\text{Living area}} = \text{Living area} / (\text{Living area} + \text{rest of house})$												
MIT	19.3823	19.6355	19.9542	20.2870	20.4895	20.5704	20.5838	20.5832	20.5447	20.2831	19.7764	19.3380	(92)
Temperature adjustment	$T_{\text{adjustment}} = T_{\text{MIT}} - T_{\text{ref}}$												
adjusted MIT	19.3823	19.6355	19.9542	20.2870	20.4895	20.5704	20.5838	20.5832	20.5447	20.2831	19.7764	19.3380	(93)

8. Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9843	0.9659	0.9281	0.8452	0.7032	0.5157	0.3632	0.3980	0.6260	0.8743	0.9677	0.9877	(94)
Useful gains	436.0328	511.2452	556.0654	554.2066	482.4749	344.9919	233.9490	244.6430	363.6505	450.0398	432.2094	412.0142	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.7000	7.1000	4.2000	(96)
Heat loss rate W	916.9481	893.5339	813.7492	680.4207	524.0141	352.1538	234.9761	246.2478	381.7075	577.2871	759.2372	911.0375	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	357.8010	256.8980	191.7167	90.8742	30.9052	0.0000	0.0000	0.0000	0.0000	94.6720	235.4600	371.2733	(98)
Space heating													
Space heating per m2										(98) / (4) =		32.4622	(99)

8c. Space cooling requirement	
Not applicable	



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

9a. Energy requirements - Individual heating systems, including micro-CHP														
Fraction of space heat from secondary/supplementary system (Table 11)														0.0000 (201)
Efficiency of main space heating system 1 (in %)														1.0000 (202)
Efficiency of secondary/supplementary heating system, %														93.5000 (206)
Space heating requirement														0.0000 (208)
Space heating requirement														1742.8881 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	357.8010	256.8980	191.7167	90.8742	30.9052	0.0000	0.0000	0.0000	0.0000	94.6720	235.4600	371.2733	(98)	
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	(210)	
Space heating fuel (main heating system)	382.6748	274.7572	205.0446	97.1916	33.0536	0.0000	0.0000	0.0000	0.0000	101.2534	251.8289	397.0838	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406	(64)	
Efficiency of water heater	86.7551	86.2381	85.3302	83.6527	81.5423	79.8000	79.8000	79.8000	79.8000	83.6648	85.9235	86.8993	(216)	
Fuel for water heating, kWh/month	195.8088	173.8880	185.1983	170.2454	171.8199	157.8592	152.5388	166.0977	165.4017	176.4651	180.5894	191.0723	(219)	
Water heating fuel used														2086.9847 (219)
Annual totals kWh/year														1742.8881 (211)
Space heating fuel - main system														0.0000 (215)
Space heating fuel - secondary														30.0000 (230c)
Electricity for pumps and fans:														45.0000 (230a)
central heating pump														75.0000 (231)
main heating flue fan														232.5833 (232)
Total electricity for the above, kWh/year														4137.4560 (238)
Electricity for lighting (calculated in Appendix L)														
Total delivered energy for all uses														

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP														
Energy kWh/year	1742.8881													
Emission factor kg CO2/kWh	0.2160													
Space heating - main system 1	0.0000													
Space heating - secondary	2086.9847													
Water heating (other fuel)														
Space and water heating														
Pumps and fans														
Energy for lighting	75.0000													
Total CO2, kg/m2/year	232.5833													
Emissions per m2 for space and water heating														16.4791 (272a)
Fuel factor (electricity)														1.5500
Emissions per m2 for lighting														2.4046 (272b)
Emissions per m2 for pumps and fans														0.7754 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.4791 * 1.55) + 2.4046 + 0.7754, rounded to 2 d.p.														28.7200 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P End MF - Apt	Issued on Date	23/08/2022
Assessment Reference	1B2P End MF	Prop Type Ref	
Property	Apartment, 1B2P End MF, Edmansons Close, Tottenham, N17 6XD		
SAP Rating	86 B	DER	16.25
Environmental	89 B	% DER<TER	35.40
CO ₂ Emissions (t/year)	0.73	DFEE	31.20
General Requirements Compliance	Pass	% DFEE<TFEE	13.14
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com	Assessor ID	M976-0001
Client			

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-floor flat, total floor area 50 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Electricity
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 25.16 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 16.25 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)35.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)31.2 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Daikin Altherma ERWQ006BV3 + EKUBH008B

Secondary heating system: None

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.20 kWh/day	
Permitted by DBSCG 2.03	OK	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
-------------------------	-----------------------------------	----

Hot water controls:

Cylinderstat	OK
Independent timer for DHW	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%		
Minimum	75%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.53	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	

Windows facing South East: 2.88 m², No overhang

Windows facing South West: 8.16 m², No overhang

Windows facing North West: 0.44 m², No overhang

Air change rate: 3.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value	0.00 W/m ² K
Door U-value	1.00 W/m ² K
Window U-value	0.90 W/m ² K
Air permeability	3.0 m ³ /m ² h
Photovoltaic array	0.30 kW

HODKINSON

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)
Energy cost	121.4985	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629 (45)
Energy cost											Total = Sum(45) =	1171.8559 (46)
Distribution loss (46) = 0.15 x (45)												
Water storage loss	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.8694 (46)



HODKINSON

Store volume		170.0000	(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)			
Enter (50) or (54) in (55)		0.6480	(55)

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	160.1719	95.4846	50.9213	12.1348	1.6610	0.0000	0.0000	0.0000	0.0000	14.0777	83.1071	170.6869 (98)
Space heating per m2										(98) / (4) =		11.7180 (99)

8c. Space cooling requirement
Not applicable

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 %)												280.8532 (206)
Efficiency of secondary/supplementary heating system, %												100.0000 (208)
Space heating requirement												209.4494 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	160.1719	95.4846	50.9213	12.1348	1.6610	0.0000	0.0000	0.0000	0.0000	14.0777	83.1071	170.6869 (98)
Space heating efficiency (main heating system 1)	280.8532	280.8532	280.8532	280.8532	280.8532	0.0000	0.0000	0.0000	0.0000	280.8532	280.8532	280.8532 (210)
Space heating fuel (main heating system)	57.0305	33.9981	18.1309	4.3207	0.5914	0.0000	0.0000	0.0000	0.0000	5.0125	29.5909	60.7744 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	164.8469	145.4168	153.0029	137.5497	135.0786	121.1065	116.6987	127.5186	127.1255	142.6119	150.3036	161.0133 (64)
Efficiency of water heater (217)m	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550 (217)
Fuel for water heating, kWh/month	123.1533	108.6376	114.3049	102.7602	100.9142	90.4759	87.1829	95.2662	94.9725	106.5420	112.2884	120.2893 (219)
Water heating fuel used												1256.7875 (219)
Annual totals kWh/year												209.4494 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												

Electricity for pumps and fans:												
(BalancedWithHeatRecovery: Database: in-use factor = 1.2500, SFP = 0.6625)												
mechanical ventilation fans (SFP = 0.6625)												101.4354 (230a)
Total electricity for the above, kWh/year												101.4354 (231)
Electricity for lighting (calculated in Appendix L)												232.6273 (232)

Energy saving/generation technologies (Appendices M, N and Q)												
PV Unit 0 (0.80 * 0.30 * 951 * 1.00) =												-228.1478 (233)
Total delivered energy for all uses												1572.1517 (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	209.4494	0.5190	108.7042 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	1256.7875	0.5190	652.2727 (264)
Space and water heating			760.9769 (265)
Pumps and fans	101.4354	0.5190	52.6450 (267)
Energy for lighting	232.6273	0.5190	120.7336 (268)

Energy saving/generation technologies			
PV Unit	-228.1478	0.5190	-118.4087 (269)
Total CO2, kg/year			815.9467 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			16.2500 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER			
Total Floor Area		TFA	16.2500 EC1
Assumed number of occupants		N	1.6960
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			17.4413 EC2
CO2 emissions from cooking, equation (L16)			3.1814 EC3
Total CO2 emissions			36.8727 EC4
Residual CO2 emissions offset from biofuel CHP			0.0000 EC5
Additional allowable electricity generation, kWh/m²/year			0.0000 EC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000 EC7
Net CO2 emissions			36.8727 EC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.2000 (1b)	x 2.5000 (2b)	= 125.5000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	125.5000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of fuelless gas fires				0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	20.0000 / (5) =	Air changes per hour
Pressure test		0.1594 (8)
Measured/design AP50		Yes
Infiltration rate		5.0000
Number of sides sheltered		0.4094 (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) =	0.3480 (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 infiltr rate	0.4436	0.4349	0.4262	0.3828	0.3741	0.3306	0.3306	0.3219	0.3480	0.3741	0.3915	0.4089 (22b)
Effective ac	0.5984	0.5946	0.5908	0.5733	0.5700	0.5546	0.5546	0.5518	0.5605	0.5700	0.5766	0.5836 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.2000	1.0000	1.2000		(26)
TER Opening Type (Uw = 1.40)			11.3600	1.3258	15.0606		(27)
External Wall	41.7500	11.3600	30.3900	0.1800	5.4702		(29a)
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274		(29a)
Total net area of external elements Aum(A, m2)			45.8800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		22.2582		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.3560 (36)
Total fabric heat loss						(33) + (36) =	26.6142 (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	24.7832	24.6249	24.4698	23.7412	23.6048	22.9702	22.9702	22.8527	23.2147	23.6048	23.8806	24.1689 (38)
Average = Sum(39)m / 12 =	51.3974	51.2391	51.0840	50.3554	50.2190	49.5844	49.5844	49.4669	49.8289	50.2190	50.4948	50.7832 (39)
HLP	1.0239	1.0207	1.0176	1.0031	1.0004	0.9877	0.9877	0.9854	0.9926	1.0004	1.0059	1.0116 (40)
HLP (average)												1.0031 (41)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6960 (42)
Average daily hot water use (litres/day)												74.4798 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)
Energy conte	121.4965	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629 (45)
Energy content (annual)												Total = Sum(45)m = 1171.8569 (45)
Distribution loss (46)m = 0.15 x (45)m												
	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494 (46)
Water storage loss:												
Store volume												170.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												
Temperature factor from Table 2b												
Enter (49) or (54) in (55)												0.5400 (49)
Total storage loss												0.8102 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	24.3051	25.1153	(56)
If cylinder contains dedicated solar storage															
	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	24.3051	25.1153	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406	(62)		
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	0.0000	(63)
Output from w/h	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406	(64)		
Heat gains from water heating, kWh/month	79.0397	70.2888	75.1616	69.2399	69.2018	63.7726	63.0905	66.6881	65.7739	71.7066	73.4806	77.8251	(65)		

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

Metabolic gains (Table 5), Watts												
(66m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995 (66)
Lighting gains (calculated in Appendix L, equation L19 or L5a), also see Table 5												
	13.1698	11.6973	9.5129	7.2019	5.3835	4.5450	4.9110	6.3835	8.5679	10.8789	12.6973	13.5359 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.7534	149.2866	145.4229	137.1977	126.8147	117.0562	110.5370	109.0038	112.8674	121.0927	131.4756	141.2341 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800 (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)												
	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396 (71)
Water heating gains (Table 5)												
	106.3169	104.5964	101.0237	96.1666	93.0132	88.5730	84.7990	89.6345	91.3526	96.3798	102.0564	104.6036 (72)
Total internal gains												
	318.6799	317.0202	307.3994	292.0060	276.6513	261.6141	251.6868	256.4617	264.2278	279.7913	297.6692	310.8134 (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								
Southeast	2.8500	36.7938	0.6300	0.7000	0.7700	32.0473 (77)								
Southwest	8.0700	36.7938	0.6300	0.7000	0.7700	90.7445 (79)								
Northwest	0.4400	11.2829	0.6300	0.7000	0.7700	1.5172 (81)								
Solar gains	124.3090	212.2463	291.7459	363.7310	409.4570	407.3969	392.3992	358.1478	316.6543	234.9405	148.9854	106.3233 (83)		
Total gains	442.9990	529.2684	599.1453	655.7370	686.1083	669.0110	644.0860	614.6095	580.8822	514.7318	446.6546	417.1367 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (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	67.8266	68.0361	68.2427	69.2302	69.4181	70.3066	70.3066	70.4736	69.9617	69.4181	69.0390	68.6470
alpha	5.5218	5.5357	5.5495	5.6153	5.6279	5.6871	5.6871	5.6982	5.6641	5.6279	5.6026	5.5765
util living area	0.9873	0.9675	0.9215	0.8160	0.6536	0.4707	0.3383	0.3694	0.5791	0.8552	0.9696	0.9905 (86)
MIT	20.1939	20.4005	20.6385	20.8573	20.9643	20.9953	20.9994	20.9990	20.9857	20.8422	20.4835	20.1555 (87)
Th 2	20.0635	20.0661	20.0687	20.0808	20.0830	20.0936	20.0936	20.0935	20.0895	20.0830	20.0784	20.0737 (88)
util rest of house	0.9835	0.9586	0.9018	0.7774	0.5978	0.4057	0.2688	0.2972	0.5080	0.8142	0.9596	0.9876 (89)
MIT 2	19.0132	19.3092	19.6395	19.9309	20.0525	20.0908	20.0934	20.0952	20.0800	19.9221	19.4404	18.9657 (90)
Living area fraction	19.7329	19.9744	20.2485	20.4956	20.6083	20.6422	20.6457	20.6461	20.6321	20.4830	20.0763	19.6910 (92)
Temperature adjustment	19.7329	19.9744	20.2485	20.4956	20.6083	20.6422	20.6457	20.6461	20.6321	20.4830	20.0763	19.6910 (93)
adjusted MIT	19.7329	19.9744	20.2485	20.4956	20.6083	20.6422	20.6457	20.6461	20.6321	20.4830	20.0763	19.6910 (93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
0.9819	0.9576	0.9060	0.7956	0.6303	0.4452	0.3112	0.3413	0.5509	0.8332	0.9596	0.9861 (94)			
Useful gains	434.9685	506.8165	542.7972	521.6791	432.4641	297.8742	200.4197	319.9895	428.6881	428.6044	411.3485 (95)			
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)			
Heat loss rate W	7.2103	772.3999	702.3260	583.9005	447.3656	299.5978	200.6014	325.4857	496.3125	655.2341	786.6813 (97)			
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)			
Space heating kWh	266.5318	178.4720	118.6895	44.7994	11.0867	0.0000	0.0000	0.0000	50.1638	163.1733	279.2468 (98)			
Space heating											1112.1633 (99)			
Space heating per m2									(98) / (4) =		22.1546 (99)			

