



HODKINSON



**Revised Energy Strategy
– Condition 28a**

Peabody Trust, Catalyst by Design
and Hill Residential Limited

St Ann's Phase 1A

Final

Eleanor Risby
BSc (Hons), MEI

November 2023

DOCUMENT CONTROL RECORD

REPORT STATUS: FINAL

Version	Date	Reason for issue	Author	Checked by	Approved for Issue by Project Manager
v.1	26.10.23	Draft	E Risby	J Peck	Z Watkins
v.2	30.11.23	Final	E Risby	J Peck	Z Watkins
v.3	15.07.2024	Final	E Risby	J Peck	Z Watkins

ABOUT HODKINSON CONSULTANCY

Our team of technical specialists offer advanced levels of expertise and experience to our clients. We have a wide experience of the construction and development industry and tailor teams to suit each individual project.

We are able to advise at all stages of projects from planning applications to handover.

Our emphasis is to provide innovative and cost-effective solutions that respond to increasing demands for quality and construction efficiency.

This report has been prepared by Hodkinson Consultancy using all reasonable skill, care and diligence and using evidence supplied by the design team, client and where relevant through desktop research.

Hodkinson Consultancy can accept no responsibility for misinformation or inaccurate information supplied by any third party as part of this assessment.

This report may not be copied or reproduced in whole or in part for any purpose, without the agreed permission of Hodkinson Consultancy of Rickmansworth, Hertfordshire.

Executive Summary

This report summarises the latest proposed energy strategy for the development at St Ann's Phase 1A, in the London Borough of Haringey. The aim of this report is to show that the energy strategy meets the targets set out in Condition 28(a) of the masterplan planning consent (HGY/2022/1833), to partly discharge the condition for the residential portion of Phase 1A.

The key energy strategy targets noted within the condition are as follows:

- > Achieve a minimum 26% CO₂ emissions reduction at the **Be Lean** stage, over a Part L 2013 baseline using SAP 10 emission factors.
- > Achieve a minimum 76.1% CO₂ emissions reduction overall, over a Part L 2013 baseline, using SAP 10 carbon emission factors.
- > Provide a minimum 178 kWp across Phase 1A of the development.
- > Offset any remaining CO₂ emissions up to a standard of *Zero Carbon*, using the carbon offset price of £95/tonne for a period of 30 years.

The proposed development will be built under Part L 2021 Building Regulations. However, in line with the requirements of Condition 28(a), the figures in this report are based over a Part L 2013 baseline, using SAP 10 carbon emission factors.

Phase 1A will provide 239 dwellings, including 26 houses, and 213 apartments. Work has not yet started on the non-residential, existing buildings on the scheme, and so this report focuses on the energy strategy for the new build residential dwellings. The strategy for the non-residential buildings will be reported on separately.

The energy strategy includes a range of **Be Lean** energy efficiency measures, including triple glazing and mechanical ventilation with heat recovery. This allows the development to achieve a **26.3%** reduction over a Part L 2013 baseline, using SAP 10 emission factors. This meets the **Be Lean** requirement of Condition 28(a) for the residential development.

In line with the consented masterplan energy strategy, a site wide heat network comprising air source heat pumps and electric boilers, will provide the space heating and hot water demand to all apartments on site. This delivers a further site wide CO₂ reduction of **33.1%**, using SAP 10 carbon emission factors. The houses will have heating and hot water supplied by individual air source heat pumps to each dwelling which is reported at the **Be Green** stage.

In line with the masterplan energy strategy, a number of **Be Green** renewable energy technologies are included as part of the energy strategy. Individual air source heat pumps will provide heating and hot water to the houses on the development. In addition, in line with Condition 28(a), 178 kWp of solar PV is proposed

for Phase 1A. This will be located on the roofs of Block C and Block D. These measures deliver a further site wide CO₂ reduction of **76.2%**, using SAP 10 carbon emissions.

Table *i*, below, summarises the anticipated site wide CO₂ emissions for Phase 1A of the St Ann's development. The combination of the **Be Lean**, **Be Clean** and **Be Green** measures, as outlined above, result in an overall **76.2%** reduction in CO₂ emissions over a Part L 2013 baseline, using SAP 10 carbon emission factors. This meets the targets set out in Condition 28(a) of the planning conditions.

The development will be built to Part L 2021 Building Regulations. Table *ii* shows the estimated performance over a Part L 2021 baseline.

The development will commit to offset the remaining CO₂ emissions through a carbon offset payment to the London Borough of Haringey. The remaining CO₂ emissions to be offset are estimated at **58.5 Tonnes CO₂ per annum**, based on the calculations over the Part L 2021 baseline. Using the carbon offset price of £95 per tonne of CO₂ for a period of 30 years, as outlined in the S106 agreement, the carbon offset payment is calculated to be **£166,725**.

Table *i*: Residential Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)	
	Regulated	
Baseline: Part L 2013 Compliant Development	279	
After <i>Be Lean</i> Measures	205	
After <i>Be Clean</i> Measures	113	
After <i>Be Green</i> Measures	66	
Stage	Regulated Carbon Dioxide Savings	
	Tonnes CO ₂ per Annum	Percentage
Savings from <i>Be Lean</i> Measures	73	26.3%
Savings from <i>Be Clean</i> Measures	92	33.1%
Savings from <i>Be Green</i> Measures	47	16.8%
Cumulative On-Site Savings	212	76.2%

Table ii: Regulated Carbon Dioxide Emissions over a Part L 2021 baseline

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)
	Residential
Part L 2021 Baseline	231.0
Final Energy Strategy	58.5
Total Emissions Reduction	172.5
Percentage Reduction	74.7%

CONTENTS

Executive Summary	2
1. INTRODUCTION	6
2. DEVELOPMENT OVERVIEW	7
3. PLANNING CONDITIONS	9
4. ASSESSMENT METHODOLOGY – BASELINE EMISSIONS	11
5. BE LEAN – ENERGY EFFICIENCY	12
CO ₂ Emissions at <i>Be Lean</i> Stage	16
6. BE CLEAN – DECENTRALISED ENERGY	18
CO ₂ Emissions at <i>Be Clean</i> Stage	19
7. BE GREEN – RENEWABLE ENERGY TECHNOLOGIES	20
CO ₂ Emissions at <i>Be Green</i> Stage	20
Part L 2021 Energy Performance	21
8. BE SEEN – ENERGY MONITORING	22
9. ZERO CARBON	23
10. SUMMARY	24
APPENDICES	27
Appendix A: TER / DER Worksheets – <i>Be Lean</i>	
Appendix B: Energy Centre Schematic	
Appendix C: TER / DER Worksheets – <i>Be Clean</i>	
Appendix D: TER / DER Worksheets – <i>Be Green</i>	
Appendix E: Monitoring and Metering Plan	

1. INTRODUCTION

- 1.1** This document has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development.
- 1.2** This document sets out the energy strategy on behalf of Peabody Trust, Catalyst by Design and Hill Residential Limited ('The Developer') for Phase 1A of the St Ann's development, located in the London Borough of Haringey.
- 1.3** The site benefits from planning consent (HGY/2022/1833), with a masterplan Energy Statement prepared by XCO2 (May 2022) which sets the site wide energy strategy. Condition 28(a) of the consent sets out the energy requirements for Phase 1A of the development, including the following targets:
- > A minimum residential 26% CO₂ emissions reduction at the **Be Lean** stage (over Part L 2013, with SAP 10 emission factors);
 - > A minimum residential 76% CO₂ emissions reduction overall (over Part L 2013, with SAP 10 emission factors);
 - > A minimum 178 kWp located within Phase 1A of the development.
- 1.4** This report aims to partially discharge the condition by presenting the energy strategy for the residential part of Phase 1A. The non-residential buildings will be addressed separately.
- 1.5** Detailed design work has started for Phase 1A, and therefore this reports demonstrates the performance of the latest design information available.
- 1.6** The aims of the energy strategy are summarised as follows:
- > To provide comfortable high-quality homes that people aspire to live in;
 - > To be low carbon from the outset, with plans for further decarbonisation;
 - > To take account of specific site characteristics that link to the energy strategy, for instance, acoustics and air quality;
 - > To supply a resilient supply of reasonably priced heat to residents;
 - > To address the requirements of the planning consent, as well as relevant Building Regulations.

2. DEVELOPMENT OVERVIEW

- 2.1** The development is located in the London Borough of Haringey, at the St Ann's hospital site, as shown in Figure 1, below.



Figure 1: Site location - circled in red (Google Maps 2023)

- 2.2** Figure 2 shows the proposed site plan for Phase 1A.

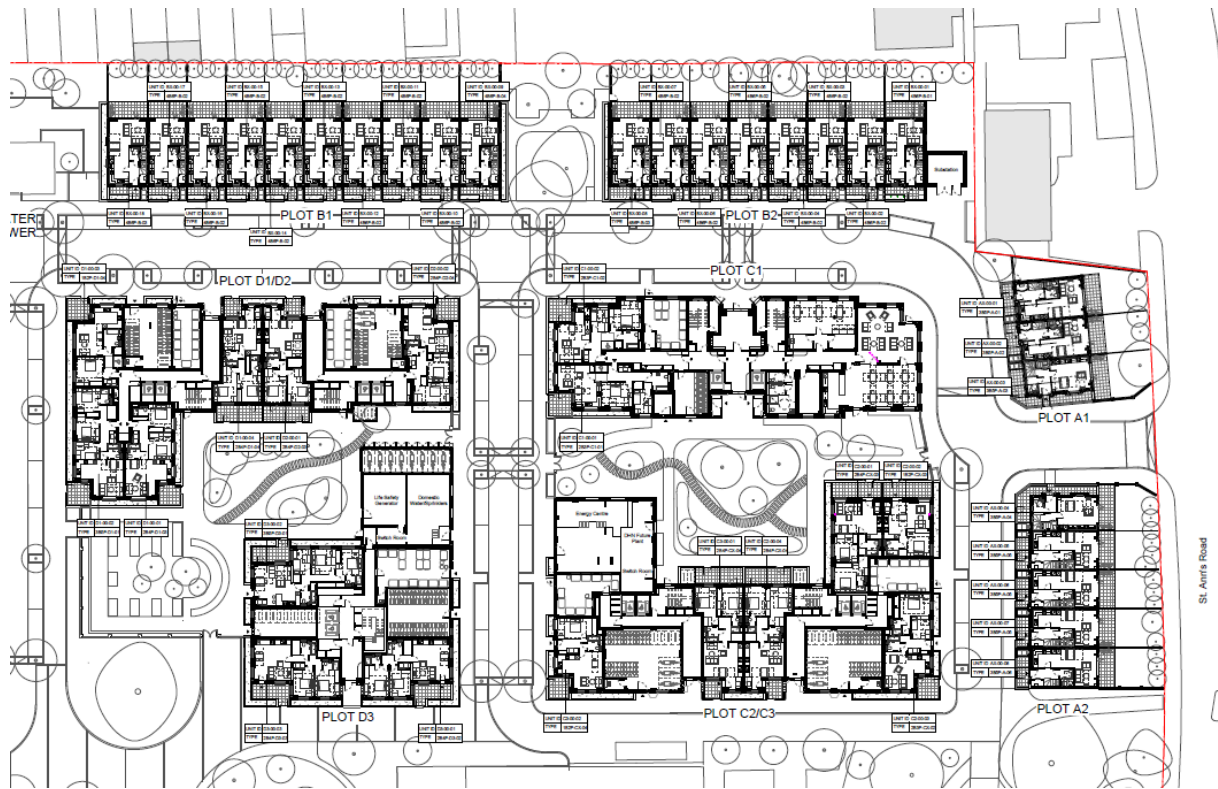


Figure 2: Proposed Site Layout – KCA, August 2023

3. PLANNING CONDITIONS

3.1 A hybrid planning consent was granted in 2022 for the site (HGY2022/1833). This consisted of detailed consent for Phase 1A and outline consent for Phases 1B, 2 and 3. The aim of this report is to partly discharge Condition 28(a) of the decision notice, for the residential portion of the development, relating to the energy strategy for Phase 1A of the development, as below.

3.2 Condition 28 – Revised Energy Statement

“(a) Prior to the commencement of above ground works to Phase 1a, a Revised Energy Strategy shall be submitted to and approved by the Local Planning Authority. This shall be based on the approved Energy Strategy prepared by XCO2 (dated October 2022), delivering as a minimum a 76.1% (new build) and 56.6% (refurbishment) improvement on carbon emissions over 2013 Building Regulations Part L, with SAP 10 emission factors, high fabric efficiencies, a low-carbon heating strategy, and a minimum 178 kWp solar photovoltaic (PV) array. The strategy will set out:

- Confirmation of how this phase will meet the zero carbon policy requirement in line with the Energy Hierarchy;*
- Confirmation of achieving the highest possible fabric improvements, aiming for a minimum reduction of 26% reduction under Be Lean;*
- Specifications, location, pipework routes for the proposed heating and ventilation strategies;*
- Confirmation of the annual and peak space heating demand of the retained and new buildings;*
- Air tightness testing results and strategy to improve air tightness in the existing buildings;*
- Strategy to reduce thermal bridging and insulation of existing buildings;*
- Confirmation that the two large retained buildings will be connected to the Phase 1a heat network;*
- Confirmation and details of how Phase 1a will form part of a site-wide heat network in future phases;*
- How the solar PVs have been maximised on Blocks A, C and D, and the retained buildings;*
- The proposed heating, renewable energy and ventilation strategies (including their efficiency, output, location and pipework layout);*
- A metering strategy.*

The final agreed energy strategy shall be installed and operation prior to the first occupation of the development. The development shall be carried out strictly in accordance with the details so approved and shall be operated and maintained as such thereafter.

(b) The solar PV arrays must be installed and brought into use by block prior to the first occupation of that block. Two months prior to first occupation of that block, evidence that the solar PV arrays have been installed correctly shall be submitted to and approved by the Local Planning Authority, including photographs of the solar array, installer confirmation, and an energy generation statement for the period that the solar PV array has been installed.

Within six months of completion of each block, a final Energy Assessment must be submitted to the local planning authority to demonstrate achieved carbon emission savings on site. Evidence shall also

be submitted to the Local Planning Authority that the development has been registered on the GLA's Be Seen energy monitoring platform.

Reason: To ensure the development reduces its impact on climate change by reducing carbon emissions on site in compliance with the Energy Hierarchy, and in line with London Plan (2021) Policy SI2 and SI3, and Local Plan (2017) Policies of SP4 and DM22."

- 3.3** Condition 29 of the decision notice relates to the overheating strategy, and has been addressed in a separate report.

Summary of Requirements

- 3.4** In order to meet the requirements of Condition 28, this energy strategy aims to show that the residential portion of the development at Phase 1A will:
- > Achieve a minimum 26% CO₂ emissions reduction at the **Be Lean** stage, over a Part L 2013 baseline using SAP 10 emission factors.
 - > Achieve a minimum 76.1% CO₂ emissions reduction overall, over a Part L 2013 baseline, using SAP 10 carbon emission factors.
 - > Provide a minimum 178 kWp across Phase 1A of the development.
 - > Offset any remaining CO₂ emissions up to a standard of *Zero Carbon*, using the carbon offset price of £95/tonne for a period of 30 years as outlined in the S106 agreement.

4. ASSESSMENT METHODOLOGY – BASELINE EMISSIONS

- 4.1** This statement first establishes a baseline assessment of the energy demands and associated CO₂ emissions for the proposed development. The energy strategy then follows the GLA hierarchy approach of **Be Lean, Be Clean, Be Green** and **Be Seen**.
- 4.2** The development is expected to be built under Part L 2021 Building Regulations. However, in line with Condition 28(a) of the decision notice, this report shows that targets over a Part L 2013 baseline, using SAP 10 carbon emission factors, have been achieved. Through the design process, the energy strategy is being developed to ensure that Part L 2021 compliance is also achieved.
- 4.3** The estimated annual 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 demand and fixed electrical items.
- 4.4** Calculations have been performed on representative dwelling types. These encompass an array of flat and house types which differ in orientation and size, and take into account a mix of ground floor, mid floor and top floor apartments. The selected dwellings therefore represent a fair aggregation of the proposed unit mix.
- 4.5** The performance of the sample dwelling types has then been extrapolated to reflect the whole of Phase 1A.

Baseline Emissions

- 4.6** A baseline calculation has been carried out to establish the regulated CO₂ emissions by which this energy strategy will be compared against. Table 1, below, shows the Part L 2013 regulated baseline CO₂ emissions rate, using SAP 10 emission factors. TER worksheets supporting this calculation are in Appendix A.

Table 1: Carbon Dioxide Emissions Baseline (SAP 10 Carbon Emission Factors)	
	Regulated [T CO ₂ /year]
Residential	279

5. BE LEAN – ENERGY EFFICIENCY

5.1 This section describes how the development has been designed to achieve the **Be Lean** requirements of Condition 28(a) of the planning permission (REF:HGY/2022/1833).

Insulation Standards

5.2 The detailed design stage is in progress, the fabric energy performance outlined below have been calculated from the current proposed build ups for the development.

5.3 All dwellings will incorporate enhanced insulation in the building envelope (walls, roofs, floors and glazing) to achieve the following U-values:

- > Glazing with a U-value of 0.80 W/m²K;
- > External wall U-value of 0.15 W/m²K for apartments, and 0.16 W/m²K for houses;
- > Apartment corridors assumed to have no active heating. Wall U-value of 0.15 W/m²K (with a shelter factor applied);
- > Party walls to be fully filled and insulated (achieving an effective U-value of 0.00 W/m²K);
- > Exposed/Ground floor U-values of 0.13 W/m²K;
- > Main roof U-values of 0.10 W/m²K for apartments and 0.11 W/m²K for houses.

Air Tightness and Ventilation

5.4 Air tightness standards will confirm 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 8m³/h.m² to 3.0 m³/h.m² or less (for houses) or 2.5 m³/h.m² (for apartments) will further reduce space heating demands.

5.5 Mechanical Ventilation with Heat Recovery (MVHR) will be installed in all 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.

5.6 The MVHR units will be located within the prefabricated utility cupboard (PUC) within each apartment.

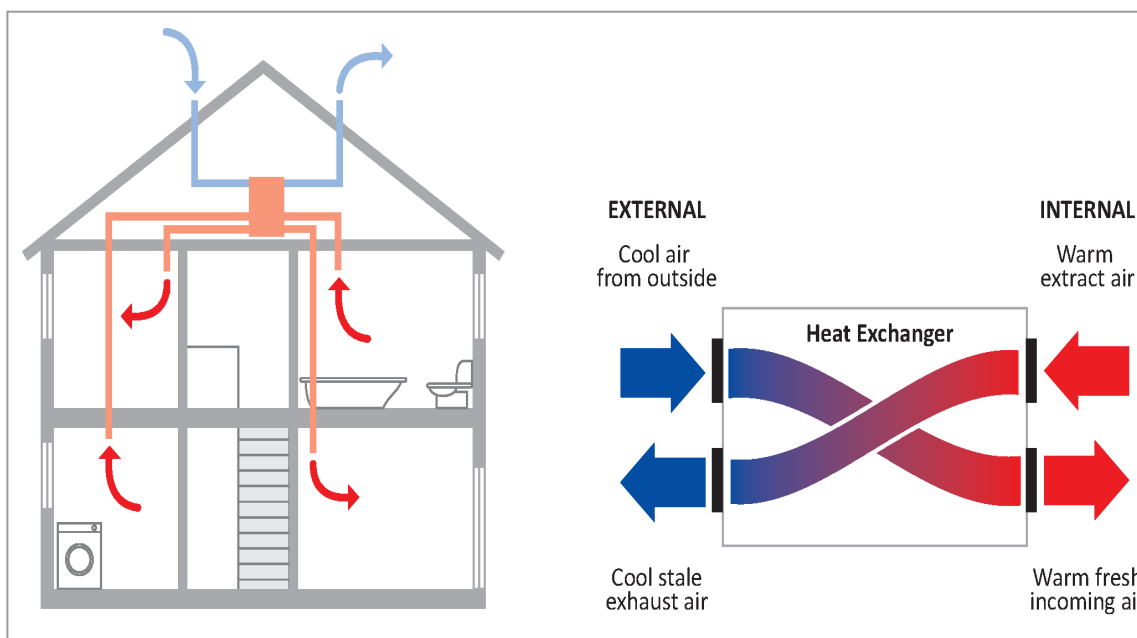


Figure 3: MVHR in operation

- 5.7** The overheating analysis, summarised in a separate report, proposes the use of MVHR units which are compatible with bolt-on peak-logging units for the dwellings that are most affected by external noise. There are limited products available with this option, and those that are available generally have lower efficiencies than standard MVHR units. Therefore, two separate systems are proposed to maximise energy performance in the dwellings that do not have noise constraints. The proposed performance of each system is summarised in Table 2, below.

Table 2: MVHR Performance – Phase 1A Dwellings		
	Noise Affected Dwellings (Peak Logging)	All Other Dwellings
Dwellings with 1 wet room + kitchen	SFP – 0.56 W/l/s Heat recovery – 87%	SFP – 0.52 W/l/s Heat recovery – 92%
Dwellings with 2 wet rooms + kitchen	SFP – 0.68 W/l/s Heat recovery – 87%	SFP – 0.65 W/l/s Heat recovery – 92%

- 5.8** Additionally, where possible, all homes will have openable windows and therefore the ability to naturally ventilate should the occupant desire. This is restricted in some scenarios, on some facades. This has been taken account in the accompanying Overheating Report.

Thermal Bridging

5.9 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.

5.10 Figure 4 below illustrates the benefits of reducing thermal bridges.

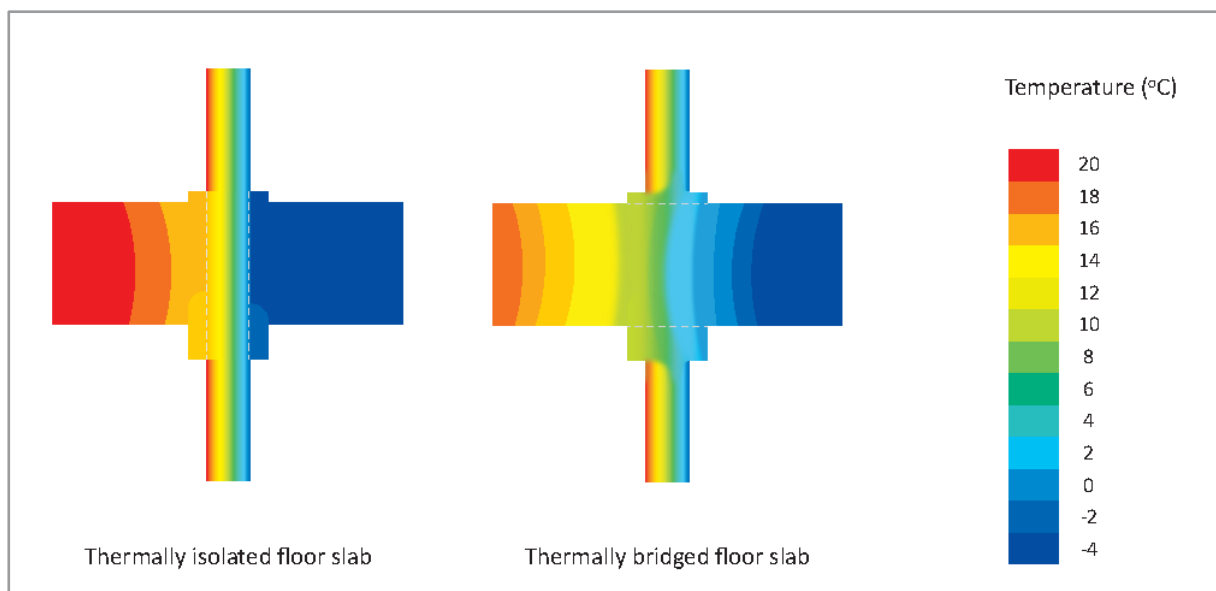


Figure 4: Thermal Bridging

5.11 Bespoke thermal bridging psi value calculations have been completed for the proposed development. The achieved performance is summarised below and has been accounted for within the SAP calculations. For any junctions that have not been calculated, default performance is used.

5.12 The calculated thermal bridging performance is as follows:

- > Lintels (apartments) – 0.021 W/mK;
- > Lintels (houses) – 0.049 W/mK;
- > Sill (apartments) – 0.086 W/mK;
- > Jamb (apartments) – 0.098 W/mK;
- > Ground floor (apartments) – 0.089 W/mK;

- > Exposed floor (apartments) – 0.13 W/mK;
- > Intermediate floor (apartments) – 0.129 W/mK;
- > Balcony between dwellings (apartments) – 0.597 W/mK;
- > External corner (houses) – 0.06 W/mK;
- > Party corner (apartments) – 0.053 W/mK;
- > Party corner (houses) – 0.053 W/mK;
- > Party roof (apartments) – 0.029 W/mK;
- > Party roof (houses) – 0.055 W/mK.

Space Heating & Hot Water

- 5.13** The space heating requirement will be reduced by the fabric, air tightness and ventilation measures detailed above.
- 5.14** In line with the masterplan energy strategy, a gas boiler baseline has been used in the **Be Lean** stage assessment. An efficiency of 95% has been assumed.
- 5.15** The final energy strategy will be for the apartments to connect to the proposed St Ann's site wide heat network. Further details of this will be outlined at the **Be Clean** stage. The houses will be heated by individual Air Source Heat Pumps (ASHP) in line with the consented energy strategy. This will be reflected in the **Be Green** stage calculations.

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 Developer 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 full results of the overheating analysis are presented in a separate Dynamic Overheating Report, with results and detailed mitigation strategies. As a summary, the main points impacting the energy strategy are:

- > Solar control glazing (g-value) to reduce uncomfortable solar gains. A g-value of 0.42 has been used for West, East and South facades, and a g-value of 0.50 on North facades.
- > Openable windows used as the primary means of ventilation where there is minimal noise risk.
- > Air tempering bolt-on to MVHR proposed for dwellings with window opening limitations due to external noise.

CO₂ Emissions at *Be Lean* Stage

5.20 Table 3, below, shows the site wide estimated Regulated CO₂ emissions following the *Be Lean* measures outlined above for Phase 1A. As shown, these result in a CO₂ emissions reduction of 26.3% over a Part L 2013 baseline, assuming SAP 10 carbon emission factors. This meets the requirements of Condition 28(a). DER worksheets supporting these calculations can be found in Appendix A.

Table 3: Regulated Carbon Dioxide Emissions at *Be Lean* Stage (SAP 10 carbon emission factors)

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)
	Residential
Baseline: Part L 2013 Compliant Development	279
After <i>Be Lean</i> Measures	205
Total Emissions Reduction	73
Percentage Reduction	26.3%

5.21 Table 4, below, shows the expected Part L 2021 Fabric Energy Efficiency Standard (FEES) following the proposed *Be Lean* measures.

Table 4: Fabric Energy Efficiency

	Part L 2013 Baseline Target Fabric Energy Efficiency (kWh/m²/year)	Design Fabric Energy Efficiency (kWh/m²/year)	Improvement (%)
Development Total	50.4	39.74	21%

6. BE CLEAN – DECENTRALISED ENERGY

Masterplan Heating Strategy

- 6.1** As outlined in the masterplan energy strategy by XCO2 (May 2022), there will be a site wide heat network for the St Ann's development, of which the apartments in Phase 1A will be connected to.
- 6.2** The masterplan energy strategy concluded that due to the phasing of land ownership and availability, a single centralised energy centre would not be compatible. Because of this, three energy centres are planned for the network (Phase 1A, 1B/2, and 3). Therefore, the Phase 1A energy centre will be sized to meet the demands of Phase 1A only. However, it will connect to the other phases of the network once they become operational too.
- 6.3** Connection points will also be provided to the Peace Building and the Admin Building within Phase 1A.
- 6.4** The energy centre for Phase 1A is located within Plot C2/C3. A schematic of the energy centre can be found in Appendix B.
- 6.5** As set out in the masterplan energy statement, the site network will generate heat from the following sources:
- > ASHPs – 95% of heat demand (primary source);
 - > Electric boilers – 5% of heat demand.
- 6.6** The full design of the heat network is not yet finalised, but the efficiencies of the network will be optimised as far as possible. For the purpose of this report, a Seasonal Coefficient of Performance (SCOP) of 3.20 has been assumed for the heat pumps. This aligns with the propane-based heat pumps such as the Thermonova models which are currently under consideration. The efficiency of the electric boilers is assumed to be 95%. This will be optimised through the detailed design.
- 6.7** A distribution loss factor of 1.05 has been used in the SAP calculations (as per SAP 2012 default allowances). It is understood that this underestimates actual network losses, even with an excellent design adhered to. However, this factor has been used to be consistent with the masterplan energy calculations. Heat losses will be minimised as far as possible through the detailed design stage, but it is expected that actual loss factor within the final Part L 2021 calculations will be higher.
- 6.8** With the electricity grid projected to continue to decarbonise into the 2020s and 2030s, the heat pump and electric boiler strategy will ensure that the site continues to improve its carbon performance even after occupation.

CO₂ Emissions at *Be Clean* Stage

6.9 Table 5, below, shows the Regulated CO₂ emission reductions following the application of *Be Clean* measures. DER worksheets to support these calculations are in Appendix C.

Table 5: Regulated Carbon Dioxide Emissions at <i>Be Clean</i> Stage (SAP 10 carbon emission factors)	
Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)
	Residential
After <i>Be Lean</i> Measures	205
After <i>Be Clean</i> Measures	113
Total Emissions Reduction	92
Percentage Reduction	33.1%

6.10 Table 6, below, shows the expected space heating demand of the proposed development.

Table 6: Space Heating Demand	
Building Use	Space Heating Demand (kWh/m ² /year)
Phase 1A Residential	18.05

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.
- 7.2 The Applicant has already demonstrated a clear commitment to applying renewables across the site with the inclusion of ASHPs as the lead heat source on the heat network to supply heating and hot water to all apartments.
- 7.3 In line with the masterplan energy strategy, the following renewable energy technologies are proposed for Phase 1A of the development.

Air Source Heat Pumps

- 7.4 Individual ASHPs are expected to be used for all houses on the proposed development. The houses have utilised a space heating COP of 3.6.

Photovoltaic (PV) Panels

- 7.5 In line with condition 28 and the masterplan energy strategy, 178 kWp of solar PV is proposed for Phase 1A of the development. It is proposed that 78 kWp is located on the roof of Block C, and 100 kWp located on the roof of Block D.
- 7.6 Panels should be positioned at an angle of 5-10 degrees towards a southerly direction.

CO₂ Emissions at **Be Green** Stage

- 7.7 Table 7, below, shows the regulated CO₂ emission reductions following the application of the **Be Green** measures as outlined above, assuming SAP 10 carbon emission factors. DER worksheets supporting these calculations are in Appendix D.

Table 7: Regulated Carbon Dioxide Emissions at Be Green Stage (SAP 10 carbon emission factors)

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)
	Residential
After <i>Be Clean</i> Measures	113
After <i>Be Green</i> Measures	66
Total Emissions Reduction	47
Percentage Reduction	16.8%

Part L 2021 Energy Performance

- 7.8 The development at St Ann's Phase 1A will be built under Part L 2021 building regulations. Table 8, below, summarises current estimated energy performance over a Part L 2021 baseline, using the assumptions outlined throughout this report following all *Be Lean*, *Be Clean* and *Be Green* measures.

Table 8: Regulated Carbon Dioxide Emissions over a Part L 2021 baseline

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)
	Residential
Part L 2021 Baseline	231.0
Final Energy Strategy	58.5
Total Emissions Reduction	172.5
Percentage Reduction	74.7%

8. BE SEEN – ENERGY MONITORING

- 8.1** The London Plan introduces a fourth stage to the energy hierarchy; the *Be Seen* stage, which proposes monitoring and reporting of the actual operational energy performance of major developments for at least five years.
- 8.2** An effectively implemented post-construction monitoring regime can have several benefits including environmental (e.g. reduced grid infrastructure strain, carbon emissions reduction) and socio-economic (e.g. reduced occupants bills and raised awareness around energy use).
- 8.3** The *Be Seen* stage aims to monitor the actual energy and carbon performance of buildings and compare with the estimated figures put forward at both planning and as-built stages. This will assist with achieving a zero-carbon London and determining the effectiveness of the incumbent policies.
- 8.4** The figure below outlines the three stages for submission of information, and who is responsible for compiling all necessary outputs.

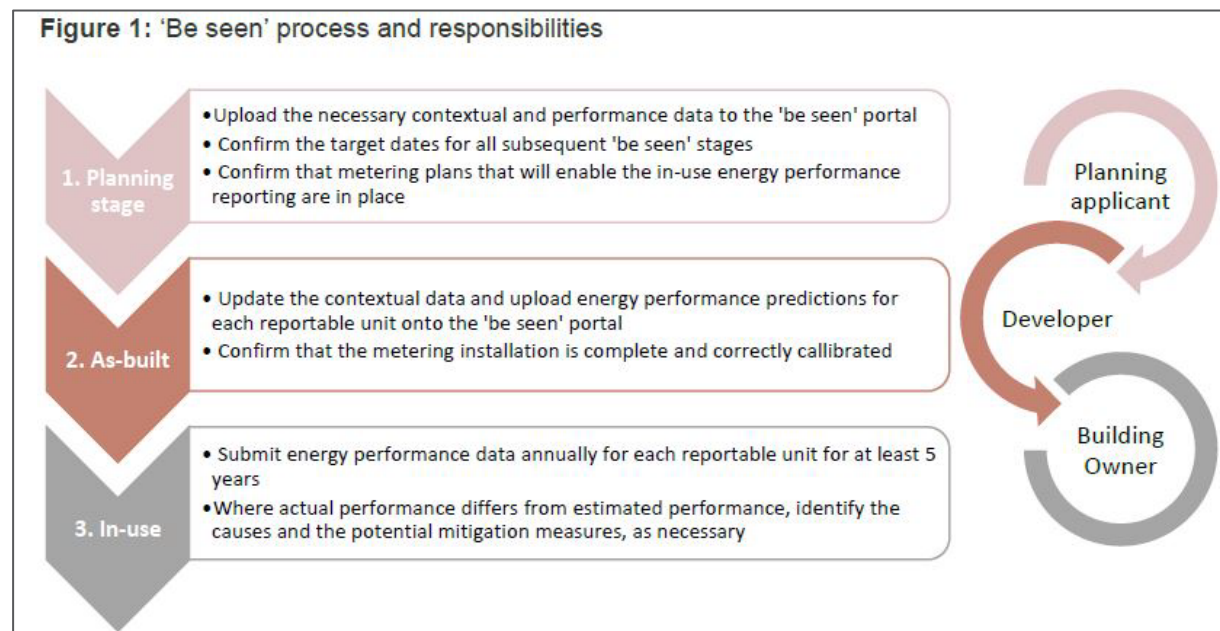


Figure 5: *Be Seen* Stages

- 8.5** See Appendix E for a proposed metering and monitoring plan for Phase 1A.

9. ZERO CARBON

- 9.1** The proposed development is required to achieve a minimum on-site CO₂ reduction of 76.1% beyond Part L 2013 using SAP 10 carbon emission figures.
- 9.2** In addition to this, the development is also subject to an additional off-setting contribution to meet a total 100% reduction in Regulated CO₂ emissions in order to achieve a standard of *Zero Carbon*.
- 9.3** As the site will be built to Part L 2021, the carbon offsetting contribution has been based on this calculation. The residual 58.5 tonnes of CO₂, as shown in Table 7, will therefore be subject to an offsetting price of £95/tonne for a period of 30 years (as per London Plan requirements and in line with the XCO2 masterplan strategy).
- 9.4** Table 9, below, shows the calculated carbon offsetting cost to the application, following the **Be Lean, Be Clean** and **Be Green** measures outlined in this report.

Table 9: Carbon Offset Payment		
Stage	Residual CO ₂ (Tonnes)	Offset Payment (£95/tonne/30yrs)
Residential	58.5	£166,725

10. SUMMARY

- 10.1** This report summarises the latest proposed energy strategy for the development at St Ann's Phase 1A, in the London Borough of Haringey. The aim of this report is to show that the energy strategy meets the targets set out in Condition 28(a) of the masterplan planning consent (HGY/2022/1833), to partly discharge the condition for the residential portion of Phase 1A.
- 10.2** The key energy strategy targets noted within the condition are as follows:
- > Achieve a minimum 26% CO₂ emissions reduction at the **Be Lean** stage, over a Part L 2013 baseline using SAP 10 emission factors.
 - > Achieve a minimum 76.1% CO₂ emissions reduction overall, over a Part L 2013 baseline, using SAP 10 carbon emission factors.
 - > Provide a minimum 178 kWp across Phase 1A of the development.
 - > Offset any remaining CO₂ emissions up to a standard of *Zero Carbon*, using the carbon offset price of £95/tonne for a period of 30 years.
- 10.3** The proposed development will be built under Part L 2021 Building Regulations. However, in line with the requirements of Condition 28(a), the figures in this report are based over a Part L 2013 baseline, using SAP 10 carbon emission factors.
- 10.4** Phase 1A will provide 239 dwellings, including 26 houses, and 213 apartments. Work has not yet started on the non-residential, existing buildings on the scheme, and so this report focuses on the energy strategy for the new build residential dwellings. The strategy for the non-residential buildings will be reported on separately.
- 10.5** The energy strategy includes a range of **Be Lean** energy efficiency measures, including triple glazing and mechanical ventilation with heat recovery. This allows the development to achieve a **26.3%** reduction over a Part L 2013 baseline, using SAP 10 emission factors. This meets the **Be Lean** requirement of Condition 28(a) for the residential development.
- 10.6** In line with the consented masterplan energy strategy, a site wide heat network comprising air source heat pumps and electric boilers, will provide the space heating and hot water demand to all apartments on site. This delivers a further site wide CO₂ reduction of **33.1%**, using SAP 10 carbon emission factors. The houses will have heating and hot water supplied by individual air source heat pumps to each dwelling which is reported at the **Be Green** stage.
- 10.7** In line with the masterplan energy strategy, a number of **Be Green** renewable energy technologies are included as part of the energy strategy. Individual air source heat pumps will provide heating and hot water to the houses on the development. In addition, in line with Condition 28(a), 178 kWp

of solar PV is proposed for Phase 1A. This will be located on the roofs of Block C and Block D. These measures deliver a further site wide CO₂ reduction of **76.2%**, using SAP 10 carbon emissions.

- 10.8** Table 10, below, summarises the anticipated site wide CO₂ emissions for Phase 1A of the St Ann's development. The combination of the **Be Lean**, **Be Clean** and **Be Green** measures, as outlined above, result in an overall **76.2%** reduction in CO₂ emissions over a Part L 2013 baseline, using SAP 10 carbon emission factors. This meets the targets set out in Condition 28(a) of the planning conditions.
- 10.9** The development will be built to Part L 2021 Building Regulations. Table 11 shows the estimated performance over a Part L 2021 baseline.
- 10.10** The development will commit to offset the remaining CO₂ emissions through a carbon offset payment to the London Borough of Haringey. The remaining CO₂ emissions to be offset are estimated at **58.5 Tonnes CO₂ per annum**, based on the calculations over the Part L 2021 baseline. Using the carbon offset price of £95 per tonne of CO₂ for a period of 30 years, as outlined in the S106 agreement, the carbon offset payment is calculated to be **£166,725**.

Table 10: Residential Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)	
	Regulated	
Baseline: Part L 2013 Compliant Development	279	
After <i>Be Lean</i> Measures	205	
After <i>Be Clean</i> Measures	113	
After <i>Be Green</i> Measures	66	
Stage	Regulated Carbon Dioxide Savings	
	Tonnes CO ₂ per Annum	Percentage
Savings from <i>Be Lean</i> Measures	73	26.3%
Savings from <i>Be Clean</i> Measures	92	33.1%
Savings from <i>Be Green</i> Measures	47	16.8%
Cumulative On-Site Savings	212	76.2%

Table 11: Regulated Carbon Dioxide Emissions over a Part L 2021 baseline

Stage	Carbon Dioxide Emissions (Tonnes CO ₂ per Annum)
	Residential
Part L 2021 Baseline	231.0
Final Energy Strategy	58.5
Total Emissions Reduction	172.5
Percentage Reduction	74.7%

APPENDICES

Appendix A: TER / DER Worksheets – *Be Lean*

Appendix B: Energy Centre Schematic

Appendix C: TER / DER Worksheets – *Be Clean*

Appendix D: TER / DER Worksheets – *Be Green*

Appendix E: Monitoring and Metering Plan

Appendix A

TER / DER Worksheets – *Be Lean*

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End EF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End EF LEAN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End EF, St Ann's Hospital, London, N15					
SAP Rating	83 B	DER	17.13	TER	21.87	
Environmental	88 B	% DER<TER	21.68			
CO ₂ Emissions (t/year)	0.83	DFEE	45.77	TFEE	61.28	
General Requirements Compliance	Pass	% DFEE<TFEE	25.31			
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 55 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) 21.87 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.13 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)61.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.8 kWh/m²/yrOK

2 Fabric U-values			
Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof (no roof)			
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
x X
Combi boiler
Efficiency: 95.0% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Time and temperature zone control 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: 0.52
Maximum: 1.5 OK
MVHR efficiency: 92%
Minimum: 70% OK

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

Based on:
Overshading: Average
Windows facing North: 7.58 m², No overhang
Windows facing West: 8.03 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features		
Party wall U-value	0.00 W/m ² K	
Exposed floor U-value	0.12 W/m ² K	
Door U-value	0.50 W/m ² K	
Window U-value	0.80 W/m ² K	
Window U-value	0.80 W/m ² K	
Air permeability	2.5 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

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 (m2)		Storey height (m)		Volume (m3)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000 (1b)		x 2.6000 (2b)		= 143.2600 (1b) - (3b)							
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 143.2600 (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	0 + 0		0 + 0		0 = 0		0 * 10 = 0.0000 (7a)					
Number of fuelless gas fires	0 + 0		0 + 0		0 = 0		0 * 10 = 0.0000 (7b)					
	0 + 0		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							2.5000					
Infiltration rate							0.1250 (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) = 0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (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) =	78.2000 (23c)											
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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					
Glazing North (Uw = 0.80)			7.5800	0.7752	5.8760	6.2248	(27)					
Glazing E, S, W (Uw = 0.80)			8.0300	0.7752	6.2248	6.2248	(27)					
Corridor Door			2.1000	0.5000	1.0500	1.0500	(26)					
Exposed Floor			55.1000	0.1200	6.6120	6.6120	(28b)					
External Wall	45.8900	15.6100	30.2800	0.1500	4.5420	14.0000	423.9200 (29a)					
Corridor	10.5300	2.1000	8.4300	0.1500	1.2645	14.0000	118.2000 (29a)					
Total net area of external elements Aum(A, m2)			111.5200		(26)...(30) + (32) = 25.5693		(33)					
Fabric heat loss, W/K = Sum (A x U)							4039.3700 (34)					
Party Wall 1			27.5600	0.0000	0.0000	20.0000	551.2000 (32)					
Party Ceilings 1			55.1000			40.0000	2204.0000 (32b)					
Timber Frame			82.4700			9.0000	742.2300 (32c)					
Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 4039.3700 (34)											
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	73.3098 (35)											
Thermal bridges (Sum(L x Psi) calculated using Appendix K)	15.0450 (36)											
Total fabric heat loss	(33) + (36) = 40.6143 (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	11.5575	11.4319	11.3063	10.6784	10.5528	9.9250	9.9250	9.7994	10.1761	10.5528	10.8040	11.0552 (38)
Heat transfer coeff	52.1718	52.0462	51.9206	51.2927	51.1672	50.5393	50.5393	50.4137	50.7904	51.1672	51.4183	51.6695 (39)
Average = Sum(39)m / 12 =	51.2613 (39)											
HLP	0.9469	0.9446	0.9423	0.9309	0.9286	0.9172	0.9172	0.9149	0.9218	0.9286	0.9332	0.9377 (40)
HLP (average)	0.9303 (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	1.8403 (42)											
Average daily hot water use (litres/day)	77.9069 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)	
Distribution loss (46)m = 0.15 x (45)m												
19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (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 (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 heat	43.6705	38.0100	40.4945	37.6514	37.3185	34.5778	35.7304	37.3185	37.6514	40.4945	40.7250	43.6705 (61)
Total heat required for water heating calculated for each month	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475 (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	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475 (64)
Heat gains from water heating, kWh/month	53.1741	46.4602	48.2607	42.6617	41.2327	36.1744	34.4431	38.6033	39.0361	44.6467	47.8659	51.8407 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	14.3036	12.7044	10.3319	7.8219	5.8470	4.9363	5.3338	6.9331	9.3055	11.8155	13.7905	14.7012 (67)
Appliances gains (calculated in Appendix L, equation 113 or 113a), also see Table 5	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation 115 or 115a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)
Water heating gains (Table 5)	71.4705	69.1373	64.8665	59.2523	55.4202	50.2422	46.2945	51.8861	54.2169	60.0090	66.4804	69.6784 (72)
Total internal gains	299.8218	297.5542	286.7155	269.6596	252.5779	235.8925	225.2632	230.7892	239.6879	256.9217	276.6427	291.3480 (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			7.5800		10.6334		0.5000		0.8000		0.7700	22.3426 (74)
West			8.0300		19.6403		0.4200		0.8000		0.7700	36.7228 (80)
Solar gains	59.0654	114.5354	190.8603	289.0831	368.4482	384.5276	362.9914	301.5090	224.8286	136.0675	73.3515	48.8249 (83)
Total gains	358.8872	412.0896	477.5758	558.7427	621.0260	620.4200	588.2545	532.2982	464.5165	392.9893	349.9942	340.1730 (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, nil,m (see Table 9a)												
tau	21.5068	21.5587	21.6108	21.8754	21.9291	22.2015	22.2015	22.2568	22.0917	21.9291	21.8219	21.7159
alpha	2.4338	2.4372	2.4407	2.4584	2.4619	2.4801	2.4801	2.4838	2.4728	2.4619	2.4548	2.4477
util living area	0.9287	0.9013	0.8478	0.7472	0.6118	0.4660	0.3562	0.4026	0.6066	0.8092	0.9034	0.9361 (86)
MIT	18.7139	19.0310	19.5300	20.1372	20.5923	20.8533	20.9452	20.9248	20.7071	20.0898	19.3093	18.6732 (87)
Th 2	20.1279	20.1298	20.1317	20.1413	20.1432	20.1529	20.1529	20.1548	20.1490	20.1432	20.1394	20.1355 (88)
util rest of house	0.9211	0.8910	0.8321	0.7219	0.5745	0.4154	0.2939	0.3376	0.5557	0.7836	0.8916	0.9292 (89)
MIT 2	17.7007	17.4997	18.2112	19.0639	19.7478	20.0093	20.1111	20.0946	19.8423	19.0203	17.9125	16.9990 (89)
Living area fraction									fLA = Living area / (4) =			0.5145 (91)
MIT	17.9250	18.2876	18.8898	19.6161	20.1469	20.4435	20.5402	20.5217	20.2872	19.5706	18.6312	17.8561 (92)
Temperature adjustment												-0.1500 (93)
adjusted MIT	17.7750	18.1376	18.7398	19.4661	19.9969	20.2935	20.3902	20.3717	20.1372	19.4206	18.4812	17.7061 (93)
8. Space heating requirement												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8942	0.8615	0.8023	0.6989	0.5678	0.4241	0.3118	0.5549	0.7585	0.8630	0.9306 (94)	
Useful gains	320.9129	355.0110	383.1452	391.0819	352.6005	263.0963	183.3986	188.8377	257.7658	298.0879	302.0475	307.3882 (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	703.0170	688.9668	635.4958	541.9663	424.5300	287.7478	191.5560	200.2287	306.6334	451.3228	585.2008	697.8519 (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	284.2584	224.4182	187.7489	108.6368	53.5155	0.0000	0.0000	0.0000	0.0000	114.0068	203.8704	290.5050 (98)
Space heating												1466.9870 (98)
Space heating per m2										(98) / (4) =		26.6241 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %)												95.8000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1531.3016 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	284.2854	224.4182	187.7489	108.6368	53.5155	0.0000	0.0000	0.0000	0.0000	114.0068	203.8704	290.5050 (98)
Space heating efficiency (main heating system 1)	95.8000	95.8000	95.8000	95.8000	95.8000	0.0000	0.0000	0.0000	0.0000	95.8000	95.8000	95.8000 (210)
Space heating fuel (main heating system)	296.7488	234.2570	195.9800	113.3996	55.8617	0.0000	0.0000	0.0000	0.0000	119.0050	212.8083	303.2411 (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	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475 (64)
Efficiency of water heater (217)%	92.0848	91.8568	91.3552	90.3697	88.9747	86.5000	86.5000	86.5000	86.5000	90.3717	91.5628	92.1856 (217)
Fuel for water heating, kWh/month	185.4351	162.3844	169.8781	152.3164	149.7812	135.6931	130.0043	144.9244	146.5249	159.6996	168.2587	180.8823 (219)
Water heating fuel used	185.4351	162.3844	169.8781	152.3164	149.7812	135.6931	130.0043	144.9244	146.5249	159.6996	168.2587	180.8823 (219)
Annual totals kWh/year												1531.3016 (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 = 0.6500)												
mechanical ventilation fans (SFP = 0.6500)												113.6052 (230a)
central heating pump												30.0000 (230c)
Total electricity for the above, kWh/year												143.6052 (231)
Electricity for lighting (calculated in Appendix L)												252.6067 (232)
Total delivered energy for all uses												3813.2960 (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	1531.3016	330.7612 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	1885.7825	407.3290 (264)
Space and water heating		738.0902 (265)
Pumps and fans	143.6052	74.5311 (267)
Energy for lighting	252.6067	131.1029 (268)
Total CO2, kg/year		943.7241 (272)
Dwelling Carbon Dioxide Emission Rate (DER)		17.1300 (273)

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

DER	17.1300 ZC1
Total Floor Area	55.1000
Assumed number of occupants	1.8403
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190
CO2 emissions from appliances, equation (L14)	17.2551 ZC2
CO2 emissions from cooking, equation (L16)	2.9613 ZC3
Total CO2 emissions	37.3463 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	37.3463 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)	55.1000 (1b)	2.6000 (2b)	143.2600 (1b) - (3b)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.2600 (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	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)					
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000	Air changes per hour (5) = 0.1396 (8)					
Pressure test							Yes					
Measured/design AP50							5.0000					
Infiltration rate							0.3896 (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) =	0.3312 (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	0.4222	0.4140	0.4057	0.3643	0.3560	0.3146	0.3146	0.3063	0.3312	0.3560	0.3726	0.3891 (22b)
Adjustive ac	0.5891	0.5857	0.5823	0.5664	0.5634	0.5495	0.5495	0.5469	0.5548	0.5634	0.5694	0.5757 (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 k3/m2K	A x K kJ/K
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			11.6600	1.3258	15.4583		(27)
Exposed Floor			55.1000	0.1300	7.1630		(28b)
External Wall	45.8900	11.6600	34.2300	0.1800	6.1614		(29a)
Corridor	10.5300	2.1000	8.4300	0.1800	1.5174		(29a)
Total net area of external elements Aum(A, m2)			111.5200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	32.4001		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.7310 (36)
Total fabric heat loss						(33) + (36) =	43.1311 (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	27.8521	27.6885	27.5281	26.7747	26.6337	25.9775	25.9775	25.8560	26.2303	26.6337	26.9189	27.2170 (38)
Heat transfer coeff	70.9833	70.8196	70.6592	69.9058	69.7649	69.1087	69.1087	68.9871	69.3614	69.7649	70.0500	70.3481 (39)
Average = Sum(39)m / 12 =												69.9051 (39)
HLP	1.2883	1.2853	1.2824	1.2687	1.2661	1.2542	1.2542	1.2520	1.2588	1.2661	1.2713	Dec 1.2767 (40)
HLP (average)												1.2687 (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													1.8403 (42)
Average daily hot water use (litres/day)													77.9069 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)	
Energy content (annual)	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)	
Distribution loss (46)m = 0.15 x (45)m	19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (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	43.6705	38.0100	40.4945	37.6514	37.3185	34.5778	35.7304	37.3185	37.6514	40.4945	40.7250	43.6705	(61)
Total heat required for water heating calculated for each month	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475	(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	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475	(64)
Heat gains from water heating, kWh/month	53.1741	46.4602	48.2607	42.6617	41.2327	36.1744	34.4431	38.6033	39.0361	44.6467	47.8659	51.8407	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.3355	12.7327	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.4633	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	(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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	(71)
Water heating gains (Table 5)	71.4705	69.1373	64.8665	59.2523	55.4202	50.2422	46.2945	51.8861	54.2169	60.0090	66.4804	69.6784	(72)
Total internal gains	299.8536	297.5825	286.7385	269.6770	252.5909	235.9035	225.2750	230.8046	239.7086	256.9480	276.6735	291.3808	(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	5.6600	10.6334	0.6300	0.7000	0.7700	18.3933	(74)
West	6.0000	19.6403	0.6300	0.7000	0.7700	36.0139	(80)
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421	331.2781
Total gains	354.2609	403.1839	462.4904	584.8297	589.2075	586.5456	556.5531

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, nil,m (see Table 9a)	53.9055	54.0301	54.1527	54.7363	54.8469	53.3677	53.3677	52.4652	53.1660	54.8469	54.6237	54.3922	
tau	4.5937	4.6020	4.6102	4.6491	4.6565	4.6912	4.6912	4.6977	4.6777	4.6565	4.6416	4.6261	
util living area	0.9973	0.9946	0.9858	0.9528	0.8604	0.6924	0.5313	0.5982	0.8512	0.9754	0.9948	0.9979	(86)
MIT	19.6165	19.7704	20.0536	20.4390	20.7632	20.9395	20.9860	20.9764	20.8353	20.4115	19.9474	19.5902	(87)
Th 2	19.8500	19.8524	19.8547	19.8654	19.8674	19.8769	19.8769	19.8764	19.8732	19.8674	19.8634	19.8591	(88)
util rest of house	0.9963	0.9927	0.9806	0.9347	0.8092	0.5946	0.4033	0.4659	0.7763	0.9627	0.9926	0.9971	(89)
MIT 2	18.0217	18.2476	18.6599	19.2139	19.6400	19.8379	19.8720	19.8692	19.7414	19.1868	18.5143	17.9894	(90)
Living area fraction	18.8422	19.0311	19.3770	19.8442	20.2179	20.4047	20.4452	20.4389	20.3042	19.8169	19.2516	18.8130	(92)
MIT	18.8422	19.0311	19.3770	19.8442	20.2179	20.4047	20.4452	20.4389	20.3042	19.8169	19.2516	18.8130	(92)
Temperature adjustment													
adjusted MIT	18.8422	19.0311	19.3770	19.8442	20.2179	20.4047	20.4452	20.4389	20.3042	19.8169	19.2516	18.8130	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9952	0.9908	0.9778	0.9343	0.8267	0.6428	0.4696	0.5343	0.8084	0.9620	0.9910	0.9962	(94)
Useful gains	352.5459	399.4920	452.2145	499.7157	487.0985	377.0430	261.3398	270.8268	360.9125	367.8369	341.1813	335.0400	(95)
Ext temp	4.3000	4.3000	6.5000	8.2000	11.7000	16.6000	16.6000	16.6000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1032.2562	1000.7570	909.8795	765.0657	594.2512	401.1525	265.7346	278.6300	430.3341	643.0161	851.2227	1027.9999	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	505.7044	404.0501	340.5028	191.0520	79.7216	0.0000	0.0000	0.0000	0.0000	204.7334	367.2298	515.5622	(98)
Space heating per m2													(98) / (4) = 47.3422 (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	2792.8867	(211)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	505.7044	404.0501	340.5028	191.0520	79.7216	0.0000	0.0000	0.0000	0.0000	204.7334	367.2298	515.5622	(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)	541.4394	432.6018	364.5640	204.5524	85.3550	0.0000	0.0000	0.0000	0.0000	219.2006	393.1796	551.9938	(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	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475	(64)
Efficiency of water heater	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)
Fuel for water heating, kWh/month	194.8883	170.5970	178.4334	160.2854	159.0216	146.1700	140.0420	156.1140	157.8381	167.9523	176.7579	190.1251	(219)
Water heating fuel used	194.8883	170.5970	178.4334	160.2854	159.0216	146.1700	140.0420	156.1140	157.8381	167.9523	176.7579	190.1251	(219)
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	2792.8867												
Emission factor kg CO2/kWh	0.2160												
Emissions kg CO2/year	603.2635	(261)											
Space heating - main system 1	0.0000												
Space heating - secondary	1998.2253												
Water heating (other fuel)	0.2160												
Space and water heating	75.0000												
Pumps and fans	253.1691												
Energy for lighting	0.5190												
Total CO2, kg/m2/year	131.3948	(268)											
Emissions per m2 for space and water heating	1205.2000	(272)											
Fuel factor (main gas)	18.7819	(272a)											
Emissions per m2 for lighting	1.0000												
Emissions per m2 for pumps and fans	2.3867	(272b)											
Target Carbon Dioxide Emission Rate (TER) = (18.7819 * 1.00) + 2.3867 + 0.7064, rounded to 2 d.p.	0.7064	(272c)											
	21.8700	(273)											

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End MF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End MF LEAN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End MF, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	14.74	TER	18.86	
Environmental	90 B	% DER<TER	21.83			
CO ₂ Emissions (t/year)	0.70	DFEE	37.76	TFEE	46.00	
General Requirements Compliance	Pass	% DFEE<TFEE	17.92			
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 55 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) 18.86 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.74 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)46.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)37.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
x X
Combi boiler
Efficiency: 95%
Minimum: 88%
OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls:	Time and temperature zone control	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:	0.52	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average	
Windows facing North:	7.58 m ² , No overhang	
Windows facing West:	8.03 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	
Door U-value	0.50 W/m ² K	
Window U-value	0.80 W/m ² K	
Window U-value	0.80 W/m ² K	
Air permeability	2.5 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) (Version 9.92, January 2014)												
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014												

1. Overall dwelling dimensions												

	Area		Storey height		Volume							
	m2	(1b)	x	m	(2b)	=	m3	(1b) - (3b)				
Ground floor	55.1000	(1b)		2.6000	(2b)		143.2600	(4)				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000							(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.2600 (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 + 10 =	0.0000 (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) =							0.0000 / (5) =	0.0000 (8)				
Pressure test							Yes					
Measured/design AP50							2.5000					
Infiltration rate							0.1250	(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) =	0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
Balanced mechanical ventilation with heat recovery								0.5000 (23a)				
If mechanical ventilation:								78.2000 (23c)				
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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					
Glazing North (Uw = 0.80)			7.5800	0.7752	5.8760	6.2248	(27)					
Glazing E, S, W (Uw = 0.80)			8.0300	0.7752	6.2248		(27)					
Corridor Door			2.1000	0.5000	1.0500		(26)					
External Wall	45.8900	15.6100	30.2800	0.1500	4.5420	14.0000	423.9200 (29a)					
Corridor	10.5300	2.1000	8.4300	0.1500	1.2645	9.0000	118.0200 (29a)					
Total net area of external elements Aum(A, m2)			56.4200	(26)...(30) + (32) =		18.9573	(31)					
Fabric heat loss, W/K = Sum (A x U)			27.5600	0.0000	0.0000	20.0000	551.2000 (32)					
Party Wall 1			55.1000			40.0000	2204.0000 (32d)					
Party Floor 1			55.1000			40.0000	2204.0000 (32b)					
Party Ceilings 1			55.1000			9.0000	742.2300 (32c)					
Timber Frame			82.4700									
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6243.3700 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							113.3098 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.8888 (36)					
Total fabric heat loss						(33) + (36) =	30.8461 (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	11.5575	11.4319	11.3063	10.6784	10.5528	9.9250	9.9250	9.7994	10.1761	10.5528	10.8040	11.0552 (38)
Heat transfer coeff	62.4035	42.2779	42.1524	41.5245	41.3989	40.7710	40.7710	40.6455	41.0222	41.3989	41.6501	41.9012 (39)
Average = Sum(39)m / 12 =	41.4931 (39)											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7696	0.7673	0.7650	0.7536	0.7513	0.7399	0.7399	0.7377	0.7445	0.7513	0.7559	0.7605 (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												
Average daily hot water use (litres/day)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)
5. Internal gains												

(Jan)	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Table 6c	FF or Table 6c	Access factor Table 6d	Gains W					
North	7.5800	10.6334	0.5000	0.8000	0.7700	22.3426 (74)						
West	8.0300	19.6403	0.4200	0.8000	0.7700	36.7228 (74)						
Solar gains	59.0654	114.5354	190.8603	289.0831	368.4482	384.5276	362.9914	301.5090	224.8286	136.0675	73.3515	
Total gains	358.8872	412.0896	477.5758	558.7427	621.0260	620.4200	588.2545	532.2982	464.5165	392.9893	349.9942	
6. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9420	0.9111	0.8460	0.7165	0.5473	0.3811	0.2696	0.3111	0.5318	0.7919	0.9123	
Ext temp.	338.0597	375.4484	404.0163	400.3230	339.9014	236.4192	158.5999	165.6134	247.0449	311.2270	319.2997	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	
Space heating kWh	213.6553	157.5155	114.7832	49.1467	15.4714	0.0000	0.0000	0.0000	0.0000	61.2715	142.2493	
Space heating per m2												
(98) / (4) =												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %)												95.0000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1026.2057 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
170.7575	157.5155	114.7832	49.1467	15.4714	0.0000	0.0000	0.0000	0.0000	61.2715	142.2493	220.8024 (98)	
Space heating efficiency (main heating system 1)												
95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	0.0000	0.0000	0.0000	95.0000	95.0000	95.0000 (210)	
Space heating fuel (main heating system)												
224.9003	165.8058	120.8244	51.7334	16.2857	0.0000	0.0000	0.0000	0.0000	64.4963	149.7361	232.4236 (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												
170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475 (64)	
Efficiency of water heater												
(217)%	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000 (217)	
Fuel for water heating, kWh/month												
179.7448	157.0117	163.3605	144.8925	140.2815	123.5521	118.3724	131.9574	133.4148	151.9193	162.1709	175.5237 (219)	
Water heating fuel used												
Annual totals kWh/year												
Space heating fuel - main system												1782.2015 (219)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)												
mechanical ventilation fans (SFP = 0.6500)												113.6052 (230a)
central heating pump												30.0000 (230c)
Total electricity for the above, kWh/year												143.6052 (231)
Electricity for lighting (calculated in Appendix L)												252.6067 (232)
Total delivered energy for all uses												3204.6191 (238)

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

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
1026.2057	0.2160	221.8604 (261)
0.0000	0.0000	0.0000 (263)
1782.2015	0.2160	384.9555 (264)
Space and water heating		606.6160 (265)
Pumps and fans		74.5311 (267)
Energy for lighting		131.1029 (268)
Total CO2, kg/year		812.2499 (272)
Dwelling Carbon Dioxide Emission Rate (DER)		14.7400 (273)

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

DER		14.7400 ZC1
Total Floor Area	TFA	55.1000
Assumed number of occupants	N	1.8403
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		17.2551 ZC2
CO2 emissions from cooking, equation (L16)		2.9613 ZC3
Total CO2 emissions		34.9563 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		34.9563 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 (m ²)	Storey height (m)	Volume (m ³)
55.1000 (1b)	x 2.6000 (2b)	= 143.2600 (1b) - (3b)
Ground floor		(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.2600 (5)

2. Ventilation rate

		main heating		secondary heating		other		total		m3 per hour		
Number of chimneys		0	+	0	+	0	=	0	×	0	= 0.0000 (6a)	
Number of open flues		0	+	0	+	0	=	0	×	0	= 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	×	0	= 0.0000 (7c)	
									Air changes per hour			
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =								20.0000 / (5) =	0.1396 (8)			
Pressure test									Yes			
Measured/design AP50									5.0000			
Infiltration rate									0.3896 (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) = 0.3312 (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 (22a)
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	0.4222	0.4140	0.4057	0.3643	0.3560	0.3146	0.3146	0.3063	0.3312	0.3560	0.3726	0.3891 (22b)
Adjustive ac	0.5891	0.5857	0.5823	0.5664	0.5634	0.5495	0.5495	0.5469	0.5548	0.5634	0.5694	0.5757 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			11.6600	1.3258	15.4583		(27)					
External Wall	45.8900	11.6600	34.2300	0.1800	6.1614		(29a)					
Corridor	10.5300	2.1000	8.4300	0.1800	1.5174		(29a)					
Total net area of external elements Aum(A, m2)			56.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.2371		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.2100 (36)					
Total fabric heat loss						(33) + (36) =	30.4471 (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	27.8521	27.6885	27.5281	26.7747	26.6337	25.9775	25.9775	25.8560	26.2303	26.6337	26.9189	27.2170 (38)
Average = Sum(39)m / 12 =	58.2993	58.1356	57.9752	57.2218	57.0809	56.4247	56.4247	56.3031	56.6774	57.0809	57.3660	57.6641 (39)
												57.2211 (39)
HLP (average)	1.0581	1.0551	1.0522	1.0385	1.0360	1.0240	1.0240	1.0218	1.0286	1.0360	1.0411	1.0465 (40)
HLP (average)												1.0385 (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											1.8403 (42)	
Average daily hot water use (litres/day)											77.9069 (43)	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)
Energy conte	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)
Energy content (annual)										Total =	Sum(45)m =	1225.7783 (45)
Distribution loss (46)m = 0.15 x (45)m	19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (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	43.6705	38.0100	40.4945	37.6514	37.3185	34.5778	35.7304	37.3185	37.6514	40.4945	40.7250	43.6705 (61)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total heat required for water heating calculated for each month	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475 (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	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475 (64)
Heat gains from water heating, kWh/month	53.1741	46.4602	48.2607	42.6617	41.2327	36.1744	34.4431	38.6033	39.0361	44.6467	47.8659	51.8407 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	14.3355	12.7527	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339 (67)
Appliances gains (calculated in Appendix L, equation 113 or 113a), also see Table 5	160.4433	162.1082	157.9127	148.9810	137.7083	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation 115 or 115a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)
Water heating gains (Table 5)	71.4705	69.1373	64.8665	59.2523	55.4202	50.2422	46.2945	51.8861	54.2169	60.0090	66.4804	69.6784 (72)
Total internal gains	299.8536	297.5825	286.7385	269.6770	252.5909	235.9035	225.2750	230.8046	239.7086	256.9480	276.6735	291.3808 (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
North	5.6600	10.6334	0.6300	0.7000	0.7700	18.3933 (74)
West	6.0000	19.6403	0.6300	0.7000	0.7700	36.0139 (80)
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421
Total gains	354.2609	403.1839	462.4904	534.8297	589.2075	586.5456