8c. Space cooling requirement

Not applicable



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)												93.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1189.4795 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	266.5318	178.4720	118.6895	44.7994	0.0000	0.0000	0.0000	0.0000	50.1638	163.1733	279.2468 (98)	
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000 (210)	
Space heating fuel (main heating system)	285.0608	190.8792	126.9406	47.9138	11.8574	0.0000	0.0000	0.0000	53.6511	174.5169	298.6597 (211)	
Water heating requirement	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	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406 (64)
Efficiency of water heater												79.8000 (216)
(217)m	86.0108	85.2791	84.0630	82.1235	80.4979	79.8000	79.8000	79.8000	79.8000	82.2667	84.9481	86.1906 (217)
Fuel for water heating, kWh/month	197.5034	175.8434	187.9902	173.4155	174.0492	157.8592	152.5388	166.0977	165.4017	179.4641	182.6631	192.7634 (219)
Water heating fuel used												2105.4697 (219)
Annual totals kWh/year												
Space heating fuel - main system												1189.4795 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												75.0000 (231)
Electricity for lighting (calculated in Appendix L)												232.5833 (232)
Total delivered energy for all uses												3602.5324 (238)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P End TF - Apt				Issued on Date	23/08/2022
Assessment Reference	1B2P End TF	Prop Type Ref				
Property	Apartment, 1B2P End TF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	84 B	DER	18.98	TER	33.66	
Environmental	88 B	% DER<TER	43.61			
CO ₂ Emissions (t/year)	0.82	DFEE	48.43	TFEE	64.21	
General Requirements Compliance	Pass	% DFEE<TFEE	24.57			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Top-floor flat, total floor area 50 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating: Electricity
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 33.66 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 18.98 kgCO₂/m² OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 64.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 48.4 kWh/m²/yr OK

2 Fabric U-values			
Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability			
Air permeability at 50 pascals:	3.00 (design value)		
Maximum	10.0		OK

4 Heating efficiency
Main heating system: Heat pump with radiators or underfloor - Electric
Daikin Altherma EKXQ006BV3 + EKXHB008B

Secondary heating system: None

5 Cylinder insulation			
Hot water storage	Measured cylinder loss: 1.20 kWh/day		
Permitted by DBSCG 2.03	OK		
Primary pipework insulated:	Yes		OK

6 Controls			
Space heating controls:	Time and temperature zone control		OK

Hot water controls:			
	Cylinderstat		OK
	Independent timer for DHW		OK

7 Low energy lights			
Percentage of fixed lights with low-energy fittings: 100%			
Minimum	75%		OK

8 Mechanical ventilation			
Continuous supply and extract system			
Specific fan power:	0.53		
Maximum	1.5		OK
MVHR efficiency:	90%		
Minimum:	70%		OK

9 Summer time temperature			
Overheating risk (Thames Valley):	Medium		OK
Based on:			
Overheating:	Average		
Windows facing North East:	8.16 m ² , No overhang		
Windows facing South East:	2.88 m ² , No overhang		
Windows facing North West:	0.44 m ² , No overhang		
Air change rate:	3.00 ach		
Blinds/curtains:	None		

10 Key features			
Party wall U-value	0.00 W/m ² K		
Roof U-value	0.10 W/m ² K		
Door U-value	1.00 W/m ² K		
Window U-value	0.80 W/m ² K		
Air permeability	3.00 m ³ /m ² h		
Photovoltaic array	0.30 kW		

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)																
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014																

1. Overall dwelling dimensions																

Ground floor	Area		Storey height		Volume											
	(m ²)		(m)		(m ³)											
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000		x 2.5000 (2b)		= 125.5000 (1b) - (3b)											
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 125.5000 (5)											

2. Ventilation rate																

	main heating		secondary heating		other		total		m ³ per hour							
Number of chimneys	0		0		0		0		0 * 40 = 0.0000 (6a)							
Number of open flues	0		0		0		0		0 * 20 = 0.0000 (6b)							
Number of intermittent fans	0		0		0		0		0 * 10 = 0.0000 (7a)							
Number of passive vents	0		0		0		0		0 * 10 = 0.0000 (7b)							
Number of fuelless gas fires	0		0		0		0		0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =							0.0000 / (5) =		0.0000 (8)							
Pressure test									Yes							
Measured/design AP50									3.0000							
Infiltration rate									0.1500 (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) =		0.1275 (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 infiltr rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)				
Balanced mechanical ventilation with heat recovery																
If mechanical ventilation:																
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =																
Effective ac	0.2801	0.2769	0.2737	0.2578	0.2546	0.2386	0.2386	0.2354	0.2450	0.2546	0.2609	0.2673 (25)				

3. Heat losses and heat loss parameter																

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K									
	m ²	m ²	m ²	W/m ² K	W/K	kJ/m ² K	kJ/K									
Door to corridor			1.2000	1.0000	1.2000	0.8687	0.8687 (26)									
Window (Uw = 0.90)			11.4800	0.8687	9.9730	0.8687	9.9730 (27)									
External Wall	41.7500	11.4800	30.2700	0.1800	5.4486	0.1800	5.4486 (29a)									
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274	0.1800	0.5274 (29b)									
External Roof 1	50.2000		50.2000	0.1000	5.0200	0.1000	5.0200 (30)									
Total net area of external elements Aum(A, m ²)			96.0800					(26)...(30) + (32) =								
Fabric heat loss, W/K = Sum (A x U)			30.1300	0.0000	0.0000	22.1690	22.1690 (33)									
Party Wall 1						0.0000	0.0000 (32)									
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K																
Thermal bridges (Sum(L x Psi) calculated using Appendix K)																
Total fabric heat loss							(33) + (36) =		36.1315 (37)							
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
(38)m	11.5988	11.4668	11.3348	10.6747	10.5427	9.8827	9.8827	9.7506	10.1467	10.5427	10.8067	11.0707 (38)				
Heat transfer coeff	47.7303	47.5983	47.4662	46.8062	46.6742	46.0141	46.0141	45.8821	46.2781	46.6742	46.9382	47.2022 (39)				
Average = Sum(39)m / 12 =																
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
HLP	0.9508	0.9482	0.9455	0.9324	0.9298	0.9166	0.9166	0.9140	0.9219	0.9298	0.9350	0.9403 (40)				
HLP (average)																
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)				

4. Water heating energy requirements (kWh/year)																

Assumed occupancy																
Average daily hot water use (litres/day)																
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Daily hot water use	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)				
Energy conte	121.4965	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629 (45)				
Energy content (annual)																
Distribution loss (46)m = 0.15 x (45)m	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494 (46)				



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:													170.0000 (47)
Store volume													1.2000 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.6880 (55)
Enter (49) or (54) in (55)													
Total storage loss													

If cylinder contains dedicated solar storage													

Primary 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	164.8469	145.4168	153.0029	137.5497	135.0786	121.1065	116.6987	127.5186	127.1255	142.6119	150.3036	161.0133 (62)	
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 (63)	
Output from w/h	164.8469	145.4168	153.0029	137.5497	135.0786	121.1065	116.6987	127.5186	127.1255	142.6119	150.3036	161.0133 (64)	
Heat gains from water heating, kWh/month	75.0779	66.6561	71.1398	65.3478	65.1800	59.8805	59.0686	62.6663	61.8818	67.6848	69.5885	73.8032 (65)	

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

Metabolic gains (Table 5), Watts													
(66)m	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995 (66)	
Lighting gains (calculated in Appendix L, equation L15 or L19a), also see Table 5	13.1723	11.6995	9.5147	7.2032	5.3845	4.5458	4.9119	6.3847	8.5695	10.8810	12.6997	13.5384 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.7534	149.2866	145.4229	137.1977	126.8147	117.0562	110.5370	109.0038	112.8674	121.0927	131.4756	141.2341 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800 (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)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396 (71)	
Water heating gains (Table 5)	100.9137	99.1907	95.6180	90.7609	87.6075	83.1673	79.3933	84.2288	85.9469	90.9741	96.6507	99.1979 (72)	
Total internal gains	310.2767	308.6167	298.9955	283.6016	268.2466	253.2093	243.2821	248.0572	255.8237	271.3877	289.2659	302.4103 (73)	

6. Solar gains													

[Jan]			Area m ²		Solar flux Table 6a W/m ²		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W	
Northeast			8.1600		11.2829		0.4000		0.8000		0.7700	20.4172 (75)	
Southeast			2.8800		36.7938		0.4000		0.8000		0.7700	23.4991 (77)	
Northeast			0.4400		11.2829		0.4000		0.8000		0.7700	1.1009 (81)	

Solar gains	45.0172	83.8283	133.6825	197.4607	250.2177	261.1843	246.4927	205.1804	155.4608	97.7670	55.2218	37.6831 (83)	
Total gains	355.2939	392.4450	432.6780	481.0623	518.4642	514.3935	489.7748	453.2375	411.2845	369.1547	344.4878	340.9933 (84)	

7. Mean internal temperature (heating season)													

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Temperature factor for gains for living area, nil,m (see Table 9a)													
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	73.0378	73.2403	73.4440	74.4797	74.6904	75.7618	75.7618	75.9797	75.3295	74.6904	74.2702	73.8548	
alpha	5.8692	5.8627	5.8963	5.9653	5.9794	6.0508	6.0508	6.0653	6.0220	5.9794	5.9513	5.9237	
util living area	0.9951	0.9904	0.9749	0.9163	0.7709	0.5640	0.4122	0.4632	0.7309	0.9453	0.9893	0.9962 (86)	

Weekday	18.9807	19.1673	19.4786	19.8630	20.0809	20.1480	20.1530	20.1548	20.1219	19.8443	19.3673	18.9548	
Weekend	20.4434	20.5258	20.6653	20.8419	20.9567	20.9944	20.9993	20.9986	20.9764	20.8821	20.6077	20.4289	
24 / 16	9	8	8	9	8	9	9	8	9	8	9	8	
24 / 9	22	20	22	22	22	21	22	22	22	22	22	22	
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000 (87)	
Th 2	20.1245	20.1267	20.1290	20.1401	20.1423	20.1534	20.1534	20.1556	20.1489	20.1423	20.1378	20.1334 (88)	
util rest of house													
Weekday	0.9936	0.9874	0.9670	0.8918	0.7186	0.4931	0.3335	0.3795	0.6577	0.9237	0.9854	0.9950 (89)	
Weekend	18.9807	19.1673	19.4786	19.8630	20.0809	20.1480	20.1530	20.1548	20.1219	19.8443	19.3670	18.9548	
MIT 2	18.9807	19.1673	19.4786	19.8630	20.0809	20.1480	20.1530	20.1548	20.1219	19.8443	19.3670	18.9548	
Living area fraction	20.1245	20.1267	20.1290	20.1401	20.1423	20.1534	20.1534	20.1556	20.1489	20.1423	20.1378	20.1334 (90)	
MIT	20.6582	20.6590	20.6599	20.6642	20.6651	20.6695	20.6695	20.6703	20.6677	20.6651	20.6634	20.6616 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.6582	20.6590	20.6599	20.6642	20.6651	20.6695	20.6695	20.6703	20.6677	20.6651	20.6634	20.6616 (93)	

8. Space heating requirement													

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9946	0.9993	0.9721	0.9074	0.7514	0.5367	0.3816	0.4308	0.7036	0.9377	0.9880	0.9958 (94)	
Useful gains	353.7197	388.2538	420.6160	436.5267	389.5601	276.0676	186.9080	195.2423	289.3626	346.1719	340.3414	338.6566 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	10.7000	14.6000	16.6000	16.4000	14.8000	10.6000	7.1000	4.2000 (96)	
Heat loss rate													
Month	780.7804	750.1032	672.1179	550.6394	418.4392	279.2807	187.2524	195.9315	303.9417	469.7808	636.6405	777.0621 (97)	
Winter factor	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating kWh	317.9861	243.1614	187.1174	82.1611	21.4860	0.0000	0.0000	0.0000	0.0000	91.9650	213.3353	326.1469 (98)
Space heating												1483.3594 (98)
Space heating per m2										(98) / (4) =		29.5490 (99)

8c. Space cooling requirement	
Not applicable	

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 %)	313.6510 (206)
Efficiency of secondary/supplementary heating system, %	100.0000 (208)
Space heating requirement	472.9331 (211)

Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	317.9861	243.1614	187.1174	82.1611	21.4860	0.0000	0.0000	0.0000	0.0000	91.9650	213.3353	326.1469 (98)
Space heating efficiency (main heating system 1)	313.6510	313.6510	313.6510	313.6510	313.6510	0.0000	0.0000	0.0000	0.0000	0.0000	313.6510	313.6510 (210)
Space heating fuel (main heating system)	101.3821	77.5261	59.6578	26.1951	6.8503	0.0000	0.0000	0.0000	0.0000	29.3208	68.0168	103.9840 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	164.8469	145.4168	153.0029	137.5497	135.0786	121.1065	116.6987	127.5186	127.1255	142.6119	150.3036	161.0133 (64)
Water heating requirement												133.8550 (216)
Efficiency of water heater (217)m	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550 (217)
Fuel for water heating, kWh/month	123.1533	108.6376	114.3049	102.7602	100.9142	90.4759	87.1829	95.2662	94.9725	106.5420	112.2884	120.2893 (219)
Water heating fuel used												1256.7875 (219)
Annual totals kWh/year												472.9331 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6625)	
mechanical ventilation fans (SFP = 0.6625)	
Total electricity for the above, kWh/year	101.4354 (231)
Electricity for lighting (calculated in Appendix L)	232.6273 (232)

Energy saving/generation technologies (Appendices M, N and Q)	
FV Unit 0 (0.80 * 0.30 * 951 * 1.00) =	-228.1478 (233)
Total delivered energy for all uses	1835.6354 (238)

Space heating - main system 1	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	472.9331	0.5190	245.4323 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	1256.7875	0.5190	652.2727 (264)
Space and water heating			897.7250 (265)
Pumps and fans	101.4354	0.5190	52.6450 (267)
Energy for lighting	232.6273	0.5190	120.7336 (268)

Energy saving/generation technologies			
FV Unit	-228.1478	0.5190	-118.4087 (269)
Total CO2, kg/year			952.6948 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			18.9800 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER			18.9800 ZC1
Total Floor Area	TFA	50.2000	
Assumed number of occupants	N	1.6960	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		17.4413 ZC2	
CO2 emissions from cooking, equation (L16)		3.1814 ZC3	
Total CO2 emissions		39.6027 ZC4	
Residual CO2 emissions offset from biofuel CHP		0.0000 ZC5	
Additional allowable electricity generation, kWh/m²/year		0.0000 ZC6	
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 ZC7	
Net CO2 emissions		39.6027 ZC8	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

Ground floor	Area (m2)	Storey height (m)	Volume (m3)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.2000	2.5000 (2b)	125.5000 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	125.5000 (5)