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, T _{hi} (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, n _{li} (see Table 9a)	0.9972	0.9939	0.9817	0.9315	0.7982	0.5987	0.4432	0.5048	0.7851	0.9659	0.9941	0.9979 (86)
tau	65.6336	65.8183	66.0004	66.8694	67.0345	67.8141	67.8141	67.9605	67.5117	67.0345	66.7013	66.3565
alpha	5.3756	5.3879	5.4000	5.4580	5.4690	5.5209	5.5209	5.5307	5.5008	5.4690	5.4468	5.4238
util living area	0.9972	0.9939	0.9817	0.9315	0.7982	0.5987	0.4432	0.5048	0.7851	0.9659	0.9941	0.9979 (86)
MIT	19.9247	20.0716	20.3291	20.6621	20.8946	20.9826	20.9972	20.9945	20.9293	20.6096	20.2085	19.9001 (87)
Th 2	20.0352	20.0377	20.0401	20.0514	20.0535	20.0633	20.0633	20.0652	20.0595	20.0535	20.0492	20.0447 (88)
util rest of house	0.9963	0.9919	0.9756	0.9092	0.7442	0.5183	0.3504	0.4054	0.7091	0.9504	0.9918	0.9972 (89)
MIT 2	18.6022	18.8180	19.1917	19.6645	19.9557	20.0525	20.0623	20.0630	20.0055	19.6042	19.0269	18.5734 (90)
Living area fraction	19.2827	19.4630	19.7769	20.1778	20.4388	20.5311	20.5433	20.5423	20.4808	20.1215	19.6349	0.0000
MIT	19.2827	19.4630	19.7769	20.1778	20.4388	20.5311	20.5433	20.5423	20.4808	20.1215	19.6349	0.0000
Temperature adjustment	19.2827	19.4630	19.7769	20.1778	20.4388	20.5311	20.5433	20.5423	20.4808	20.1215	19.6349	0.0000
adjusted MIT	19.2827	19.4630	19.7769	20.1778	20.4388	20.5311	20.5433	20.5423	20.4808	20.1215	19.6349	19.2560 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	352.6091	399.2706	450.2286	488.0723	452.1484	327.9991	221.6539	231.4937	332.7385	363.9154	340.9925	335.1250 (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	873.4781	846.6285	769.7313	645.3358	498.8175	334.6576	222.5020	233.2423	361.6478	543.4965	719.0747	868.1912 (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	387.5266	300.6245	237.7100	113.2297	34.7218	0.0000	0.0000	0.0000	0.0000	133.6083	272.2192	396.6013 (98)
Space heating												1876.2414 (98)
Space heating per m ²										(98) / (4) =		34.0516 (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)
---	--------------

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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												2008.8238 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	387.5266	300.6245	237.7100	113.2297	34.7218	0.0000	0.0000	0.0000	0.0000	133.6083	272.2192	396.6013 (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)	414.9107	321.8678	254.5075	121.2310	37.1754	0.0000	0.0000	0.0000	0.0000	143.0496	291.4552	424.6266 (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	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475 (64)
Efficiency of water heater	87.0511	86.7803	86.1214	84.5642	82.1982	80.3000	80.3000	80.3000	80.3000	84.8576	86.4693	87.1552 (217)
Fuel for water heating, kWh/month	196.1578	171.8837	180.2020	162.7732	162.1295	146.1700	140.0420	156.1140	157.8381	170.0770	178.1699	191.3224 (219)
Water heating fuel used												2012.8798 (219)
Annual totals kWh/year												2008.8238 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												
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)												253.1691 (232)
Total delivered energy for all uses												4349.8727 (238)

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

Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
2008.8238	0.2160	433.9059 (261)
0.0000	0.0000	0.0000 (263)
2012.8798	0.2160	434.7820 (264)
75.0000	0.5190	38.9250 (267)
253.1691	0.5190	131.3948 (268)
Total CO ₂ , kg/m ² /year		1039.0078 (272)
Emissions per m ² for space and water heating		15.7657 (272a)
Fuel factor (main gas)		1.0000
Emissions per m ² for lighting		2.3847 (272b)
Emissions per m ² for pumps and fans		0.7064 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.7657 * 1.00) + 2.3847 + 0.7064, rounded to 2 d.p.		18.8600 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End TF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End TF LEAN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End TF, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	17.36	TER	22.99	
Environmental	88 B	% DER<TER	24.48			
CO ₂ Emissions (t/year)	0.80	DFEE	50.29	TFEE	66.97	
General Requirements Compliance	Pass	% DFEE<TFEE	24.92			
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 55 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) 22.99 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.36 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 67.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 50.3 kWh/m²/yrOK

2 Fabric U-values			
Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (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	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
x x
Combi boiler
Efficiency: 95%
Minimum: 88%
OK

Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Time and temperature zone control
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: 0.52
Maximum: 1.5
MVHR efficiency: 92%
Minimum: 70%
OK

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

Overshading: Average
Windows facing North: 7.58 m², No overhang
Windows facing West: 8.03 m², 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	
Door U-value	0.50 W/m ² K	
Window U-value	0.80 W/m ² K	
Window U-value	0.80 W/m ² K	
Air permeability	2.5 m ³ /m ² h	

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												1.8403 (42)
Average daily hot water use (litres/day)												77.9069 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)

HODKINSON

D. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9811	0.9669	0.9307	0.8379	0.6775	0.4860	0.3439	0.3968	0.6600	0.8953	0.9677	0.9844 (94)
Useful gains	352.0687	398.4639	444.4902	468.1679	420.7259	301.5175	202.3135	211.2189	366.5925	531.8472	338.7012	384.8679 (95)
Heat loss rate W	4.3200	4.9000	5.4000	6.0000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	8.2000	4.2200 (96)
Heat loss rate W	802.3225	780.5459	712.8008	600.3023	463.6396	309.4541	203.6969	213.7266	334.2268	503.0661	662.9002	798.0942 (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	334.9758	256.7652	199.6231	95.1368	31.9278	0.0000	0.0000	0.0000	0.0000	112.5699	233.4233	344.6404 (98)
Space heating per m ²										(98) / (4) =		29.2014 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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 %)												95.0000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1693.6832 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
Space heating efficiency (main heating system 1)												
Space heating fuel (main heating system)												
Water heating requirement												
Water heating requirement												
Water heating efficiency of water heater												
(217)%												
Fuel for water heating, kWh/month												
Water heating fuel used												
Annual totals kWh/year												
Space heating fuel - main system												
Space heating fuel - secondary												
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)												
mechanical ventilation fans (SFP = 0.6500)												113.6052 (230a)
central heating pump												30.0000 (230c)
Total electricity for the above, kWh/year												143.6052 (231)
Electricity for lighting (calculated in Appendix L)												252.6067 (232)
Total delivered energy for all uses												3872.0967 (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	1693.6832	365.8356 (261)	
Space heating - secondary	0.0000	0.0000 (263)	
Water heating (other fuel)	1782.2015	384.9555 (264)	
Space and water heating		750.7911 (265)	
Pumps and fans	143.6052	74.5311 (267)	
Energy for lighting	252.6067	131.1029 (268)	
Total CO2, kg/year		956.4251 (272)	
Dwelling Carbon Dioxide Emission Rate (DER)		17.3600 (273)	

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

DER			
Total Floor Area	55.1000	TFA	17.3600 ZC1
Assumed number of occupants	1.8403	N	1.8403
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190	EF	0.5190
CO2 emissions from appliances, equation (L14)	17.2551 ZC2		
CO2 emissions from cooking, equation (L16)	2.9613 ZC3		
Total CO2 emissions	37.5763 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	37.5763 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)	55.1000	2.6000 (2b)	143.2600 (1b) - (3b)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.2600 (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) =	0.1396	(8)		
Pressure test							Yes					
Measured/design AP50									5.0000			
Infiltration rate									0.3896	(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) =		0.3312	(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												
Effective ac	0.4222	0.4140	0.4057	0.3643	0.3560	0.3146	0.3146	0.3063	0.3312	0.3560	0.3726	0.3891 (22b)
	0.5891	0.5857	0.5823	0.5664	0.5634	0.5495	0.5495	0.5469	0.5548	0.5634	0.5694	0.5757 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			11.6600	1.3258	15.4583		(27)					
External Wall	45.8900	11.6600	34.2300	0.1800	6.1614		(29a)					
Corridor	10.5300	2.1000	8.4300	0.1800	1.5174		(29a)					
Main Roof	55.1000		55.1000	0.1300	7.1630		(30)					
Total net area of external elements Aum(A, m2)			111.5200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		32.4001		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.4910 (36)					
Total fabric heat loss						(33) + (36) =	47.8911 (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	27.8521	27.6885	27.5281	26.7747	26.6337	25.9775	25.9775	25.8560	26.2303	26.6337	26.9189	27.2170 (38)
Average = Sum(39)m / 12 =	75.7433	75.5796	75.4192	74.6658	74.5249	73.8687	73.8687	73.7471	74.1214	74.5249	74.8100	75.1081 (39)
	75.7433	75.5796	75.4192	74.6658	74.5249	73.8687	73.8687	73.7471	74.1214	74.5249	74.8100	75.1081 (39)
HLP	1.3747	1.3717	1.3688	1.3551	1.3525	1.3406	1.3406	1.3384	1.3452	1.3525	1.3577	Dec 1.3631 (40)
HLP (average)												1.3551 (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													1.8403 (42)
Average daily hot water use (litres/day)													77.9069 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)	
Energy content (annual)	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)	
Distribution loss (46)m = 0.15 x (45)m	19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (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	43.6705	38.0100	40.4945	37.6514	37.3185	34.5778	35.7304	37.3185	37.6514	40.4945	40.7250	43.6705	(61)
Total heat required for water heating calculated for each month	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475	(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	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475	(64)
Heat gains from water heating, kWh/month	53.1741	46.4602	48.2607	42.6617	41.2327	36.1744	34.4431	38.6033	39.0361	44.6467	47.8659	51.8407	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.3355	12.7327	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.4633	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	(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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	(71)
Water heating gains (Table 5)	71.4705	69.1373	64.8665	59.2523	55.4202	50.2422	46.2945	51.8861	54.2169	60.0090	66.4804	69.6784	(72)
Total internal gains	299.8536	297.5825	286.7385	269.6770	252.5909	235.9035	225.2750	230.8046	239.7086	256.9480	276.6735	291.3808	(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	5.6600	10.6334	0.6300	0.7000	0.7700	18.3933	(74)
West	6.0000	19.6403	0.6300	0.7000	0.7700	36.0139	(80)
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421	331.2781
Total gains	354.2609	403.1839	462.4904	534.8297	589.2075	586.5456	556.5531

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, nil,m (see Table 9a)	0.5179	0.6273	0.7149	0.7469	0.7438	0.7199	0.6273	0.5179	0.4416	0.3438	0.2148	0.1481	(85)
tau	4.3679	4.3752	4.3823	4.4165	4.4229	4.4533	4.4590	4.4590	4.4590	4.4590	4.4590	4.4590	
alpha	0.9972	0.9947	0.9866	0.9572	0.8752	0.7195	0.5606	0.6277	0.8670	0.9772	0.9949	0.9978	(86)
util living area	19.5072	19.6635	19.9554	20.3567	20.7083	20.9164	20.9786	20.9653	20.7953	20.3402	19.8547	19.4803	(87)
MIT	19.7828	19.7851	19.7874	19.7979	19.7999	19.8091	19.8091	19.8056	19.8056	19.7999	19.7959	19.7917	(88)
util rest of house	0.9963	0.9928	0.9815	0.9401	0.8253	0.6177	0.4204	0.4850	0.7934	0.9651	0.9927	0.9970	(89)
MIT 2	17.8167	18.0461	18.4713	19.0497	19.5174	19.7548	19.8017	19.7971	19.6401	19.0377	18.3333	17.7833	(90)
Living area fraction	18.6865	18.8782	19.2349	19.7222	20.1301	20.3525	20.4072	20.3982	20.2345	19.7079	19.1161	18.6564	(92)
MIT	18.6865	18.8782	19.2349	19.7222	20.1301	20.3525	20.4072	20.3982	20.2345	19.7079	19.1161	18.6564	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9950	0.9908	0.9785	0.9388	0.8408	0.6670	0.4931	0.5588	0.8236	0.9639	0.9910	0.9960	(94)
Ext temp	352.4900	399.4784	452.5462	502.1036	495.3882	391.2539	274.4134	283.2376	367.7096	368.5777	341.1683	334.9849	(95)
Heat loss rate W	4.3000	4.2000	4.2000	4.2000	4.2000	4.2000	4.2000	4.2000	4.2000	4.2000	4.2000	4.2000	(96)
Month fracti	1089.6822	1056.4702	960.4562	808.0490	628.2551	424.9275	281.2352	294.8524	454.6960	678.7625	898.9261	1085.7964	(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	(98)
Space heating per m2	548.4710	441.4985	377.8850	220.2807	98.8530	0.0000	0.0000	0.0000	0.0000	230.7775	401.5856	558.6038	(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	3081.3224	(211)

Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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)	587.2281	472.6965	404.5878	235.8466	105.8383	0.0000	0.0000	0.0000	0.0000	247.0851	429.9632	598.0768	(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	170.7575	149.1611	155.1925	137.6479	133.2675	117.3745	112.4537	125.3596	126.7440	144.3233	154.0623	166.7475	(64)
Efficiency of water heater (217)m	87.7788	87.6170	87.2067	86.2291	84.3116	80.3000	80.3000	80.3000	80.3000	86.2271	87.3536	87.8596	(217)
Fuel for water heating, kWh/month	194.5317	170.2422	177.9593	159.6305	158.0654	146.1700	140.0420	156.1140	157.8381	167.3758	176.3662	189.7886	(219)
Water heating fuel used	194.5317	170.2422	177.9593	159.6305	158.0654	146.1700	140.0420	156.1140	157.8381	167.3758	176.3662	189.7886	(219)
Annual totals kWh/year	2334.0000	2042.9000	2135.5100	1915.5600	1896.7800	1752.8400	1680.5000	1873.3700	1895.6600	2008.5100	2116.3900	2277.4600	(220)
Space heating fuel - main system	194.5317	170.2422	177.9593	159.6305	158.0654	146.1700	140.0420	156.1140	157.8381	167.3758	176.3662	189.7886	(221)
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	(222)

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	
3081.3224	0.2160	665.5656	(261)
0.0000	0.0000	0.0000	(263)
1994.1241	0.2160	430.7308	(264)
75.0000	0.5190	38.9250	(267)
253.1691	0.5190	131.3948	(268)
		1266.6162	(272)
		19.8965	(272a)
		1.0000	
		2.3847	(272b)
		0.7064	(272c)
		22.9900	(273)

Target Carbon Dioxide Emission Rate (TER) = (19.8965 * 1.00) + 2.3847 + 0.7064, rounded to 2 d.p.

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-06 Mid MF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-06 - Mid MF LEAN	Prop Type Ref	W Core			
Property	1B2P-C1-06 Mid MF, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	15.40	TER	18.82	
Environmental	89 B	% DER<TER	18.16			
CO ₂ Emissions (t/year)	0.77	DFEE	40.09	TFEE	47.38	
General Requirements Compliance	Pass	% DFEE<TFEE	15.39			
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 58 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) 18.82 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 15.40 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)47.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)40.1 kWh/m²/yrOK

2 Fabric U-values
Element Average Highest
External wall 0.18 (max. 0.30) 0.25 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK
Floor (no floor)
Roof (no roof)
Openings 0.76 (max. 2.00) 0.80 (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: 2.50 (design value)
Maximum 10.0 OK

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
x x
Combi boiler
Efficiency: 95%
Minimum: 88% OK
Secondary heating system: None

5 Cylinder insulation
Hot water storage No cylinder

6 Controls
Space heating controls: Time and temperature zone control 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: 0.56
Maximum 1.5 OK
MVHR efficiency: 87%
Minimum: 70% OK

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

Based on:
Overshading: Average
Windows facing North: 2.88 m², No overhang
Windows facing West: 9.68 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K
Door U-value 0.50 W/m²K
Window U-value 0.80 W/m²K
Window U-value 0.80 W/m²K
Air permeability 2.5 m³/m²h

HODKINSON

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

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												1.9303 (42)
Average daily hot water use (litres/day)												80.0449 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

													Assumed occupancy	1.9303 (42)
													Average daily hot water use (litres/day)	80.0449 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

HODKINSON

Energy conte	88.094	84.876	8.6458	78.4440	75.2422	72.0044	72.0044	75.2422	78.4440	81.6458	84.876	88.094	44
Energy content (annual)	130.5747	114.2014	117.8456	102.7407	98.5821	85.0689	78.8288	90.4572	91.5376	106.6782	116.4476	126.4546	45
Distribution loss (40m = 0.15 x 45m)										Total = Sum(45m) =		1259.4175	45
	19.8666	17.1102	17.6768	15.4111	14.7873	12.7603	11.8743	13.5686	13.7306	16.0017	17.4671	18.9682	45

D. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9482	0.9239	0.8730	0.7711	0.6236	0.4536	0.3234	0.3651	0.5917	0.8241	0.9236	0.9549 (94)
Useful gains	345,672.8	380,905.9	408,889.9	410,742.4	359,901.4	258,540.0	175,318.0	182,703.6	265,132.1	320,651.2	326,257.0	330,800.0 (95)
Heat loss rate W	4,300.0	4,900.0	6,500.0	8,900.0	11,700.0	14,600.0	16,600.0	16,400.0	14,100.0	10,600.0	7,100.0	4,200.0 (96)
Heat loss rate W	689,320.0	671,412.4	614,277.4	517,226.0	399,977.2	267,884.6	177,359.7	185,874.6	289,237.9	434,536.8	570,329.9	684,204.0 (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	255,378.1	195,221.6	152,808.3	76,668.1	29,816.4	0.0000	0.0000	0.0000	0.0000	84,730.9	175,732.4	262,925.9 (98)
Space heating per m ²												1233,281.9 (98)
										(98) / (4) =		21,190.4 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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)
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	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	255.3781	195.2216	152.8083	76.6681	29.8164	0.0000	0.0000	0.0000	0.0000	84.7309	175.7324	262.9259	(98)
Space heating efficiency (main heating system 1)	95.0000	95.0000	95.0000	95.0000	95.0000	0.0000	0.0000	0.0000	0.0000	95.0000	95.0000	95.0000	(210)
Space heating fuel (main heating system)	268.8191	205.4964	160.8509	80.7033	31.3857	0.0000	0.0000	0.0000	0.0000	89.1904	184.9815	276.7641	(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	175.4336	153.2546	159.4514	141.4254	136.9247	120.5957	115.5398	128.7998	130.2223	148.2840	158.2903	171.3236	(64)
Efficiency of water heater (217)m	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	(216)
Fuel for water heating, kWh/month	184.6775	161.3206	167.8436	148.8688	144.1313	126.9428	121.6209	135.5788	137.0761	156.0884	166.6213	180.3406	(219)
Water heating fuel used												1831.1107	(219)
Annual totals kWh/year												1298.1914	(215)
Space heating fuel - main system												1298.1914	(215)
Space heating fuel - secondary												0.0000	(215)
Electricity for pumps and fans:												129.2273	(230a)
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7000)												30.0000	(230c)
mechanical ventilation fans (SFP = 0.7000)												159.2273	(231)
central heating pump												265.4077	(232)
Total electricity for the above, kWh/year												3553.9371	(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	1298.1914	0.2160	280.4094 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1831.1107	0.2160	395.5199 (264)
Space and water heating			675.9293 (265)
Pumps and fans	159.2273	0.5190	82.6390 (267)
Energy for lighting	265.4077	0.5190	137.7466 (268)
Total CO2, kg/year			896.3148 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			15.4000 (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	58.2000	15.4000	ZC1
N	1.9303	5.9030	(36)
EF	0.5190	35.3853	ZC2
	17.1466	2.8407	ZC3
	35.3853	35.3853	ZC4
	0.0000	0.0000	ZC5
	0.0000	0.0000	ZC6
	0.0000	0.0000	ZC7
	35.3853	35.3853	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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	58.2000 (1b)	x 2.6000 (2b)	= 151.3200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	58.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.3200 (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					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								
Pressure test					Air changes per hour / (5) = 0.1322 (8)								
Measured/design AP50					Yes 5.0000								
Infiltration rate					0.3822 (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) = 0.2962 (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	0.3776	0.3702	0.3628	0.3258	0.3184	0.2814	0.2814	0.2740	0.2962	0.3184	0.3332	0.3480	(22b)
Effective ac	0.5713	0.5685	0.5658	0.5531	0.5507	0.5396	0.5396	0.5375	0.5439	0.5507	0.5555	0.5606	(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						
TER Opaque door			2.1000	1.0000	2.1000		(26)						
TER Opening Type (Uw = 1.40)			12.4400	1.3258	16.4924		(27)						
External Wall	31.3300	12.4400	18.8900	0.1800	3.4002		(29a)						
Corridor	24.7000	2.1000	22.6000	0.1800	4.0680		(29a)						
Lift / Stair Wall	18.0700		18.0700	0.1800	3.2526		(29a)						
Total net area of external elements Aum(A, m ²)			74.1000				(31)						
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	29.3132		(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)							5.9030 (36)						
Total fabric heat loss						(33) + (36) =	35.2162 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 28.5284	Feb 28.3901	Mar 28.2546	Apr 27.6180	May 27.4989	Jun 26.9445	Jul 26.9445	Aug 26.8418	Sep 27.1581	Oct 27.4989	Nov 27.7399	Dec 27.9917	(38)
Heat transfer coeff	63.7446	63.6063	63.4708	62.8342	62.7152	62.1607	62.1607	62.0581	62.3743	62.7152	62.9561	63.2080	(39)
Average = Sum(39)m / 12 =												62.8337	(39)
HLP	Jan 1.0953	Feb 1.0929	Mar 1.0906	Apr 1.0796	May 1.0776	Jun 1.0681	Jul 1.0681	Aug 1.0663	Sep 1.0717	Oct 1.0776	Nov 1.0817	Dec 1.0860	(40)
HLP (average)												1.0796	(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	88.0494	84.8476	81.6458	78.4440	75.2422	72.0404	72.0404	75.2422	78.4440	81.6458	84.8476	88.0494	(44)
Energy conte	130.5747	114.2014	117.8456	102.7407	98.5821	85.0689	78.8288	90.4572	91.5376	106.6782	116.4476	126.4546	(45)
Energy content (annual)													(45)
Distribution loss (46)m = 0.15 x (45)m													(46)
19.5862	17.1302	17.6768	15.4111	14.7873	12.7603	11.8243	13.5686	13.7306	16.0017	17.4671	18.9682		(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	44.8690	39.0531	41.6058	38.6847	38.3426	35.5268	36.7110	38.3426	38.6847	41.6058	41.8426	44.8690	(61)
Total heat required for water heating calculated for each month	175.4436	153.2546	159.4514	141.4254	136.9247	120.5957	115.5398	128.7998	130.2223	148.2840	158.2903	171.3236	(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	175.4436	153.2546	159.4514	141.4254	136.9247	120.5957	115.5398	128.7998	130.2223	148.2840	158.2903	171.3236	(64)
Heat gains from water heating, kWh/month	54.6333	47.7353	49.5851	43.8325	42.3642	37.1671	35.3883	39.6627	40.1074	45.8720	49.1795	53.2634	(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	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.0360	13.3549	10.8609	8.2224	6.1463	5.1890	5.6069	7.2881	9.7820	12.4205	14.4966	15.4539	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	168.3855	170.1329	165.7297	156.3588	144.5230	133.4019	125.9723	124.2250	128.6281	138.0020	149.8348	160.9559	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	(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)	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	(71)
Water heating gains (Table 5)	73.4319	71.0346	66.6467	60.8784	56.9411	51.6210	47.5650	53.3101	55.7048	61.6559	68.3049	71.5906	(72)
Total internal gains	311.8081	309.4770	298.1919	280.4113	262.5652	245.1665	234.0988	239.7777	249.0696	267.0330	287.5909	302.9551	(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	2.8500		10.6334		0.6300		0.7000		0.7700		9.2617 (74)	
West	5.5900		19.6403		0.6300		0.7000		0.7700		57.5622 (80)	
Solar gains	66.8239	130.3035	215.5185	318.7665	396.5325	408.9706	388.0739	329.0821	251.8383	154.6830	83.1988	55.0574 (83)
Total gains	378.6320	439.7805	513.7104	599.1778	659.0977	654.1371	622.1727	568.8598	500.9079	421.7161	370.7897	358.0125 (84)

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, nil,m (see Table 9a)	63.4041	63.5419	63.6776	64.3227	64.4448	63.0196	63.0196	63.1272	64.7970	64.4448	64.1982	63.9424	(85)
tau	5.2269	5.2361	5.2452	5.2882	5.2963	5.3346	5.3346	5.3418	5.3198	5.2963	5.2799	5.2628	
util living area	0.9971	0.9931	0.9787	0.9225	0.7857	0.5906	0.4365	0.4955	0.7717	0.9625	0.9938	0.9978	(86)
MIT	19.8802	20.0423	20.3188	20.6607	20.8930	20.9812	20.9969	20.9941	20.9283	20.5972	20.1722	19.8495	(87)
Th 2	20.0047	20.0066	20.0085	20.0175	20.0192	20.0270	20.0285	20.0240	20.0240	20.0192	20.0158	20.0122	(88)
util rest of house	0.9961	0.9909	0.9715	0.8979	0.7295	0.5083	0.3416	0.3941	0.6928	0.9455	0.9913	0.9971	(89)
MIT 2	18.5152	18.7525	19.1524	19.6331	19.9211	20.0154	20.0259	20.0261	19.9700	19.5593	18.9495	18.4759	(90)
Living area fraction	19.1696	19.3708	19.7116	20.1258	20.3870	20.4784	20.4914	20.4901	20.4294	20.0568	19.5356	19.1344	(92)
MIT	19.1696	19.3708	19.7116	20.1258	20.3870	20.4784	20.4914	20.4901	20.4294	20.0568	19.5356	19.1344	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9950	0.9890	0.9689	0.9010	0.7518	0.5473	0.3872	0.4429	0.7277	0.9462	0.9897	0.9962 (94)
Useful gains	376.7478	434.9286	497.7358	539.8469	495.4820	357.9998	240.9299	251.9283	364.4897	399.0480	366.9817	356.6578 (95)
Ext temp	4.3000	4.3000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	947.8558	920.4361	838.5491	705.3616	544.8090	365.4043	241.8896	253.8266	394.7914	593.0873	782.8987	943.9705 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	424.9043	326.2610	253.5666	119.1706	36.6993	0.0000	0.0000	0.0000	0.0000	144.3652	299.4602	436.9607 (98)
Space heating per m2											(98) / (4) =	35.0754 (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	2185.6401	(211)

Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
424.9043	326.2610	253.5666	119.1706	36.6993	0.0000	0.0000	0.0000	0.0000	0.0000	144.3652	299.4602	436.9607	(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)	454.5297	345.3159	271.4845	127.5916	39.2926	0.0000	0.0000	0.0000	0.0000	154.5666	320.6212	467.8380	(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	175.4436	153.2546	159.4514	141.4254	136.9247	120.5957	115.5398	128.7998	130.2223	148.2840	158.2903	171.3236	(64)
Efficiency of water heater	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	(217)
Fuel for water heating, kWh/month	201.2084	176.3443	184.9493	167.1229	166.4896	150.1814	143.8852	160.3983	162.1697	174.4849	182.7157	196.2310	(219)
Water heating fuel used	2066.1807	1807.1807	1807.1807	1807.1807	1807.1807	1807.1807	1807.1807	1807.1807	1807.1807	1807.1807	1807.1807	1807.1807	(219)
Annual totals kWh/year	2185.6401	2185.6401	2185.6401	2185.6401	2185.6401	2185.6401	2185.6401	2185.6401	2185.6401	2185.6401	2185.6401	2185.6401	(211)
Space heating fuel - main system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel - 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:													
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

Space heating - main system 1	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - secondary	2185.6401	0.2160	472.0983 (261)
Water heating (other fuel)	0.0000	0.0000	0.0000 (263)
Space and water heating	2066.1807	0.2160	446.2950 (264)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	265.5411	0.5190	137.8158 (268)
Total CO2, kg/m2/year			1095.1341 (272)
Emissions per m2 for space and water heating			15.7800 (272a)
Fuel factor (main gas)			1.0000
Emissions per m2 for lighting			2.3680 (272b)
Emissions per m2 for pumps and fans			0.6688 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.7800 * 1.00) + 2.3680 + 0.6688, rounded to 2 d.p.			18.8200 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-D3-01 Mid MF				Issued on Date	06/02/2024
Assessment Reference	1B2P-D3-01 Mid MF LEAN	Prop Type Ref	E			
Property	1B2P-D3-01 Mid MF, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	15.09	TER	19.01	
Environmental	90 B	% DER<TER	20.63			
CO ₂ Emissions (t/year)	0.69	DFEE	38.75	TFEE	45.88	
General Requirements Compliance	Pass	% DFEE<TFEE	15.53			
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 53 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) 19.01 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 15.09 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)45.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)38.8 kWh/m²/yrOK

2 Fabric U-values
Element Average Highest
External wall 0.15 (max. 0.30) 0.15 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK
Floor (no floor)
Roof (no roof)
Openings 0.76 (max. 2.00) 0.80 (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: 2.50 (design value)
Maximum 10.0 OK

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
x x
Combi boiler
Efficiency: 95%
Minimum: 88% OK
Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Time and temperature zone control 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: 0.52
Maximum 1.5 OK
MVHR efficiency: 92%
Minimum: 70% OK

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

Based on:
Overshading: Average
Windows facing North: 2.06 m², No overhang
Windows facing East: 9.81 m², No overhang
Windows facing South: 2.06 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features
Party wall U-value 0.00 W/m²K
Door U-value 0.50 W/m²K
Window U-value 0.80 W/m²K
Window U-value 0.80 W/m²K
Air permeability 2.5 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)												
Assumed occupancy												
Average daily hot water use (litres/day)												1.7668 (42)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	83.7768	80.7304	77.6840	74.6375	71.5911	68.5447	68.5447	71.5911	74.6375	77.6840	80.7304	83.7768 (44)



HODKINSON

[illegible]

6. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9395	0.9034	0.8362	0.7154	0.5595	0.3967	0.2789	0.3138	0.5207	0.7765	0.9066	0.9483 (94)
Useful gains	345.4591	389.2991	415.8683	405.1242	341.8757	236.6783	160.1147	167.3872	250.9930	321.3278	328.9241	328.9194 (95)
Heat loss	4.3000	4.9900	6.8000	8.0000	11.7500	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	632.2468	618.0875	565.7322	474.5000	364.8633	243.3479	161.0300	168.8214	263.8353	399.6465	524.2212	627.4475 (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	213.3700	153.7458	111.4988	49.9512	17.0827	0.0000	0.0000	0.0000	0.0000	58.2691	140.6139	222.0513 (98)
Space heating												966.5829 (98)
Space heating per m ²												18.3765 (99)
										(98) / (4) =		



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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)
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	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	213.3700	153.7458	111.4988	49.9512	17.0827	0.0000	0.0000	0.0000	0.0000	58.2691	140.6139	222.0513	(98)
Space heating efficiency (main heating system 1)	95.0000	95.0000	95.0000	95.0000	95.0000	0.0000	0.0000	0.0000	0.0000	95.0000	95.0000	95.0000	(210)
Space heating fuel (main heating system)	224.6000	161.8377	117.3671	52.5802	17.9818	0.0000	0.0000	0.0000	0.0000	61.3359	148.0146	233.7383	(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	166.9304	145.8180	151.7142	134.5628	130.2806	114.7438	109.9333	122.5499	123.9033	141.0886	150.6093	163.0102	(64)
Efficiency of water heater	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	(216)
Fuel for water heating, kWh/month	175.7162	153.4926	159.6991	141.6451	137.1374	120.7830	115.7193	128.9999	130.4246	148.5144	158.5362	171.5897	(219)
Water heating fuel used												1742.2575	(219)
Annual totals kWh/year												1017.4557	(211)
Space heating fuel - main system												0.0000	(215)
Space heating fuel - secondary												108.4507	(230a)
Electricity for pumps and fans:												30.0000	(230c)
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)												138.4507	(231)
central heating pump												242.4331	(232)
Total electricity for the above, kWh/year												3140.5970	(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	1017.4557	0.2160	219.7704 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1742.2575	0.2160	376.3276 (264)
Space and water heating			596.0981 (265)
Pumps and fans	138.4507	0.5190	71.8559 (267)
Energy for lighting	242.4331	0.5190	125.8228 (268)
Total CO2, kg/year			793.7767 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			15.0900 (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