2. Ventilation rate

Number of chimneys	main heating	secondary heating	other	total	m3 per hour
Number of open flues	0	0	0	0	0 * 40 = 0.0000 (6a)
Number of intermittent fans	0	0	0	0	0 * 20 = 0.0000 (6b)
Number of passive vents					2 * 10 = 20.0000 (7a)
Number of fuelless gas fires					0 * 10 = 0.0000 (7b)
					0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1594 (8)
Pressure test		Yes
Measured/design AP50		5.0000
Infiltration rate		0.4094 (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) =	0.3480 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infiltr rate	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)
Effective ac	0.4436	0.4349	0.4262	0.3828	0.3741	0.3306	0.3306	0.3219	0.3480	0.3741	0.3915	0.4089 (22b)
	0.5984	0.5946	0.5908	0.5733	0.5700	0.5546	0.5546	0.5518	0.5605	0.5700	0.5766	0.5836 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value k2/m2K	A x K kJ/K
TER Opaque door			1.2000	1.0000	1.2000		(26)
TER Opening Type (Uw = 1.40)			11.3600	1.3258	15.0606		(27)
External Wall	41.7500	11.3600	30.3900	0.1800	5.4702		(29a)
Corridor Wall	4.1300	1.2000	2.9300	0.1800	0.5274		(29a)
External Roof 1	50.2000		50.2000	0.1300	6.5260		(30)
Total net area of external elements Aum(A, m2)			96.0800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.7842		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K			250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.2590 (36)
Total fabric heat loss			(33) + (36) = 43.0432 (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	24.7832	24.6249	24.4698	23.7412	23.6048	22.9702	22.9702	22.8527	23.2147	23.6048	23.8806	24.1689 (38)
Average = Sum(39)m / 12 =	67.8264	67.6681	67.5130	66.7844	66.6480	66.0134	66.0134	65.8959	66.2579	66.6480	66.9238	67.2122 (39)
												66.7837 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3511	1.3480	1.3449	1.3304	1.3277	1.3150	1.3150	1.3127	1.3199	1.3277	1.3331	Dec 1.3389 (40)
Days in month		31	28	31	30	31	30	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6960 (42)
Average daily hot water use (litres/day)												74.4798 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	81.9278	78.9486	75.9694	72.9902	70.0110	67.0318	67.0318	70.0110	72.9902	75.9694	78.9486	81.9278 (44)
Energy content (annual)	121.4965	106.2616	109.6525	95.5977	91.7282	79.1545	73.3483	84.1682	85.1735	99.2615	108.3516	117.6629 (45)
Distribution loss (46)m = 0.15 x (45)m												1171.8569 (45)
Water storage loss:	18.2245	15.9392	16.4479	14.3397	13.7592	11.8732	11.0022	12.6252	12.7760	14.8892	16.2527	17.6494 (46)
Store volume												170.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5003 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8102 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	(56)
If cylinder contains dedicated solar storage	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406	(62)
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	(63)
Output from w/h	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406	(64)
Heat gains from water heating, kWh/month	79.0997	70.2888	75.1616	69.2399	69.2018	63.7726	63.0905	66.6881	65.7739	71.7066	73.4806	77.8251	(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	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	84.7995	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.1698	11.6973	9.5129	7.2019	5.3835	4.5450	4.9110	6.3835	8.5679	10.8789	12.6973	13.5359	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.7534	149.2866	145.4229	137.1977	126.8147	117.0562	110.5370	109.0038	112.8674	121.0927	131.4756	141.2341	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	31.4800	(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)	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	-67.8396	(71)
Water heating gains (Table 5)	106.3169	104.5964	101.0237	96.1666	93.0132	88.5730	84.7990	89.6345	91.3526	96.3749	102.0564	104.6036	(72)
Total internal gains	318.6799	317.0202	307.3994	292.0060	276.6513	261.6141	251.6868	256.4617	264.2278	279.7913	297.6692	310.8134	(73)

6. Solar gains													
[Jan]	Area m2	Solar flux Table 6a	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W							
Northeast	8.0700	11.2829	0.6300	0.7000	0.7700	27.8271	(75)						
Southeast	2.8500	16.7938	0.6300	0.7000	0.7700	32.0472	(77)						
Northwest	0.4400	11.2829	0.6300	0.7000	0.7700	1.5172	(81)						
Solar gains	61.3916	114.3196	182.3068	269.2822	341.2276	356.1827	336.1476	279.8095	212.0062	133.3281	75.3080	51.3899	(83)
Total gains	380.0715	431.3398	489.7062	561.2882	617.8789	617.7968	587.8345	536.2712	476.2314	413.1914	372.9773	362.2033	(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	51.3976	51.5178	51.6361	52.1995	52.3063	52.8091	52.8091	52.9033	52.6143	52.3063	52.0907	51.8673	
alpha	4.4265	4.4345	4.4424	4.4800	4.4871	4.5206	4.5206	4.5269	4.5076	4.4871	4.4727	4.4578	
util living area	0.9947	0.9900	0.9764	0.9309	0.8190	0.6396	0.4836	0.5458	0.8013	0.9579	0.9899	0.9957	(86)
MIT	19.6381	19.8038	20.0952	20.4828	20.7938	20.9887	20.9811	20.8629	20.4610	19.9843	19.6101	19.6101	(87)
Th 2	19.8010	19.8034	19.8058	19.8171	19.8192	19.8291	19.8309	19.8253	19.8192	19.8150	19.8105	19.8105	(88)
util rest of house	0.9929	0.9866	0.9681	0.9064	0.7597	0.5403	0.3603	0.4167	0.7152	0.9378	0.9858	0.9943	(89)
MIT 2	18.0194	18.2618	18.6833	19.2325	19.6289	19.7987	19.8254	19.8239	19.7223	19.2166	18.5335	17.9851	(90)
Living area fraction									ELA = Living area / (4) =				0.6096 (91)
MIT	19.0061	19.2018	19.5439	19.9946	20.3390	20.5007	20.5345	20.5293	20.4176	19.9752	19.4179	18.9756	(92)
Temperature adjustment									0.0000				0.0000
adjusted MIT	19.0061	19.2018	19.5439	19.9946	20.3390	20.5007	20.5345	20.5293	20.4176	19.9752	19.4179	18.9756	(93)

8. Space heating requirement													
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	376.7678	424.6153	472.9865	511.1078	486.7467	370.1147	256.0802	265.7388	362.9032	388.7346	367.0172	359.6271	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.4000	14.1000	10.7000	7.1000	4.2000	4.2000	(96)
Heat loss rate W	997.4614	967.7735	880.6362	740.9467	575.7737	389.5267	259.7319	272.1025	418.5877	624.8374	824.3579	993.1012	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	461.7960	365.0023	303.2914	165.4840	66.2361	0.0000	0.0000	0.0000	0.0000	175.6605	329.2853	471.3048	(98)
Space heating													2338.0604 (98)
Space heating per m2										(98) / (4) =			46.5749 (99)

8c. Space cooling requirement													
Not applicable													



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2500.5994 (211)

Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
461.7960	365.0023	303.2914	165.4840	66.2361	0.0000	0.0000	0.0000	0.0000	0.0000	175.6605	329.2853	471.3048	(98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	(210)
Space heating fuel (main heating system)	493.8995	390.3768	324.3759	176.9882	70.8407	0.0000	0.0000	0.0000	0.0000	187.8722	352.1768	504.0693	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	169.8742	149.9576	158.0302	142.4148	140.1059	125.9716	121.7260	132.5459	131.9906	147.6392	155.1688	166.0406	(64)
Efficiency of water heater	87.3502	87.0991	86.5257	85.2150	82.9481	79.8000	79.8000	79.8000	79.8000	85.2783	86.7733	87.4454	(216)
Fuel for water heating, kWh/month	194.4749	172.1689	182.6396	167.1241	168.9080	157.8592	152.5388	166.0977	165.4017	173.1264	178.8208	189.8792	(219)
Water heating fuel used													2069.0391 (219)
Annual totals kWh/year													
Space heating fuel - main system													2500.5994 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													232.5833 (232)
Total delivered energy for all uses													4877.2218 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP													
Energy kWh/year	2500.5994												
Emission factor kg CO2/kWh	0.2160												
Emissions kg CO2/year	540.1295	(261)											
Space heating - main system 1													
Space heating - secondary													
Water heating (other fuel)													
Space and water heating													
Pumps and fans													
Energy for lighting													
Total CO2, kg/m2/year													
Emissions per m2 for space and water heating													19.6622 (272a)
Fuel factor (electricity)													1.5500
Emissions per m2 for lighting													2.4046 (272b)
Emissions per m2 for pumps and fans													0.7754 (272c)
Target Carbon Dioxide Emission Rate (TER) = (19.6622 * 1.55) + 2.4046 + 0.7754, rounded to 2 d.p.													33.6600 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B3P GF - Corner				Issued on Date	23/08/2022
Assessment Reference	2B3P - GF - Corner	Prop Type Ref				
Property	Corner Pavillion, 2B3P GF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	83 B	DER	21.26	TER	31.66	
Environmental	85 B	% DER<TER	32.86			
CO ₂ Emissions (t/year)	1.12	DFEE	56.25	TFEE	63.18	
General Requirements Compliance	Pass	% DFEE<TFEE	10.97			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Ground-floor flat, total floor area 61 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating: Electricity
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 31.66 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 21.26 kgCO₂/m² OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 63.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 56.3 kWh/m²/yr OK

2 Fabric U-values			
Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	(no roof)		
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability		
Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency
Main heating system: Heat pump with radiators or underfloor - Electric
Daikin Altherma ERH006BV3 + EKHBH008B

Secondary heating system: None

5 Cylinder insulation		
Hot water storage	Measured cylinder loss: 1.20 kWh/day	
Permitted by DBS02 2.03	OK	
Primary pipework insulated:	Yes	OK

6 Controls	Time and temperature zone control	OK
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Space heating controls:	Time and temperature zone control	OK
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Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings: 100%		
Minimum	75%	OK

8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.53	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum:	70%	OK

9 Summer time temperature		
Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overshading:	Average	
Windows facing North:	10.82 m ² , No overhang	
Windows facing East:	4.70 m ² , No overhang	
Windows facing South:	2.76 m ² , No overhang	
Windows facing West:	1.20 m ² , No overhang	
Air change rate:	3.00 ach	
Blinds/curtains:	None	

10 Key features		
Door U-value	1.00 W/m ² K	
Window U-value	0.90 W/m ² K	
Air permeability	3.0 m ³ /m ² h	

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	90,153	86,7420	83,4688	80,1955	76,9222	73,6489	73,6489	76,9222	80,1955	83,4688	86,7420	90,153 (44)
Energy conte	133,4901	116,7513	120,4769	105,0347	100,7833	86,9683	80,5889	92,4770	93,5814	109,0601	119,0477	129,2781 (45)
Energy content (annual)												
Distribution loss										Total =	Sum (45) =	1267,5378 (46)
	20,0235	15.15 x (45)	18,0715	15,7552	15,1175	13,0452	12,0883	13,8715	14,0372	16,3590	17,8572	19,3917 (46)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9951	0.9893	0.9717	0.9100	0.7635	0.5523	0.3872	0.4414	0.7237	0.9442	0.9893	0.9962 (94)
Useful gains	427.9300	489.2900	547.2800	584.0670	534.9284	384.8656	256.9810	268.9271	395.1169	447.1525	418.7321	406.6449 (95)
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.7000	7.1000	4.2000 (66)
Heat loss rate W												
	1127.6348	1083.1647	969.0693	792.7625	598.2129	394.3315	258.2178	271.2769	430.1995	673.9555	919.0309	1220.6470 (97)

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Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	520.5351	399.0778	313.8076	150.2607	47.0837	0.0000	0.0000	0.0000	0.0000	168.7414	360.2151	534.1935	(98)
Space heating												2493.9150	(99)
Space heating per m2												(98) / (4) =	0.9846 (99)

Not applicable

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 %)	332.2345	(206)
Efficiency of secondary/supplementary heating system, %	100.0000	(208)
Space heating requirement	750.6491	(211)

Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6625)		
mechanical ventilation fans (SFP = 0.6625)	122.9550	(230)
Total electricity for the above, kWh/year	122.9550	(231)
Electricity for lighting (calculated in Appendix L)	275.6597	(232)
Total delivered energy for all uses	2492.4739	(238)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

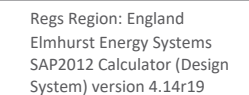
SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.8500		
Dwelling volume			
	60.8500 (1b)	x 2.5000 (2b)	= 152.1250 (1b) - (3b)
		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 152.1250 (4)

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	+	0 =	0.0000 (6a)
Number of open fires	0	+	0 =	0 + 20 =	0.0000 (6b)
Number of intermittent fans				2 x 10 =	20.0000 (7a)
Number of passive vents				0 x 10 =	0.0000 (7b)
Number of fuelless gas fires				0 x 40 =	0.0000 (7c)

[illegible]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3512	1.3484	1.3458	1.3332	1.3308	1.3198	1.3198	1.3178	1.3240	1.3308	1.3356	1.3406 (40)
Days (average)												1.3331 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153 (56)
If cylinder contains dedicated solar storage	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	181.8678	160.4473	168.8546	151.8518	149.1610	133.7854	128.9666	140.8547	140.3986	157.4378	165.8648	177.6558 (62)
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 (63)
Output from w/h	181.8678	160.4473	168.8546	151.8518	149.1610	133.7854	128.9666	140.8547	140.3986	157.4378	165.8648	177.6558 (64)
Heat gains from water heating, kWh/month	83.0876	73.7766	78.7607	72.3777	72.2126	66.3707	65.4980	69.4508	68.5695	74.9647	77.0371	81.6871 (65)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.6090	13.8638	11.2748	8.5357	6.3866	5.3867	5.8206	7.5658	10.1548	12.8938	15.0490	16.0428 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.0855	176.9023	172.3239	162.5771	150.2735	138.7098	130.9846	129.1678	133.7461	143.4930	155.7966	167.3602 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278 (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)	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225 (71)
Water heating gains (Table 5)	111.6769	109.7866	105.8612	100.5246	97.0599	92.1815	88.0349	93.3478	95.2355	106.9959	109.7945	109.7945 (72)
Total internal gains	358.4548	356.6361	345.5433	327.7209	309.7974	292.3615	280.9235	286.1648	295.2198	313.2292	333.9249	349.2810 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
North	7.8200	10.6334	0.6300	0.7000	0.7700	25.4127 (74)						
East	3.3700	19.6403	0.6300	0.7000	0.7700	20.7000 (76)						
South	1.9800	46.7521	0.6300	0.7000	0.7700	28.2903 (78)						
West	0.8600	19.6403	0.6300	0.7000	0.7700	5.1620 (80)						
Solar gains	79.0928	144.5650	223.3386	318.5530	394.2725	407.7121	386.3125	327.4571	256.0046	166.7190	96.5416	66.5100 (83)
Total gains	437.5476	501.2012	568.8820	646.2739	704.0699	700.0736	667.2360	613.6219	551.2244	479.9481	430.4665	415.7910 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilization factor for gains for living area, n11,m (see Table 9a)												
tau	51.3955	51.4999	51.6026	52.0905	52.1828	52.6168	52.6168	52.6980	52.4488	52.1828	51.9964	51.8029
alpha	4.4264	4.4333	4.4402	4.4727	4.4789	4.5078	4.5078	4.5132	4.4966	4.4789	4.4664	4.4535
util living area	0.9957	0.9915	0.9798	0.9414	0.8439	0.6749	0.5150	0.5755	0.8215	0.9637	0.9916	0.9966 (86)
MIT	19.6044	19.7724	20.0611	20.4426	20.7625	20.9379	20.9854	20.9764	20.8458	20.4327	19.9508	19.5739 (87)
Th 2	19.8010	19.8031	19.8052	19.8150	19.8168	19.8253	19.8269	19.8220	19.8168	19.8131	19.8092	19.8092 (88)
util rest of house	0.9942	0.9886	0.9725	0.9196	0.7883	0.5740	0.3849	0.4412	0.7384	0.9458	0.9882	0.9954 (89)
MIT 2	17.9704	18.2162	18.6346	19.1781	19.5930	19.7863	19.8204	19.8180	19.7037	19.1768	18.4841	17.9316 (90)
Living area fraction												0.4026 (91)
MIT	18.6283	18.8428	19.2089	19.6872	20.0639	20.2500	20.2895	20.2844	20.1636	19.6825	19.0746	18.5929 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6283	18.8428	19.2089	19.6872	20.0639	20.2500	20.2895	20.2844	20.1636	19.6825	19.0746	18.5929 (93)

8. Space heating requirement												
Utilization	0.9921	0.9854	0.9678	0.9167	0.8013	0.6126	0.4376	0.4956	0.7655	0.9432	0.9852	0.9936 (94)
Useful gains	434.1006	493.8634	550.5452	592.4709	564.1615	428.8608	292.0136	304.1125	421.9676	452.6686	424.1110	413.1438 (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	1178.0576	1144.0426	1040.7250	875.0821	677.2955	453.7528	296.3047	311.4776	488.5294	735.4858	973.1659	1174.0623 (97)
Month fract	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	553.5040	436.9205	364.6938	203.4601	84.1717	0.0000	0.0000	0.0000	0.0000	210.4160	395.3195	566.1234 (98)
Space heating												2814.6289 (98)
Space heating per m2										(98) / (4) =		46.2352 (99)

8c. Space cooling requirement												
Not applicable												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)												93.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												3010.2983 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	553.5040	436.9205	364.6938	203.4601	84.1717	0.0000	0.0000	0.0000	0.0000	210.4160	395.3195	566.1234 (98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000 (210)
Space heating fuel (main heating system)	591.9829	467.2946	390.0468	217.6258	90.0232	0.0000	0.0000	0.0000	0.0000	225.0438	422.8017	605.4796 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	181.8678	160.4473	168.8546	151.8518	149.1610	133.7854	128.9666	140.8547	140.3986	157.4378	165.8648	177.6558 (64)
Efficiency of water heater	87.5952	87.3540	86.8160	85.5953	83.3552	79.8000	79.8000	79.8000	79.8000	85.5883	87.0502	87.6915 (217)
Fuel for water heating, kWh/month	207.6230	183.6748	194.4971	177.4068	78.9463	167.6509	161.6123	176.5096	175.9380	183.9478	190.5393	202.5918 (219)
Water heating fuel used												2200.9377 (219)
Annual totals kWh/year												3010.2983 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												
Electricity for pumps and fans:												30.0000 (230c)
central heating pump												45.0000 (230e)
main heating flue fan												75.0000 (231)
Total electricity for the above, kWh/year												275.4597 (232)
Electricity for lighting (calculated in Appendix L)												5561.8957 (238)
Total delivered energy for all uses												

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	3010.2983	0.2160										650.2244 (261)
Space heating - secondary	0.0000	0.0000										0.0000 (263)
Water heating (other fuel)	2200.9377	0.2160										475.4025 (264)
Space and water heating												1125.6270 (265)
Pumps and fans	75.0000	0.5190										38.9250 (267)
Energy for lighting	275.4597	0.5190										143.0674 (268)
Total CO2, kg/m2/year												1307.6194 (272)
Emissions per m2 for space and water heating												18.4984 (272a)
Fuel factor (electricity)												1.5500
Emissions per m2 for lighting												2.3511 (272b)
Emissions per m2 for pumps and fans												0.6397 (272c)
Target Carbon Dioxide Emission Rate (TER) = (18.4984 * 1.55) + 2.3511 + 0.6397, rounded to 2 d.p.												31.6600 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B3P TF - Corner				Issued on Date	23/08/2022
Assessment Reference	2B3P - TF - Corner	Prop Type Ref				
Property	Corner Pavillion, 2B3P TF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	83 B	DER	21.94	TER	34.91	
Environmental	84 B	% DER<TER	37.15			
CO ₂ Emissions (t/year)	1.15	DFEE	58.46	TFEE	74.11	
General Requirements Compliance	Pass	% DFEE<TFEE	21.11			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Top-floor flat, total floor area 61 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER
Fuel for main heating: Electricity
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 34.91 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 21.94 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 74.1 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 58.5 kWh/m²/yrOK

2 Fabric U-values			
Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Floor (no floor)			
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging
Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability		
Air permeability at 50 pascals:	4.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency
Main heating system: Heat pump with radiators or underfloor - Electric
Daikin Altherma ERH006BV3 + EKHBH008B

Secondary heating system: None

5 Cylinder insulation
Hot water storage Measured cylinder loss: 1.20 kWh/day
Permitted by BS6800 2.03 OK
Primary pipework insulated: Yes OK

6 Controls
Space heating controls: Time and temperature zone control OK

Hot water controls: Cylinderstat OK
Independent timer for DHW OK

7 Low energy lights
Percentage of fixed lights with low-energy fittings: 100%
Minimum 75% OK

8 Mechanical ventilation
Continuous supply and extract system
Specific fan power: 0.53
Maximum 1.5 OK
MVR efficiency: 90%
Minimum: 70% OK

9 Summer time temperature
Overheating risk (Thames Valley): Medium OK
Based on:
Overheating:
Average
Windows facing North: 10.82 m², No overhang
Windows facing East: 4.70 m², No overhang
Windows facing South: 2.76 m², No overhang
Windows facing West: 1.20 m², No overhang
Air change rate: 3.00 ach
Blinds/curtains: None

10 Key features		
Roof U-value	0.10 W/m ² K	
Door U-value	1.00 W/m ² K	
Window U-value	0.90 W/m ² K	

HODKINSON

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	90.0153	86.7420	83.4688	80.1955	76.9222	73.6489	73.6489	76.9222	80.1955	83.4688	86.7420	90.0153 (44)
Energy costs	133.4901	116.7513	120.4769	105.0347	100.7833	86.9683	80.5889	92.4770	93.9814	109.0601	119.0477	129.2781 (45)
Energy costs (annual)	Total = \$um(45) = 1287.5378 (45)											
Distribution loss (46) = 0.15 x (45m)												
Water storage losses	20.0235	17.5127	18.0715	15.7552	15.1175	13.0452	12.0883	13.8715	14.0372	16.3590	17.8572	19.3917 (46)

HODKINSON

Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9952	0.9989	0.9739	0.9184	0.7829	0.5741	0.4040	0.2598	0.1437	0.0490	0.0898	0.962 (94)
Useful gains	428.0278	489.5463	548.5131	589.4655	548.4750	400.0146	268.1139	208.1384	406.0330	449.4232	418.361	406.657 (95)
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.0000	16.0000	16.4000	14.0000	10.6000	7.1000	4.2000 (96)
Heat loss rate												
	1195.1108	1147.2441	1025.5667	836.2075	630.0848	413.4668	270.0284	283.6647	451.7571	710.1494	970.3117	1189.2748 (97)
Month fract.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating kWh	570.7097	441.9729	354.9279	177.6542	60.7177	0.0000	0.0000	0.0000	0.0000	193.9803	396.9904	582.2672	(98)
Space heating												2779.2203	(98)
Space heating per m2												45.6733	(99)

8c. Space cooling requirement	
Not applicable	

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 %)													334.5478	(206)
Efficiency of secondary/supplementary heating system, %													100.0000	(208)
Space heating requirement													830.7395	(211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	570.7097	441.9729	354.9279	177.6542	60.7177	0.0000	0.0000	0.0000	0.0000	193.9803	396.9904	582.2672	(98)	
Space heating efficiency (main heating system 1)	334.5478	334.5478	334.5478	334.5478	334.5478	0.0000	0.0000	0.0000	0.0000	334.5478	334.5478	334.5478	(210)	
Space heating fuel (main heating system)	170.5914	132.1106	106.0918	53.1028	18.1492	0.0000	0.0000	0.0000	0.0000	57.9828	118.6648	174.0461	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	176.8405	155.9065	163.8273	146.9867	144.1337	128.9203	123.9393	135.8274	135.5334	152.4105	160.9997	172.6285	(64)	
Efficiency of water heater	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	(217)	
Fuel for water heating, kWh/month	132.1135	116.4742	122.3916	109.8104	107.6790	96.3134	92.5922	101.4735	101.2539	113.8624	120.2792	128.9668	(219)	
Water heating fuel used												1343.2100	(219)	
Annual totals kWh/year												830.7395	(211)	
Space heating fuel - main system												0.0000	(215)	
Space heating fuel - secondary														
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6625)														
mechanical ventilation fans (SFP = 0.6625)														
Total electricity for the above, kWh/year												122.9550	(230a)	
Electricity for lighting (calculated in Appendix L)												275.6597	(232)	
Total delivered energy for all uses												2572.5643	(238)	

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

Energy	Emission factor	Emissions												
kWh/year	kg CO2/kWh	kg CO2/year												
Space heating - main system 1	0.5190	431.1538	(261)											
Space heating - secondary	0.5190	0.0000	(263)											
Water heating (other fuel)	0.5190	697.1260	(264)											
Space and water heating	0.5190	1128.2798	(265)											
Pumps and fans	0.5190	63.8137	(267)											
Energy for lighting	0.5190	143.0674	(268)											
Total CO2, kg/year		1335.1609	(272)											
Dwelling Carbon Dioxide Emission Rate (DER)		21.9400	(273)											

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER														
Total Floor Area	TFA	21.9400	ZC1											
Assumed number of occupants	N	0.0056												
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190												
CO2 emissions from appliances, equation (L14)		17.0504	ZC2											
CO2 emissions from cooking, equation (L16)		2.7466	ZC3											
Total CO2 emissions		41.7373	ZC4											
Residual CO2 emissions offset from biofuel CHP		0.0000	ZC5											
Additional allowable electricity generation, kWh/m²/year		0.0000	ZC6											
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000	ZC7											
Net CO2 emissions		41.7373	ZC8											

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

Ground floor	Area (m2)	Storey height (m)	Volume (m3)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.8500	2.5000	152.1250
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	152.1250

2. Ventilation rate

	main		secondary		other		total		m3 per hour				
	heating		heating										
Number of chimneys	0	+	0	+	0	=	0	* 40 =	0.0000	(6a)			
Number of open flues	0	+	0	+	0	=	0	* 40 =	0.0000	(6b)			
Number of intermittent fans							2	* 10 =	20.0000	(7a)			
Number of passive vents							0	* 10 =	0.0000	(7b)			
Number of fuelless gas fires							0	* 40 =	0.0000	(7c)			
Air changes per hour													
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =						20.0000	/ (5) =	0.1315	(8)			
Pressure test									Yes				
Measured/design AP50									5.0000				
Infiltration rate									0.3815	(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) =	0.3243	(21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	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 infiltr rate													
	0.4134	0.4053	0.3972	0.3567	0.3486	0.3080	0.3080	0.2999	0.3243	0.3486	0.3648	0.3810	(22b)
Effective ac	0.5855	0.5821	0.5789	0.5636	0.5608	0.5474	0.5474	0.5450	0.5526	0.5608	0.5665	0.5726	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.2000	1.0000	1.2000		(26)
TER Opening Type (Uw = 1.40)			14.0300	1.3258	18.6004		(27)
External Wall	69.7500	14.0300	55.7200	0.1800	10.0296		(29a)
Corridor Wall	19.3800	1.2000	18.1800	0.1800	3.2724		(29a)
Main Roof	60.8500		60.8500	0.1300	7.9105		(30)
Total net area of external elements Aum(A, m2)			149.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.0129		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							22.2455 (36)
Total fabric heat loss						(33) + (36) =	63.2584 (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	29.3907	29.2241	29.0608	28.2939	28.1504	27.4824	27.3586	27.7397	28.1504	28.4407	28.7441	(38)		
Average = Sum(39)m / 12 =	92.6491	92.4825	92.3192	91.5522	91.4087	90.7407	90.7407	90.6170	90.9980	91.4087	91.6990	92.0025 (39)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP	1.5226	1.5198	1.5172	1.5046	1.5022	1.4912	1.4912	1.4892	1.4954	1.5022	1.5070	1.5120 (40)		
HLP (average)												1.5045 (40)		
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)		

4. Water heating energy requirements (kWh/year)

Assumed occupancy														2.0056 (42)
Average daily hot water use (litres/day)														81.8321 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	90.0153	86.7420	83.6488	80.1955	76.9222	73.6489	73.6489	76.9222	80.1955	83.6488	86.7420	90.0153 (44)		
Energy content (annual)	133.4901	116.7513	120.4769	105.0347	100.7833	86.9683	80.5889	92.4770	93.5814	109.0601	119.0477	129.2781 (45)		
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1287.5378 (45)		
Water storage loss:	20.0235	17.5127	18.0715	15.7552	15.1175	13.0452	12.0883	13.8715	14.0372	16.3590	17.8572	19.3917 (46)		
Store volume												170.0000 (47)		
a) If manufacturer declared loss factor is known (kWh/day):												1.5003 (48)		
Temperature factor from Table 2b												0.5400 (49)		
Enter (49) or (54) in (55)												0.5102 (55)		

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153 (56)
If cylinder contains dedicated solar storage	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120 (59)
Total heat required for water heating calculated for each month	181.8678	160.4473	168.8546	151.8518	149.1610	133.7854	128.9666	140.8547	140.3986	157.4378	165.8648	177.6558 (62)
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 (63)
Output from w/h	181.8678	160.4473	168.8546	151.8518	149.1610	133.7854	128.9666	140.8547	140.3986	157.4378	165.8648	177.6558 (64)
Heat gains from water heating, kWh/month	83.0876	73.7766	78.7607	72.3777	72.2126	66.3707	65.4980	69.4508	68.5695	74.9647	77.0371	81.6871 (65)
Total per year (kWh/year) = Sum(63) =												0.0000 (63)
Total per year (kWh/year) = Sum(64) =												1857.1462 (64)

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	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781	100.2781 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.4090	13.8638	11.2748	8.5357	6.3866	5.3867	5.8206	7.5658	10.1548	12.8938	15.0490	16.0428 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	175.0855	176.9023	172.3239	162.5771	150.2735	138.7098	130.9846	129.1678	133.7461	143.4930	155.7966	167.3602 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278	33.0278 (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)	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225	-80.2225 (71)
Water heating gains (Table 5)	111.6769	109.7866	105.8612	100.5246	97.0599	92.1815	88.0349	93.3478	95.2355	106.9595	109.7945	116.8871 (72)
Total internal gains	358.4548	356.6361	345.5433	327.7209	309.7974	292.3615	280.9235	286.1648	295.2198	313.2292	333.9249	349.2810 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
North	7.8200	10.6334	0.6300	0.7000	0.7700	23.4127 (74)						
East	3.3700	19.6403	0.6300	0.7000	0.7700	20.7700 (76)						
South	1.9800	46.7521	0.6300	0.7000	0.7700	28.2903 (78)						
West	0.8600	19.6403	0.6300	0.7000	0.7700	5.1620 (80)						
Solar gains	79.0928	144.5650	223.3386	318.5530	394.2725	407.7121	386.3125	327.4571	256.0046	166.7190	96.5416	66.5100 (83)
Total gains	437.5476	501.2012	568.8820	646.2739	704.0699	700.0736	667.2360	613.6219	551.2244	479.9481	430.4665	415.7910 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (°C)												21.0000 (85)
Utilization factor for gains for living area, n11,m (see Table 9a)												
tau	45.6097	45.6918	45.7726	46.1561	46.2286	46.5689	46.5689	46.6325	46.4372	46.2286	46.0822	45.9302
alpha	4.0406	4.0461	4.0515	4.0771	4.0819	4.1046	4.1046	4.1088	4.0958	4.0819	4.0721	4.0620
util living area	0.9956	0.9919	0.9818	0.9505	0.8709	0.7227	0.5669	0.6277	0.8523	0.9686	0.9920	0.9965 (86)
MIT	19.3934	19.5658	19.8715	20.2845	20.6563	20.8913	20.9695	20.9539	20.7705	20.2955	19.7717	19.3619 (87)
Th 2	19.6706	19.6726	19.6747	19.6841	19.6859	19.6941	19.6956	19.6956	19.6909	19.6823	19.6785	19.6785 (88)
util rest of house	0.9941	0.9890	0.9750	0.9305	0.8175	0.6139	0.4137	0.4734	0.7703	0.9520	0.9886	0.9952 (89)
MIT 2	17.5768	17.8290	18.2728	18.8646	19.3578	19.6250	19.6841	19.6783	19.5119	18.8922	18.1366	17.5361 (90)
Living area fraction	18.3082	18.5283	18.9164	19.4363	19.8806	20.1348	20.2016	20.1919	20.0187	19.4572	18.7949	18.2712 (91)
MIT	18.3082	18.5283	18.9164	19.4363	19.8806	20.1348	20.2016	20.1919	20.0187	19.4572	18.7949	18.2712 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3082	18.5283	18.9164	19.4363	19.8806	20.1348	20.2016	20.1919	20.0187	19.4572	18.7949	18.2712 (93)