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	52.6000 (1b)	2.6000 (2b)	136.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.6000		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 136.7600 (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) =	0.1462 (8)				
Pressure test								Yes				
Measured/design AP50								5.0000				
Infiltration rate								0.3962 (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) =	0.3071 (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	0.3915	0.3839	0.3762	0.3378	0.3301	0.2917	0.2917	0.2841	0.3071	0.3301	0.3455	0.3608 (22b)
	0.5767	0.5737	0.5708	0.5571	0.5545	0.5426	0.5426	0.5403	0.5472	0.5545	0.5597	0.5651 (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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			11.0400	1.3258	14.6364		(27)
External Wall	38.4800	11.0400	27.4400	0.1800	4.9392		(29a)
Corridor	28.9900	2.1000	26.8900	0.1800	4.8402		(29a)
Total net area of external elements Aum(A, m2)			67.4700				(31)
Fabric heat loss, W/K = Sum (A x U)							(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.4030 (36)
Total fabric heat loss							(33) + (36) = 31.9188 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m
Heat transfer coeff
Average = Sum(39)m / 12 =

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Jan	26.0247	25.8904	25.7587	25.1402	25.0245	24.4859	24.4859	24.3861	24.6934	25.0245	25.2586	25.5033	(38)
Feb	57.9435	57.8091	57.6775	57.0590	56.9433	56.4047	56.4047	56.3049	56.6121	56.9433	57.1774	57.4221	(39)
Mar													(39)
Apr													(39)
May													(39)
Jun													(39)
Jul													(39)
Aug													(39)
Sep													(39)
Oct													(39)
Nov													(39)
Dec													(39)
HLP	1.1016	1.0990	1.0965	1.0848	1.0826	1.0723	1.0723	1.0704	1.0763	1.0826	1.0870	1.0917	(40)
HLP (average)													(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	83.7768	80.7304	77.6840	74.6375	71.5911	68.5447	68.5447	71.5911	74.6375	77.6840	80.7304	83.7768	(44)
Energy conte	124.2386	108.6599	112.1273	97.7553	93.7985	80.9410	75.0037	86.0679	87.0958	101.5017	110.7971	120.3185	(45)
Energy content (annual)													(45)
Distribution loss (46)m = 0.15 x (45)m	18.6358	16.2990	16.8191	14.6633	14.0698	12.1411	11.2506	12.9102	13.0644	15.2253	16.6196	18.0478	(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	42.6918	37.1581	39.5869	36.8076	36.4820	33.8029	34.9296	36.4820	36.8076	39.5869	39.8123	42.6918	(61)

HODKINSON

Total heat required for water heating calculated for each month												
166.9304	145.8180	151.7142	134.5628	130.2806	114.7438	109.9333	122.5499	123.9033	141.0886	150.6093	163.0102	(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)
Solar input (sum of months) = Sum(63)m =												0.0000 (63)
Output from w/h	166.9304	145.8180	151.7142	134.5628	130.2806	114.7438	109.9333	122.5499	123.9033	141.0886	150.6093	163.0102 (64)
Total per year (KWh/year) = Sum(64)m =												1655.1446 (64)
Heat gains from water heating, kWh/month												
51.9823	45.4189	47.1790	41.7055	40.3085	35.3636	33.6711	37.7381	38.1612	43.6461	46.7931	50.6788	(65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	88.384	88.384	88.384	88.384	88.384	88.384	88.384	88.384	88.384	88.384	88.384	88.384 (66)
Lighting gains (calculated in Appendix 1, equation 10 or 15a), also see Table 5	13.7657	12.2866	9.9433	7.5278	5.6271	4.7506	5.1332	6.6783	8.9556	11.3712	13.2719	14.1483 (67)
Appliances gains (calculated in Appendix 1, equation 13 or 13a), also see Table 5	153.9815	155.5794	151.5529	142.9803	132.1603	121.9904	115.1964	113.5985	117.6251	126.1970	137.0176	147.1875 (68)
Cooking gains (calculated in Appendix 1, equation 11b or 11a), also see Table 5	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338 (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 (netative value) (Table 5)	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707 (71)
Water heating gains (Table 5)	69.6867	67.8797	63.4127	57.9243	54.1781	49.1161	45.2569	50.7232	53.0017	58.6641	64.9904	68.1167 (72)
Total internal gains	290.1175	287.8952	277.4104	260.9344	244.6670	228.3587	218.0880	223.4956	232.0839	248.7338	267.7815	281.9540 (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
North	1.6300	10.6334	0.6300	0.7000	0.7700	5.2970 (74)
East	7.7800	19.6403	0.6300	0.7000	0.7700	46.6980 (76)
South	1.6300	46.7521	0.6300	0.7000	0.7700	23.2895 (78)

Temperature during heating periods in the living area (see Table 9), Thl (°C)												21,000 (£85)
Utilisation factor for gains for living area, nillm (see Table 9)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	63.004	63.1869	63.3311	64.075	64.1476	6.7103	6.7103	64.8749	64.3229	64.1476	63.6128	63.6128
alpha	5.2027	5.2125	5.2221	5.2678	5.2763	5.3173	5.3173	5.3250	5.3015	5.2765	5.2590	5.2409
util living area												
	0.9961	0.9906	0.9729	0.9127	0.7776	0.5862	0.4316	0.4828	0.7455	0.9508	0.9914	0.9971 (£86)
MIT	19.9125	20.0858	20.3580	20.6808	20.8971	20.9816	20.9970	20.9947	20.9386	20.6347	20.2094	19.8797 (£87)
Th 2	19.9995	20.0016	20.0037	20.0193	20.0151	20.0235	20.0235	20.0251	20.0203	20.0151	20.0114	20.0076 (£88)
util rest of house												
	0.9948	0.9875	0.9640	0.8860	0.7208	0.5040	0.3374	0.3834	0.6649	0.9296	0.9881	0.9961 (£89)
MIT	18.5585	18.8116	19.2036	19.6550	19.9214	20.0121	20.0224	20.0234	20.0234	20.0036	18.9989	18.5450 (£90)
Living area fraction												
	0.9934	0.9853	0.9614	0.8834	0.7164	0.5004	0.3334	0.3794	0.6604	0.9214	0.9804	0.9914 (£91)
adjusted MIT	19.2394	19.4523	19.7841	20.1708	20.4120	20.4996	20.5125	20.5116	20.4596	20.1231	19.6081	19.0020 (£92)
adjusted MIT	19.2394	19.4523	19.7841	20.1708	20.4120	20.4996	20.5125	20.5116	20.4596	20.1231	19.6081	19.0020 (£93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9935	0.9853	0.9617	0.8908	0.7449	0.5448	0.3849	0.4335	0.7030	0.9324	0.9864	0.9950 (94)
Useful gains	363.0146	421.2467	474.7339	501.4152	452.7533	326.0898	219.8174	229.5157	336.3602	382.7055	335.2346	343.1841 (95)
Est. fuel cost	4.3000	4.9000	6.7500	8.9000	11.7000	14.6000	16.6000	16.1000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	865.6391	841.2579	766.1921	643.1029	496.0914	332.7674	220.6818	231.5029	360.0333	542.2746	715.1810	861.4398 (97)
Month factor	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	733.9526	841.2579	766.1921	643.1029	496.0914	332.7674	220.6818	231.5029	360.0333	542.2746	715.1810	861.4398 (97b)
Space heating per m ²	733.9526	282.2475	216.8448	102.0151	32.2435	0.0000	0.0000	0.0000	0.0000	118.8198	259.1614	385.9853 (98)
											(98) / (4) =	33.6667 (99)

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

[illegible]

	Energy	Emission factor	Emissions
	kWh/year	kg CO ₂ /kWh	kg CO ₂ /year
Space heating - main system 1	1896.0066	0.2160	409.5374 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1969.5086	0.2160	425.4138 (264)
Space and water heating			834.9513 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	243.1073	0.5190	126.1727 (268)
Total CO ₂ kg/m ² /year			1000.0490 (272)
Emissions per m ² for space and water heating			18.4736 (272)
Fuel factor (mains gas)			1.0000
Emissions per m ² for lighting			2.3987 (272)
Emissions per m ² for pumps and fans			0.7400 (272)
Target Carbon Dioxide Emission Rate (TER) = (18.4736 * 1.00) + 2.3987 + 0.7400, rounded to 2 d.p.			19.0100 (273)

Target Carbon Dioxide Emission Rate (TER) = $(15.8736 * 1.00) + 2.3987 + 0.7400$, rounded to 2 d.p.

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D2-01 Mid MF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D2-01 Mid MF LEAN	Prop Type Ref	W / E			
Property	2B4P-D2-01 Mid MF, St Ann's Hospital, London, N15					
SAP Rating		87 B	DER	11.59	TER	14.83
Environmental		91 B	% DER<TER	21.83		
CO ₂ Emissions (t/year)		0.87	DFEE	30.05	TFEE	35.63
General Requirements Compliance		Pass	% DFEE<TFEE	15.67		
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 86 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) 14.83 kgCO ₂ /m²			
Dwelling Carbon Dioxide Emission Rate (DER) 11.59 kgCO ₂ /m²OK			
1b TFEE and DFEE			
Target Fabric Energy Efficiency (TFEE) 35.6 kWh/m²/yr			
Dwelling Fabric Energy Efficiency (DFEE) 30.0 kWh/m²/yrOK			

2 Fabric U-values			
Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)		
Maximum	10.0		OK

4 Heating efficiency			
Main heating system:	Boiler system with radiators or underfloor - Mains gas		
Data from manufacturer			
x X			
Combi boiler			
Efficiency: 95%			
Minimum: 88%	OK		

Secondary heating system:			
	None		

5 Cylinder insulation			
Hot water storage	No cylinder		

6 Controls			
Space heating controls:	Time and temperature zone control		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:	0.52		
Maximum	1.5		OK
MVHR efficiency:	92%		
Minimum:	70%		OK

9 Summertime temperature			
Overheating risk (Thames Valley):	Slight		OK
Based on:			
Overshading:	Average		
Windows facing North:	2.14 m², No overhang		
Windows facing East:	6.68 m², No overhang		
Windows facing West:	6.22 m², No overhang		
Air change rate:	4.00 ach		
Blinds/curtains:	None		

10 Key features			
Party wall U-value	0.00 W/m²K		
Door U-value	0.50 W/m²K		
Window U-value	0.80 W/m²K		
Window U-value	0.80 W/m²K		
Air permeability	2.5 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												

Ground floor	Area		Storey height		Volume							
	(m ²)		(m)		(m ³)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		2.6000 (1b) x 2.6000 (2b)		223.8600 (1b) - (3b)							
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		223.8600 (5)							

2. Ventilation rate												

Number of chimneys	main heating		secondary heating		other		total		m ³ per hour			
Number of open flues	0		0		0		0 + 40 =		0.0000 (6a)			
Number of intermittent fans	0		0		0		0 + 20 =		0.0000 (6b)			
Number of passive vents	0		0		0		0 + 10 =		0.0000 (7a)			
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) =							0.0000 / (5) =		0.0000 (8)			
Pressure test									Yes			
Measured/design AP50									0.1250 (18)			
Infiltration rate									2 (19)			
Number of sides sheltered												
Shelter factor					(20) = 1 - (0.075 x (19)) =				0.8500 (20)			
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) =				0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation:												78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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
Glazing North (Uw = 0.80)					2.1400		0.752		1.6589			(27)
Glazing E, S, W (Uw = 0.80)					12.9000		0.752		10.0000			(27)
Corridor Door					2.1000		0.5000		1.0500			(26)
External Wall	36.2700		15.0400		21.2300		0.1500		3.1845		14.0000	297.2200 (29a)
Corridor	4.7100		2.1000		2.6100		0.1500		0.3915		14.0000	36.5400 (29a)
Core Wall	7.5700				7.5700		0.2500		1.8925		9.0000	68.1300 (29a)
Total net area of external elements Aum(A, m ²)					48.5500				18.1774			(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =				18.1774			(33)
Party Wall 1					55.6400		0.0000		0.0000		20.0000	1112.8000 (32)
Party Floor 1					73.4000						40.0000	2936.0000 (32d)
Party Ceilings 1					73.4000						40.0000	2936.0000 (32d)
Timber Frame					123.2400						9.0000	1109.1600 (32c)
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =		8495.8500 (34)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K											98.6742 (35)	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											13.5038 (36)	
Total fabric heat loss											(33) + (36) = 31.6812 (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	18.0598	17.8636	17.6674	16.6862	16.4900	15.5089	15.5089	15.3127	15.9013	16.4900	16.8825	17.2749 (38)
Average = Sum(39)m / 12 =	49.7410	49.5448	49.3486	48.3674	48.1712	47.1901	47.1901	46.9938	47.5825	48.1712	48.5636	48.9561 (39)
												48.3184 (39)
HLP (average)	0.5777	0.5754	0.5732	0.5618	0.5595	0.5481	0.5481	0.5458	0.5526	0.5595	0.5640	0.5686 (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											2.5685 (42)	
Average daily hot water use (litres/day)											95.2016 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218	(44)		
Energy content (annual)	135.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974	150.3992	(45)		
Distribution loss (46m) = 0.15 x (45m)													Total = Sum(45m) =	1497.8923	(45)
Water storage loss	23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	19.0317	20.7746	22.5599	(46)		
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	49.4840	46.0098	45.6029	42.2539	43.6623	45.6029	46.0098	49.4840	49.3151	50.9589	(61)		
Total heat required for water heating calculated for each month	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581	(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(63m) =												0.0000	(63)	
Output from w/h	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581	(64)		
	Total per year (kWh/year) = Sum(64m) =												2063.2621	(64)	
Heat gains from water heating, kWh/month	64.3768	56.6689	58.9742	52.1323	50.3860	44.2048	42.0892	47.1729	47.7019	54.5580	58.3791	62.7474	(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			
(66m)	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	(66)		
Lighting gains (calculated in Appendix L, equation 19 or L5a), also see Table 5	21.2040	18.8332	19.3162	11.5954	6.6677	7.3176	7.9069	10.2777	13.7947	17.5156	20.4433	21.7933	(67)		
Appliances gains (calculated in Appendix L, equation 13 or L3a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	(68)		
Cooking gains (calculated in Appendix L, equation 15 or L15a), also see Table 5	231.7171	234.2162	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931	(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	(70)		
Losses e.g. evaporation (negative values) (Table 5)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	(71)		
Water heating gains (Table 5)	86.5279	84.3288	79.2664	72.4059	67.7231	61.3956	56.5715	63.4045	66.2526	73.3306	81.0821	84.3380	(72)		
Total internal gains	403.9764	401.8109	387.1723	363.6915	339.7978	316.8162	302.3576	309.1568	321.5812	345.2795	372.2420	392.1518	(73)		

6. Solar gains															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
North								0.8000		0.7700		6.3078	(74)		
East			6.6800	19.6403	0.4200			0.8000		0.7700		30.5490	(76)		
West			6.2200	19.6403	0.4200			0.8000		0.7700		28.4453	(80)		

Solar gains	65.3020	127.4598	210.5396	310.0873	384.0230	395.1924	375.3656	319.5270	245.6709	152.2874	81.3404	35.7725	(83)		
Total gains	469.2784	529.2707	597.7119	673.7789	723.8208	712.0086	677.7232	628.6838	567.2522	496.5669	453.5823	445.9423	(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, nLr (see Table 9)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
tau	47.4449	47.6328	47.8222	48.7923	48.9911	50.0097	50.0097	50.2185	49.5972	48.9911	48.5952	48.2056			
alpha	6.1630	4.7155	4.1881	4.2528	4.2661	4.3340	4.3340	4.3479	4.3085	4.2661	4.2397	4.2137			
util living area	0.9574	0.9311	0.8723	0.7487	0.5858	0.4182	0.3051	0.3417	0.5543	0.8137	0.9306	0.9638	(86)		
MIT	20.0030	20.2022	20.4914	20.7873	20.9368	20.9887	20.9977	20.9964	20.9633	20.7445	20.3348	19.9693	(87)		
util rest of house	20.4501	20.4522	20.4542	20.4645	20.4666	20.4769	20.4769	20.4790	20.4728	20.4666	20.4625	20.4583	(88)		
MIT	0.9507	0.9238	0.8592	0.7278	0.5575	0.3855	0.2693	0.3037	0.5172	0.7920	0.9221	0.9598	(89)		
MIT	19.0861	19.3730	19.7839	20.1985	20.3942	20.4658	20.4752	20.4761	20.4346	20.1500	19.5740	19.0438	(90)		
Living area fraction	0.9574	0.9311	0.8723	0.7487	0.5858	0.4182	0.3051	0.3417	0.5543	0.8137	0.9306	0.9638	(91)		
MIT	19.4151	19.6706	20.0378	20.4098	20.5889	20.6535	20.6627	20.6628	20.6243	20.3634	19.8470	19.3760	(92)		
Temperature adjustment												-0.1500			
adjusted MIT	19.2651	19.5206	19.8878	20.2598	20.4389	20.5035	20.5127	20.5128	20.4743	20.2134	19.6970	19.2260	(93)		

8. Space heating requirement															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Utilisation	0.9403	0.9095	0.8454	0.7194	0.5560	0.3872	0.2717	0.3062	0.5173	0.7808	0.9081	0.9484	(94)		
Useful gains	441.2811	481.3801	505.3028	484.6633	402.4558	275.6609	184.6161	192.4809	293.4292	387.7244	411.8882	422.9251	(95)		
Ext temp.	-1.3000	-1.9000	-6.5000	-8.9000	-11.7000	-14.6000	-16.4000	-14.1000	-10.6000	-6.1000	-1.2000	4.2000	(96)		
Heat loss rate W	744.3803	724.3730	660.6669	549.4446	420.9656	278.5857	184.6110	193.2756	303.3073	463.0879	611.7565	735.6110	(97)		
Month factor	1.0000	1.0000	1.0000	1.0000	1.0000	0.9000	0.8000	0.9000	0.0000	1.0000	1.0000	1.0000	(97a)		
Space heating kWh	225.5052	163.2913	115.5909	64.6282	13.7728	0.0000	0.0000	0.0000	0.0000	56.0704	143.8980	232.6398	(98)		
Space heating per year													997.3366	(98)	
													(98) / (4) =	11.5842	(99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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)

Efficiency of main space heating system 1 (in %)

Efficiency of secondary/supplementary heating system, %

Space heating requirement

Space heating requirement

Space heating efficiency (main heating system 1)

Space heating fuel (main heating system)

Water heating requirement

Water heating requirement

Efficiency of water heater

Fuel for water heating, kWh/month

Water heating fuel used

Annual totals kWh/year

Space heating fuel - main system

Space heating fuel - secondary

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)

mechanical ventilation fans (SFP = 0.6500)

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

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)

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

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

Net CO2 emissions

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)
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
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
K-value kJ/m2K
A x K kJ/K
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
Heat transfer coeff
Average = Sum(39)m / 12 =
HLP
HLP (average)
Days in month

4. Water heating energy requirements (kWh/year)

Assumed occupancy
Average daily hot water use (litres/day)
Daily hot water use
Energy conte
Energy content (annual)
Distribution loss (46)m = 0.15 x (45)m
Water storage loss:
Total storage loss
If cylinder contains dedicated solar storage

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Combi loss	50.9589	46.0274	49.4840	46.0098	45.6029	42.2539	43.6623	45.6029	46.0098	49.4840	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581 (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	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581 (64)
Heat gains from water heating, kWh/month	64.3768	56.6689	58.9742	52.1323	50.3860	44.2048	42.0892	47.1729	47.7019	54.5580	58.3791	62.7474 (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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.2040	18.8332	15.3162	11.5954	8.6677	7.3176	7.9069	10.2777	13.7947	17.5156	20.4433	21.7933 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424 (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)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396 (71)
Water heating gains (Table 5)	86.5279	84.3288	79.2664	72.4059	67.7231	61.3956	56.5715	63.4045	66.2526	73.3306	81.0821	84.3380 (72)
Total internal gains	403.9764	401.8109	387.1723	363.6915	339.7978	316.8162	302.3576	309.1568	321.5812	345.2795	372.2420	392.1518 (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	2.1400	10.6334	0.6300	0.7000	0.7700	6.9544 (74)						
East	6.6800	19.6403	0.6300	0.7000	0.7700	40.0955 (76)						
West	6.2200	19.6403	0.6300	0.7000	0.7700	37.3344 (80)						
Solar gains	84.3843	164.7595	272.0317	400.0801	494.7225	508.7259	483.3646	411.9986	317.2712	195.5513	105.1251	69.4721 (83)
Total gains	488.3607	566.5705	659.2040	763.7717	834.5203	825.5422	785.7222	721.1554	638.8524	540.8308	477.3671	461.6239 (84)

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, nil/m (see Table 9a)	79.3431	79.6055	79.8644	81.1034	81.3395	82.4569	82.4569	82.6673	82.0229	81.3395	80.8633	80.3714
tau	6.2895	6.3070	6.3243	6.4069	6.4226	6.4971	6.4971	6.5112	6.4682	6.4226	6.3909	6.3581
util living area	0.9984	0.9955	0.9828	0.9222	0.7659	0.4054	0.4597	0.7445	0.9657	0.9960	0.9989	0.9989 (86)
MIT	20.1148	20.2587	20.4969	20.7837	20.9487	20.9944	20.9994	20.9987	20.9684	20.7207	20.3638	20.0924 (87)
Th 2	20.1886	20.1911	20.1935	20.2049	20.2070	20.2169	20.2169	20.2188	20.2131	20.2070	20.2027	20.1982 (88)
util rest of house	0.9979	0.9941	0.9772	0.8996	0.7160	0.4908	0.3336	0.3825	0.6755	0.9310	0.9945	0.9985 (89)
MIT 2	18.9945	19.2062	19.5520	19.9579	20.1600	20.2134	20.2167	20.2182	20.1893	19.8830	19.3692	18.9691 (90)
Living area fraction	19.3966	19.5839	19.8911	20.2543	20.4431	20.4936	20.4976	20.4983	20.4689	20.1837	19.7261	19.3723 (92)
MIT	19.3966	19.5839	19.8911	20.2543	20.4431	20.4936	20.4976	20.4983	20.4689	20.1837	19.7261	19.3723 (92)
Temperature adjustment	19.3966	19.5839	19.8911	20.2543	20.4431	20.4936	20.4976	20.4983	20.4689	20.1837	19.7261	19.3723 (93)
adjusted MIT	19.3966	19.5839	19.8911	20.2543	20.4431	20.4936	20.4976	20.4983	20.4689	20.1837	19.7261	19.3723 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9972	0.9927	0.9747	0.9012	0.7315	0.5142	0.3594	0.4103	0.6990	0.9505	0.9932	0.9980 (94)
Useful gains	486.9925	562.4116	642.5042	688.3166	610.4508	424.4830	282.3875	295.8866	446.5403	514.0691	474.1368	460.6957 (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	1137.6541	1102.9089	1002.5464	837.0669	642.6511	427.3635	282.6233	296.4218	464.2694	704.4821	933.5912	1128.7282 (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	184.0922	363.2142	267.8714	107.1002	23.9868	0.0000	0.0000	0.0000	0.0000	141.6673	330.8072	497.0162 (98)
Space heating												2215.7555 (98)
Space heating per m2										(98) / (4) =		25.3747 (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													2372.3292 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	484.0922	363.2142	267.8714	107.1002	23.9868	0.0000	0.0000	0.0000	0.0000	141.6673	330.8072	497.0162 (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)	518.3000	388.8803	286.8002	114.6683	25.6818	0.0000	0.0000	0.0000	0.0000	151.6780	354.1833	532.1372 (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	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581 (64)	
Efficiency of water heater (217)m	87.1259	86.7592	85.9204	83.9487	81.4686	80.3000	80.3000	80.3000	80.3000	84.5057	86.4617	80.3000 (216)	
Fuel for water heating, kWh/month	236.7360	209.6068	220.7206	200.3660	199.8954	178.6187	171.1303	190.7702	192.8771	208.6984	217.2203	230.8189 (219)	
Water heating fuel used												2457.4586 (219)	
Annual totals kWh/year												2372.3292 (211)	
Space heating fuel - main system												0.0000 (215)	
Space heating fuel - secondary													
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)													374.4696 (232)
Total delivered energy for all uses													5279.2575 (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	2372.3292	512.4231 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	2457.4586	530.8111 (264)
Space and water heating		1043.2342 (265)
Pumps and fans	75.0000	38.9250 (267)
Energy for lighting	374.4696	194.3497 (268)
Total CO2, kg/m2/year		1276.5089 (272)
Emissions per m2 for space and water heating		12.1165 (272a)
Fuel factor (main gas)		1.0000
Emissions per m2 for lighting		2.2573 (272b)
Emissions per m2 for pumps and fans		0.4521 (272c)
Target Carbon Dioxide Emission Rate (TER) = (12.1165 * 1.00) + 2.2573 + 0.4521, rounded to 2 d.p.		14.8300 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End EF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D3-01 End EF LEAN	Prop Type Ref	N / E			
Property	2B4P-D3-01 End EF, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	14.87	TER	19.61	
Environmental	88 B	% DER<TER	24.18			
CO ₂ Emissions (t/year)	0.95	DFEE	42.04	TFEE	56.98	
General Requirements Compliance	Pass	% DFEE<TFEE	26.22			
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 74 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) 14.87 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)57.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)42.0 kWh/m²/yrOK

2 Fabric U-values			
Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof (no roof)			
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency
Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
x X
Combi boiler
Efficiency: 95%
Minimum: 88%
OK
Secondary heating system: None

5 Cylinder insulation
Hot water storage: No cylinder

6 Controls
Space heating controls: Time and temperature zone control
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: 0.55
Maximum: 1.5
MVHR efficiency: 92%
Minimum: 70%
OK

9 Summertime temperature
Overheating risk (Thames Valley): Medium
OK
Based on:
Overshading: Average
Windows facing North: 9.86 m², No overhang
Windows facing East: 8.63 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features		
Party wall U-value	0.00 W/m ² K	
Exposed floor U-value	0.12 W/m ² K	
Door U-value	0.50 W/m ² K	
Window U-value	0.80 W/m ² K	
Window U-value	0.80 W/m ² K	
Air permeability	2.5 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) (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						74.1000 (1b)	x	2.6000 (2b)	=	192.6600 (1b) - (3b)		
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000										(4)	
Dwelling volume						(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =					192.6600 (5)	

2. Ventilation rate												

						main		secondary		other		
						heating		heating				
Number of chimneys						0	+	0	+	0	=	
Number of open flues						0	+	0	+	0	=	
Number of intermittent fans										0 * 10 =	0.0000 (7b)	
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) =											0.0000 / (5) =	0.0000 (8)
Pressure test												Yes
Measured/design AP50												2.5000
Infiltration rate												0.1250 (18)
Number of sides sheltered												2 (19)
										(20) = 1 - [0.075 x (19)] =	0.8500 (20)	
Shelter factor											(21) = (18) x (20) =	0.1063 (21)
Infiltration rate adjusted to include shelter factor												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation:												78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	
											0.2338 (22b)	

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					
Glazing North (Uw = 0.80)			9.8600	0.7752	7.6434		(27)					
Glazing E, S, W (Uw = 0.80)			8.6300	0.7752	6.6899		(27)					
Corridor Door			2.1000	0.5000	1.0500		(26)					
Exposed Floor			74.1000	0.1200	8.8920		(28b)					
External Wall	48.1000	18.4900	29.6100	0.1500	4.4415	14.0000	414.5400	(29a)				
Corridor	4.2900	2.1000	2.1900	0.1500	0.3285	14.0000	30.6600	(29a)				
Core Wall	5.3300		5.3300	0.2500	1.3325	9.0000	47.9700	(29a)				
Total net area of external elements Sum(A, m2)			131.8200		(26)...(30) + (32) =	30.3778						
Fabric heat loss, W/K = Sum (A x U)			41.0800	0.0000	0.0000	20.0000	821.6000	(32)				
Party Wall 1			74.1000			40.0000	2964.0000	(32b)				
Party Ceilings 1			139.6200			9.0000	1256.5800	(32c)				
Timber Frame												
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5535.3500	(34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							74.7011	(35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							17.0949	(36)				
Total fabric heat loss						(33) + (36) =	47.4727	(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	
Heat transfer coeff	15.5428	15.3739	15.2050	14.3606	14.1918	13.3474	13.3474	13.1785	13.6851	14.1918	14.5295	
Average = Sum(39)m / 12 =	63.0155	62.8467	62.6778	61.8334	61.6645	60.8201	60.8201	60.6512	61.1579	61.6645	62.0023	
	61.7912											

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
HLP	0.8504	0.8481	0.8459	0.8345	0.8322	0.8208	0.8208	0.8185	0.8253	0.8322	0.8367	
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											2.3414 (42)	
Average daily hot water use (litres/day)											89.8086 (43)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Daily hot water use												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content	88.7895	95.1971	118.6048	88.0124	84.4201	80.8277	80.8277	88.4442	101.4910	102.7032	88.0124	95.1971	88.7895	44
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4548	88.4442				119.6906	130.6517	141.8793	45
Distribution loss (46%) = 0.15 x (45)m		21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819	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
Combi loss	50.3420	43.8168	46.6808	43.4034	43.0195	39.8603	41.1889	43.0195	43.4034	46.6808	46.9465	50.3420	50.3420	61
Total heat required for water heating calculated for each month	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	145.5106	146.1065	166.3714	177.5982	192.2213	202.6231	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
Output from w/h														
	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	145.5106	146.1065	166.3714	177.5982	192.2213	202.6231	64
Heat gains from water heating, kWh/month	61.2974	53.5579	55.6334	49.1791	47.5317	41.7007	39.7049	44.5007	44.9996	51.4673	55.1783	59.7604	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	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	66
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	18.4249	16.3648	13.3088	10.0756	7.5316	6.3585	6.8706	8.9307	11.9867	15.2199	17.7639	18.9370	67	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	206.6711	208.8157	203.4114	191.9063	177.3831	163.7333	154.6144	152.4698	157.8741	169.3793	183.9025	197.5523	68	
Pumps, fans	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	69
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	70
Water heating gains (Table 5)	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	71
Total internal gains	82.3890	79.6993	74.7761	68.3042	63.8867	57.9176	53.3668	59.8127	62.4995	69.1765	76.6365	80.3231	72	
	366.6062	366.0011	352.6175	331.4073	309.9226	289.1306	275.9731	282.3344	293.4816	314.8969	339.4241	357.9335	73	

6. Solar gains														

[Jan]														
	Area	Solar flux	g	PF	Access	Gains								
	m2	Table 6a	Specific data	Specific data	Factor	W								
		W/m2	or Table 6b	or Table 6c	Table 6d									
North	9.8600	10.6334	0.5000	0.8000		29.0631 (74)								
East	8.6300	19.6403	0.4200	0.8000		39.4667 (76)								

Solar gains	68.5298	132.7463	221.5238	337.0299	431.4697	451.2538	352.1807	261.3488	157.7249	85.0634	56.6839 (83)			
Total gains	437.1360	498.7473	554.1413	668.4372	741.3924	740.3844	701.5597	634.5151	554.8304	472.6218	424.4875	414.6174	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, nil/m, (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	2.4003	85
tau	2.6267	2.6311	2.6355	2.6378	2.6623	2.6854	2.6854	2.6901	2.6761	2.6623	2.6533	2.6443		
alpha	0.9393	0.9146	0.8648	0.7662	0.6285	0.4768	0.3632	0.4113	0.6226	0.8266	0.9162	0.9460	86	
living area	0.9393	0.9146	0.8648	0.7662	0.6285	0.4768	0.3632	0.4113	0.6226	0.8266	0.9162	0.9460	86	
MIT	18.9204	19.1974	19.6610	20.2294	20.6485	20.8810	20.9579	20.9408	20.7489	20.1808	19.4576	18.8682	87	
Th 2	20.2099	20.2118	20.2138	20.2236	20.2255	20.2354	20.2354	20.2373	20.2314	20.2205	20.2216	20.2177	88	
util rest of house	0.9330	0.9059	0.8510	0.7432	0.5937	0.4295	0.3053	0.3508	0.5752	0.8037	0.9062	0.9403	89	
MIT	17.3817	17.7863	18.4494	19.2511	19.8161	20.1164	20.2021	20.1883	19.9633	19.2025	18.1728	17.3165	90	
Living area fraction	4.3000	4.9000	6.5000	9.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	91	
MIT	17.9106	18.2681	18.8630	19.5851	20.1003	20.3775	20.4601	20.4452	20.2316	19.5365	18.6115	17.8463	92	
Temperature adjustment													-0.1500	
adjusted MIT	17.7606	18.1181	18.7130	19.4351	19.9503	20.2275	20.3101	20.2952	20.0816	19.3865	18.4615	17.6963	93	