8. Space heating requirement												
Utilization	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	433.9478	493.8967	551.6132	598.3320	582.0102	457.7617	317.6667	328.8911	432.8537	455.0813	424.1418	412.9830 (94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.4000	14.1000	10.6000	7.1000	4.2000	2.0000 (96)
Heat loss rate W	1297.8468	1260.3764	1146.2765	964.6232	747.7809	502.2360	326.8122	343.6089	538.5862	809.6265	1072.4145	1294.5860 (97)
Month fractl	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	642.7409	515.0744	442.4295	263.7296	123.3334	0.0000	0.0000	0.0000	0.0000	263.7816	466.7563	655.9127 (98)
Space heating												3373.7584 (98)
Space heating per m2										(98) / (4) =		55.4439 (99)

8c. Space cooling requirement												
Not applicable												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)												93.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												3608.2978 (211)

Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
642.7409	515.0744	442.4295	263.7296	123.3334	0.0000	0.0000	0.0000	0.0000	0.0000	263.7816	466.7563	655.9127 (98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000 (210)
Space heating fuel (main heating system)	687.4234	550.8817	473.1867	282.0638	131.9074	0.0000	0.0000	0.0000	0.0000	282.1194	499.2046	701.5109 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	181.8678	160.4473	168.8546	151.8518	149.1610	133.7854	128.9666	140.8547	140.3986	157.4378	165.8648	177.6558 (64)
Efficiency of water heater	87.9006	87.7068	87.2678	86.2731	84.3118	79.8000	79.8000	79.8000	79.8000	86.1809	87.4265	87.9856 (217)
Fuel for water heating, kWh/month	206.9018	182.9361	193.4903	176.0129	176.9160	167.6509	161.6123	176.5096	175.9380	182.6830	189.7192	201.9145 (219)
Water heating fuel used												2192.2845 (219)
Annual totals kWh/year												3608.2978 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												
Electricity for pumps and fans:												30.0000 (230c)
central heating pump												45.0000 (230e)
main heating flue fan												75.0000 (231)
Total electricity for the above, kWh/year												275.4597 (232)
Electricity for lighting (calculated in Appendix L)												6151.2420 (238)
Total delivered energy for all uses												

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
Energy kWh/year												
3608.2978												
Space heating - main system 1	0.0000											
Space heating - secondary	0.0000											
Water heating (other fuel)	2192.2845											
Space and water heating												
Pumps and fans	75.0000											
Energy for lighting	275.4597											
Total CO2, kg/m2/year												
Emissions per m2 for space and water heating												
Fuel factor (electricity)	1.5500											
Emissions per m2 for lighting												2.3511 (272b)
Emissions per m2 for pumps and fans												0.6397 (272c)
Target Carbon Dioxide Emission Rate (TER) = (20.5904 * 1.55) + 2.3511 + 0.6397, rounded to 2 d.p.												34.9100 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	House Type 5 - NEW				Issued on Date	23/08/2022
Assessment Reference	House Type 5 Det	Prop Type Ref				
Property	House Type 5, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	84 B	DER	16.34	TER	27.10	
Environmental	86 B	% DER<TER	39.70			
CO ₂ Emissions (t/year)	1.46	DFEE	50.38	TFEE	60.77	
General Requirements Compliance	Pass	% DFEE<TFEE	17.11			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Detached House, total floor area 105 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating: Electricity
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 27.10 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 16.34 kgCO₂/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 60.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 50.4 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Daikin Altherma EKUH006BV3 + EKUH008B

Secondary heating system: None

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.20 kWh/day	
Permitted by DBSCG 2.03	OK	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100%		
Minimum	75%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.58	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
Based on:		
Overheating:	Average	
Windows facing North:	8.65 m ² , No overhang	
Windows facing South:	12.87 m ² , No overhang	
Windows facing West:	1.61 m ² , No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m ² K	
Roof U-value	0.10 W/m ² K	
Roof U-value	0.10 W/m ² K	
Door U-value	1.00 W/m ² K	
Window U-value	0.90 W/m ² K	
Air permeability	3.0 m ³ /m ² h	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Vers for 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	62.0500 (1b)	x 2.4000 (2b)	= 148.9200 (1b) - (3b)
First floor	42.7500 (1c)	x 2.6000 (2c)	= 111.1500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	104.8000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 260.0700 (5)

2. Ventilation rate

	main heating	secondary heating	other									
Number of chimneys	0	0	0	=								
Number of open flues	0	0	0	=								
Number of intermittent fans	0	0	0	=								
Number of passive vents	0	0	0	=								
Number of flueless gas fires	0	0	0	=								
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =			0								
Pressure test												
Measured/design AP50												
Infiltration rate												
Number of sides sheltered												
Shelter factor				(20) = 1 - [0								
Infiltration rate adjusted to include shelter factor				(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
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
Adj infiltr rate	0.1913	0.1875	0.1838	0.1650	0.1613	0.1425	0.1425	0.1388	0.1500	0.1613	0.1688	0.1763
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation:												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3088	0.3050	0.3013	0.2825	0.2788	0.2600	0.2600	0.2563	0.2675	0.2788	0.2863	0.2938

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K
Front door			1.8900	1.0000	1.8900
Window (Uw = 0.90)			23.1300	0.8687	20.0936
Ground Floor			62.0500	0.1300	8.0665
External Wall	148.9600	25.0200	123.9400	0.1800	22.3092
1st Floor	42.7500		42.7500	0.1000	4.2750
Ground Floor	19.3000		19.3000	0.1000	1.9300
Total net area of external elements Aum(A, m2)			273.0600		
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	58.5643
Party Ceilings 1			60.8500		
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)					
Total fabric heat loss					
Ventilation heat loss calculated monthly (38m) = 0.33 x (25m) x (5)					
(38m)	26.4979	26.1760	25.8542	24.2450	23.9232
Heat transfer coeff	104.8030	104.4812	104.1593	102.5502	102.2283
Average = Sum(39m) / 12 =	104.8030	104.4812	104.1593	102.5502	102.2283
	100.6191	100.6191	100.6191	100.6191	100.6191
	100.2973	101.2628	102.2283	102.8720	103.5157

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0000	0.9970	0.9939	0.9785	0.9755	0.9601	0.9601	0.9570	0.9662	0.9755	0.9816	0.9877 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7797	(42)
Average daily hot water use (litres/day)													100.2188	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	110.2407	106.2319	102.2232	98.2144	94.2057	90.1969	90.1969	94.2057	98.2144	102.2232	106.2319	110.2407	(44)	
Energy conte	163.4838	142.9840	147.5466	128.6347	123.4281	106.5091	98.6963	113.2554	114.6081	133.5647	145.7963	158.3253	(45)	
Energy content (annual)										Total =	Sum(45)=	1576.8323	(45)	



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Distribution loss (46)m = 0.15 x (45)m	24.5226	21.4476	22.1320	19.2952	18.5142	15.9764	14.8044	16.9883	17.1912	20.0347	21.8694	23.7488 (46)
Water storage losses:												
Store volume												170.0000 (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												
20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	206.8342	182.1392	190.8970	170.5867	166.7785	148.4611	142.0467	156.6058	156.5601	176.9151	187.7483	201.6757 (62)
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 (63)
								Solar input (sum of months) = Sum(63)m =				200.6000 (63)
Output from w/h	206.8342	182.1392	190.8970	170.5867	166.7785	148.4611	142.0467	156.6058	156.5601	176.9151	187.7483	201.6757 (64)
								Total per year (kWh/year) = Sum(64)m =				2087.2483 (64)
Heat gains from water heating, kWh/month	89.0387	78.8663	83.7396	76.3326	75.7202	68.9759	67.4968	72.3378	71.6688	79.0906	82.0389	87.3235 (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	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.5235	20.8916	16.9916	12.8638	9.6158	8.1181	8.7719	11.4020	15.3037	19.4316	22.6796	24.1773 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	263.8623	266.6004	259.7005	245.0116	226.4694	209.0425	197.4001	194.6621	201.5619	216.2509	234.7930	252.2200 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.8987	36.8987	36.8987	36.8987	36.8987	36.8987	36.8987	36.8987	36.8987	36.8987	36.8987	36.8987 (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)	-111.1896	-111.1896	-111.1896	-111.1896	-111.1896	-111.1896	-111.1896	-111.1896	-111.1896	-111.1896	-111.1896	-111.1896 (71)
Water heating gains (Table 5)	119.6756	117.3606	112.5532	106.0176	101.7744	95.7998	90.7216	97.2282	99.5400	106.3045	113.9429	117.3703 (72)
Total internal gains	471.7575	469.5504	453.9414	428.5890	402.5558	377.6564	361.5897	367.9883	381.1017	406.6831	436.1115	458.4637 (73)

6. Solar gains

	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
(Jan)						
North	8.6500	10.6334	0.4000	0.8000	0.7700	20.3972 (74)
South	12.8700	46.7521	0.4000	0.8000	0.7700	133.4328 (78)
West	1.6100	19.6403	0.4000	0.8000	0.7700	7.0122 (80)

Solar gains	160.8422	271.2261	367.1940	453.9550	511.5473	510.2729	490.8696	446.8246	396.6987	298.3812	192.0694	138.0689 (83)
Total gains	632.5998	740.7765	821.1354	882.5440	914.1031	887.9293	852.4592	814.8129	777.8004	705.0643	628.1809	596.5325 (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, nli/m (see Table 9a)													
tau	69.4424	69.6564	69.8716	70.9680	71.1914	72.3300	72.3300	72.5621	71.8702	71.1914	70.7460	70.3061	
alpha	5.6295	5.6438	5.6581	5.7312	5.7461	5.8220	5.8220	5.8375	5.7913	5.7461	5.7164	5.6871	
util living area	0.9979	0.9945	0.9852	0.9544	0.8680	0.6907	0.5138	0.5572	0.8034	0.9661	0.9949	0.9985 (86)	
Tweekday	18.7025	18.9365	19.2637	19.6670	19.9604	20.0976	20.1150	20.1164	20.0579	19.6956	19.1326	18.6736	
Tweekend	20.3336	20.4366	20.5818	20.7617	20.9059	20.9816	20.9972	20.9956	20.9558	20.7714	20.5189	20.3174	
24 / 16	9	8	9	8	9	9	9	9	9	9	8	9	
24 / 9	22	22	22	22	22	22	22	22	22	22	22	22	
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0	
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000 (87)	
Th 2	20.0833	20.0859	20.0884	20.1013	20.1038	20.1167	20.1167	20.1193	20.1116	20.1038	20.0987	20.0936 (88)	
util rest of house													
	0.9972	0.9927	0.9802	0.9384	0.8241	0.6093	0.4136	0.4552	0.7319	0.9509	0.9929	0.9980 (89)	
Tweekday	18.7025	18.9365	19.2637	19.6670	19.9604	20.0976	20.1150	20.1164	20.0579	19.6956	19.1326	18.6736	
Tweekend	20.3336	20.4366	20.5818	20.7617	20.9059	20.9816	20.9972	20.9956	20.9558	20.7714	20.5189	20.3174	
MIT 2	20.0833	20.0859	20.0884	20.1013	20.1038	20.1167	20.1167	20.1193	20.1116	20.1038	20.0987	20.0936 (90)	
Living area fraction													0.3884 (91)
MIT	20.4393	20.4409	20.4424	20.4503	20.4519	20.4597	20.4597	20.4613	fLiA = Living area / (4) =				0.3884 (92)
Temperature adjustment									20.4566	20.4519	20.4487	20.4456 (93)	
adjusted MIT	20.4393	20.4409	20.4424	20.4503	20.4519	20.4597	20.4597	20.4613	20.4566	20.4519	20.4487	20.4456 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9975	0.9935	0.9823	0.9452	0.8425	0.6421	0.4530	0.4955	0.7617	0.9575	0.9938	0.9982 (94)
Useful gains	631.0373	735.1566	806.6199	834.2158	770.1466	570.1466	386.1794	403.3123	592.4159	675.9281	624.2466	595.9708 (85)
Expenses	9.9000	9.9000	9.9000	9.9000	17.7000	17.7000	17.7000	17.7000	34.2000	10.0000	10.0000	27.0000 (85)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Month fractl	1691.4487	1623.7294	1452.2360	1184.4845	894.6887	589.6024	388.3641	407.3396	643.6862	1007.1398	1373.2097	1681.6723	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
	788.9461	596.5900	480.3243	252.1935	92.6905	0.0000	0.0000	0.0000	0.0000	247.0308	539.2427	808.1339	(98)
Space heating												3805.1519	(98)
Space heating per m2												36.3087	(99)
										(98) / (4) =			

8c. Space cooling requirement
Not applicable

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 %)													347.4294	(206)
Efficiency of secondary/supplementary heating system, %													100.0000	(208)
Space heating requirement													1095.2301	(211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	788.9461	596.5900	480.3243	252.1935	92.6905	0.0000	0.0000	0.0000	0.0000	247.0308	539.2427	808.1339	(98)	
Space heating efficiency (main heating system 1)	347.4294	347.4294	347.4294	347.4294	347.4294	0.0000	0.0000	0.0000	0.0000	347.4294	347.4294	347.4294	(210)	
Space heating fuel (main heating system)	227.0810	171.7155	138.2509	72.5884	26.6789	0.0000	0.0000	0.0000	0.0000	71.1024	155.2093	232.6038	(211)	
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	206.8342	182.1392	190.8970	170.5867	166.7785	148.4611	142.0467	156.6058	156.5601	176.9151	187.7483	201.6757	(64)	
Water heating efficiency (main heating system 1)	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	(217)m	
Fuel for water heating, kWh/month	154.5211	136.0720	142.6148	127.4414	124.5964	110.9118	106.1198	116.9966	116.9624	132.1692	140.2624	150.6673	(219)	
Water heating fuel used												1559.3353	(219)	
Annual totals kWh/year												1095.2301	(211)	
Space heating fuel - main system												0.0000	(215)	
Space heating fuel - secondary														
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)												230.0319	(230a)	
mechanical ventilation fans (SFP = 0.7250)												230.0319	(231)	
Total electricity for the above, kWh/year												415.4326	(232)	
Electricity for lighting (calculated in Appendix I)												3300.0300	(238)	
Total delivered energy for all uses														

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

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year		
1095.2301	0.5190	568.4244	(261)	
0.0000	0.5190	0.0000	(263)	
1559.3353	0.5190	809.2950	(264)	
Space heating (other fuel)		1377.7195	(265)	
Water and water heating		119.3866	(267)	
Pumps and fans		215.6095	(268)	
Energy for lighting		1712.7156	(272)	
Total CO2, kg/year		16.3400	(273)	
Dwelling Carbon Dioxide Emission Rate (DER)				

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER		16.3400	ZC1	
Total Floor Area		104.8000		
Assumed number of occupants		2.7797		
CO2 emission factor in Table 12 for electricity displaced from grid	TFA	54.2862		
CO2 emissions from appliances, equation (L14)	N	53.8445		
CO2 emissions from cooking, equation (L16)	EF	53.4115		
Total CO2 emissions		14.9198	ZC2	
Residual CO2 emissions offset from biofuel CHP		1.7721	ZC3	
Additional allowable electricity generation, kWh/m²/year		33.0319	ZC4	
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000	ZC5	
Net CO2 emissions		0.0000	ZC6	
		0.0000	ZC7	
		33.0319	ZC8	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	62.0500 (1b)	x	2.4000 (2b)
First floor	42.7500 (1c)	x	2.6000 (2c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	104.8000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	260.0700 (5)

2. Ventilation rate

	main heating	secondary heating	other		total	m3 per hour						
Number of chimneys	0	+	0	+	0 =	0 * 40 = 0.0000 (6a)						
Number of open flues	0	+	0	+	0 =	0 * 20 = 0.0000 (6b)						
Number of intermittent fans						4 * 10 = 40.0000 (7a)						
Number of passive vents						0 * 10 = 0.0000 (7b)						
Number of flueless gas fires						0 * 40 = 0.0000 (7c)						
						Air changes per hour						
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = Pressure test						40.0000 / (5) = 0.1538 (8)						
Measured/design AP50						Yes 5.0000						
Infiltration rate						0.4038 (18)						
Number of sides sheltered						0 (19)						
Shelter factor	(20) = 1 - [0.075 x (19)] =					1.0000 (20)						
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =					0.4038 (21)						
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
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 infiltr rate	0.5149	0.5048	0.4947	0.4442	0.4341	0.3836	0.3836	0.3735	0.4038	0.4341	0.4543	0.4745 (22b)
Effective ac	0.6325	0.6274	0.6223	0.5987	0.5942	0.5736	0.5736	0.5698	0.5815	0.5942	0.6032	0.6126 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.40)			23.1300	1.3258	30.6648		(27)
Ground Floor			62.0500	0.1300	8.0665		(28a)
External Wall	148.9600	25.0200	123.9400	0.1800	22.3092		(28a)
1st Floor	42.7500		42.7500	0.1300	5.5575		(30)
Ground Floor	19.3000		19.3000	0.1300	2.5090		(30)
Total net area of external elements Aum(A, m2)			273.0600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		70.9970		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							14.7090 (36)
Total fabric heat loss						(33) + (36) =	85.7060 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m	54.2862	53.8445	53.4115	51.3780	50.9976	49.2264	48.8984	49.9086	50.9976	51.7672	52.5719	(38)	
Heat transfer coeff	139.9922	139.5505	139.1175	137.0840	136.7035	134.9324	134.9324	134.6044	135.6146	136.7035	137.4732	138.2779	(39)
Average = Sum(39)m / 12 =												137.0822	(39)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP	1.3358	1.3316	1.3275	1.3081	1.3044	1.2875	1.2875	1.2844	1.2940	1.3044	1.3118	1.3194	(40)
HLP (average)												1.3080	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7797	(42)
Average daily hot water use (litres/day)													100.2188	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	110.2407	106.2319	102.2232	98.2144	94.2057	90.1969	90.1969	94.2057	98.2144	102.2232	106.2319	110.2407	(44)	
Energy costs	163.4838	142.9840	147.5466	128.6347	123.4281	106.5091	98.6963	113.2554	114.6081	133.5647	145.7963	158.3253	(45)	
Energy content (annual)													Total = Sum(45)m =	1576.8323
Distribution loss (46)m = 0.15 x (45)m	24.5226	21.4476	22.1320	19.2952	18.5142	15.9764	14.8044	16.9883	17.1912	20.0347	21.8694	23.7488	(46)	
Water storage loss:														
Store volume													170.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5003	(48)

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Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8102 (55)
Total storage loss													
25.1153 22.6848 25.1153 24.3051 25.1153 24.3051 25.1153 25.1153 24.3051 25.1153 24.3051 25.1153 (56)													
If cylinder contains dedicated solar storage													
25.1153 22.6848 25.1153 24.3051 25.1153 24.3051 25.1153 25.1153 24.3051 25.1153 24.3051 25.1153 (57)													
Primary loss 23.2624 21.0100 23.2624 23.2624 22.5120 23.2624 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120													
Total heat required for water heating calculated for each month													
211.8615 186.6799 195.9243 175.4519 171.8058 153.3262 147.0740 161.6331 161.4252 181.9424 192.6134 206.7030 (62)													
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 (63)													
Solar input (sum of months) = Sum(63)m = 0.0000 (63)													
Output from w/h													
211.8615 186.6799 195.9243 175.4519 171.8058 153.3262 147.0740 161.6331 161.4252 181.9424 192.6134 206.7030 (64)													
Heat gains from water heating, kWh/month													
93.0605 82.4990 87.7614 80.2248 79.7420 72.8680 71.5187 76.3596 75.5609 83.1124 85.9310 91.3453 (65)													
Total per year (kWh/year) = Sum(64)m = 2146.407 (64)													

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
666m	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870	138.9870 (66)
Lighting gains (calculated in Appendix L, equation 19 or L9a), also see Table 5												
	23.2923	20.8985	16.9958	12.8669	9.6182	8.1201	8.7740	11.4048	15.3075	19.4364	22.6852	24.1833 (67)
Appliances gains (calculated in Appendix L, equation 13 or L13a), also see Table 5												
	263.2523	265.6004	268.9780	245.0115	225.469	209.042	197.4001	194.6621	201.5619	216.2509	234.7930	252.2200 (68)
Cooking gains (calculated in Appendix L, equation 115 or L15a), also see Table 5												
	36.9887	36.9887	36.9887	36.9887	36.9887	36.9887	36.9887	36.9887	36.9887	36.9887	36.9887	36.9887 (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 (see Appendix 5, Table 5)												
	-111.8896	-111.8896	-111.8896	-111.8896	-111.8896	-111.8896	-111.8896	-111.8896	-111.8896	-111.8896	-111.8896	-111.8896 (71)
Water heating gains (Table 5)												
	121.0913	122.7663	117.9589	111.4233	107.1801	101.2055	96.1273	102.6339	104.9512	111.7012	119.3486	122.7766 (72)
Total internal gains												
	480.1691	477.9613	462.3513	436.9979	410.9638	386.0641	369.9975	376.3639	398.5452	415.0936	444.5228	466.8753 (73)

[Jan]		Area m2	Solar flux Table 6a W/m2	g Table 6b	PF Specific data or Table 6c	Access factor Table 6d	Gains W					
North		8.6500	10.6334	0.6300	0.7000		28.1099 (74)					
South		12.8700	46.7521	0.6300	0.7000		183.8871 (78)					
West		1.6300	19.6403	0.6300	0.7000		9.6637 (80)					
Solar gains	221.6607	373.7835	506.0392	625.6068	704.9761	1046.4796	191.2512 (83)					
Total gains	701.8298	851.7447	968.3906	1026.6047	1115.9400	1089.2840	1076.6771	992.1770	936.2116	826.3001	709.2185	650.2765 (84)

Temperature during heating periods in the living area (see Table 9), Thl (°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	51.8970	52.1156	52.4139	53.0899	53.2377	53.9365	53.9365	54.0679	53.6651	53.2377	52.9396	52.6135	
alpha	4.4658	4.5768	4.6876	4.5893	4.5492	4.5958	4.5958	4.6045	4.5777	4.5492	4.5293	4.5088	
util living area													
	0.9968	0.9919	0.9803	0.9480	0.8688	0.7151	0.5484	0.5953	0.8205	0.9627	0.9929	0.9976	(86)
MIT	19.7599	18.7839	20.0730	20.4326	20.7370	20.9240	20.9827	20.9500	20.8537	20.4541	19.9499	19.3504	(87)
Th 2	19.8129	18.8162	20.0730	19.8345	19.8374	19.8506	19.8506	19.8531	19.8495	19.4374	19.8516	19.8256	(88)
util rest of house													
	0.9956	0.9891	0.9733	0.9283	0.8185	0.6158	0.4446	0.4608	0.7383	0.9445	0.9900	0.9967	(89)
MIT 2	17.9429	18.2419	18.6616	19.1806	19.5883	19.6023	19.4146	19.4603	19.7330	19.2216	18.4953	17.9086	(90)
Living area fraction													
MIT	18.5786	18.8407	19.2099	19.6668	20.0313	20.2387	20.2866	20.2828	20.1682	19.7003	19.0601	18.5462	(92)
adjusted MIT													
adjusted MIT	18.5786	18.8407	19.2099	19.6668	20.0313	20.2387	20.2866	20.2828	20.1682	19.7003	19.0601	18.5462	(93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9939	0.9859	0.9685	0.9248	0.8280	0.6517	0.4670	0.5134	0.7641	0.9418	0.9873	0.9954 (94)
Useless gas	697.654	639.747	937.885	982.694	924.056	709.914	488.746	509.351	715.367	778.176	700.185	654.1281 (95)
Heat loss rate	0.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2800 (96)
Heat loss rate W												
Month fraction	1998.0988	1945.4359	1768.1655	1475.9585	1138.5220	760.8475	497.4373	522.6426	822.9366	1244.014	1644.1896	1983.7601 (97)
Space heating kWh		1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating	968.1920	743.0225	617.7283	355.1504	159.8643	0.0000	0.0000	0.0000	0.0000	346.5878	679.6829	989.2462 (98)
Space heating per m2												4859.4743 (98)
											(98) / (4) =	46.3660 (99)

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Not applicable

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

Efficiency of main space heating system 1 (in %)	93.5000 (206)
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[illegible][illegible][illegible]

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
--	--------------------	--	---------------------------------------

Space heating – Main system 1	5197,2587	0.2180	1122,8185	(26)
Space heating – secondary	0.0000	0.0000	0.0000	(26)
Water heating (other fuel)	2524,9642	0.2160	545,3923	(26)
Space and water heating				
Pumps and fans	75,0000	0.5190	1668,0088	(26)
Energy for lighting	415,5353	0.5190	38,9250	(26)
Total CO2, kg/m2/year			215,6628	(26)
Emissions per m2 for space and water heating			1922,5966	(27)
Fuel factor (electricity)			15,9161	(27)
Emissions per m2 for lighting			1,5500	
Emissions per m2 for pumps and fans			2,0579	(27)
Target Carbon Dioxide Emission Rate (TER) = (15.9161 * 1.55) + 2.0579 + 0.3714, rounded to 2 d.p.			0.3714	(27)
			27,1000	(27)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	Studio Mid GF - Apt				Issued on Date	23/08/2022
Assessment Reference	Studio Mid GF	Prop Type Ref				
Property	Apartment, Studio Mid GF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	83 B	DER	23.03	TER	41.03	
Environmental	87 B	% DER<TER	43.87			
CO ₂ Emissions (t/year)	0.75	DFEE	60.25	TFEE	64.66	
General Requirements Compliance	Pass	% DFEE<TFEE	6.82			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Ground-floor flat, total floor area 38 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Electricity
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 41.03 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 23.03 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 64.7 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 60.2 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof (no roof)			
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Daikin Altherma EKXQ006BV3 + EKXHB008B

Secondary heating system: None

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.20 kWh/day	
Permitted by DBSCG 2.03	OK	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
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Hot water controls:

Cylinderstat	OK
Independent timer for DHW	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%		
Minimum	75%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.50	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
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Based on:

Overshading:	Average	
Windows facing North East:	5.40 m ² , No overhang	
Windows facing South East:	2.88 m ² , No overhang	
Windows facing South West:	2.76 m ² , No overhang	
Air change rate:	3.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m ² K	
Door U-value	1.00 W/m ² K	
Window U-value	0.90 W/m ² K	
Air permeability	3.0 m ³ /m ² h	
Photovoltaic array	0.30 kW	

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	72.7349	70.0900	67.4451	64.8802	62.1533	59.5104	59.5104	62.1533	64.8802	67.4451	70.0900	72.7349 (44)
Energy content	107.8538	94.3932	97.3487	84.8712	81.4337	80.2728	65.1181	74.7240	75.6164	88.1237	96.1399	124.4603 (45)
Energy content (annual)										Total = Sum(45) =		1040.3668 (45)
Distribution loss (46) =	16.1796	14.1508	14.6023	12.7306	12.2154	10.5409	9.7677	11.2086	11.3425	13.2185	14.4291	15.6690 (46)

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5. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9902	0.9808	0.9565	0.8877	0.7474	0.5550	0.4035	0.4489	0.6965	0.9178	0.9801	0.9222 (94)
Useful gains	320.192	361.153	393.350	404.9276	364.5576	267.3671	185.2531	193.4632	275.9514	323.6147	312.7621	305.0666 (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)
Rest. loss rate												
Month fraction	745.9102	717.4645	644.2786	531.3024	406.1734	274.9098	187.1965	155.5756	298.0373	454.9116	612.4484	744.4463 (97)
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000 (97a)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating kWh	316.7290	239.4410	186.6902	90.9899	30.9622	0.0000	0.0000	0.0000	0.0000	97.6848	215.8001	326.5711 (98)
Space heating												1504.8683 (98)
Space heating per m2										(98) / (4) =		40.0231 (99)

8c. Space cooling requirement	
Not applicable	

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 %)	310.7551 (206)
Efficiency of secondary/supplementary heating system, %	100.0000 (208)
Space heating requirement	484.2618 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	316.7290	239.4410	186.6902	90.9899	30.9622	0.0000	0.0000	0.0000	0.0000	97.6848	215.8001	326.5711 (98)
Space heating efficiency (main heating system 1)	310.7551	310.7551	310.7551	310.7551	310.7551	0.0000	0.0000	0.0000	0.0000	310.7551	310.7551	310.7551 (210)
Space heating fuel (main heating system)	101.9224	77.0514	60.0763	29.2802	9.9635	0.0000	0.0000	0.0000	0.0000	31.4347	69.4438	105.0896 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	151.2142	133.4935	140.6991	126.8230	124.7861	112.2248	108.4685	118.0744	117.5684	131.4741	138.1459	147.8107 (64)
Efficiency of water heater	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550 (216)
Fuel for water heating, kWh/month	112.9686	99.7300	105.1131	94.7465	93.2249	83.8406	81.0343	88.2107	87.8327	98.2213	103.2056	110.4260 (219)
Water heating fuel used												1158.5542 (219)
Annual totals kWh/year												484.2618 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6250)	
mechanical ventilation fans (SFP = 0.6250)	
Total electricity for the above, kWh/year	71.6750 (230a)
Electricity for lighting (calculated in Appendix L)	181.9226 (232)