8. Space heating requirement														

Utilisation	0.9066	0.8762	0.8194	0.7172	0.5806	0.4290	0.3111	0.3555	0.5653	0.7745	0.8770	0.9155	94	
Useful gains	396.3083	436.9954	470.4510	479.3879	430.4590	317.6534	218.2607	225.5750	313.6586	366.0643	372.2839	379.5903	95	
Ext temp	4.3000	4.9000	6.5000	9.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	96	
Heat loss rate W	848.2259	830.7123	765.8666	651.4216	508.7522	342.2622	225.6514	236.2494	365.8194	541.8165	704.4383	841.5884	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	98	
Space heating kWh	336.2267	264.5778	219.5065	123.8642	58.2501	0.0000	0.0000	0.0000	0.0000	130.7596	239.1512	343.5555	98	
Space heating per year													1715.9515	99
Space heating per m2													23.1564	99
													(98) / (4) =	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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)
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	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	336.2267	264.5778	219.5065	123.8642	58.2501	0.0000	0.0000	0.0000	0.0000	130.7596	239.1512	343.5555	(98)
Space heating efficiency (main heating system 1)	95.0000	95.0000	95.0000	95.0000	95.0000	0.0000	0.0000	0.0000	0.0000	95.0000	95.0000	95.0000	(210)
Space heating fuel (main heating system)	353.9228	278.5029	231.0594	130.3834	61.3159	0.0000	0.0000	0.0000	0.0000	137.6417	251.7381	361.6374	(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	171.9483	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	(64)
Efficiency of water heater	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	(216)
Fuel for water heating, kWh/month	207.2041	180.9982	188.3169	167.0276	161.7122	142.4270	136.4559	152.1164	153.7964	175.1278	186.9455	202.3382	(219)
Water heating fuel used												2054.4661	(219)
Annual totals kWh/year												1806.2016	(211)
Space heating fuel - main system												0.0000	(215)
Space heating fuel - secondary												161.5936	(230a)
Electricity for pumps and fans:												30.0000	(230c)
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6875)												131.9396	(231)
mechanical ventilation fans (SFP = 0.6875)												325.3892	(232)
central heating pump												4377.6505	(238)
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	1806.2016	0.2160	390.1395
Space heating - secondary	0.0000	0.0000	0.0000
Water heating (other fuel)	2054.4661	0.2160	443.7647
Space and water heating			833.9042
Pumps and fans	191.5936	0.5190	99.4371
Energy for lighting	325.3892	0.5190	168.8770
Total CO2, kg/year			1102.2183
Dwelling Carbon Dioxide Emission Rate (DER)			14.8700

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

	DER	14.8700	ZC1
Total Floor Area	74.1000	TFA	74.1000
Assumed number of occupants	2.3414	N	2.3414
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190	EF	0.5190
CO2 emissions from appliances, equation (L14)	16.5275	ZC2	16.5275
CO2 emissions from cooking, equation (L16)	2.3643	ZC3	2.3643
Total CO2 emissions	33.7618	ZC4	33.7618
Residual CO2 emissions offset from biofuel CHP	0.0000	ZC5	0.0000
Additional allowable electricity generation, kWh/m ² /year	0.0000	ZC6	0.0000
Resulting CO2 emissions offset from additional allowable electricity generation	0.0000	ZC7	0.0000
Net CO2 emissions	33.7618	ZC8	33.7618

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	74.1000	2.6000	192.6600
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	192.6600

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0	0.0000
Number of open flues	0	0	0	0	0.0000
Number of intermittent fans	0	0	0	0	0.0000
Number of passive vents	0	0	0	0	0.0000
Number of fuelless gas fires	0	0	0	0	0.0000
Infiltration due to chimneys, flues and fans					30.0000
Pressure test					0.1957
Measured/design AP50					5.0000
Infiltration rate					0.4057
Number of sides sheltered					2
Shelter factor					0.8500
Infiltration rate adjusted to include shelter factor					0.3449
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750
Adj infiltr rate	0.4397	0.4311	0.4225	0.3793	0.3707
Effective ac	0.5967	0.5929	0.5892	0.5720	0.5687

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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			16.4300	1.3258	21.7822		(27)
Exposed Floor			74.1000	0.1300	9.6330		(28b)
External Wall	48.1000	16.4300	31.6700	0.1800	5.7006		(29a)
Corridor	4.2900	2.1000	2.1900	0.1800	0.3942		(29a)
Core Wall	5.3300		5.3300	0.1800	0.9594		(29a)
Total net area of external elements Aum(A, m2)			131.8200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	40.5694		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0415
Total fabric heat loss						(33) + (36) =	52.6109
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	37.9347	37.6960	37.4621	36.3634	36.1578	35.2008	35.0236
Heat transfer coeff	90.5456	90.3069	90.0730	88.9743	88.7687	87.8117	87.6345
Average = Sum(39)m / 12 =							
HLP	1.2219	1.2187	1.2156	1.2007	1.1980	1.1850	1.1827
HLP (average)							
Days in month	31	28	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Assumed occupancy													2.3414
Average daily hot water use (litres/day)													89.8086
Daily hot water use	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895	(44)
Energy conte	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.8793	(45)
Energy content (annual)													Total = Sum(45)m =
Distribution loss (46)m = 0.15 x (45)m													1413.0389
Water storage loss:	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819	(46)
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	0.0000	0.0000	0.0000	(57)
Combi loss	50.3420	43.8168	46.6808	43.4034	43.0195	39.8603	41.1889	43.0195	43.4034	46.6808	46.9465	50.3420	61.6111	50.3420	61.6111	(58)
Total heat required for water heating calculated for each month	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	196.8439	192.2213	196.8439	(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	(63)
Output from w/h	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	196.8439	192.2213	196.8439	(64)
	Solar input sum (num of months) = Sum(63)m = 0.0000 (63)															
	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	196.8439	192.2213	196.8439	(65)
	Total per year (kWh/year) = Sum(64)m = 1951.7428 (64)															
Heat gains from water heating, kWh/month	61.2974	53.5579	55.6334	49.1791	47.5317	41.7007	39.7049	44.5007	44.9996	51.4673	55.1783	59.7604	61.2974	59.7604	61.2974	(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	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	18.4271	16.3668	13.3104	10.0768	7.5325	6.3593	6.8714	8.9318	11.9882	15.2218	17.7660	18.3939 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	20.7171	20.8157	20.3421	19.1806	17.7351	16.5733	154.6144	152.4698	157.8741	169.3793	183.9025	197.5523 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071 (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. evaporative (negative values) (Table 5)												
	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566 (71)
Water heating gains (Table 5)												
	82.3890	79.6993	74.7761	68.3042	63.8867	57.9176	53.3668	59.8127	62.4995	69.1765	76.6365	80.3231 (72)
Total internal												
	368.0085	366.0031	352.6191	331.4085	309.9235	289.1314	275.9739	282.3325	293.4831	314.8988	329.4635	339.1783 (73)

6. Solar gains												
[Jan]		Area m2	Solar flux Table 6a W/m2	g Table 6a or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
North		8.7700	10.6334	0.6300	0.7000	0.7000	28.4999	(74)				
East		7.6600	19.6403	0.6300	0.7000	0.7700	45.9778	(76)				
Solar gains	74.4777	144.4070	240.6710	646.0846	465.0045	485.3972	458.1706	380.4293	283.5660	171.5573	92.4872	61.5688 (83)
Total gains	443.0861	510.4101	593.2902	696.0931	774.9281	774.5286	784.1445	682.7628	577.0290	486.4561	431.9135	419.0504 (84)

7. Mean internal temperature (heating season)														
Mean internal temperature (heating season)														
Temperature during heating periods in the living area from Table 9a, Th (°C)														
Utilisation factor for gains for living area, n _{li} (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)	
tau	56.8314	56.9816	57.1296	57.8351	57.9690	58.6007	58.6007	58.7192	58.3558	57.9690	57.6987	57.4818		
alpha	4.7888	4.7988	4.8086	4.8557	4.8646	4.9067	4.9067	4.9146	4.8904	4.8646	4.8466	4.8279		
util living area	0.9980	0.9957	0.9876	0.9539	0.8546	0.6770	0.5154	0.5864	0.8515	0.9785	0.9961	0.9975	(86)	
MIT	19.6151	19.8162	20.0981	20.4818	20.9488	20.9526	20.9699	20.9818	20.8526	20.4381	19.9840	19.9384	(87)	
Th 2	19.5025	19.9051	19.9076	19.9194	19.9216	19.9320	19.9320	19.9339	19.9280	19.9216	19.9171	19.9125	(88)	
util rest of house	0.9973	0.9942	0.9830	0.9365	0.8037	0.5832	0.3959	0.4613	0.7788	0.9675	0.9944	0.9980	(89)	
MIT 2	19.1236	19.3511	18.7621	19.3151	19.7247	19.9013	19.9286	19.9286	19.8091	19.2650	19.0553	18.9893	(90)	
Living area fraction									f _{LA} = Living area /				(91)	
MIT	18.6487	18.8513	19.2182	19.7134	20.0901	20.2604	20.2908	20.2869	20.1654	19.6655	19.0760	18.6218	(92)	
adjusted MIT												0.0000	(93)	
adjusted MIT	18.6487	18.8513	19.2182	19.7134	20.0901	20.2604	20.2908	20.2869	20.1654	19.6655	19.0760	18.6218	(93)	

8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9962	0.9922	0.9792	0.9324	0.8126	0.6136	0.4370	0.5043	0.7973	0.9639	0.9926	0.9970 (94)
Useful gases	441.3921	506.4149	580.9329	649.4020	629.7189	475.2688	320.7962	320.7962	460.0733	468.9152	428.7009	418.2641 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1239.2115	1259.9007	1145.5703	962.1185	744.7760	497.0500	324.0985	340.6224	534.8494	804.7341	1068.0762	1292.4748 (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 (97)
Space heating kWh	638.2177	506.3424	420.0903	225.4151	85.6025	0.0000	0.0000	0.0000	0.0000	249.8493	460.3502	650.4212 (98)
Space heating per m2												3236.2802 (98)
										(98) / (3)		43.6745 (99)

Not applicable

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

HODKINSON

[illegible]

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	3464.9681	0.2160	748.4333 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2301.3400	0.2160	497.0894 (264)
Space and water heating			1245.5225 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	325.4292	0.5190	168.8977 (268)
Total CO2, kg/m2/year			1453.3453 (272)
Emissions per m2 for space and water heating			16.8087 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2793 (272b)
Emissions per m2 for pumps and fans			0.5253 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.8087 * 1.00) + 2.2793 + 0.5253, rounded to 2 d.p.			19.6100 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End MF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D3-01 End MF LEAN	Prop Type Ref	N / E			
Property	2B4P-D3-01 End MF, St Ann's Hospital, London, N15					
SAP Rating	86 B	DER	13.33	TER	16.92	
Environmental	90 B	% DER<TER	21.20			
CO ₂ Emissions (t/year)	0.85	DFEE	33.87	TFEE	43.23	
General Requirements Compliance	Pass	% DFEE<TFEE	21.65			
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 74 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) 16.92 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.33 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)43.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)33.9 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
x X
Combi boiler
Efficiency: 95%
Minimum: 88%
OK
Secondary heating system: None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls: Time and temperature zone control 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: 0.68
Maximum 1.5 OK
MVHR efficiency: 87%
Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overshading: Average
Windows facing North: 9.86 m², No overhang
Windows facing East: 8.63 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value	0.00 W/m ² K
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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) (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												
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000			(m2)	(m)	(m3)												
Dwelling volume	(3a)+(3b)+(3c)+(3d)+(3e)...(3n)			x	2.6000 (2b)	=	192.6600 (1b) - (3b)											
							(4)											
							192.6600 (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	0		0		0		0		0 * 10 = 0.0000 (7a)									
Number of fuelless gas fires	0		0		0		0		0 * 10 = 0.0000 (7b)									
									0 * 40 = 0.0000 (7c)									
Air changes per hour																		
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =						0.0000 / (5) =		0.0000 (8)									
Pressure test									2.5000									
Measured/design AP50									0.1250 (18)									
Infiltration rate									2 (19)									
Number of sides sheltered																		
Shelter factor							(20) = 1 - [0.075 x (19)] =		0.8500 (20)									
Infiltration rate adjusted to include shelter factor							(21) = (18) x (20) =		0.1063 (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							
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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195							
Balanced mechanical ventilation with heat recovery									0.1248 (22b)									
If mechanical ventilation:									0.5000 (23a)									
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =									73.9500 (23c)									
Effective ac	0.2657	0.2631	0.2604	0.2471	0.2445	0.2312	0.2312	0.2285	0.2365	0.2445	0.2498							
											0.2551 (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											
Glazing North (Uw = 0.80)	9.8600	0.7752	7.6434	0.7752	6.6899	(27)	(27)											
Glazing E, S, W (Uw = 0.80)	8.6300	0.7752	6.6899	0.7752	6.6899	(27)	(27)											
Corridor Door	2.1000	0.5000	1.0500	0.5000	1.0500	(26)	(26)											
External Wall	48.1000	18.4900	29.6100	0.1500	4.4415	14.0000	414.5400 (29a)											
Corridor	4.2900	2.1000	0.1500	0.3285	30.6600 (29a)	0.0000	0.0000											
Core Wall	5.3300	0.2500	5.3300	0.2500	1.3325	9.0000	47.9700 (29a)											
Total net area of external elements Aum(A, m2)	57.7200	(31)	(26)...(30) + (32) =		21.4858	(33)	8499.3500 (34)											
Fabric heat loss, W/K = Sum (A x U)							114.7011 (35)											
Party Wall 1	41.0800	0.0000	0.0000	0.0000	20.0000	821.6000 (32)	16.2183 (38)											
Party Floor 1	74.1000	0.0000	0.0000	0.0000	40.0000	2964.0000 (32a)	0.0000											
Party Ceilings 1	74.1000	0.0000	0.0000	0.0000	40.0000	2964.0000 (32b)	0.0000											
Timber Frame	139.6200	0.0000	0.0000	0.0000	9.0000	1256.5800 (32c)	0.0000											
Heat capacity Cm = Sum(A x k)							8499.3500 (34)											
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							114.7011 (35)											
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.7342 (36)											
Total fabric heat loss							(33) + (36) =											
							34.2200 (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							
Heat transfer coeff	16.8938	16.7249	16.5561	15.7117	15.5428	14.6984	14.6984	14.5295	15.0361	15.5428	15.8905							
Average = Sum(39)m / 12 =	51.1138	50.9449	50.7760	49.9317	49.7628	48.9184	48.9184	48.7495	49.2561	49.7628	50.1005							
											50.4383 (39)							
											49.8894 (39)							
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov							
HLP (average)	0.6898	0.6875	0.6852	0.6738	0.6716	0.6602	0.6602	0.6579	0.6647	0.6716	0.6761							
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									2.3414 (42)									
Average daily hot water use (litres/day)									89.8086 (43)									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec							
Daily hot water use																		



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											

Energy cont	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517
Distribution loss (46)m = 0.15 x (45)m	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978
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	50.3420	43.8168	46.6808	43.4034	43.0195	39.8603	41.1889	43.0195	43.4034	46.6808	46.9465
Total heat required for water heating calculated for each month	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982
Heat gains from water heating, kWh/year	61.2974	53.5579	55.6334	49.1791	47.5317	41.7007	39.7049	44.5007	44.9996	51.4673	55.1783
											1951.7428 (64)
											59.7604 (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
(66)m	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.4249	16.3648	13.3088	10.0756	7.5316	6.3585	6.8706	8.9307	11.9867	15.2199	17.763

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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)
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	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	251.1198	183.9405	131.5808	52.9809	14.9214	0.0000	0.0000	0.0000	0.0000	67.5923	164.8280	259.4869	(98)
Space heating efficiency (main heating system 1)	95.0000	95.0000	95.0000	95.0000	95.0000	0.0000	0.0000	0.0000	0.0000	95.0000	95.0000	95.0000	(210)
Space heating fuel (main heating system)	264.3366	193.6216	138.5061	55.7694	15.7068	0.0000	0.0000	0.0000	0.0000	71.1498	173.5031	273.1441	(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	196.8239	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	(64)
Efficiency of water heater (217)m	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	(216)
Fuel for water heating, kWh/month	207.2061	180.3982	188.3169	167.0276	161.7122	142.4270	136.4559	152.1164	153.7964	175.1278	186.9455	202.3382	(219)
Water heating fuel used												2054.4661	(219)
Annual totals kWh/year												1185.7375	(215)
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 = 0.8500) mechanical ventilation fans (SFP = 0.8500) central heating pump Total electricity for the above, kWh/year Electricity for lighting (calculated in Appendix L) Total delivered energy for all uses												199.7884	(230a)
												30.0000	(230c)
												229.7884	(231)
												325.3892	(232)
												3795.3812	(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	1185.7375	0.2160	256.1193	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	2054.4661	0.2160	443.7647	(264)
Space and water heating			699.8840	(265)
Pumps and fans	229.7884	0.5190	119.2602	(267)
Energy for lighting	325.3892	0.5190	168.8770	(268)
Total CO2, kg/year			988.0212	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			13.3300	(273)

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

DER	13.3300	ZC1
Total Floor Area	74.1000	TFA
Assumed number of occupants	2.3414	N
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190	EF
CO2 emissions from appliances, equation (L14)	16.5275	ZC2
CO2 emissions from cooking, equation (L16)	2.3643	ZC3
Total CO2 emissions	32.2218	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	32.2218	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	74.1000	2.6000	192.6600
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 192.6600

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					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) =					Air changes per hour 30.0000 / (5) = 0.1557 (8)								
Pressure test					Yes								
Measured/design AP50					5.0000								
Infiltration rate					0.4057 (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) =	0.3449 (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	0.4397	0.4311	0.4225	0.3793	0.3707	0.3276	0.3276	0.3190	0.3449	0.3707	0.3880	0.4052	(22b)
Effective ac	0.5967	0.5929	0.5892	0.5720	0.5687	0.5537	0.5537	0.5509	0.5595	0.5687	0.5753	0.5821	(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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			16.4300	1.3258	21.7822		(27)
External Wall	48.1000	16.4300	31.6700	0.1800	5.7006		(29a)
Corridor	4.2900	2.1000	2.1900	0.1800	0.3942		(29a)
Core Wall	5.3300		5.3300	0.1800	0.9594		(29a)
Total net area of external elements Aum(A, m2)			57.7200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.9364		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.9010 (36)
Total fabric heat loss						(33) + (36) =	36.8374 (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	37.9347	37.6960	37.4621	36.3634	36.1578	35.2008	35.2008	35.0236	35.5694	36.1578	36.5737	37.0084
Heat transfer coeff	74.7721	74.5334	74.2995	73.2008	72.9952	72.0382	72.0382	71.8610	72.4068	72.9952	73.4111	73.8458
Average = Sum(39)m / 12 =												
HLP	1.0091	1.0058	1.0027	0.9879	0.9851	0.9722	0.9722	0.9698	0.9772	0.9851	0.9907	0.9966
HLP (average)												0.9879
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3414	(42)
Average daily hot water use (litres/day)													89.8086	(43)
Daily hot water use	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895	98.7895	(44)
Energy conte	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.8793	141.8793	(45)
Energy content (annual)													1413.0389	(45)
Distribution loss (46)m = 0.15 x (45)m	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819	21.2819	(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	50.3420	43.8168	46.6808	43.4034	43.0195	39.8603	41.1889	43.0195	43.4034	46.6808	46.9465	50.3420	(61)
Total heat required for water heating calculated for each month	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	(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	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	(64)
Heat gains from water heating, kWh/month	61.2974	53.5579	55.6334	49.1791	47.5317	41.7007	39.7049	44.5007	44.9996	51.4673	55.1783	59.7604	(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	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.4271	16.3668	13.3104	10.0768	7.5325	6.3593	6.8714	8.9318	11.9882	15.2218	17.7660	18.9393	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.6711	208.8157	203.4114	191.9063	177.3831	163.7333	154.6144	152.4698	157.8741	169.3793	183.9025	197.5523	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	(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)	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	(71)
Water heating gains (Table 5)	82.3890	79.6993	74.7761	68.3042	63.8867	57.9176	53.3668	59.8127	62.4995	69.1765	76.6365	80.3231	(72)
Total internal gains	368.6085	366.0031	352.6191	331.4085	309.9235	289.1314	275.9739	282.3355	293.4831	314.8988	339.4263	357.9358	(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	8.7700		10.6334		0.6300		0.7000		0.7700		28.4999 (74)	
East	7.6600		19.6403		0.6300		0.7000		0.7700		45.9778 (76)	
Solar gains	74.4777	144.4070	240.6710	364.6846	465.0045	485.3972	458.1706	380.4293	283.5460	171.5573	92.4872	61.5688 (83)
Total gains	443.0861	510.4101	593.2902	696.0931	774.9281	774.5286	734.1445	662.7648	577.0290	486.4561	431.9135	419.5046 (84)

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, nil,m (see Table 9a)	0.9980	0.9952	0.9839	0.9320	0.7892	0.5828	0.4298	0.4942	0.7840	0.9701	0.9956	0.9985	(86)
tau	19.9509	20.0993	20.3572	20.6905	20.9120	20.9873	20.9981	20.9961	20.9382	20.6246	20.2293	19.9286	(87)
alpha	20.0758	20.0785	20.0811	20.0935	20.0958	20.1066	20.1086	20.1024	20.1024	20.0958	20.0911	20.0862	(88)
util living area	0.9974	0.9936	0.9785	0.9103	0.7360	0.5068	0.3436	0.4009	0.7103	0.9563	0.9939	0.9981	(89)
MIT	18.6704	18.8886	19.2637	19.7383	20.0145	20.0986	20.1059	20.1070	20.0550	19.6595	19.0885	18.6455	(90)
Living area fraction	19.1076	19.3020	19.6370	20.0634	20.3210	20.4021	20.4105	20.4105	20.3565	19.9890	19.4780	19.0836	(92)
Temperature adjustment	19.1076	19.3020	19.6370	20.0634	20.3210	20.4021	20.4105	20.4105	20.3565	19.9890	19.4780	19.0836	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	491.4903	506.2218	578.5458	633.0980	681.2850	712.3810	723.9101	726.8679	722.8097	684.2085	628.5573	418.3745	(94)
Ext temp	4.3000	4.3000	6.5000	8.9000	11.7000	14.6000	16.4000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1107.1931	1073.4266	976.0739	817.1691	629.2882	417.9704	274.5043	288.2021	453.0155	685.3553	908.6827	1099.0884	(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	495.2829	381.1616	295.7609	132.5312	35.7143	0.0000	0.0000	0.0000	0.0000	164.5332	345.6903	506.4512	(98)
Space heating													
Space heating per m2										(98) / (4) =			

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	2523.6890	(211)

Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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)	530.2814	408.0559	316.6605	141.8963	38.2381	0.0000	0.0000	0.0000	0.0000	176.1597	370.1181	542.2389	(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	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	(64)
Efficiency of water heater	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	93.4000	(216)
Fuel for water heating, kWh/month	225.5370	197.6457	207.2810	187.5566	187.2839	168.5002	161.4361	179.9634	181.9509	195.6775	204.8445	219.9923	(219)
Water heating fuel used	225.5370	197.6457	207.2810	187.5566	187.2839	168.5002	161.4361	179.9634	181.9509	195.6775	204.8445	219.9923	(219)
Annual totals kWh/year	2706.444	2371.748	2487.372	2250.679	2247.403	2022.002	1937.233	2159.561	2183.411	2348.130	2458.134	2639.908	(220)
Space heating fuel - main system	225.5370	197.6457	207.2810	187.5566	187.2839	168.5002	161.4361	179.9634	181.9509	195.6775	204.8445	219.9923	(221)
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	(222)

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

Space heating - main system 1	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - secondary	2523.6890	0.2160	545.1168	(261)
Water heating (other fuel)	0.0000	0.0000	0.0000	(263)
Space and water heating	2523.6890	0.2160	545.1168	(264)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	325.4292	0.5190	168.8977	(268)
Total CO2, kg/m2/year			1255.5561	(272)
Emissions per m2 for space and water heating			14.1125	(272a)
Fuel factor (main gas)			1.0000	(272b)
Emissions per m2 for lighting			2.2793	(272c)
Emissions per m2 for pumps and fans			0.5253	(272d)
Target Carbon Dioxide Emission Rate (TER) = (14.1125 * 1.00) + 2.2793 + 0.5253, rounded to 2 d.p.			16.9100	(273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End TF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D3-01 End TF LEAN	Prop Type Ref	N / E			
Property	2B4P-D3-01 End TF, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	15.66	TER	20.49	
Environmental	88 B	% DER<TER	23.59			
CO ₂ Emissions (t/year)	0.96	DFEE	45.05	TFEE	61.53	
General Requirements Compliance	Pass	% DFEE<TFEE	26.79			
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 74 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) 20.49 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 15.66 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)61.5 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (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	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

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

x X

Combi boiler

Efficiency: 95%

Minimum: 88%

OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls:

Time and temperature zone control

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:

0.68

Maximum

1.5

OK

MVHR efficiency:

87%

Minimum:

70%

OK

9 Summertime temperature

Overheating risk (Thames Valley):

Slight

OK

Based on:

Overshading:

Average

Windows facing North:

9.86 m², No overhang

Windows facing East:

8.63 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

0.50 W/m²K

Window U-value

0.80 W/m²K

Window U-value

0.80 W/m²K

Air permeability

2.5 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

[illegible]

6. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9856	0.9739	0.9419	0.8520	0.6864	0.4851	0.3386	0.3920	0.6655	0.9071	0.9743	0.9884 (94)
Useful gains	430.853	485.748	540.767	569.356	508.906	359.183	237.565	248.754	369.258	428.698	413.592	409.081 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month factor	964.4048	937.4098	854.8746	718.0162	552.5801	365.8635	238.5170	250.6088	396.3962	600.9536	794.5841	958.5919 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000 (97a)
Space heating	396.3623	303.5167	233.6956	106.9052	32.4944	0.0000	0.0000	0.0000	0.0000	128.1581	274.3143	408.2998 (98)
Space heating per m2											(98) / 4 =	25.4298 (99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

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)
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	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	394.9623	303.5167	233.6956	106.9052	32.4944	0.0000	0.0000	0.0000	0.0000	128.1581	274.3143	408.2998	(98)
Space heating efficiency (main heating system 1)	95.0000	95.0000	95.0000	95.0000	95.0000	0.0000	0.0000	0.0000	0.0000	95.0000	95.0000	95.0000	(210)
Space heating fuel (main heating system)	417.8551	319.4913	245.9953	112.5318	34.2046	0.0000	0.0000	0.0000	0.0000	134.9033	288.7519	429.7893	(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	196.8439	171.9483	178.9010	158.6762	153.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	(64)
Efficiency of water heater (217)m	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	(216)
Fuel for water heating, kWh/month	207.2041	180.9982	188.3169	167.0276	161.7122	142.4270	136.4559	152.1164	153.7964	175.1278	186.9455	202.3382	(219)
Water heating fuel used													2054.4661 (219)
Annual totals kWh/year													1983.5225 (211)
Space heating fuel - main system													0.0000 (215)
Space heating fuel - secondary													199.7884 (230a)
Electricity for pumps and fans:													30.0000 (230c)
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8500)													229.7884 (231)
mechanical ventilation fans (SFP = 0.8500)													325.3892 (232)
central heating pump													4593.1662 (238)
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

	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1983.5225	428.4409 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	2054.4661	443.7647 (264)
Space and water heating		872.2055 (265)
Pumps and fans	229.7884	119.2602 (267)
Energy for lighting	325.3892	168.8770 (268)
Total CO2, kg/year	0.5190	1160.3427 (272)
Dwelling Carbon Dioxide Emission Rate (DER)		15.6600 (273)

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

DER	15.6600	ZC1
Total Floor Area	74.1000	TFA
Assumed number of occupants	2.3414	N
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190	EF
CO2 emissions from appliances, equation (L14)	16.5275	ZC2
CO2 emissions from cooking, equation (L16)	2.3643	ZC3
Total CO2 emissions	34.5518	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	34.5518	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	74.1000 (1b)	2.6000 (2b)	192.6600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 192.6600 (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					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) =				Air changes per hour 30.0000 / (5) = 0.1557 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.4057 (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) =				0.3449 (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	0.4397	0.4311	0.4225	0.3793	0.3707	0.3276	0.3276	0.3190	0.3449	0.3707	0.3880	0.4052 (22b)
	0.5967	0.5929	0.5892	0.5720	0.5687	0.5537	0.5537	0.5509	0.5595	0.5687	0.5753	0.5821 (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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			16.4300	1.3258	21.7822		(27)
External Wall	48.1000	16.4300	31.6700	0.1800	5.7006		(29a)
Corridor	4.2900	2.1000	2.1900	0.1800	0.3942		(29a)
Core Wall	5.3300		5.3300	0.1800	0.9594		(29a)
Main Roof	74.1000		74.1000	0.1300	9.6330		(30)
Total net area of external elements Aum(A, m2)			131.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)... (30) + (32) =	40.5694	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							17.2865 (36)
Total fabric heat loss							(33) + (36) = 57.8559 (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	37.9347	37.6960	37.4621	36.3634	36.1578	35.2008	35.2008	35.0236	35.5694	36.1578	36.5737	37.0084 (38)
Heat transfer coeff	95.7906	95.5519	95.3180	94.2193	94.0137	93.0567	93.0567	92.8795	93.4253	94.0137	94.4296	94.8643 (39)
Average = Sum(39)m / 12 =												94.2183 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2927	1.2895	1.2863	1.2715	1.2687	1.2558	1.2558	1.2534	1.2608	1.2687	1.2744	1.2802 (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													2.3414 (42)
Average daily hot water use (litres/day)													89.8086 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)	
Energy content (sum45)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.8793 (45)	
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)	
Total storage loss:													
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 (56)	

	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	50.3420	83.168	46.6808	43.4034	83.0195	39.8603	41.1889	43.0195	43.4034	46.6808	46.9465	50.3420	(61)
Total heat required for water heating calculated for each month	196.8439	171.9483	178.9010	158.6762	135.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	(63)
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	196.8439	171.9483	178.9010	158.6762	135.6265	135.3057	129.6331	144.5106	146.1065	166.3714	177.5982	192.2213	(64)
								Solar input (sum of months) = Sum(63)m				= 0.0000	(63)
Heat gains from water heating, kWh/month	61.2974	53.5579	55.6334	49.1791	47.5317	41.7007	39.7049	44.5007	44.9996	51.4673	55.1783	59.7604	(65)
								Total per year (kWh/year) = Sum(64)m				= 1951.7428	(64)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707 (66)
Lighting gains (calculated in Appendix L, equation L3 or L3a), also see Table 5												
	18.4271	16.3668	13.1004	10.0768	7.5325	6.3593	6.8714	8.9318	11.9882	15.2218	17.7660	18.9393 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	206.6711	208.8157	203.4114	191.9063	177.381	163.7333	154.6414	152.4698	157.8741	169.3793	183.9025	197.5523 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071 (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. evaporator (negative values) (Table 5)												
	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566 (71)
Water heating gains (Table 5)												
	82.3890	79.6993	74.7661	68.3042	63.8867	57.9176	53.3668	59.8127	62.4995	69.1765	76.6365	80.3231 (72)
Total internal gains												
	368.6085	366.0031	352.6191	331.4085	309.3259	289.1314	275.9739	282.3355	293.4831	314.8988	339.4263	357.9358 (73)

[Jan]		Area	Solar flux	g	PF	Access	Gains
		m2	Table 6a	or Table 6b	Specific data or Table 6c	factor Table 6d	W
			W/m2				
North		8.7600	0.6300	0.6300	0.7000	0.7700	28.4999 (74)
East		7.6600	19.6403	0.6300	0.7000	0.7700	45.9778 (76)
Total gains	74.4777	144.4070	240.6710	364.6866	465.0045	485.3972	458.1706
					380.4293	283.5460	
Total gains	443.0861	510.4101	593.2902	696.0931	734.1445	662.7648	577.0290
					466.4561	431.9135	419.5064 (84)