Energy saving/generation technologies (Appendices M, N and Q)	
PV Unit 0 (0.80 * 0.30 * 951 * 1.00) =	-228.1478 (233)
Total delivered energy for all uses	1668.2658 (238)

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP	484.2618	0.5190	251.3319 (261)
Space heating - main system 1	0.0000	0.5190	0.0000 (263)
Space heating - secondary	1158.5542	0.5190	601.2896 (264)
Water heating (other fuel)			852.6218 (265)
Space and water heating			37.1993 (267)
Pumps and fans	71.6750	0.5190	94.4178 (268)
Energy for lighting	181.9226		

Energy saving/generation technologies			
PV Unit	-228.1478	0.5190	-118.4087 (269)
Total CO2, kg/year			865.8300 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			23.0300 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER	23.0300	ZC1
Total Floor Area	37.6000	TFA
Assumed number of occupants	1.3441	N
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190	EF
CO2 emissions from appliances, equation (L14)	18.2105	ZC2
CO2 emissions from cooking, equation (L16)	4.0228	ZC3
Total CO2 emissions	45.2633	ZC4
Residual CO2 emissions offset from biofuel CHP	0.0000	ZC5
Additional allowable electricity generation, kWh/m²/year	0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation	0.0000	ZC7
Net CO2 emissions	45.2633	ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	37.6000 (1b)	x 2.5000 (2b)	= 94.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	94.0000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of fuelless gas fires				0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	20.0000 / (5) =	5.2128 (8)
Pressure test		Yes
Measured/design AP50		5.0000
Infiltration rate		6.4628 (18)
Number of sides sheltered		3 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3586 (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 infiltr rate												
Effective ac	0.4573	0.4483	0.4393	0.3945	0.3855	0.3407	0.3407	0.3317	0.3586	0.3855	0.4035	0.4214 (22b)
Effective ac	0.6045	0.6005	0.5965	0.5778	0.5743	0.5580	0.5580	0.5550	0.5643	0.5743	0.5814	0.5888 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.2000	1.0000	1.2000		(26)
TER Opening Type (Uw = 1.40)			8.2000	1.3258	10.8712		(27)
Heat Loss Floor 1			37.6000	0.1300	4.8880		(28a)
External Wall	32.0000	8.2000	23.8000	0.1800	4.2840		(29a)
Corridor Wall	25.2500	1.2000	24.0500	0.1800	4.3290		(29a)
Total net area of external elements Aum(A, m2)			94.8500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.5722		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K			250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.7755 (36)
Total fabric heat loss		(33) + (36) =	33.3477 (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	18.7531	18.6272	18.5037	17.9239	17.8154	17.3105	17.3105	17.2170	17.5050	17.8154	18.0349	18.2643 (38)
Average = Sum(39)m / 12 =	52.1008	51.9749	51.8514	51.2716	51.1632	50.6582	50.6582	50.5647	50.8527	51.1632	51.3826	51.6120 (39)
												51.2711 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3857	1.3823	1.3790	1.3636	1.3607	1.3473	1.3473	1.3448	1.3525	1.3607	1.3666	Dec 1.3727 (40)
HLP (average)												1.3636 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy			1.3441 (42)
Average daily hot water use (litres/day)			66.1227 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	72.7349	70.0900	67.4451	64.8002	62.1553	59.5104	59.5104	62.1553	64.8002	67.4451	70.0900	72.7349 (44)
Energy conte	107.8638	94.3383	97.3487	84.8710	81.4357	70.2728	65.1181	74.7240	75.6164	88.1237	96.1939	104.4603 (45)
Energy content (annual)												Total = Sum(45)m = 1040.3668 (45)
Distribution loss (46)m = 0.15 x (45)m												
	16.1796	14.1508	14.6023	12.7306	12.2154	10.5409	9.7677	11.2086	11.3425	13.2185	14.4291	15.6690 (46)
Water storage loss:												
Store volume												170.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5003 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8102 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	(56)
If cylinder contains dedicated solar storage	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	156.2415	138.0343	145.7264	131.6881	129.8134	117.0900	113.4958	123.1017	122.4336	136.5014	143.0110	152.8380	(62)
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	(63)
Output from w/h	156.2415	138.0343	145.7264	131.6881	129.8134	117.0900	113.4958	123.1017	122.4336	136.5014	143.0110	152.8380	(64)
Heat gains from water heating, kWh/month	74.5669	66.3243	71.0706	65.6733	65.7795	60.8194	60.3539	63.5479	62.5962	68.0033	69.4382	73.4352	(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	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	10.3080	9.1555	7.4457	5.6369	4.2136	3.5573	3.8438	4.9963	6.7061	8.5149	9.9382	10.5945 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.5483	116.7473	113.7258	107.2933	99.1735	91.5420	86.4437	85.2447	88.2662	94.6987	102.8185	110.4500 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206 (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)	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645 (71)
Water heating gains (Table 5)	100.2243	98.6969	95.5250	91.2129	88.4134	84.4714	81.1209	85.8138	86.9391	91.4023	96.4419	98.7032 (72)
Total internal gains	272.2422	270.7613	262.8582	250.3048	237.9622	225.7325	217.5701	221.8166	228.0731	240.7775	255.3602	265.9094 (73)

6. Solar gains													
[Jan]	Area m2	Solar flux Table 6a	Specific data g/m2	Specific data FF or Table 6c	Access factor Table 6d	Gains W							
Northeast	4.0100	11.2829	0.6300	0.7000	0.7700	13.8273	(75)						
Southeast	2.1400	36.7938	0.6300	0.7000	0.7700	23.0516	(79)						
Southwest	2.0500	36.7938	0.6300	0.7000	0.7700	23.0516	(79)						
Solar gains	60.9425	108.4005	160.5179	219.3377	264.3407	270.6389	257.5082	222.6788	180.6896	123.0950	73.8315	51.6129	(83)
Total gains	333.1847	379.1618	423.3760	469.6425	502.3029	496.3713	475.0784	444.4954	408.7627	363.8725	329.1917	317.5222	(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, n1,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	50.1165	50.2380	50.3576	50.9270	51.0350	51.5437	51.5437	51.6390	51.3466	51.0350	50.8170	50.5911	
alpha	4.3411	4.3492	4.3572	4.3951	4.4023	4.4362	4.4362	4.4231	4.4231	4.4023	4.3878	4.3727	
util living area	0.9904	0.9823	0.9625	0.9080	0.7922	0.6152	0.4604	0.5088	0.7485	0.9319	0.9817	0.9921	(86)
MIT	19.7065	19.8872	20.1743	20.5337	20.8126	20.9545	20.9899	20.9845	20.8918	20.3358	20.0603	19.6748	(87)
Th 2	20.3072	20.3088	20.3105	20.3182	20.3196	20.3264	20.3264	20.3276	20.3238	20.3196	20.3167	20.3137	(88)
util rest of house	0.9887	0.9792	0.9560	0.8920	0.7583	0.5607	0.3933	0.4398	0.6991	0.9168	0.9781	0.9908	(89)
MIT 2	19.0988	19.2794	19.5639	19.9179	20.1751	20.2980	20.3218	20.3201	20.2498	19.9259	19.4585	19.0725	(90)
Living area fraction	19.6305	19.8112	20.0980	20.4568	20.7329	20.8725	20.9064	20.9014	20.8116	20.4595	19.9851	19.5995	(92)
MIT	20.2305	20.4112	20.6980	21.0568	21.3329	21.4725	21.5064	21.5014	21.4116	21.0595	20.5851	20.1995	(93)

8. Space heating requirement													
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	329.3621	371.4753	406.3475	427.0175	405.3944	322.9272	241.6516	247.7758	316.7986	339.5280	322.4736	314.5127	(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	829.9921	806.1948	736.1882	623.2966	492.8500	348.1466	248.5483	257.9526	371.8124	535.1424	692.8990	825.7685	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	372.4687	292.1315	245.4014	141.3210	65.0670	0.0000	0.0000	0.0000	0.0000	145.5371	266.7063	380.3743	(98)
Space heating													
Space heating per m2										(98) / (4) =			

8c. Space cooling requirement
Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

9a. Energy requirements - Individual heating systems, including micro-CHP													
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of secondary/supplementary heating system, %													88.5000 (206)
Space heating requirement													0.0000 (208)
													2157.0705 (211)

Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
372.4687	292.1315	245.4014	141.3210	65.0670	0.0000	0.0000	0.0000	0.0000	0.0000	145.5371	266.7063	380.3743	(98)
Space heating efficiency (main heating system 1)	88.5000	88.5000	88.5000	88.5000	88.5000	88.5000	88.5000	88.5000	88.5000	88.5000	88.5000	88.5000	(210)
Space heating fuel (main heating system)	420.8686	330.0921	277.2897	159.6847	73.5220	0.0000	0.0000	0.0000	0.0000	164.4487	301.3631	429.8014	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	156.2415	138.0343	145.7264	131.6881	129.8134	117.0900	113.4958	123.1017	122.4336	136.5014	143.0110	152.8380	(64)
Efficiency of water heater	82.0323	81.7476	81.1737	79.9813	78.0617	74.8000	74.8000	74.8000	74.8000	79.9639	81.4339	82.1323	(217)
Fuel for water heating, kWh/month	190.4634	168.8543	179.5242	164.6487	166.2959	156.5374	151.7324	164.5745	163.6812	170.7038	175.6159	186.0875	(219)
Water heating fuel used													2038.7191 (219)
Annual totals kWh/year													
Space heating fuel - main system													2157.0705 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													39.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													84.0000 (231)
Electricity for lighting (calculated in Appendix L)													182.0420 (232)
Total delivered energy for all uses													4461.8316 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP													
Energy kWh/year	2157.0705												
Emission factor kg CO2/kWh	0.2160												
Emissions kg CO2/year	465.9272	(261)											
Space heating - main system 1	0.0000												
Space heating - secondary	0.0000												
Water heating (other fuel)	2038.7191												
Space and water heating	0.2160												
Pumps and fans	84.0000												
Energy for lighting	182.0420												
Total CO2, kg/m2/year	0.5190												
Emissions per m2 for space and water heating	24.1035	(272a)											
Fuel factor (electricity)	1.5500												
Emissions per m2 for lighting	2.5128	(272b)											
Emissions per m2 for pumps and fans	1.1595	(272c)											
Target Carbon Dioxide Emission Rate (TER) = (24.1035 * 1.55) + 2.5128 + 1.1595, rounded to 2 d.p.	41.0300	(273)											

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	Studio Mid MF - Apt				Issued on Date	23/08/2022
Assessment Reference	Studio Mid MF	Prop Type Ref				
Property	Apartment, Studio Mid MF, Edmansons Close, Tottenham, N17 6XD					
SAP Rating	85 B	DER	21.10	TER	36.15	
Environmental	88 B	% DER<TER	41.64			
CO ₂ Emissions (t/year)	0.69	DFEE	48.18	TFEE	50.76	
General Requirements Compliance	Pass	% DFEE<TFEE	5.09			
Assessor Details	Miss Eleanor Ballinger, Eleanor Ballinger, Tel: 02036031625, Eleanor@hodkinsonconsultancy.com				Assessor ID	M976-0001
Client						

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-floor flat, total floor area 38 m²

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Electricity
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 36.15 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 21.10 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)50.8 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)48.2 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.91 (max. 2.00)	1.00 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Daikin Altherma ERWQ006BV3 + EKUBH008B

Secondary heating system: None

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.20 kWh/day	
Permitted by DBSCG 2.03	OK	
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
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Hot water controls:

Cylinderstat	OK
Independent timer for DHW	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%		
Minimum	75%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.50	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
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Based on:

Overshading:	Average	
Windows facing North East:	2.76 m ² , No overhang	
Windows facing South West:	5.40 m ² , No overhang	
Windows facing North West:	2.88 m ² , No overhang	
Air change rate:	3.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m ² K	
Door U-value	1.00 W/m ² K	
Window U-value	0.90 W/m ² K	
Air permeability	3.0 m ³ /m ² h	
Photovoltaic array	0.30 kW	

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SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

	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 infiltr rate												
	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1163	0.1250	0.1308	0.1366 (22b)
balanced mechanical ventilation with heat recovery												
If mechanical ventilation:												
												0.5000 (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
												76.5000 (23c)
Effective ac	0.2657	0.2628	0.2599	0.2454	0.2425	0.2279	0.2279	0.2250	0.2338	0.2425	0.2483	0.2541 (25)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000	(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)	10.2640	(36)
Total fabric heat loss	(33) + (36) =	29.1565 (37)

4. Water heating energy requirements (kWh/year)	
Assumed occupancy	1,3441 (42)
Average daily hot water use (litres/day)	66,1227 (43)

[illegible]

HODKINSON

Store volume	170.0000 (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)

[illegible]

[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	2.7600	11.2829	0.4000	0.8000	0.7700	6.9058 (75)
Southeast	5.4000	36.7938	0.4000	0.8000	0.7700	44.8605 (79)
Northwest	2.8800	11.2829	0.4000	0.8000	0.7700	7.2061 (81)

Solar gains	58.1726	103.7769	154.4427	212.2310	256.7647	263.2866	250.3495	215.8444	174.2531	118.0526	70.5310	49.2313 (83)
Total gains	322.0024	366.1265	408.8903	454.1264	486.3184	480.6110	459.5114	429.2520	393.9161	350.4188	317.4790	306.7280 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 3, Th1 (°C)

21.0000 (85)

Temperature during heating periods in the living area, on Table 9a, Thl (°C)												21.0000 (85)
Utilisation factor for gains for living area, n _{l,lm} (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	69.8174	69.8661	70.1557	71.0137	71.1903	72.0761	72.0761	72.2559	71.7819	71.1903	70.8420	70.4972
alpha	5.6545	5.6557	5.6770	5.7344	5.7460	5.8051	5.8051	5.8171	5.7813	5.7460	5.7228	5.6998
util living area	0.9884	0.9755	0.9405	0.8426	0.6714	0.4788	0.3464	0.3863	0.6197	0.8854	0.9744	0.9909 (86)
Weekday	19.0589	19.2908	19.6100	19.9303	20.0713	20.1112	20.1137	20.1155	20.0973	19.9115	19.4686	19.0184
Weekend	20.4910	20.5951	20.7420	20.8963	20.9756	20.9971	20.9996	20.9993	20.9882	20.8813	20.6418	20.4701
24 / 16	9	8	9	8	9	9	9	9	8	9	8	9
24 / 9	22	22	22	22	22	22	22	22	22	22	22	22
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000 (87)
T _{int}	20.0978	20.0998	20.0918	20.1018	20.1038	20.1139	20.1139	20.1159	20.1098	20.1038	20.0998	20.0958 (88)
util rest of house	0.9850	0.9685	0.9245	0.8069	0.6161	0.4141	0.2769	0.3126	0.5471	0.8495	0.9659	0.9882 (89)
Weekday	19.0589	19.2908	19.6100	19.9303	20.0713	20.1112	20.1137	20.1155	20.0973	19.9115	19.4686	19.0184
Weekend	19.0589	19.2908	19.6100	19.9303	20.0713	20.1112	20.1137	20.1155	20.0973	19.9115	19.4686	19.0184
24 / 16	9	8	9	8	9	9	9	9	8	9	8	9
24 / 9	22	22	22	22	22	22	22	22	22	22	22	22
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
Living area fraction	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098 (90)
MIT	20.8860	20.8862	20.8865	20.8877	20.8880	20.8892	20.8892	20.8895	20.8887	20.8880	20.8875	20.8870 (91)
adjusted MIT	20.8860	20.8862	20.8865	20.8877	20.8880	20.8892	20.8892	20.8895	20.8887	20.8880	20.8875	20.8870 (92)
Weekday	20.8860	20.8862	20.8865	20.8877	20.8880	20.8892	20.8892	20.8895	20.8887	20.8880	20.8875	20.8870 (93)
Weekend	20.8860	20.8862	20.8865	20.8877	20.8880	20.8892	20.8892	20.8895	20.8887	20.8880	20.8875	20.8870 (94)
24 / 16	9	8	9	8	9	9	9	9	8	9	8	9
24 / 9	22	22	22	22	22	22	22	22	22	22	22	22
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
Living area fraction	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098 (95)
MIT	20.8860	20.8862	20.8865	20.8877	20.8880	20.8892	20.8892	20.8895	20.8887	20.8880	20.8875	20.8870 (96)
adjusted MIT	20.8860	20.8862	20.8865	20.8877	20.8880	20.8892	20.8892	20.8895	20.8887	20.8880	20.8875	20.8870 (97)
Weekday	20.8860	20.8862	20.8865	20.8877	20.8880	20.8892	20.8892	20.8895	20.8887	20.8880	20.8875	20.8870 (98)
Weekend	20.8860	20.8862	20.8865	20.8877	20.8880	20.8892	20.8892	20.8895	20.8887	20.8880	20.8875	20.8870 (99)
24 / 16	9	8	9	8	9	9	9	9	8	9	8	9
24 / 9	22	22	22	22	22	22	22	22	22	22	22	22
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
Living area fraction	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098	0.0098 (100)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9880	0.9747	0.9387	0.8385	0.6647	0.4708	0.3377	0.3771	0.6110	0.8814	0.9735	0.9906 (94)
Heat loss gains	318.1259	356.8631	363.8429	380.7851	323.2644	226.2580	155.1967	161.8846	240.6635	308.8491	309.0527	303.8532 (95)
Est temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.1600	16.8000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate	620.3010	596.4297	535.4477	440.7655	336.9958	227.8410	155.3867	162.2366	247.1604	377.3416	508.1818	618.0609 (97)
Month fraction	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97)
Month length	31.0000	28.0000	31.0000	30.0000	31.0000	30.0000	31.0000	31.0000	30.0000	31.0000	30.0000	31.0000 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	224.7981	160.9887	112.7940	43.1859	10.2162	0.0000	0.0000	0.0000	0.0000	50.9584	143.3730	233.7705 (98)
Space heating per m2										(98) / (4) =		26.0661 (99)

8c. Space cooling requirement
Not applicable

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 %)	284.2417 (206)
Efficiency of secondary/supplementary heating system, %	100.0000 (208)
Space heating requirement	344.8069 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	224.7981	160.9887	112.7940	43.1859	10.2162	0.0000	0.0000	0.0000	0.0000	50.9584	143.3730	233.7705 (98)
Space heating efficiency (main heating system 1)	284.2417	284.2417	284.2417	284.2417	284.2417	0.0000	0.0000	0.0000	0.0000	284.2417	284.2417	284.2417 (210)
Space heating fuel (main heating system)	79.0870	56.6380	39.6824	15.1934	3.5942	0.0000	0.0000	0.0000	0.0000	17.9278	50.4405	82.2436 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating requirement	151.2142	133.4935	140.6991	126.8230	124.7861	112.2248	108.4685	118.0744	117.5684	131.4741	138.1459	147.8107 (64)
Efficiency of water heater	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550	133.8550 (216)
Fuel for water heating, kWh/month	112.9686	99.7300	105.1131	94.7465	93.2249	83.8406	81.0343	88.2107	87.8327	98.2213	103.2056	110.4260 (219)
Water heating fuel used	112.9686	99.7300	105.1131	94.7465	93.2249	83.8406	81.0343	88.2107	87.8327	98.2213	103.2056	110.4260 (219)
Annual totals kWh/year												344.8069 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												0.0000 (215)

Electricity for pumps and fans:

(BalancedWithHeatRecovery; Database: in-use factor = 1.2500, SFP = 0.6250)	
mechanical ventilation fans (SFP = 0.6250)	71.6750 (230a)
Total electricity for the above, kWh/year	71.6750 (231)
Electricity for lighting (calculated in Appendix L)	181.9226 (232)

Energy saving/generation technologies (Appendices M, N and Q)

PV Unit 0 (0.80 * 0.30 * 951 * 1.00) =	-228.1478 (233)
Total delivered energy for all uses	1528.8109 (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	344.8069	0.5190	178.9548 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	1158.5542	0.5190	601.2896 (264)
Space and water heating			780.2444 (265)
Pumps and fans	71.6750	0.5190	37.1993 (267)
Energy for lighting	181.9226	0.5190	94.4178 (268)

Energy saving/generation technologies

PV Unit	-228.1478	0.5190	-118.4087 (269)
Total CO2, kg/year			793.4529 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			21.1000 (273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER		21.1000 EC1
Total Floor Area	TFA	37.6000
Assumed number of occupants	N	1.3441
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		18.2105 EC2
CO2 emissions from cooking, equation (L16)		4.0228 EC3
Total CO2 emissions		43.3333 EC4
Residual CO2 emissions offset from biofuel CHP		0.0000 EC5
Additional allowable electricity generation, kWh/m²/year		0.0000 EC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 EC7
Net CO2 emissions		43.3333 EC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	37.6000 (1b)	2.5000 (2b)	94.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.6000		94.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	94.0000 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of fuelless gas fires				0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.2128 (8)

Pressure test

Measured/design AP50

Infiltration rate

Number of sides sheltered

Shelter factor

Infiltration rate adjusted to include shelter factor

Wind speed

Wind factor

Adj infiltr rate

Effective ac

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.2000	1.0000	1.2000		(26)
TER Opening Type (Uw = 1.40)			8.2000	1.3258	10.8712		(27)
External Wall	32.0000	8.2000	23.8000	0.1800	4.2840		(29a)
Corridor Wall	25.2500	1.2000	24.0500	0.1800	4.3290		(29a)
Total net area of external elements Aum(A, m2)			57.2500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		20.6842		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.9930 (36)
Total fabric heat loss						(33) + (36) =	25.6772 (37)

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

(38)m

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.3441 (42)
Average daily hot water use (litres/day)												66.1227 (43)
Daily hot water use	72.7349	70.0900	67.4451	64.8002	62.1553	59.5104	59.5104	62.1553	64.8002	67.4451	70.0900	72.7349 (44)
Energy conte	107.8638	94.3383	97.3487	84.8710	81.4357	70.2728	65.1181	74.7240	75.6139	88.1237	96.1939	104.4603 (45)
Energy content (annual)												1040.3668 (45)
Distribution loss (46)m = 0.15 x (45)m	16.1796	14.1508	14.6023	12.7306	12.2154	10.5409	9.7677	11.2086	11.3425	13.2185	14.4291	15.6690 (46)
Water storage loss:												170.0000 (47)
Store volume												1.5003 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8102 (55)
Enter (49) or (54) in (55)												
Total storage loss												

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	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153 (56)
If cylinder contains dedicated solar storage													
	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624 (59)
Total heat required for water heating calculator for each month													
	156.2415	138.0343	145.7264	131.6881	129.8134	117.0900	113.4958	123.1017	122.4336	136.5014	143.0110	152.8380	152.8380 (62)
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 (63)
Solar input (sum of months) = Sum(63)m =												0.0000	0.0000 (63)
Output from w/h													
	156.2415	138.0343	145.7264	131.6881	129.8134	117.0900	113.4958	123.1017	122.4336	136.5014	143.0110	152.8380	152.8380 (64)
Heat gains from water heating, kWh/month													
	74.5669	66.3243	71.0706	65.6733	65.7795	60.8194	60.3539	63.5479	62.5962	68.0033	69.4382	73.4352	73.4352 (65)
Total per year (kWh/year) = Sum(64)m =												1609.9752	1609.9752 (64)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056	67.2056 (66)
Lighting gains	(calculated in Appendix L, equation 15 or 19a), also see Table 5											
	10.3080	8.1255	7.7457	5.6369	4.2136	3.5573	3.8438	4.9963	6.7061	8.5149	9.3982	10.5945 (67)
Appliances gains	(calculated in Appendix L, equation 13 or 13a), also see Table 5											
	115.9483	116.7473	113.7258	107.2933	99.1735	91.5420	86.4437	85.2447	88.2662	94.6987	102.8185	110.4500 (68)
Cooking gains	(calculated in Appendix L, equation 13 or 13a), also see Table 5											
	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206	29.7206 (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)												
	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645	-53.7645 (71)
Water heating gains (Table 5)												
	100.2243	98.6969	95.9250	91.2129	88.4134	84.4714	81.1209	85.4138	96.9391	91.4023	96.4619	98.7032 (72)
Total internal gains												
	272.2422	270.7613	262.8592	250.3048	237.9622	225.7325	217.5071	221.8616	228.0731	240.7775	255.3602	265.9094 (73)

[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		2.050	11.2829	0.6300	0.7000	0.7700	7.0688 (75)					
Southeast		4.0100	36.7938	0.6300	0.7000	0.7700	45.0911 (79)					
Northwest		2.1400	11.2829	0.6300	0.7000	0.7700	7.3792 (81)					
Solar gains	59.5392	106.2162	158.076	217.2310	262.8188	269.496	256.235	220.9315	178.3555	120.8285	72.1881	50.3876 (83)
Total gains	331.7814	376.9775	420.9350	467.5358	502.8188	495.2290	473.8237	442.7481	406.4286	361.6061	327.5848	316.2970 (84)

Temperature during heating periods in the living area (see Table 9), Th (°C)												Dec 2000 (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	58.7587	58.38	59.004	59.4863	60.0327	60.7409	60.7409	60.8733	60.4673	60.0357	59.7343	59.4224	59.4224
alpha	4.9179	4.9291	4.9104	4.9294	4.9024	5.0494	5.0494	5.0582	5.0312	5.0024	4.9823	4.9615	4.9615
util living area	0.9894	0.9792	0.9531	0.8791	0.7338	0.5425	0.3369	0.4415	0.6846	0.9114	0.9782	0.9914	0.9914 (86)
MIT	19.5725	20.1448	20.4046	20.7094	20.9077	20.9838	20.9972	20.9954	20.9508	20.6938	20.2843	19.9430	19.9430 (87)
Th 2	20.4092	20.4108	20.4125	20.4202	20.4216	20.4284	20.4284	20.4284	20.4256	20.4258	20.4216	20.4187	20.4157 (88)
util rest of house	0.9876	0.9759	0.9457	0.8615	0.7010	0.4978	0.3462	0.3883	0.6393	0.8945	0.9743	0.9900	0.9900 (89)
MIT 2	19.4455	19.6174	19.8740	20.1721	20.3511	20.4183	20.4271	20.4271	20.3924	20.1634	19.7631	19.4778	19.4778 (90)
Living area fraction									f _{lra} = Living area /	(4) = 0.8750 (91)			
MIT	19.9066	20.0788	20.3383	20.6423	20.8381	20.9131	20.9260	20.9244	20.8810	20.6274	20.2192	19.8778	19.8778 (92)
adjusted MIT	20.5066	20.6788	20.9383	21.2423	21.4381	21.5131	21.5260	21.5244	21.4810	21.2274	21.0192	20.7778	20.7778 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.97879	0.9775	0.9523	0.9858	0.9768	0.9810	0.9426	0.9194	0.9193	0.9173	0.9771	0.9902 (94)
Useful gains	327.7809	368.4842	400.8714	414.1616	378.9769	287.7314	209.7338	216.5452	292.4050	331.7003	320.4353	313.1945 (95)
Ext temp.	1.3700	1.4900	1.5000	1.8900	1.7100	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate %	720.0651	699.0713	637.8907	538.1362	423.5380	297.1792	211.7558	219.8056	318.7264	462.2153	599.4966	715.2699 (97)
Month francs	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating km ³ /h	291.8594	222.1545	176.3471	89.2616	33.1533	0.0000	0.0000	0.0000	0.0000	97.1032	201.3488	299.1441 (98)
Space heating per m ²											1410.3723 (98)	377.5099 (99)

Not applicable

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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, % (in %)	88.5000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Space heating requirement	1593.6410 (211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	291.8594	222.1545	176.3471	89.2618	33.1535	0.0000	0.0000	0.0000	0.0000	97.1032	201.3488	299.1441	(98)
Space heating efficiency factor (main heating system 1)	88.5000	88.5000	88.5000	88.5000	88.5000	0.0000	0.0000	0.0000	0.0000	88.5000	88.5000	88.5000	(210)
Space heating fuel (main heating system)	329.7847	251.0221	199.2622	100.8608	37.4615	0.0000	0.0000	0.0000	0.0000	109.7211	227.5127	338.0159	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	156.2415	138.0343	145.7264	131.6881	129.8134	117.0900	113.4958	123.1017	122.4336	136.5014	143.0110	152.8380	(64)
Efficiency of water heater (217)m	81.4381	81.0565	80.3025	78.7831	76.7541	74.8000	74.8000	74.8000	74.8000	78.9046	80.7055	81.5550	(217)
Fuel for water heating, kWh/month	170.2940	170.2940	181.4718	167.1527	169.1290	156.5374	151.7324	164.5745	163.6812	172.9954	177.2010	187.4058	(219)
Water heating fuel used												2054.0273	(219)
Annual totals kWh/year													
Space heating fuel - main system												1993.6410	(211)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:													
central heating pump												39.0000	(230)
main heating flue fan												45.0000	(230)
Total electricity for the above, kWh/year												84.0000	(231)
Electricity for lighting (calculated in Appendix L)												182.0420	(232)
Total delivered energy for all uses												3913.7103	(238)

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating – main system 1	1593.6410	0.2160	344.2265 (261)
Space heating – secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2054.0273	0.2160	443.6699 (264)
Space and water heating			787.8963 (265)
Pumps and fans	84.0000	0.5190	43.5960 (267)
Energy for lighting	182.0420	0.5190	94.4798 (268)
Total CO ₂ , kg/m ² /year			925.9722 (272)
Emissions per m ² for space and water heating			20.9547 (272a)
Fuel factor (electricity)			1.5500
Emissions per m ² for lighting			2.5128 (272b)
Emissions per m ² for pumps and fans			1.1595 (272c)
Target Carbon Dioxide Emission Rate (TER) = (20.9547 * 1.55) + 2.5128 + 1.1595, rounded to 2 d.p.			36.1000 (273)