Temperature during heating periods in the living area from Table 9, Th (C)												21,000 (85)
Utilization factor for gains for living area, nL/m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	4.813	4.5903	4.5991	4.6410	4.7349	4.5928	4.5928	4.5033	4.5079	4.7349	4.9439	5.4244
alpha						4.6865	4.6865	4.6936	4.6720	4.6490	4.6329	4.6163
util living area	0.9980	0.9958	0.9882	0.9579	0.8688	0.7021	0.5411	0.6129	0.8660	0.9800	0.9961	0.9984 (86)
MIT	19.5701	19.7267	20.0158	20.4632	20.7505	20.9356	20.9849	20.9738	20.8200	20.3785	19.9065	19.5454 (87)
Th 2	19.8465	19.8491	19.8515	19.8632	19.8654	19.8756	19.8756	19.8775	19.8717	19.8654	19.8610	19.8554 (88)
util rest of house	0.9973	0.9943	0.9838	0.9415	0.8191	0.6042	0.4112	0.4786	0.7947	0.9694	0.9945	0.9979 (89)
MIT	17.1716	18.1819	18.6036	19.1774	19.6239	19.8338	19.8702	19.8670	19.7249	19.4395	19.2232	19.0033 (90)
Living area fraction									f _{LA} = Living area / (4) =			
MIT	18.5042	18.7093	19.0858	19.5994	20.0085	20.2100	20.2508	20.2449	20.0988	19.5625	18.9494	18.4765 (92)
Temperature adjustment												2000
adjusted MIT	18.5042	18.7093	19.0858	19.5994	20.0085	20.2100	20.2508	20.2449	20.0988	19.5625	18.9494	18.4765 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9960	0.9921	0.9798	0.9367	0.8262	0.6353	0.4560	0.5248	0.8115	0.9656	0.9925	0.9969 (94)
Useful gains	441.324	506.360	581.290	652.006	670.720	492.078	334.740	347.794	468.244	469.7124	428.6752	418.2083 (95)
Heat loss temp	4.3000	4.9000	6.5000	8.9000	14.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate w/m²	1360.927	1319.5096	1139.6512	1008.0867	781.1157	522.0493	339.7349	357.1106	560.4385	842.6013	1118.9381	1354.3275 (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)
Space heating kWh	683.9572	546.4162	460.0592	256.3679	104.7877	0.0000	0.0000	0.0000	0.0000	277.4293	496.9893	696.4722 (98)
Space heating per m²											(98) / (4)	47.5370 (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 %)	93.4000	(206)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)
Space heating requirement	3771.4010	(211)

[illegible]

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	3771.4010	0.2160	814.4224 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2297.2371	0.2160	496.2032 (264)
Space and water heating			1310.6256 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	325.4292	0.5190	168.8977 (268)
Total CO ₂ kg/m ² /year			1518.6486 (272)
Emissions per m ² for space and water heating			17.6900 (272a)
Fuel factor (mains gas)		1.0000	
Emissions per m ² for lighting			2.2793 (272b)
Emissions per m ² for pumps and fans			0.5253 (272c)
Target Carbon Dioxide Emission Rate (TER) =	(17.6900 + 1.000 + 2.2793 + 0.5253, rounded to 2 d.p.)		
			20.4933 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	3B5P-D1-01 End MF				Issued on Date	06/02/2024
Assessment Reference	3B5P-D1-01 End MF LEAN	Prop Type Ref	S / E			
Property	3B5P-D1-01 End MF, St Ann's Hospital, London, N15					
SAP Rating	86 B	DER	11.98	TER	14.85	
Environmental	90 B	% DER<TER	19.34			
CO ₂ Emissions (t/year)	0.90	DFEE	29.63	TFEE	36.58	
General Requirements Compliance	Pass	% DFEE<TFEE	19.01			
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 86 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) 14.85 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 11.98 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)36.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)29.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from manufacturer
x x
Combi boiler
Efficiency: 95%
Minimum: 88%
OK
Secondary heating system: None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls:	Time and temperature zone control	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:	0.68	
Maximum	1.5	OK
MVHR efficiency:	87%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
-----------------------------------	--------	----

Based on:

Overshading: Average
Windows facing East: 5.36 m², No overhang
Windows facing South: 14.61 m², No overhang

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value	0.00 W/m ² K
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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) (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	86.1000 (1b)	2.6000 (2b)	223.8600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	223.8600 (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	0	0	0	0 * 10 =	0.0000 (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) =				0.0000 / (5) =	0.0000 (8)						
Pressure test				Yes	2.5000						
Measured/design AP50					0.1250 (18)						
Infiltration rate					2 (19)						
Number of sides sheltered											
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)						
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1063 (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
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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195
Balanced mechanical ventilation with heat recovery											0.1248 (22b)
If mechanical ventilation:											0.5000 (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =											73.9500 (23c)
Effective ac	0.2657	0.2631	0.2604	0.2471	0.2445	0.2312	0.2312	0.2285	0.2365	0.2445	0.2498
											0.2551 (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					
Glazing E, S, W (Uw = 0.80)			19.9700	0.7752	15.4806		(27)					
Corridor Door			2.1000	0.5000	1.0500		(26)					
External Wall	56.9400	19.9700	36.9700	0.1500	5.5455	14.0000	517.5800 (29a)					
Corridor	24.3100	2.1000	22.2100	0.1500	3.3315	14.0000	310.9400 (29a)					
Total net area of external elements Aum(A, m ²)			81.2500				(31)					
Fabric heat loss, W/K = Sum (A x U)						25.4076	(33)					
Party Wall 1			32.6300	0.0000	0.0000	20.0000	652.6000 (32)					
Party Floor 1			86.1000			40.0000	3444.0000 (32d)					
Party Ceilings 1			86.1000			40.0000	3444.0000 (32b)					
Timber Frame			181.5300			9.0000	1633.7700 (32c)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 10002.8900 (34)					
Thermal mass parameter (TMP = Cm / TPA) in kJ/m ² K							121.1776 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							13.8165 (36)					
Total fabric heat loss							(33) + (36) = 39.2241 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 19.6297	Feb 19.4334	Mar 19.2372	Apr 18.2561	May 18.0598	Jun 17.0787	Jul 17.0787	Aug 16.8825	Sep 17.4712	Oct 18.0598	Nov 18.4523	Dec 18.8447 (38)
Heat transfer coeff	58.8538	58.6576	58.4613	57.4802	57.2840	56.3028	56.1066	56.6953	57.2840	57.6764	58.0689 (39)	57.4331 (39)
Average = Sum(39)m / 12 =												

4. Water heating energy requirements (kWh/year)

												2.5685 (42)
Assumed occupancy												95.2016 (43)
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218 (44)
Energy conte	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974	150.3992 (45)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)																			Total = Sum(45)m =	1497.8923 (45)
Distribution loss (46)m = 0.15 x (45)m																			19.0317	20.7746
23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	16.3306	16.3306	16.3306	16.3306	16.3306	16.3306	16.3306	16.3306	16.3306	16.3306	22.5599 (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	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.9589	46.0274	49.4840	46.0098	45.6029	42.2539	43.6623	45.6029	46.0098	49.4840	49.3151	50.9589	46.01							
Total heat required for water heating calculated for each month	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581	162							
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	0.0000	0.0000 (63)
Output from w/h	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581	162							
Heat gains from water heating, kWh/month	64.3768	56.6689	58.9742	52.1323	50.3860	44.2048	42.0892	47.1729	47.7019	54.5580	58.3791	62.7474	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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.6577	18.3480	14.9216	11.2966	8.4444	7.1291	7.7032	10.0129	13.4394	17.0643	19.9166	21.2319 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424 (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)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396 (71)
Water heating gains (Table 5)	86.5279	84.3288	79.2664	72.4059	67.7231	61.3956	56.5715	63.4045	66.2526	73.3306	81.0821	84.3380 (72)
Total internal gains	403.4301	401.3257	386.7777	363.3928	339.5745	316.6277	302.1539	308.8920	321.2258	344.8282	371.7153	391.5903 (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
East	5.3600	19.0403	0.4200	0.8000	0.7700	24.5123 (76)
South	14.6100	46.7521	0.4200	0.8000	0.7700	159.0463 (78)
Solar gains	183.5586	308.4281	410.7703	490.1790	531.9281	520.5627
Total gains	586.9887	709.7539	797.5480	853.5718	871.5026	837.1904

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 areas, nil,m (see Table 9a)	0.9489	0.9017	0.8303	0.7181	0.5793	0.4237	0.3056	0.3274	0.4998	0.7502	0.9087	0.9585 (86)
MIT	20.0556	20.3244	20.5880	20.8158	20.9377	20.9875	20.9976	20.9967	20.9742	20.8133	20.4097	20.0006 (87)
Th 2	20.3554	20.3574	20.3594	20.3695	20.3716	20.3817	20.3817	20.3837	20.3777	20.3716	20.3675	20.3635 (88)
util rest of house	0.9425	0.8906	0.8128	0.6926	0.5460	0.3847	0.2632	0.2842	0.4585	0.7214	0.8964	0.9532 (89)
MIT 2	19.0831	19.4648	19.8325	20.1471	20.3033	20.3703	20.3800	20.3814	20.3528	20.1515	19.5984	19.0106 (90)
Living area fraction	19.4050	19.7493	20.0825	20.3684	20.5133	20.5746	20.5844	20.5851	20.5585	20.3706	19.8669	19.3383 (92)
MIT	19.2550	19.5993	19.9325	20.2184	20.3633	20.4246	20.4344	20.4351	20.4085	20.2206	19.7169	19.1883 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext temp.	4.3000	4.9000	6.5000	8.9500	11.7000	14.6000	16.6000	22.5628	34.9113	48.7430	521.0584	516.7759 (95)
Heat loss rate W	880.1595	862.2272	785.2846	650.5847	496.2688	327.9404	215.8894	226.3931	357.6615	551.1041	727.6980	870.3526 (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	249.0741	161.7409	109.4186	46.6950	15.4662	0.0000	0.0000	0.0000	0.0000	47.3713	148.7805	263.0611 (98)
Space heating per m2										(98) / (4) =		12.0977 (99)

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)												0.0000	(201)	
Fraction of space heat from main system(s)												1.0000	(202)	
Efficiency of main space heating system 1 (in %)												95.0000	(206)	
Efficiency of secondary/supplementary heating system, %												0.0000	(208)	
Space heating requirement												1096.4291	(211)	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	249.0741	161.7409	109.4186	46.6950	15.4662	0.0000	0.0000	0.0000	0.0000	47.3713	148.7805	263.0611	(98)	
Space heating efficiency (main heating system 1)	95.0000	95.0000	95.0000	95.0000	95.0000	0.0000	0.0000	0.0000	0.0000	95.0000	95.0000	95.0000	(210)	
Space heating fuel (main heating system)	262.1833	170.2536	115.1775	49.1526	16.2802	0.0000	0.0000	0.0000	0.0000	49.8645	156.6110	276.9064	(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	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581	(64)	
Efficiency of water heater	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	(217)	
Fuel for water heating, kWh/month	217.1140	191.4245	199.6253	177.0576	171.4230	150.9798	144.6502	161.2510	163.0319	185.6443	197.6973	211.9559	(219)	
Water heating fuel used	217.1140	191.4245	199.6253	177.0576	171.4230	150.9798	144.6502	161.2510	163.0319	185.6443	197.6973	211.9559	(219)	
Annual totals kWh/year	2621.833	2062.583	2275.732	2090.456	1993.819	1710.576	1628.026	1838.260	1896.979	2119.559	2237.732	2542.877	(220)	
Space heating fuel - main system	1096.4291												(211)	
Space heating fuel - secondary	0.0000												(215)	
Electricity for pumps and fans:														
(BalanceWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8500)														
mechanical ventilation fans (SFP = 0.8500)													232.1428	(230a)
central heating pump													30.0000	(230c)
Total electricity for the above, kWh/year													262.1428	(231)
Electricity for lighting (calculated in Appendix L)													364.8223	(232)
Total delivered energy for all uses													3895.2490	(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	1096.4291	0.2160	236.8287 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2171.8548	0.2160	469.1206 (264)
Space and water heating			705.9493 (265)
Pumps and fans	262.1428	0.5190	136.0521 (267)
Energy for lighting	364.8223	0.5190	189.3428 (268)
Total CO2, kg/year			1031.3442 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			11.9800 (273)

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

DER		11.9800	ZC1
Total Floor Area	TFA	86.1000	
Assumed number of occupants	N	2.5685	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		15.9478	ZC2
CO2 emissions from cooking, equation (L16)		2.0981	ZC3
Total CO2 emissions		30.0259	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		30.0259	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	Storey height	Volume
(m2)	(m)	(m3)
86.1000 (1b)	x 2.6000 (2b)	= 223.8600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)		(4)
Dwelling volume		223.8600 (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	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)					
							Air changes per hour					
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =					30.0000	(5) = 0.1340 (8)					
Pressure test							Yes					
Measured/design AP50							5.0000					
Infiltration rate							0.3840 (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) =	0.3264 (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 (22a)
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	0.4162	0.4080	0.3999	0.3591	0.3509	0.3101	0.3101	0.3019	0.3264	0.3509	0.3672	0.3835 (22b)
	0.5866	0.5832	0.5799	0.5645	0.5616	0.5481	0.5481	0.5456	0.5533	0.5616	0.5674	0.5735 (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			2.1000	1.0000	2.1000		(26)				
TER Opening Type (Uw = 1.40)			12.000	1.3258	25.7462		(27)				
External Wall	56.9400	19.4200	37.5200	0.1800	6.7536		(29a)				
Corridor	24.3100	2.1000	22.2100	0.1800	3.9978		(29a)				
Total net area of external elements Aum(A, m2)			81.2500				(31)				
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.5976		(33)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.2270 (36)				
Total fabric heat loss						(33) + (36) =	45.8246 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)											
Jan											
43.3344	43.0860	42.8425	41.6987	41.4847	40.4886	40.3041	40.8723	41.4847	41.9176	42.3702 (38)	
Heat transfer coeff											
89.1590	88.9106	88.6671	87.5233	87.3094	86.3132	86.3132	86.1287	86.6969	87.3094	87.7422	88.1948 (39)
Average = Sum(39)m / 12 =											87.5223 (39)
Jan											
1.0355	1.0326	1.0298	1.0165	1.0140	1.0025	1.0025	1.0003	1.0069	1.0140	1.0191	1.0243 (40)
HLP (average)											1.0165 (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												2.5685 (42)
Average daily hot water use (litres/day)												95.2016 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218 (44)
Energy conte	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974	150.3992 (45)
Energy content (annual)										Total = Sum(45)m =		1497.8923 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	19.0317	20.7746	22.5599 (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	50.9589	46.0274	49.4840	46.0098	45.6029	42.2539	43.6623	45.6029	46.0098	49.4840	49.3151	50.9589 (61)

HODKINSON

Total heat required for water heating calculated for each month												
	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581 (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	206.2583	181.8532	189.6441	168.2047	162.8519	143.4308	137.4177	153.1885	154.8803	176.3621	187.8124	201.3581 (64)
								Total per year (kWh/year) =	Sum(64)=			2063.2621 (64)
Heat gains from water heating, kWh/month	64.3768	56.6689	58.9742	52.1323	50.3860	44.2048	42.0892	47.1279	47.7019	54.5580	58.3791	62.7474 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245
Lighting gains	(calculated in Appendix L, equation 19 or 19a), also see Table 5											
	23.0583	18.3450	14.9192	11.2488	7.79	7.7020	10.0113	13.4371	17.0615	19.9133	21.2284	(67)
Appliances gains	(calculated in Appendix L, equation 13 or 13a), also see Table 5											
	231.7171	234.1216	228.0623	215.1629	188.879	183.5757	173.3517	170.9473	167.0065	169.1896	206.1892	221.4931
Cooking gains	(calculated in Appendix L, equation 115 or 115a), also see Table 5											
	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424
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
Losses e.g. evaporation	(negative values) (Table 5)											
	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396
Water heating gains	(Table 5)											
	86.5279	84.3288	79.2664	72.4059	67.7231	61.3956	56.7135	63.4045	66.2526	73.3306	81.0821	84.3380
Total internal gains	103.4267	101.3227	86.7653	63.3099	39.5731	36.6265	30.21526	38.8904	321.2236	344.8254	371.3121	381.5868

[Jan]	Area m ²	Solar flux Table 6a W/m ²	G or Table 6b	FF or Table 6c	Access factor Table 6d	Gains W
East	5.2100	19.6403	0.6300	0.7000	0.7700	31.2721 (76)
South	14.2100	46.7521	0.6300	0.7000	0.7700	203.0330 (78)

Temperature during heating periods in the living area from Table 9, Th (°C)												21.0000 (85)
Utilisation factor for gains for living area, n _{l,m} (see Table 9a)												7.1250
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	5.4708	5.4833	5.4956	5.5543	5.5655	5.6182	5.6279	6.4213	6.9663	6.4825	6.1447	6.7190
alpha									1.5978	1.5655	1.5430	1.5197
util living area	0.9944	0.9819	0.9509	0.8748	0.7381	0.5531	0.3997	0.4307	0.6520	0.9057	0.9854	0.9962 (86)
MIT	20.0478	20.2746	20.5323	20.7834	20.9326	20.8890	20.9985	20.9977	20.9733	20.7706	20.3544	20.0051 (87)
Th 2	20.0538	20.0562	20.0586	20.0696	20.0716	20.0813	20.0813	20.0831	20.0776	20.0716	20.0675	20.0631 (88)
util rest of house	0.9927	0.9765	0.9368	0.8425	0.6816	0.4781	0.3170	0.3460	0.5755	0.8733	0.9801	0.9949 (89)
MIT 2	18.1950	19.1237	19.4890	19.8312	0.0115	0.0745	0.0822	0.0822	0.0590	0.0822	0.1950	0.1950 (90)
Living area fraction	19.2097	19.5047	19.8344	20.1477	20.3164	20.3772	20.3845	20.3852	20.3617	20.1394	19.6156	19.1587 (91)
Adjusted MIT	19.2097	19.5047	19.8344	20.1477	20.3164	20.3772	20.3845	20.3852	20.3617	20.1394	19.6156	19.1587 (92)
Adjusted MIT	19.2097	19.5047	19.8344	20.1477	20.3164	20.3772	20.3845	20.3852	20.3617	20.1394	19.6156	19.1587 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9906	0.9725	0.9329	0.8454	0.6972	0.5026	0.3445	0.3741	0.5999	0.8760	0.9767	0.9933 (94)
Useful gases	631.7136	773.1846	849.5917	836.1864	710.0664	493.1412	326.1119	342.3821	528.4068	679.8058	636.2184	588.7718 (95)
Heat loss rate	4.3900	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	1.329.323	1298.5106	1182.1396	984.4635	752.2913	498.6519	326.6543	343.2432	542.8666	832.8820	1098.1496	1319.2794 (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 (97)
Space heating per m2	519.0283	353.0191	247.3055	106.7435	31.3931	0.0000	0.0000	0.0000	0.0000	113.8893	332.5905	543.4900 (98)
											(98) / (4) =	26.1029 (99)

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
---	--------------

HODKINSON

[illegible]

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	2406.2765	0.2160	519.7557 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2457.7527	0.2160	530.8746 (264)
Space and water heating			1050.6303 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	364.7619	0.5190	189.3114 (268)
Total CO ₂ , kg/m ² /year			1278.8667 (272)
Emissions per m ² for space and water heating			12.2024 (272a)
Fuel factor (main gas)			1.0000
Emissions per m ² for pumps and fans			2.1987 (272b)
Emissions per m ² for lighting			0.4522 (272c)
Target Carbon Dioxide Emission Rate (TER) = (12.2024 * 1.00) + 2.1987 + 0.4521, rounded to 2 d.p.			14.8530 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	B End Terrace				Issued on Date	06/02/2024
Assessment Reference	B End Terrace LEAN	Prop Type Ref	E / W			
Property	B End Terrace, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	14.81	TER	18.15	
Environmental	87 B	% DER<TER	18.39			
CO ₂ Emissions (t/year)	1.48	DFEE	50.11	TFEE	62.71	
General Requirements Compliance	Pass	% DFEE<TFEE	20.09			
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

End-Terrace House, total floor area 121 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) 18.15 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.81 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)62.7 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)50.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.16 (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	0.11 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	0.85 (max. 2.00)	1.40 (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 manufacturer
x x
Combi boiler
Efficiency: 95%
Minimum: 88% OK

Secondary heating system: None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls: Time and temperature zone control 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: 0.63
Maximum 1.5 OK
MVHR efficiency: 90%
Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Not significant OK

Based on:

Overshading: Average
Windows facing East: 8.18 m², No overhang
Windows facing South: 5.40 m², No overhang
Windows facing West: 13.93 m², No overhang
Air change rate: 8.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.10 W/m²K
Window U-value 0.80 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												

Ground floor												
Area (a2)	46.5000 (1b)	x	2.5200 (2b)	=	117.1800 (1b) - (3b)							
First floor	37.2500 (1c)	x	3.0500 (2c)	=	113.6125 (1c) - (3c)							
Second floor	37.2500 (1d)	x	2.9000 (2d)	=	108.0250 (1d) - (3d)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000											
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	338.8175 (5)						

2. Ventilation rate												

Number of chimneys												
Number of open flues	0	+	0	+	0	=	0 * 40 =	0.0000 (6a)				
Number of intermittent fans	0	+	0	+	0	=	0 * 10 =	0.0000 (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) =							0.0000 / (5) =	0.0000 (8)				
Pressure test								3.0000				
Measured/design AP50								0.1500 (18)				
Infiltration rate								1 (19)				
Number of sides sheltered												
Shelter factor							(20) = 1 - [0.075 x (19)] =	0.9250 (20)				
Infiltration rate adjusted to include shelter factor							(21) = (18) x (20) =	0.1388 (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	3.7000	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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
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	0.2944	0.2909	0.2875	0.2701	0.2667	0.2493	0.2493	0.2458	0.2563	0.2667	0.2736	0.2805 (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					
Glazing E, S, W (Uw = 0.80)			27.5100	0.7752	21.3256		(27)					
Door			2.3200	1.4000	3.2480		(28)					
Ground Floor			46.5000	0.1300	6.0450	75.0000	3487.5000 (28a)					
External Wall	153.6100	29.8300	123.7800	0.1600	19.8048	14.0000	1732.9200 (29a)					
Main Roof	37.2500		37.2500	0.1000	3.7250	100.0000	3725.0000 (30)					
GP Roof	9.2500		9.2500	0.1500	1.3875	100.0000	925.0000 (30)					
Total net area of external elements Aum(A, m2)			246.6100				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	55.5359	20.0000	1293.4000 (32)				
Party Wall 1			64.6700	0.0000	0.0000		9.0000	1267.9200 (32c)				
Timber Frame			140.8800				18.0000	670.5000 (32d)				
Internal Floor 1			37.2500				18.0000	670.5000 (32d)				
Internal Floor 2			37.2500				18.0000	670.5000 (32d)				
Internal Ceiling 1			37.2500				18.0000	670.5000 (32d)				
Internal Ceiling 2			37.2500				18.0000	670.5000 (32d)				
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =	15113.7400 (34)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						124.9069 (35)						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						33.2662 (36)						
Total fabric heat loss					(33) + (36) =	88.8021 (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	32.9175	32.5297	32.1418	30.2026	29.8148	27.8756	27.8756	27.4877	28.6513	28.8148	30.5905	31.3661 (38)
Average = Sum(39)m / 12 =	121.7196	121.3318	120.9439	119.0047	118.6169	116.6777	116.6777	116.2898	117.4534	118.6169	119.3926	120.1682 (39)
												118.9078 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0059	1.0027	0.9995	0.9835	0.9803	0.9643	0.9643	0.9611	0.9707	0.9803	0.9867	0.9931 (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												2.8671 (42)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Average daily hot water use (litres/day)													102.2935 (43)

Daily hot water use													
Energy content	112.5229	108.4312	104.3394	100.2477	96.1559	92.0642	92.0642	96.1559	100.2477	104.3394	108.4312	112.5229 (44)	
Energy content (annual)	166.8682	145.9440	150.6011	131.2977	125.9833	108.7140	100.7395	115.6000	116.9807	136.3297	148.8145	161.6029 (45)	
Distribution loss (46)m = 0.15 x (45)m	25.0302	21.8916	22.5902	19.6947	18.8975	16.3071	15.1109	17.3400	17.5471	20.4495	22.3222	24.2404 (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	50.9589	46.0274	50.9589	49.3151	49.0000	45.4015	46.9149	49.0000	49.3151	50.9589	49.3151	50.9589 (61)	
Total heat required for water heating calculated for each month	217.8271	191.9714	201.5600	180.6128	174.9833	154.1155	147.6544	164.6001	166.2957	187.2886	198.1296	212.5619 (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	217.8271	191.9714	201.5600	180.6128	174.9833	154.1155	147.6544	164.6001	166.2957	187.2886	198.1296	212.5619 (64)	
Heat gains from water heating, kWh/month	68.2234	60.0332	62.8146	55.9853	54.1394	47.4978	45.2246	50.6870	51.2248	58.0694	61.8096	66.4727 (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	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548 (66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	25.5425	22.6866	18.4500	13.9678	10.4411	8.8148	9.5247	12.3806	16.6173	21.0994	24.6261	26.2524 (67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	286.5094	289.4824	281.9904	266.0407	245.9071	226.9844	214.3428	211.3698	218.8618	234.8115	254.9451	273.8678 (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 (70)	
Losses e.g. evaporation (negative values) (Table 5)	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839 (71)	
Water heating gains (Table 5)	91.6981	89.3352	84.4282	77.7573	72.7681	65.9691	60.7858	68.1277	71.1456	78.0502	85.8467	89.3450 (72)	
Total internal gains	472.7564	470.5107	453.8751	426.7723	398.1228	370.7748	353.6598	360.8845	375.6311	402.9675	434.4243	458.4717 (73)	

6. Solar gains													

[Jan]	Area m2	Solar flux Table 6a	Specific data or Table 6b	g W/m2	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
East	8.1800	19.6403	0.4200	0.8000	0.8000	0.7700	0.7700	63.4087 (76)					
South	5.4000	16.7521	0.4200	0.8000	0.8000	0.7700	0.7700	58.7851 (78)					
West	13.9300	19.6403	0.4200	0.8000	0.8000	0.7700	0.7700	63.7046 (76)					

Solar gains	159.8984	294.4704	448.3841	613.6892	726.6682	735.0182	703.2451	619.3089	506.9662	338.5468	195.7568	133.9464 (83)	
Total gains	632.6549	764.5847	902.2592	1040.4615	1124.7910	1105.7931	1056.9049	980.1935	882.5973	741.5144	630.1812	592.4181 (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, n1/m, (see Table 9a)												21.0000 (85)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	34.4913	34.6015	34.7125	35.2781	35.3935	35.9817	35.9817	36.1017	35.7441	35.3935	35.1635	34.9365	
alpha	3.2994	3.3068	3.3142	3.3519	3.3596	3.3988	3.3988	3.4068	3.3829	3.3596	3.3442	3.3291	
util living area	0.9853	0.9721	0.9431	0.8767	0.7631	0.6051	0.4633	0.5119	0.7379	0.9191	0.9753	0.9880 (86)	
MIT	19.1081	19.3739	19.7857	20.2864	20.6687	20.8944	20.9678	20.9548	20.7839	20.2528	19.5887	19.0679 (87)	
Th 2	20.0784	20.0810	20.0837	20.0971	20.0998	20.1132	20.1132	20.1159	20.1078	20.0998	20.0984	20.0891 (88)	
util rest of house	0.9827	0.9673	0.9331	0.8549	0.7219	0.5392	0.3782	0.4253	0.6792	0.9000	0.9702	0.9859 (89)	
MIT 2	17.5247	17.9115	18.5057	19.2199	19.7343	20.0195	20.0929	20.0855	19.8967	19.1891	18.2350	17.4728 (90)	
Living area fraction									fLA = Living area / (4) =			0.2715 (91)	
MIT	17.9545	18.3085	18.8532	19.5095	19.9880	20.2570	20.3304	20.3215	20.1376	19.4779	18.6025	17.9058 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	17.8045	18.1585	18.7032	19.3595	19.8380	20.1070	20.1804	20.1715	19.9876	19.3279	18.4525	17.7558 (93)	

8. Space heating requirement													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9732	0.9533	0.9136	0.8339	0.7086	0.5387	0.3849	0.4310	0.6704	0.8794	0.9571	0.9778 (94)	
Useful gains	615.7051	728.8471	824.8717	867.5965	797.0026	595.7171	406.7965	422.4689	591.6569	652.0648	603.1762	579.2552 (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	1643.7683	1608.6793	1475.9055	1244.7256	965.2993	642.5495	417.7556	438.5875	691.5152	1035.2754	1355.4029	1628.9819 (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	764.8790	591.2472	484.8040	271.5330	125.2128	0.0000	0.0000	0.0000	0.0000	285.1087	541.6032	780.9967 (98)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating
Space heating per m2 (98) / (4) = 3845.3847 (98)
31.7800 (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)
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

0.0000 (201)	0.0000 (202)	95.0000 (208)	0.0000 (208)	4047.7733 (211)
--------------	--------------	---------------	--------------	-----------------

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	764.8790	591.2472	484.8040	271.5330	125.2128	0.0000	0.0000	0.0000	0.0000	285.1087	541.6032	780.9967 (98)
Space heating efficiency (main heating system 1)	95.0000	95.0000	95.0000	95.0000	95.0000	0.0000	0.0000	0.0000	0.0000	95.0000	95.0000	95.0000 (210)
Space heating fuel (main heating system)	805.1358	622.3655	510.3200	285.8242	131.8029	0.0000	0.0000	0.0000	0.0000	300.1144	570.1087	822.1018 (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	217.8271	191.9714	201.5600	180.6128	174.9833	154.1155	147.6544	164.6001	166.2957	187.2886	198.1296	212.5619 (64)
Efficiency of water heater (217)m	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000	95.0000 (216)
Fuel for water heating, kWh/month	229.2917	202.0752	212.1685	190.1187	184.1929	162.2269	155.4257	173.2632	175.0482	197.1459	208.5575	223.7493 (219)
Annual totals kWh/year												2313.2636 (219)
Space heating fuel - main system												4047.7733 (211)
Space heating fuel - secondary												0.0000 (215)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7875)
mechanical ventilation fans (SFP = 0.7875)
central heating pump
Total electricity for the above, kWh/year
Electricity for lighting (calculated in Appendix I)
Total delivered energy for all uses

325.5189 (230a)	30.0000 (230c)	355.5189 (231)	451.0888 (232)	7167.6447 (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	4047.7733	0.2160	874.3190 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2313.2636	0.2160	499.6649 (264)
Space and water heating			1373.9840 (265)
Pumps and fans	355.5189	0.5190	184.5143 (267)
Energy for lighting	451.0888	0.5190	234.1151 (268)
Total CO2, kg/year			1792.6134 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			14.8100 (273)

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

DER	14.8100	ZC1
Total Floor Area	121.0000	
Assumed number of occupants	2.8671	TFA
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190	N
CO2 emissions from appliances, equation (L14)	14.0314	EF
CO2 emissions from cooking, equation (L16)	1.5522	ZC2
Total CO2 emissions	30.3935	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	30.3935	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	46.5000 (1b)	x	2.5200 (2b)
First floor	37.2500 (1c)	x	3.0500 (2c)
Second floor	37.2500 (1d)	x	2.9000 (2d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 338.8175 (5)

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	4 * 10 = 40.0000 (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)
Pressure test					Air changes per hour
Measured/design AP50					40.0000 / (5) = 0.1181 (8)
Infiltration rate					Yes
Number of sides sheltered					0.3681 (18)
Shelter factor					1 (19)
Infiltration rate adjusted to include shelter factor					(20) = 1 - [0.075 x (19)] = 0.9250 (20)
					(21) = (18) x (20) = 0.3405 (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	3.7000	4.0000	4.3000	4.5000	4.7000	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	0.4341	0.4256	0.4171	0.3745	0.3660	0.3234	0.3234	0.3149	0.3405	0.3660	0.3830	0.4000 (22b)
Effective ac	0.5942	0.5906	0.5870	0.5701	0.5670	0.5523	0.5523	0.5496	0.5580	0.5670	0.5733	0.5800 (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 k3/m2K	A x K kJ/K
TER Opaque door			2.3200	1.0000	2.3200		(26)
TER Opening Type (Uw = 1.40)			27.5100	1.3258	36.4716		(27)
Ground Floor			46.5000	6.0450	280.0000		(28a)
External Wall	153.6100	29.8300	123.7800	0.1800	22.2804		(29a)
Main Roof	37.2500		37.2500	0.1300	4.8425		(30)
GP Roof	9.2500		9.2500	0.1300	1.2025		(30)
Total net area of external elements Aum(A, m2)			246.6100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	73.1620		(33)

Thermal mass parameter (TWP = Cm / TFA) in kJ/m2K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss (33) + (36) = 96.1995 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	66.4387	66.0297	65.6287	63.7455	63.3932	61.7530	61.7530	61.4492	62.3847	63.3932	64.1059	64.8511 (38)
Heat transfer coeff	162.6382	162.2291	161.8282	159.9450	159.5927	157.9524	157.9524	157.6487	158.5842	159.5927	160.3054	161.0506 (39)
Average = Sum(39)m / 12 =												159.9433 (39)
HLP	1.3441	1.3407	1.3374	1.3219	1.3189	1.3054	1.3054	1.3029	1.3106	1.3189	1.3248	1.3310 (40)
HLP (average)												1.3218 (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												2.8671 (42)
Average daily hot water use (litres/day)												102.2935 (43)
Daily hot water use	112.5229	108.4312	104.3394	100.2477	96.1559	92.0642	92.0642	96.1559	100.2477	104.3394	108.4312	112.5229 (44)
Energy conte	166.8682	145.9440	150.6011	131.2977	125.9833	108.7140	100.7395	115.6000	116.9807	136.3297	148.8145	161.6029 (45)
Energy content (annual)												Total = Sum(45)m = 1609.4758 (45)
Distribution loss (46)m = 0.15 x (45)m	25.0302	21.8916	22.5902	19.6947	18.8975	16.3071	15.1109	17.3400	17.5471	20.4495	22.3222	24.2404 (46)
Water storage loss:												
Total storage loss												

HODKINSON

[illegible]

Metabolic gains (Table 3), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548 (66)
Lighting gains (calculated in Appendix L, equation 10 or 9a), also see Table 5	25.5425	22.6666	18.4500	13.9678	10.4411	8.8148	9.5247	12.3806	16.6173	21.0994	24.2621	26.2524 (67)
Appliances gains (calculated in Appendix L, equation 13 or 113a), also see Table 5	29.8149	28.9149	28.9149	28.9149	28.9149	28.9149	28.9149	28.9149	28.9149	28.9149	28.9149	28.9149 (68)
Cooking gains (calculated in Appendix L, equation 115 or 115a), also see Table 5	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355 (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)	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839 (71)
Water heating gains (Table 5)	91.6981	89.3532	84.4282	77.7573	72.6681	65.9691	60.7588	68.1277	71.1456	78.0502	85.8467	89.3450 (72)
Total internal gains	472.7564	470.5107	453.8751	426.7723	398.1228	370.7748	353.6598	360.8845	375.3131	402.9675	434.4243	458.4717 (73)

[Jan	Area	Solar flux	g	FF	Access	Gains
	Table a2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	
East	8.1800	19.6403	0.7000	0.7000	0.7700	49.0990 (76)
South	5.4000	46.7521	0.6300	0.7000	0.7700	77.1554 (78)
West	13.9300	19.6403	0.6300	0.7000	0.7700	83.6123 (80)
Total gains	209.8667	385.9712	588.5042	805.4670	953.7526	964.7114
Total gains	682.6231	856.4828	1042.3792	1232.2394	1351.8748	1335.4863
					1276.0690	1173.7275
					1173.7275	1041.0243
					844.3127	256.9309
					844.3127	691.3525
						374.2664 (84)

Temperature during heating periods in the living area (see Table 9a)												21.0000 (85)
Temperature factor for gains for living area, nil/m (see Table 9a)												
	Jan	Feb	Mar	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	51.6655	51.7957	51.9241	52.5354	52.6514	53.1982	53.3006	52.9862	52.6514	52.4173	52.1478	
alpha	4.4444	4.4530	4.4616	4.5024	4.5101	4.5465	4.5534	4.5324	4.5101	4.4945	4.4783	
util living area	0.9984	0.9953	0.9849	0.9481	0.8545	0.6910	0.5282	0.3895	0.2330	0.9758	0.9964	
											0.9988 (86)	
MIT	19.4748	19.6802	20.0094	20.4227	20.7523	20.9335	20.9844	20.9749	20.8335	20.7328	19.8421	
Th 2	19.8064	19.8091	19.8116	19.8237	19.8260	19.8366	19.8386	19.8386	19.8325	19.8260	19.8124	
util rest of house	0.9978	0.9936	0.9794	0.9283	0.8011	0.5906	0.3967	0.4584	0.7597	0.9631	0.9949	
	17.7852	18.0868	18.5658	19.1587	19.5902	19.7942	19.8313	19.8289	19.7020	19.1022	18.3324	
MIT 2											17.7457 (90)	
Living area fraction											0.2715 (91)	
MIT	18.2439	18.5194	19.9577	19.5019	19.9057	20.1444	20.1400	20.0092	19.4471	18.7423	18.2065 (92)	
adjusted MIT	18.2439	18.5194	19.9577	19.5019	19.9057	20.1444	20.0092	19.4471	18.7423	18.2065 (93)	0.0000	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9366	0.9309	0.9738	0.9215	0.8053	0.6134	0.4327	0.4312	0.7737	0.9575	0.8927	0.9375 (94)
Useful gains	680.324	848.729	1015.104	1135.552	1088.614	821.827	552.354	576.558	805.430	811.2825	686.319	632.7215 (94)
Ext temp.	1.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	16.6000	14.1000	10.6000	4.2000 (96)
Space heating rate W	2267.8168	2209.462	2016.0101	1695.7192	1309.5637	869.2955	559.8399	589.6069	937.1057	1411.9359	1866.3222	2255.7535 (97)
Month fraction	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000 (97a)
Space heating kWh	1181.0958	914.4109	744.6768	403.3197	164.884	0.0000	0.0000	0.0000	0.0000	446.8861	849.6030	1207.5558 (98)
Space heating per m2												5911.9230 (98)
												(94) / (4) = 48.8588 (99)

Not applicable

Not applicable

HODKINSON

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	6329.6714 (211)

[illegible]

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	6329.4714	0.2160	1367.2090 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2571.9891	0.2160	555.5496 (264)
Space and water heating			1922.7587 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	451.0888	0.5190	234.1151 (268)
Total CO2, kg/m2/year			2195.7988 (272)
Emissions per m2 for space and water heating			15.4806 (272a)
Fuel factor (main gas)			1.0000
Emissions per m2 for lighting			1.9348 (272b)
Emissions per m2 for pumps and fans			0.3217 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.8906 + 1.00 + 1.9348 + 0.3217, rounded to 2 d.p.			18.1500 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	B Mid Terrace				Issued on Date	06/02/2024
Assessment Reference	B Mid Terrace LEAN	Prop Type Ref	E / W			
Property	B Mid Terrace, St Ann's Hospital, London, N15					
SAP Rating	86 B	DER	13.40	TER	16.73	
Environmental	88 B	% DER<TER	19.92			
CO ₂ Emissions (t/year)	1.31	DFEE	43.57	TFEE	54.29	
General Requirements Compliance	Pass	% DFEE<TFEE	19.75			
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)



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 119 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) 16.73 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.40 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)54.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)43.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.16 (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	0.11 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	0.86 (max. 2.00)	1.40 (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 manufacturer
x X
Combi boiler
Efficiency: 95%
Minimum: 88%
OK
Secondary heating system: None

5 Cylinder insulation

Hot water storage: No cylinder

6 Controls

Space heating controls: Time and temperature zone control 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: 0.63
Maximum 1.5
MVHR efficiency: 90%
Minimum: 70%
OK

9 Summertime temperature

Overheating risk (Thames Valley): Not significant OK

Based on:

Overshading: Average
Windows facing East: 8.18 m², No overhang
Windows facing West: 13.93 m², No overhang
Air change rate: 8.00 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
Window U-value	0.80 W/m ² K
Window U-value	0.80 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) (Version 9.92, January 2014)											
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014											
1. Overall dwelling dimensions											
Ground floor	Area (m2)	Storey height (m)	Volume (m3)								
First floor	46.0000 (1b)	x	2.5200 (2b)	=	115.9200 (1b) - (3b)						
Second floor	36.7000 (1c)	x	3.0500 (2c)	=	111.9350 (1c) - (3c)						
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	119.4000										
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	334.2850 (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							0 * 10 =	0.0000 (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	0.0000 (8)			
Pressure test							0.0000 / (5) =	0.0000 (8)			
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
Wind factor	5.1000	5.0000	4.9000	4.8000	4.7000	4.6000	4.5000	4.4000	4.3000	4.2000	4.1000
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
Balanced mechanical ventilation with heat recovery	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434
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
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				
Glazing E, S, W (Uw = 0.80)			22.1100	0.7752	17.1395		(27)				
Door			2.3200	1.4000	3.2480		(28)				
Ground Floor			46.0000	0.1300	5.9800	75.0000	3450.0000 (28a)				
External Wall	87.2400	24.4300	62.8100	0.1600	10.0496	14.0000	879.3400 (29a)				
Main Roof	36.7000		36.7000	0.1000	3.6700	100.0000	3670.0000 (30)				
GP Roof	9.3000		9.3000	0.1500	1.3950	100.0000	930.0000 (30)				
Total net area of external elements Aum(A, m2)			179.2400				(31)				
Fabric heat loss, W/K = Sum (A x U)							(26)...(30) + (32) =	41.4821	20.0000	2587.0000 (32)	
Party Wall 1			129.3500	0.0000	0.0000						
Timber Frame			140.8800					9.0000	1267.9200 (32c)		
Internal Floor 1			36.7000					18.0000	660.6000 (32d)		
Internal Floor 2			36.7000					18.0000	660.6000 (32d)		
Internal Ceiling 1			36.7000					18.0000	660.6000 (32d)		
Internal Ceiling 2			36.7000					18.0000	660.6000 (32d)		
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =	15426.6600 (34)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								129.2015 (35)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								25.9176 (36)			
Total fabric heat loss							(33) + (36) =	67.3997 (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
Heat transfer coeff	30.8948	30.5432	30.1916	28.4334	28.0818	26.3237	26.3237	25.9721	27.0269	28.0818	28.7851
Average = Sum(39)m / 12 =	98.2945	97.9429	97.5913	95.8331	95.4815	93.7234	93.7234	93.3718	94.4266	95.4815	96.1848
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
HLP (average)	0.8232	0.8203	0.8173	0.8026	0.7997	0.7850	0.7850	0.7820	0.7908	0.7997	0.8056
Days in month	31	28	31	30	31	30	31	31	30	31	30
4. Water heating energy requirements (kWh/year)											
Assumed occupancy											



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Average daily hot water use (litres/day)												102.1479 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	112.3627	108.2768	104.1909	100.1050	96.0191	91.9332	91.9332	96.0191	100.1050	104.1909	108.2768	112.3627 (44)
Energy content	166.6307	145.7363	150.3868	131.1108	125.8040	108.5593	100.5961	115.4355	116.8142	136.1357	148.6027	161.3729 (45)
Energy content (annual)												Total = Sum(45)m = 1607.1850 (45)
Distribution loss (46)m = 0.15 x (45)m	24.9946	21.8604	22.5580	19.6666	18.8706	16.2839	15.0894	17.3153	17.5221	20.4203	22.2904	24.2059 (46)
Water 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)
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 (57)
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	48.9303	45.3369	46.8481	48.9303	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	217.5896	191.7637	201.3457	180.4259	174.7342	153.8962	147.4442	164.3658	166.1292	187.0946	197.9178	212.3318 (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 =												
Output from w/h	217.5896	191.7637	201.3457	180.4259	174.7342	153.8962	147.4442	164.3658	166.1292	187.0946	197.9178	212.3318 (64)
Heat gains from water heating, kWh/month	68.1444	59.9642	62.7433	55.9231	54.0624	47.4302	45.1602	50.6149	51.1695	58.0048	61.7392	66.3962 (65)
Total per year (kWh/year) = Sum(64)m =												
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	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483 (66)
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	25.7862	22.9031	18.6261	14.1011	10.5408	8.8990	9.6156	12.4988	16.7758	21.3007	24.8611	26.5029 (67)
Appliances gains (calculated in Appendix L, equation 133 or 133a), also see Table 5	284.4300	287.3815	279.9438	264.1099	244.1224	225.3370	212.7872	209.8357	217.2734	233.1073	253.0948	271.8802 (68)
Cooking gains (calculated in Appendix L, equation 135 or 135a), also see 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 (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)	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386 (71)
Water heating gains (Table 5)	91.5920	89.2324	84.3324	77.6710	72.6645	65.8752	60.6992	68.0307	71.0687	77.9635	85.7489	89.2422 (72)
Total internal gains	470.7227	468.4315	451.8168	424.7965	396.2422	369.0257	352.0166	359.2797	374.0324	401.2860	432.6192	456.5398 (73)
6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a	g W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W				
East	8.1800	19.6403	0.4200		0.8000		0.7700	37.4087 (76)				
West	13.9300	19.6403	0.4200		0.8000		0.7700	63.7046 (80)				
Solar gains	101.1134	197.7992	325.7471	475.0827	582.2317	596.0178	567.4332	487.4167	378.8574	234.7054	126.0765	83.1507 (83)
Total gains	571.8361	666.2307	777.5639	899.8793	978.4739	965.0435	919.4498	846.6965	752.8898	635.9914	558.6957	539.6904 (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	43.5953	43.7519	43.9095	44.7150	44.8797	45.7216	45.7216	45.8938	45.3811	44.8797	44.5516	44.2282
alpha	3.9064	3.9168	3.9273	3.9810	3.9920	4.0481	4.0481	4.0596	4.0254	3.9920	3.9701	3.9485
util living area	0.9893	0.9799	0.9547	0.8862	0.7591	0.5838	0.4387	0.4909	0.7393	0.9319	0.9815	0.9914 (86)
MIT	19.4849	19.6974	20.0508	20.4866	20.7939	20.9481	20.9871	20.9801	20.8649	20.4319	19.8830	19.4552 (87)
Th 2	129.2332	129.2332	129.2332	129.2332	129.2332	129.2332	129.2332	129.2332	129.2332	129.2332	129.2332	129.2332 (88)
util rest of house	0.9875	0.9765	0.9469	0.8672	0.7218	0.5271	0.3693	0.4188	0.6871	0.9164	0.9778	0.9899 (89)
MIT 2	18.1675	18.4778	18.9891	19.6125	20.0240	20.2196	20.2580	20.2551	20.1268	19.5491	18.7581	18.1310 (90)
Living area fraction	18.5300	18.8133	19.2812	19.8530	20.2359	20.4201	20.4586	20.4546	20.3299	19.7920	19.0676	18.4953 (92)
Temperature adjustment	18.3800	18.6633	19.1312	19.7030	20.0859	20.2701	20.3086	20.3046	20.1799	19.6420	18.9176	18.3453 (93)
adjusted MIT	18.3800	18.6633	19.1312	19.7030	20.0859	20.2701	20.3086	20.3046	20.1799	19.6420	18.9176	18.3453 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9812	0.9670	0.9326	0.8510	0.7127	0.5274	0.3734	0.4225	0.6808	0.9007	0.9688	0.9846 (94)
Useful gains	561.0713	644.2240	725.1530	765.8301	697.3891	508.9775	343.1367	357.6855	512.5743	672.8080	741.3729	531.3541 (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	1383.9823	1348.0211	1232.6962	1035.2852	800.6949	531.4165	347.5812	364.5792	574.1045	863.3418	1136.6705	1370.1505 (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	612.2458	472.9517	377.6122	194.0076	76.8595	0.0000	0.0000	0.0000	0.0000	216.1572	428.7045	624.3323 (98)
Space heating	612.2458	472.9517	377.6122	194.0076	76.8595	0.0000	0.0000	0.0000	0.0000	216.1572	428.7045	624.3323 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating per m2 (98) / (4) = 25.1497 (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)

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

Space heating requirement

Space heating efficiency (main heating system 1)

Space heating fuel (main heating system)

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

Water heating requirement

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	46.0000 (1b)	2.5200 (2b)	115.9200 (1b) - (3b)
First floor	36.7000 (1c)	3.0500 (2c)	111.9350 (1c) - (3c)
Second floor	36.7000 (1d)	2.9000 (2d)	106.4300 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	119.4000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	334.2850 (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 + 20 = 0.0000 (6b)						
Number of intermittent fans						4 + 10 = 40.0000 (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) =					40.0000 / (5) = 0.1197 (8)						
Pressure test						Yes						
Measured/design AP50						5.0000						
Infiltration rate						0.3697 (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) = 0.1197 x (20) =					0.3142 (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	0.4006	0.3928	0.3849	0.3456	0.3378	0.2985	0.2985	0.2906	0.3142	0.3378	0.3535	0.3692 (22b)
	0.5802	0.5771	0.5741	0.5597	0.5570	0.5446	0.5446	0.5422	0.5494	0.5570	0.5625	0.5682 (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					
TER Opaque door			2.3200	1.0000	2.3200		(26)					
TER Opening Type (Uw = 1.40)			22.1100	1.3258	29.3125		(27)					
Ground Floor			46.0000	0.1300	5.9800		(28a)					
External Wall	87.2400	24.4300	62.8100	0.1800	11.3058		(29a)					
Main Roof	36.7000		36.7000	0.1300	4.7710		(30)					
GF Roof	9.3000		9.3000	0.1300	1.2090		(31)					
Total net area of external elements Sum(A, m ²)			179.2400				(32)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	54.8983		(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)							17.7813 (36)					
Total fabric heat loss						(33) + (36) =	72.6796 (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	64.0094	63.6657	63.3287	61.7461	61.4500	60.0716	60.0716	59.8164	60.6026	61.4500	62.0490	62.6753 (38)
Average = Sum(39)m / 12 =	136.6890	136.3453	136.0083	134.4257	134.1296	132.7512	132.7512	132.4960	133.2822	134.1296	134.7286	135.3549 (39)
												134.4243 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1448	1.1419	1.1391	1.1258	1.1234	1.1118	1.1118	1.1097	1.1163	1.1234	1.1284	1.1336 (40)
Days in month												1.1258 (40)
	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)	
Daily hot water use	112.3627	102.1479 (43)
Energy conte	166.6307	
Energy content (annual)	145.7363	
Distribution loss (46)m = 0.15 x (45)m	24.9946	
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 (\$6)
If cylinder contains dedicated solar storage													0.0000 (\$7)
Cool loss	50.98589	46.0274	50.98589	46.0274	48.9303	45.3369	46.8481	48.9303	49.3151	50.9859	49.3151	50.9859	(61)
Total heat required for water heating calculated for each month													
Solar input	217.5896	191.7637	201.3457	180.4259	174.7342	153.8962	147.4442	164.3658	166.1292	187.0946	197.9178	212.3318	(62)
													0.0000 (\$6)
Output from w/h													
	217.5896	191.7637	201.3457	180.4259	174.7342	153.8962	147.4442	164.3658	166.1292	187.0946	197.9178	212.3318	(64)
													0.0000 (\$6)
Heat gains from water heating, kWh/month													
	68.1444	59.9642	62.7433	55.9231	54.0624	47.4302	45.1602	50.6149	51.1695	58.0048	61.7392	66.3962	(65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66m)	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483	143.0483 (66)
Lighting gains (calculated in Appendix L, equation 15 or 18a), also see Table 5	25.7862	22.9031	18.6261	14.1011	10.5408	8.8990	6.9156	12.4988	16.7758	21.3007	24.8611	26.5029 (67)
Appliances gains (calculated in Appendix L, equation 13 or 13a), also see Table 5	284.4300	287.9515	279.9348	264.1099	244.1224	225.3370	212.7872	209.8357	217.2734	233.1073	253.0948	271.8802 (68)
Cooking gains (calculated in Appendix L, equation 13 or 13a), also see Table 5	37.3048	37.3048	37.3048	37.3048	37.3048	37.3048	37.3048	37.3048	37.3048	37.3048	37.3048	37.3048 (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)	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386	-114.4386 (71)
Water heating gains (Table 5)	91.9592	89.2324	84.8324	77.6710	72.6645	65.8752	60.6992	68.0307	71.0687	77.9635	85.7489	89.2422 (72)
Total internal gains	470.7227	468.4313	441.8168	424.7965	396.2422	369.0257	352.0166	359.2797	374.0324	401.2860	432.6192	458.5398 (73)

[Jan]		Area	Solar flux	g	FF	Access	Gains
		m ²	Table 6a	Specific data	Specific data	factor	W
			W/m ²	or Table 6b	or Table 6c	Table 6d	
East		8.1800	19.6403	0.6300	0.7000	0.7700	49.0996 (76)
West		11.9300	19.6403	0.6300	0.7000	0.7700	83.6123 (80)
Solar gains	132.7113	259.6114	427.5431	782.2733	744.7561	399.4745	897.2503
Total gains	603.4340	728.0429	879.3599	1048.3426	1160.4213	1153.2990	1096.7727
						639.1345	671.2827
						208.0509	165.4754
						209.3369	598.0946
						586.6752	644.1624

Temperature during heating periods in the living area from Table 9, Th (°C)												21,0000 (85)
Utilisation factor for gains for living area, n _{l,m} (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	60.4608	60.8138	60.9644	61.6821	61.8183	62.4640	62.4640	62.5805	62.1214	61.8435	61.2587	
alpha	5.0441	5.0543	5.0643	5.1212	5.1212	5.1660	5.1660	5.1720	5.1474	5.1212	5.1029	5.0839
util living area	0.9991	0.9975	0.9907	0.9596	0.8653	0.6904	0.5227	0.5907	0.8591	0.9844	0.9980	0.9994 (86)
MIT	19.6775	19.8429	20.1323	20.5097	20.8077	20.9566	20.9915	20.9847	20.8645	20.4493	19.9925	19.6502 (87)
util rest of house	19.9644	19.9667	19.9690	19.9798	19.9818	19.9912	19.9912	19.9929	19.9876	19.9818	19.9777	19.9735 (88)
alpha	0.9988	0.9966	0.9872	0.9443	0.8178	0.6003	0.4080	0.4871	0.7906	0.9761	0.9971	0.9991 (89)
MIT	18.1904	18.4337	18.8565	19.4018	19.7945	19.9627	19.9881	19.9816	19.8764	19.3202	18.9560	18.6008
living area fraction									f _{l,m} = Living area /			1 / (4 = 0.25) (91)
MIT	18.5995	18.8214	19.2075	19.7067	20.0732	20.2362	20.2641	20.2612	20.1483	19.6355	19.0272	18.5702 (92)
temperature adjustment												0.0000
adjusted MIT	18.5995	18.8214	19.2075	19.7067	20.0732	20.2362	20.2641	20.2612	20.1483	19.6355	19.0272	18.5702 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9982	0.9951	0.9837	0.9392	0.8227	0.6234	0.4398	0.5041	0.8031	0.9723	0.9959	0.9987 (94)
Useful gains	602.3222	724.9532	865.0201	984.6014	954.6309	717.7709	482.2638	503.6088	699.7574	689.4662	595.4662	564.9223 (95)
Heat loss rate W	1.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month fraction	1954.5862	1898.1207	1728.3256	1452.6926	1123.1007	748.2059	486.4185	511.5935	806.1277	1211.9256	1606.9337	1945.0719 (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	1006.0844	788.6764	642.2993	337.0256	125.347	0.0000	0.0000	0.0000	0.0000	388.5655	728.1126	1026.8313 (98)
Space heating per m ²										(98) / (4) =		42.2357 (99)

Not applicable

HODKINSON

9a. Energy requirements - Individual heating systems, including micro-CHP		
Fraction of space heat from secondary/supplementary system (Table 1)		0.0000 (20)
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		539.2899 (21)

[illegible]

	Energy kBtu/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5399,2899	0.2160	1166,2466 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2575,6566	0.2160	556,3418 (264)
Space and water heating			1722,5885 (265)
Pumps and fans	75,0000	0.5190	38,9250 (267)
Energy for lighting	455,3930	0.5190	236,3490 (268)
Total CO2, kg/m2/year			1997,8624 (272)
Emissions per m2 for space and water heating			14,4270 (272)
Fuel factor (mains gas)		1.0000	
Emissions per m2 for lighting			1.9795 (272)
Emissions per m2 for pumps and fans		0.3260 (272)	
Target Carbon Dioxide Emission Rate (TER) = (14.4270 * 1.00) + 1.9795 + 0.3260, rounded to 2 d.p.			16,7300 (273)

Appendix B

Energy Centre Schematic



CDM INFORMATION :
THERE ARE NO SIGNIFICANT OR UNFAMILIAR RISKS TO A COMPETENT CONTRACTOR

1. LTHW HEATING PIPEWORK TO BE INSTALLED IN BLACK HW MILD STEEL TUBE JOINTED TOGETHER WITH SCREWED MALLEABLE IRON FITTINGS UP TO 50MM AND WELDED FITTINGS 65MM AND ABOVE.
2. ALL CONCEALED PIPEWORK AND PIPEWORK IN PLANT ROOMS TO BE INSULATED IN ACCORDANCE WITH THE SPECIFICATION & TO BS-EN5422
3. FIT AIR VENTS AT ALL HIGH POINTS AND DRAIN COCKS AT ALL LOW POINTS.
4. ALL PIPES PASSING THROUGH WALLS AND FLOORS TO BE SLEEVED AND FIRE STOPPED AS REQUIRED.
5. EXPANSION JOINTS, ANCHORS AND ROLLERS TO BE FITTED AS PER THE DRAWINGS.
6. COMMISSIONING VALVES, VALVES, TEST, AND FLUSHING POINTS TO BE FITTED AS PER THE DRAWINGS.
7. ACCESS REQUIRED TO ALL METERS, VALVES, AND EQUIPMENT FOR FUTURE SERVICE AND MAINTENANCE REQUIREMENTS.
8. ALL PIPEWORK BRACKETS TO BE PHENOLIC BLOCKS TO INSULATION THICKNESSES AS DETAILED ON THE DRAWINGS.
9. HEATING FLOW TEMPERATURE - 55°C
HEATING RETURN TEMPERATURE - 30°C

P03	XREF UPDATED ELECTRIC BOILER OMITTED PLANT RELOCATED	08 11 23	T.H	T.H
P02	XREF UPDATED	08 09 23	T.H	T.H
P01	INITIAL ISSUE	26 05 23	T.H	T.H
REV	DESCRIPTION	DATE	INITIAL	VFIED



DRAWING STATUS :
PRELIMINARY

PROJECT :
ST ANN'S HOSPITAL

TITLE :
ENERGY CENTRE LAYOUT

FIRE STRATEGY:

ARCHITECTS REF:

PLOT NUMBER:

JOB No: SCALE @A1: DATE: DRAWN: VFIED:
10800 1:20 MAY' 23 T.H T.H
DRAWING No.: REV: **P03**
N15301-JSW-D3-ZZ-DR-M-1016

Appendix C

TER / DER Worksheets – *Be Clean*

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End EF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End EF CLEAN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End EF, St Ann's Hospital, London, N15					
SAP Rating	83 B	DER	14.28	TER	30.76	
Environmental	90 B	% DER<TER	53.58			
CO ₂ Emissions (t/year)	0.68	DFEE	45.77	TFEE	61.28	
General Requirements Compliance	Pass	% DFEE<TFEE	25.31			
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 55 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 30.76 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.28 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)61.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof (no roof)			
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.52	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	7.58 m ² , No overhang	
Windows facing West:	8.03 m ² , No overhang	
Air change rates:	4.00 ach	
Blinds/curtains:	None	

10 Key Features

Party wall U-value	0.00 W/m ² K
Exposed floor U-value	0.12 W/m ² K
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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

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 (m2)		Storey height (m)		Volume (m3)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		2.6000 (2b)		= 143.2600 (1b) - (3b)							
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		143.2600 (5)							

2. Ventilation rate												

Number of chimneys	main heating		secondary heating		other		total		m3 per hour			
Number of open flues	0		0		0		0		0.0000 (6a)			
Number of intermittent fans	0		0		0		0		0.0000 (6b)			
Number of passive vents	0		0		0		0		0.0000 (7a)			
Number of fuelless gas fires	0		0		0		0		0.0000 (7b)			
									0.0000 (7c)			
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =							Air changes per hour					
Pressure test							0.0000 / (5) =		0.0000 (8)			
Measured/design AP50							Yes					
Infiltration rate							2.5000					
Number of sides sheltered							0.1250 (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) =		0.1063 (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)
	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (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) =											78.2000 (23c)	
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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					
Glazing North (Uw = 0.80)			7.5800	0.7752	5.8760	6.2248	(27)					
Glazing E, S, W (Uw = 0.80)			8.0300	0.7752	6.2248	6.2248	(27)					
Corridor Door			2.1000	0.5000	1.0500	1.0500	(26)					
Exposed Floor			55.1000	0.1200	6.6120	6.6120	(28b)					
External Wall	45.8900	15.6100	30.2800	0.1500	4.5420	14.0000	423.9200 (29a)					
Corridor	10.5300	2.1000	8.4300	0.1500	1.2645	14.0000	118.0200 (29a)					
Total net area of external elements Aum(A, m2)			111.5200			(26)...(30) + (32) =	25.5693	(31)				
Fabric heat loss, W/K = Sum (A x U)							4039.3700 (34)					
Party Wall 1			27.5600	0.0000	0.0000	20.0000	551.2000 (32)					
Party Ceilings 1			55.1000	0.0000	0.0000	40.0000	2204.0000 (32b)					
Timber Frame			82.4700	0.0000	0.0000	9.0000	742.2300 (32c)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =	4039.3700 (34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							73.3098 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.0450 (36)					
Total fabric heat loss							(33) + (36) =	40.6143 (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	11.5575	11.4319	11.3063	10.6784	10.5528	9.9250	9.9250	9.7994	10.1761	10.5528	10.8040	11.0552 (38)
Heat transfer coeff	52.1718	52.0462	51.9206	51.2927	51.1672	50.5393	50.5393	50.4137	50.7904	51.1672	51.6695 (39)	
Average = Sum(39)m / 12 =											51.2613 (39)	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9469	0.9446	0.9423	0.9309	0.9286	0.9172	0.9172	0.9149	0.9218	0.9286	0.9332	0.9377 (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											1.8403 (42)	
Average daily hot water use (litres/day)											77.9069 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)	
Distribution loss (46)m = 0.15 x (45)m										Sum(45)m =	1225.7783 (45)	
19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)	
Water storage loss:												
Store volume											3.0000 (47)	
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)											0.0212 (51)	
Volume factor from Table 2a											3.4200 (52)	
Temperature factor from Table 2b											1.0000 (53)	
Enter (49) or (54) in (55)											0.2173 (55)	
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.5180	6.7353	6.5180	6.7353 (56)	
If cylinder contains dedicated solar storage	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.5180	6.7353	6.5180	6.7353 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	23.2624 (59)	
Total heat required for water heating calculated for each month	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (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	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (64)
Heat gains from water heating, kWh/month	66.2546	58.6335	62.1352	56.4728	55.9012	50.7539	49.5087	53.2718	52.8473	58.5212	60.9087	64.9212 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.3036	12.7044	10.3319	7.8219	5.8470	4.9363	5.3338	6.9331	9.3055	11.8155	13.7905	14.7012 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)
Water heating gains (Table 5)	89.0519	87.2522	83.5151	78.4345	75.1360	70.4916	66.5439	71.6019	73.3990	78.6576	84.5954	87.2597 (72)
Total internal gains	314.4031	312.6691	302.3640	285.8418	269.2936	253.1419	242.5126	247.5050	255.8701	272.5703	291.7577	305.9294 (73)
6. Solar gains												
[Jan]	Area m2	Table 6a W/m2	g Table 6b	g Table 6b	FF Table 6c	Access factor Table 6d	Gains W					
North	7.5800	10.6334	0.5000	0.8000			22.3426 (74)					
West	8.0300	19.6403	0.4200	0.8000		0.7700	67.7228 (80)					
Solar gains	59.0654	114.5354	190.8603	289.0831	368.4482	384.5276	362.9914	301.5090	224.8286	136.0675	73.3515	48.8249 (83)
Total gains	373.4685	427.2046	493.2244	574.9249	637.7418	637.6694	605.5039	549.0140	480.6987	408.6378	365.1092	354.7543 (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 from the living area, nil/m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	21.5068	21.5587	21.5587	21.8754	21.9291	22.2015	22.2015	22.2568	22.0917	21.9291	21.8219	21.7159
alpha	2.4338	2.4372	2.4407	2.4584	2.4619	2.4801	2.4801	2.4838	2.4728	2.4619	2.4548	2.4477
util living area	0.9231	0.8947	0.8398	0.7375	0.6016	0.4560	0.3473	0.3922	0.5933	0.7978	0.8957	0.9307 (86)
MIT	18.7802	19.0767	19.5692	20.1650	20.6081	20.8603	20.9483	20.9291	20.7218	20.1238	19.3554	18.7229 (87)
Th 2	20.1279	20.1298	20.1317	20.1413	20.1432	20.1529	20.1529	20.1548	20.1490	20.1432	20.1394	20.1355 (88)
util rest of house	0.9150	0.8839	0.8255	0.7119	0.5643	0.4060	0.2862	0.3283	0.5425	0.7713	0.8833	0.9233 (89)
MIT 2	17.1389	17.5643	18.2655	19.1006	19.6940	20.0166	20.1135	20.0982	19.8588	19.0655	17.9773	17.0611 (90)
Living area fraction									fLA = Living area / (4)			0.5145 (91)
MIT	17.9934	18.3424	18.9363	19.6482	20.1643	20.4507	20.5430	20.5257	20.3028	19.6100	18.6863	17.9161 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9934	18.3424	18.9363	19.6482	20.1643	20.4507	20.5430	20.5257	20.3028	19.6100	18.6863	17.9161 (93)
8. Space heating requirement												
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8895	0.8567	0.7975	0.6958	0.5652	0.4240	0.3148	0.3570	0.5521	0.7526	0.8573	0.8989 (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	713.8852	699.6275	645.7011	551.3070	443.0932	295.6914	199.2775	207.9936	315.0445	461.0519	595.7496	708.7053 (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 (97)
Space heating kWh	283.9664	224.2109	187.7581	108.9217	54.0325	0.0000	0.0000	0.0000	0.0000	114.7115	203.5645	290.0242 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating
Space heating per m2
(98) / (4) = 1466.6500 (98)
26.6180 (99)

8c. Space cooling requirement

Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)
Fraction of space heat from community system
Fraction of heat from community Heat pump
Fraction of heat from community Boilers
Fraction of total space heat from community Heat pump
Fraction of total space heat from community Boilers
Factor for control and charging method (Table 4c(3)) for community space heating
Factor for control and charging method (Table 4c(3)) for community water heating
Distribution loss factor (Table 12c) for community heating system
Space heating:
Annual space heating requirement
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)
Space heating fuel for secondary/supplementary system

Water heating
Annual water heating requirement
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05
Electricity used for heat distribution
Annual totals kWh/year

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)
mechanical ventilation fans (SFP = 0.6500)
Total electricity for the above, kWh/year
Electricity for lighting (calculated in Appendix L)
Total delivered energy for all uses

12b. Carbon dioxide emissions - Community heating scheme
Energy kWh/year
Emission factor kg CO2/kWh
Emissions kg CO2/year
Efficiency of heat source Heat pump
Space heating from Heat pump
Efficiency of heat source Boilers
Space heating from Boilers
Electrical energy for heat distribution
Total CO2 associated with community systems
(negative value allowed since DPEE <= TPFE)
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/m²/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)
Dwelling volume
Storey height
Volume
(3a)+(3b)+(3c)+(3d)+(3e)...(3n)

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
Pressure test
Measured/design AP50
Infiltration rate
Number of sides sheltered
Air changes per hour
Shelter factor
Infiltration rate adjusted to include shelter factor

Wind speed
Wind factor
Adj infiltr rate
Effective ac
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

3. Heat losses and heat loss parameter

Element
Gross
Openings
NetArea
U-value
A x U
K-value
A x K
TER Opaque door
TER Opening Type (Uw = 1.40)
Exposed Floor
External Wall
Corridor
Total net area of external elements Sum(A, m2)
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
(33) + (36) =

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m
Heat transfer coeff
Average = Sum(39)m / 12 =
HLP
HLP (average)
Days in month

4. Water heating energy requirements (kWh/year)

Assumed occupancy
Average daily hot water use (litres/day)
Daily hot water use
Energy content (annual)
Distribution loss (46)m = 0.15 x (45)m
Water storage loss:
Store volume
a) If manufacturer declared loss factor is known (kWh/day):
Temperature factor from Table 2b
Enter (49) or (54) in (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (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(62)m =												0.0000 (63)
Output from w/h	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Heat gains from water heating, kWh/month	64.3506	56.9137	60.2312	54.6303	53.9972	48.9113	47.6046	51.3678	51.0047	56.6172	59.0661	63.0172 (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	
92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
(66)m	14.3355	12.7327	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
(66)m	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
(66)m	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	(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)												
(66)m	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	(71)
Water heating gains (Table 5)												
(66)m	86.4927	84.6931	80.9559	75.8753	72.5769	67.9324	63.9847	69.0428	70.8399	76.0984	82.0362	84.7006 (72)
Total internal gains	314.8758	313.1383	302.8279	286.3000	269.7475	253.5937	242.9653	247.9612	256.3316	273.0374	292.2292	306.4030 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a	Specific data g W/m2	Specific data or Table 6b	FF	Access factor Table 6d	Gains W					
North	5.6600	10.6334	0.6300	0.7000	0.7000	0.7700	18.3933 (74)					
West	6.0000	19.6403	0.6300	0.7000	0.7000	0.7700	36.0139 (80)					
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421	331.2781	276.0875	206.7531	125.4381	67.5956	44.9497 (83)
Total gains	369.2831	418.7397	478.5798	551.4527	606.3641	604.2358	574.2433	524.0488	463.0847	398.4755	359.8249	351.3526 (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, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
53.9055	54.0301	54.1327	54.7363	54.8469	55.3677	55.3677	55.4652	55.1660	54.8469	54.6237	54.3922	
alpha	4.5937	4.6020	4.6102	4.6491	4.6565	4.6912	4.6977	4.6777	4.6565	4.6416	4.6261	
util living area	0.9968	0.9937	0.9838	0.9477	0.8499	0.6773	0.5166	0.5815	0.8372	0.9714	0.9938	0.9974 (86)
MIT	19.6411	19.7955	20.0784	20.4607	20.7772	20.9448	20.9875	20.9789	20.8480	20.4350	19.9726	19.6149 (87)
Th 2	19.8500	19.8524	19.8547	19.8654	19.8674	19.8769	19.8769	19.8786	19.8732	19.8674	19.8634	19.8591 (88)
util rest of house	0.9956	0.9915	0.9780	0.9281	0.7967	0.5798	0.3913	0.4515	0.7592	0.9569	0.9912	0.9965 (89)
MIT 2	18.0575	18.2840	18.6953	19.2430	19.6554	19.8417	19.8726	19.8704	19.7536	19.2190	18.5508	18.0255 (90)
Living area fraction												
MIT	18.8723	19.0617	19.4070	19.8695	20.2326	20.4093	20.4462	20.4408	20.3167	19.8447	19.2823	18.8433 (92)
Temperature adjustment												
adjusted MIT	18.8723	19.0617	19.4070	19.8695	20.2326	20.4093	20.4462	20.4408	20.3167	19.8447	19.2823	18.8433 (93)

8. Space heating requirement												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.9943	0.9895	0.9750	0.9282	0.8155	0.6281	0.4561	0.5187	0.7933	0.9566	0.9894	0.9954 (94)	
Useful gains	367.1838	414.3256	466.6218	511.8630	494.5082	379.5360	261.9111	271.8451	367.3496	356.0158	349.7512 (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	1034.3890	1002.9236	911.9954	766.8327	595.2758	401.4697	265.8084	278.7600	431.2018	644.9532	853.3703	1030.1260 (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	496.4007	395.5379	331.3580	183.5782	74.9711	0.0000	0.0000	0.0000	196.2593	358.0952	506.1989 (98)	
Space heating												
Space heating per m2									(98) / (4) =			46.1415 (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												2719.1435 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	496.4007	395.5379	331.3580	183.5782	74.9711	0.0000	0.0000	0.0000	0.0000	196.2593	358.0952	506.1989 (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)	530.9098	423.0352	354.3935	196.3403	80.1830	0.0000	0.0000	0.0000	0.0000	209.9030	382.9895	541.3892 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Water heating requirement	496.4007	395.5379	331.3580	183.5782	74.9711	0.0000	0.0000	0.0000	0.0000	196.2593	358.0952	506.1989 (98)
Efficiency of water heater	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)
Fuel for water heating, kWh/month	530.9098	423.0352	354.3935	196.3403	80.1830	0.0000	0.0000	0.0000	0.0000	209.9030	382.9895	541.3892 (211)
Water heating fuel used	176.3905	155.5443	163.5900	147.6933	147.9322	137.2475	130.7531	144.9358	145.1371	153.0565	160.6016	171.6353 (219)
Annual totals kWh/year												1834.5173 (219)
Space heating fuel - main system												2719.1435 (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)												253.1691 (232)
Total delivered energy for all uses												4881.8299 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
Energy kWh/year	2719.1435	Emission factor kg CO2/kWh	0.2160	Emissions kg CO2/year	587.3350 (261)							
Space heating - main system 1	2719.1435	0.0000	0.2160	0.0000	0.0000 (263)							
Space heating - secondary	0.0000	0.2160	0.0000	0.0000	0.0000 (264)							
Water heating (other fuel)	1834.5173	0.2160	0.2160	398.2557	398.2557 (265)							
Space and water heating				398.2557	398.2557 (265)							
Pumps and fans	75.0000	0.5190	0.5190	38.9250	38.9250 (267)							
Energy for lighting	253.1691	0.5190	0.5190	131.3948	131.3948 (268)							
Total CO2, kg/m2/year				1153.9105	1153.9105 (272)							
Emissions per m2 for space and water heating				17.8510	17.8510 (272a)							
Fuel factor (electricity)				1.5500	1.5500 (272b)							
Emissions per m2 for lighting				2.3847	2.3847 (272b)							
Emissions per m2 for pumps and fans				0.7064	0.7064 (272c)							
Target Carbon Dioxide Emission Rate (TER) = (17.8510 * 1.55) + 2.3847 + 0.7064, rounded to 2 d.p.				30.7600	30.7600 (273)							

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End MF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End MF CLEAN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End MF, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	12.48	TER	26.11	
Environmental	92 A	% DER<TER	52.19			
CO ₂ Emissions (t/year)	0.59	DFEE	37.76	TFEE	46.00	
General Requirements Compliance	Pass	% DFEE<TFEE	17.92			
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 55 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 (c)

Fuel factor:1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 26.11 kgCO₂/m²

Dwelling Carbon Dioxide Emission Rate (DER) 12.48 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)46.0 kWh/m²/yr

Dwelling Fabric Energy Efficiency (DFEE)37.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Community heating scheme -

Secondary heating system: None

5 Cylinder insulation

Hot water storage Nominal cylinder loss: 0.22 kWh/day

Permitted by DBSOG 0.35 OK

Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls:

No cylinder thermostat

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: 0.52

Maximum 1.5

MVHR efficiency: 92%

Minimum: 70%

OK

OK

9 Summertime temperature

Overheating risk (Thames Valley):

Medium

OK

Based on:

Overheating:

Average

Windows facing North: 7.58 m², No overhang

Windows facing West: 8.03 m², No overhang

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key Features

Party wall U-value 0.00 W/m²K

Door U-value 0.50 W/m²K

Window U-value 0.80 W/m²K

Window U-value 0.80 W/m²K

Air permeability 2.5 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	55.1000 (1b)	x 2.6000 (2b)	= 143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 143.2600 (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			2.5000
Measured/design AP50			0.1250 (18)
Infiltration rate			2 (19)
Number of sides sheltered			

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (22a)
If mechanical ventilation:												78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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
Glazing North (Uw = 0.80)	7.5800		7.5800	0.7752	5.8760	6.2248	(27)
Glazing E, S, W (Uw = 0.80)	8.0300		8.0300	0.7752	6.2248		(27)
Corridor Door		2.1000	2.1000	0.5000	1.0500		(26)
External Wall	45.8900	15.6100	30.2800	0.1500	4.5420	14.0000	423.9200 (29a)
Corridor	10.5300	2.1000	8.4300	0.1500	1.2645	14.0000	118.0200 (29a)
Total net area of external elements Aum(A, m2)			56.4200				(31)
Fabric heat loss, W/K = Sum (A x U)					27.5600	0.0000	551.2000 (32)
Party Wall 1			55.1000			40.0000	2204.0000 (32d)
Party Floor 1			55.1000			40.0000	2204.0000 (32b)
Party Ceilings 1			82.4700			9.0000	742.2300 (32c)
Timber Frame							

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	6243.3700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		113.3098 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		11.8888 (36)
Total fabric heat loss	(33) + (36) =	30.8461 (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	11.5575	11.4319	11.3063	10.6784	10.5528	9.9250	9.9250	9.7994	10.1761	10.5528	10.8040	11.0552 (38)
Heat transfer coeff	42.4035	42.2779	42.1524	41.5245	41.3989	40.7710	40.7710	40.6455	41.0222	41.3989	41.6501	41.9012 (39)
Average = Sum(39)m / 12 =												41.4931 (39)
HLP	0.7696	0.7673	0.7650	0.7536	0.7513	0.7399	0.7399	0.7377	0.7445	0.7513	0.7559	0.7605 (40)
HLP (average)												0.7531 (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												1.8403 (42)
Average daily hot water use (litres/day)												77.9069 (43)
Daily hot water use	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum (45)m =	1225.7783 (45)	
	19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)
Water storage loss:												
Store volume												3.0000 (47)
b) If manufacturer declared loss factor is not known :												0.0212 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)												3.4200 (52)
Volume factor from Table 2a												1.0000 (53)
Temperature factor from Table 2b												0.2173 (55)
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage												
	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (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	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (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	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (64)
										Total per year (kWh/year) = Sum(64)m =	1578.9770 (64)	
Heat gains from water heating, kWh/month	66.2546	58.6335	62.1352	56.4728	55.9012	50.7539	49.5087	53.2718	52.8473	58.5212	60.9087	64.9212 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	14.3036	12.7044	10.3319	7.8219	5.8470	4.9363	5.3338	6.9331	9.3055	11.8155	13.7905	14.7012 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (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)												
	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)
Water heating gains (Table 5)												
	89.0519	87.2522	83.5151	78.4345	75.1360	70.4916	66.5439	71.6019	73.3990	78.6576	84.5954	87.2597 (72)
Total internal gains	314.4031	312.6691	302.3640	285.8418	269.2936	253.1419	242.5126	247.5050	255.8701	272.5703	291.7577	305.9294 (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		7.5800	10.6334	0.5000	0.8000	0.7700	22.3426 (74)
West		8.0300	19.6403	0.4200	0.8000	0.7700	36.7228 (80)
Solar gains	59.0654	114.5354	190.8603	289.0831	368.4482	384.5276	362.9914
Total gains	373.4685	427.2046	493.2244	574.9249	637.7418	637.6694	605.5039
						549.0140	480.6987
						408.6378	365.1092
							354.7543 (84)

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, nil/m (see Table 9a)												21.0000 (85)
tau	40.8992	41.0207	41.1429	41.7650	41.8917	42.5368	42.5368	42.6682	42.2764	41.8917	41.6391	41.3895
alpha	3.7266	3.7347	3.7429	3.7843	3.7928	3.8358	3.8358	3.8445	3.8184	3.7928	3.7759	3.7593
util living area	0.9542	0.9265	0.8645	0.7347	0.5650	0.4012	0.2943	0.3370	0.5541	0.8115	0.9272	0.9608 (86)
MIT	19.7972	20.0251	20.3670	20.7247	20.9150	20.9825	20.9959	20.9932	20.9423	20.6594	20.1738	19.7543 (87)
Th 2	20.2798	20.2818	20.2838	20.2937	20.2957	20.3057	20.3057	20.3057	20.3017	20.2957	20.2917	20.2877 (88)
util rest of house	0.9481	0.9173	0.8485	0.7080	0.5293	0.3599	0.2486	0.2875	0.5062	0.7842	0.9164	0.9555 (89)
MIT 2	18.6597	18.9863	19.4685	19.9608	20.2899	20.3029	20.3029	20.3029	20.2458	19.8877	19.2104	18.6037 (90)
Living area fraction												
MIT	19.2449	19.5208	19.9308	20.3538	20.5695	20.6462	20.6594	20.6580	20.6042	20.2847	19.7061	19.1957 (92)
Temperature adjustment												
adjusted MIT	19.2449	19.5208	19.9308	20.3538	20.5695	20.6462	20.6594	20.6580	20.6042	20.2847	19.7061	19.1957 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9376	0.9059	0.8398	0.7104	0.5434	0.3803	0.2720	0.3127	0.5273	0.7838	0.9062	0.9457 (94)
Useful gains	350.1776	387.0096	414.2331	408.4009	346.5277	242.5239	164.6754	171.6634	253.4947	320.2741	330.8552	335.4749 (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	633.7180	618.1379	566.1392	475.6150	367.1865	246.5118	165.5077	173.0690	266.8154	400.9380	525.0438	628.3381 (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	210.9540	155.3182	113.0181	48.3942	15.3701	0.0000	0.0000	0.0000	0.0000	60.0140	139.8158	217.8903 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating 960.7746 (98)
Space heating per m2 17.4369 (99)
(98) / (4) =

8c. Space cooling requirement

Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (301)
Fraction of space heat from community system 1.0000 (302)
Fraction of heat from community Heat pump 0.9500 (303a)
Fraction of heat from community Boilers 0.0500 (303b)
Fraction of total space heat from community Heat pump 0.9500 (304a)
Fraction of total space heat from community Boilers 0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating 1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating 1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system 1.0500 (306)
Space heating:
Annual space heating requirement 960.7746 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05 958.3726 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05 50.4407 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) 0.0000 (308)
Space heating fuel for secondary/supplementary system 0.0000 (309)
Water heating
Annual water heating requirement 1578.9770 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05 1575.0295 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05 82.8963 (310b)
Electricity used for heat distribution 26.6674 (313)
Annual totals kWh/year
Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)
mechanical ventilation fans (SFP = 0.6500) 113.6052 (330a)
Total electricity for the above, kWh/year 113.6052 (331)
Electricity for lighting (calculated in Appendix L) 252.6067 (332)
Total delivered energy for all uses 3032.9510 (338)

12b. Carbon dioxide emissions - Community heating scheme
Energy kWh/year Emission factor kg CO2/kWh Emissions kg CO2/year
Efficiency of heat source Heat pump 791.6882 0.5190 410.8862 (367a)
Space heating from Heat pump 791.6882 0.5190 410.8862 (367b)
Efficiency of heat source Boilers 140.3547 0.5190 72.8441 (368)
Space heating from Boilers 140.3547 0.5190 72.8441 (368)
Electrical energy for heat distribution 26.6674 0.5190 13.8404 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFE) 497.5706 (373)
Space and water heating 497.5706 (376)
Pumps and fans 113.6052 0.5190 58.9611 (378)
Energy for lighting 252.6067 0.5190 131.1029 (379)
Total CO2, kg/year 687.6346 (383)
Dwelling Carbon Dioxide Emission Rate (DER) 12.4800 (384)

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

Total Floor Area 55.1000 TFA
Assumed number of occupants 1.8403 N
CO2 emission factor in Table 12 for electricity displaced from grid 1.8403 EF
CO2 emissions from appliances, equation (L14) 17.2551 C22
CO2 emissions from cooking, equation (L16) 2.9613 C23
Total CO2 emissions 32.6963 C24
Residual CO2 emissions offset from biofuel CHP 0.0000 C25
Additional allowable electricity generation, kWh/m²/year 0.0000 C26
Resulting CO2 emissions offset from additional allowable electricity generation 0.0000 C27
Net CO2 emissions 32.6963 C28

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) 55.1000 (1b) x Storey height (m) 2.6000 (2b) = Volume (m3) 143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 55.1000
Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.2600 (5)

2. Ventilation rate

Number of chimneys main heating secondary heating other total m3 per hour
Number of open flues 0 + 0 + 0 = 0 * 40 = 0.0000 (6a)
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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1396 (8)
Pressure test Yes
Measured/design AP50 5.0000
Infiltration rate 0.3896 (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) = 0.3312 (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 0.4222 0.4140 0.4057 0.3643 0.3560 0.3146 0.3146 0.3063 0.3312 0.3560 0.3726 0.3891 (22b)
0.5891 0.5857 0.5823 0.5664 0.5634 0.5495 0.5495 0.5469 0.5548 0.5634 0.5694 0.5757 (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 2.1000 1.0000 2.1000 (26)
TER Opening Type (Uw = 1.40) 11.6600 1.3258 15.4583 (27)
External Wall 45.8900 11.6600 34.2300 0.1800 6.1614 (29a)
Corridor 10.5300 2.1000 8.4300 0.1800 1.5174 (29a)
Total net area of external elements Aum(A, m2) 56.4200 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 25.2371 (33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.2100 (36)
Total fabric heat loss (33) + (36) = 30.4471 (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 27.8521 27.6885 27.5281 26.7747 26.6337 25.9775 25.9775 25.8560 26.2303 26.6337 26.9189 27.2170 (38)
Average = Sum(39)m / 12 = 58.2993 58.1356 57.9752 57.2218 57.0809 56.4247 56.4247 56.3031 56.6774 57.0809 57.3660 57.6641 (39)
HLP (average) 1.0581 1.0551 1.0522 1.0385 1.0360 1.0240 1.0240 1.0218 1.0286 1.0360 1.0411 1.0465 (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 1.8403 (42)
Average daily hot water use (litres/day) 77.9069 (43)
Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Energy conte 85.6976 82.5813 79.4650 76.3487 73.2325 70.1162 70.1162 73.2325 76.3487 79.4650 82.5813 85.6976 (44)
Energy content (annual) 127.0870 111.1511 114.6980 99.9965 95.9490 82.7967 82.7967 88.0411 89.0926 103.8288 113.3373 123.0770 (45)
Distribution loss (46)m = 0.15 x (45)m 19.0630 16.6727 17.2047 14.9995 14.3923 12.4195 11.5085 13.2062 13.3639 15.5743 17.0006 18.4615 (46)
Water storage loss:
Store volume 3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 0.2602 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.1405 (55)
Total storage loss

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Heat gains from water heating, kWh/month	64.3506	56.3137	60.2312	54.6303	53.9972	48.9113	47.6046	51.3678	51.0047	56.6172	59.0661	63.0172 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	(66)
Lighting gains (calculated in Appendix L, equation L10 or L9a), also see Table 5	14.3355	12.7327	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	(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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	(71)
Water heating gains (Table 5)	86.4927	84.6931	80.9559	75.8753	72.5769	67.9324	63.9847	69.0428	70.8399	76.0984	82.0362	84.7006 (72)
Total internal gains	314.8758	313.1383	302.8279	286.3000	269.7475	253.5937	242.9653	247.9612	256.3316	273.0374	292.2292	306.4030 (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	5.6600	10.6334	0.6300	0.7000	0.7700	18.3933 (74)
West	6.0000	19.6403	0.6300	0.7000	0.7700	36.0139 (80)
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421
Total gains	369.2831	418.7397	478.5798	551.4527	606.3641	604.2358

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, nil,m (see Table 9a)	65.6336	65.8183	66.0004	66.8694	67.0345	67.8141	67.8141	67.9605	67.5117	67.0345	66.7013	66.3565
tau	5.3756	5.3879	5.4000	5.4580	5.4690	5.5209	5.5209	5.5307	5.5008	5.4690	5.4468	5.4238
util living area	0.9966	0.9927	0.9789	0.9237	0.7842	0.5831	0.4299	0.4891	0.7668	0.9598	0.9928	0.9974 (86)
MIT	19.9503	20.0976	20.3541	20.6816	20.9036	20.9847	20.9976	20.9953	20.9373	20.6324	20.2346	19.9259 (87)
Th 2	20.0352	20.0377	20.0401	20.0514	20.0535	20.0633	20.0633	20.0652	20.0595	20.0535	20.0492	20.0447 (88)
util rest of house	0.9955	0.9903	0.9718	0.8997	0.7291	0.5040	0.3397	0.3924	0.6895	0.9420	0.9900	0.9965 (89)
MIT 2	18.6395	18.8555	19.2270	19.6896	19.9650	20.0538	20.0625	20.0633	20.0123	19.6348	19.0645	18.6109 (90)
Living area fraction	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319 (91)
MIT	19.3139	19.4946	19.8069	20.2000	20.4480	20.5328	20.5436	20.5429	20.4882	20.1481	19.6665	19.2875 (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
adjusted MIT	19.3139	19.4946	19.8069	20.2000	20.4480	20.5328	20.5436	20.5429	20.4882	20.1481	19.6665	19.2875 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9944	0.9886	0.9698	0.9039	0.7532	0.5443	0.3862	0.4423	0.7267	0.9441	0.9885	0.9956 (94)
Ext temp	367.2110	413.9656	464.1087	498.4552	456.7383	328.9020	221.7891	231.7765	336.5043	376.2138	355.6844	349.8158 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month fracti	875.2994	848.4653	771.4728	646.6061	499.3412	334.7549	222.5172	233.2556	362.0682	545.0120	720.8906	870.0053 (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	378.0178	291.9838	228.6789	106.6687	31.6965	0.0000	0.0000	0.0000	0.0000	125.5859	262.9485	387.0210 (98)
Space heating per m2												1812.6010 (98)
										(98) / (4) =		32.8966 (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													1938.6107 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency (main heating system 1)	378.0178	291.9838	228.6789	106.6687	31.6965	0.0000	0.0000	0.0000	0.0000	125.5859	262.9485	387.0210 (98)	
Space heating fuel (main heating system)	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)	
Water heating requirement	404.2971	312.2821	244.5764	114.0841	33.9000	0.0000	0.0000	0.0000	0.0000	134.3165	281.2283	413.9262 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)	
Efficiency of water heater	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000 (216)	
Fuel for water heating, kWh/month	177.6008	156.7930	165.3434	150.2200	151.1080	137.2475	130.7531	144.9358	145.1371	155.2044	161.9791	172.7705 (219)	
Water heating fuel used													
Annual totals kWh/year													1938.6107 (211)
Space heating fuel - main system													0.0000 (215)
Space heating fuel - secondary													
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)													253.1691 (232)
Total delivered energy for all uses													4115.8725 (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	418.7399 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	0.2160	399.4040 (264)
Space and water heating	0.5190	818.1439 (265)
Pumps and fans	0.5190	38.9250 (267)
Energy for lighting	0.5190	131.3948 (268)
Total CO2, kg/m2/year		988.4637 (272)
Emissions per m2 for space and water heating		14.8483 (272a)
Fuel factor (electricity)		1.5500
Emissions per m2 for lighting		2.3847 (272b)
Emissions per m2 for pumps and fans		0.7064 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.8483 * 1.55) + 2.3847 + 0.7064, rounded to 2 d.p.		26.1100 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End TF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End TF CLEAN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End TF, St Ann's Hospital, London, N15					
SAP Rating	83 B	DER	14.73	TER	32.48	
Environmental	90 B	% DER<TER	54.65			
CO ₂ Emissions (t/year)	0.67	DFEE	50.29	TFEE	66.97	
General Requirements Compliance	Pass	% DFEE<TFEE	24.92			
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 55 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 32.48 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.73 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)67.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)50.3 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (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	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Community heating scheme -

Secondary heating system: None

5 Cylinder insulation

Hot water storage Nominal cylinder loss: 0.22 kWh/day

Permitted by DBSOG 0.35 OK

Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls:

No cylinder thermostat

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:	0.52
Maximum	1.5 OK
MVHR efficiency:	92%
Minimum:	70% OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overheating:

Windows facing North: 7.58 m², No overhang

Windows facing West: 8.03 m², 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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) (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	55.1000 (1b)	x 2.6000 (2b)	= 143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 143.2600 (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 fires	0	0	0	0	= 0.0000 (6b)
Number of intermittent fans	0	0	0	0	= 0.0000 (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) =	0.0000 / (5) =	0.0000 (8)
Pressure test			Yes
Measured/design AP50			2.5000
Infiltration rate			0.1250 (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) =	0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)

Balanced mechanical ventilation with heat recovery												0.5000 (22c)
If mechanical ventilation:												78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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
Glazing North (Uw = 0.80)	7.5800	0.7752	5.8760	0.7752	4.5420	14.0000	423.9200 (26)
Glazing E, S, W (Uw = 0.80)	8.0300	0.7752	6.2248	0.7752	4.8400	14.0000	423.9200 (26)
Corridor Door	2.1000	0.5000	1.6000	0.5000	0.8000	100.0000	5510.0000 (30)
External Wall	45.8900	15.6100	30.2800	0.1500	4.5420	14.0000	423.9200 (26)
Corridor	10.5300	2.1000	8.4300	0.1500	1.2648	10.0000	118.0200 (29a)
Main Roof	55.1000	0.0000	55.1000	0.1000	5.5100	100.0000	5510.0000 (30)
Total net area of external elements Aum(A, m2)			111.5200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.4673		(33)
Party Wall 1			27.5600	0.0000	0.0000	20.0000	551.2000 (32)
Party Floor 1			55.1000	0.0000	0.0000	2204.0000	324.0000 (32a)
Timber Frame			82.4700	0.0000	0.0000	9.0000	742.2300 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9549.3700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		173.3098 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		19.0375 (36)
Total fabric heat loss	(33) + (36) =	43.5048 (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	11.5575	11.4319	11.3063	10.6784	10.5528	9.9250	9.9250	9.7994	10.1761	10.5528	10.8040	11.0552 (38)
Average = Sum(39)m / 12 =	55.0623	54.9367	54.8111	54.1832	54.0577	53.4298	53.4298	53.3042	53.6809	54.0577	54.5600 (39)	54.1518 (39)

HLP	0.9993	0.9970	0.9948	0.9834	0.9811	0.9697	0.9697	0.9674	0.9742	0.9811	0.9856	0.9902 (40)
HLP (average)												0.9828 (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												1.8403 (42)
Average daily hot water use (litres/day)												77.9069 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)
Distribution loss (46)m = 0.15 x (45)m												Sum(45)m = 1225.7783 (45)
19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)	
Water storage loss:												3.0000 (47)
Store volume												0.0212 (51)
b) If manufacturer declared loss factor is not known :												3.4200 (52)
Hot water storage loss factor from Table 2 (kWh/litre/day)												1.0000 (53)
Volume factor from Table 2a												0.2173 (55)
Temperature factor from Table 2b												
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (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 (58)
Total heat required for water heating calculated for each month	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (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	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (64)
Heat gains from water heating, kWh/month	66.2546	58.6335	62.1352	56.4728	55.9012	50.7539	49.5087	53.2718	52.8473	58.5212	60.9087	64.9212 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	14.3036	12.7044	10.3319	7.8219	5.8470	4.9363	5.3338	6.9331	9.3055	11.8155	13.7905	14.7012 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (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)												
	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)
Water heating gains (Table 5)												
	89.0519	87.2522	83.5151	78.4345	75.1360	70.4916	66.5439	71.6019	73.3990	78.6576	84.5954	87.2597 (72)
Total internal gains	314.4031	312.6691	302.3640	285.8418	269.2936	253.1419	242.5126	247.5050	255.8701	272.5703	291.7577	305.9294 (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		7.5800	10.6334	0.5000	0.8000	0.7700	22.3426 (74)
West		8.0300	19.6403	0.4200	0.8000	0.7700	36.7228 (80)
Solar gains	59.0654	114.5354	190.8603	289.0831	368.4482	384.5276	362.9914
Total gains	373.4685	427.2046	493.2244	574.9249	637.7418	637.6694	605.5039
						549.0140	480.6987
						408.6378	365.1092
							354.7543 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil/m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	48.1746	48.2847	48.3953	48.9562	49.0699	49.6465	49.6465	49.7635	49.4142	49.0699	48.8430	48.6181
util living area	4.2116	4.2190	4.2264	4.2637	4.2713	4.3098	4.3098	4.3176	4.2943	4.2713	4.2562	4.2412
	0.9865	0.9755	0.9449	0.8591	0.7038	0.5187	0.3842	0.4389	0.6934	0.9141	0.9760	0.9890 (86)
MIT	19.7133	19.9073	20.2317	20.6210	20.8735	20.9736	20.9942	20.9900	20.9129	20.5575	20.0663	19.6761 (87)
Th 2	20.0839	20.0858	20.0877	20.0972	20.0991	20.1087	20.1087	20.1106	20.1049	20.0991	20.0953	20.0915 (88)
util rest of house	0.9835	0.9701	0.9330	0.8312	0.6543	0.4525	0.3082	0.3574	0.6234	0.8900	0.9699	0.9865 (89)
MIT 2	18.3680	18.6494	19.1135	19.6548	19.9728	20.0888	20.1058	20.1052	20.0302	19.5845	18.8887	18.3193 (90)
Living area fraction												
MIT	19.0602	19.2966	19.6889	20.1520	20.4362	20.5441	20.5629	20.5605	20.4843	20.0852	19.4946	19.0174 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0602	19.2966	19.6889	20.1520	20.4362	20.5441	20.5629	20.5605	20.4843	20.0852	19.4946	19.0174 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9792	0.9644	0.9270	0.8330	0.6735	0.4853	0.3472	0.3991	0.6555	0.8896	0.9647	0.9827 (94)
Useful gains	365.6988	411.9801	457.1952	478.9119	429.5238	309.4863	210.2454	219.1106	315.1039	363.5295	352.2293	348.6208 (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	812.7310	790.9016	722.8962	609.6674	472.2610	317.5903	211.7380	221.7712	342.7174	512.7455	673.1365	808.4377 (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	332.5913	254.6352	197.6815	94.1440	31.7965	0.0000	0.0000	0.0000	0.0000	11.0165	231.0532	342.1038 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating 1595.0226 (98)
Space heating per m2 (98) / (4) = 28.9478 (99)

8c. Space cooling requirement

Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (301)
Fraction of space heat from community system 1.0000 (302)
Fraction of heat from community Heat pump 0.9500 (303a)
Fraction of heat from community Boilers 0.0500 (303b)
Fraction of total space heat from community Heat pump 0.9500 (304a)
Fraction of total space heat from community Boilers 0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating 1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating 1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system 1.0500 (306)
Space heating:
Annual space heating requirement 1595.0226 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05 1591.0351 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05 83.7387 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) 0.0000 (308)
Space heating fuel for secondary/supplementary system 0.0000 (309)

Water heating
Annual water heating requirement 1578.9770 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05 1575.0295 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05 82.8963 (310b)
Electricity used for heat distribution 33.3270 (313)
Annual totals kWh/year

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)
mechanical ventilation fans (SFP = 0.6500) 113.6052 (330a)
Total electricity for the above, kWh/year 113.6052 (331)
Electricity for lighting (calculated in Appendix L) 252.6067 (332)
Total delivered energy for all uses 3698.9115 (338)

12b. Carbon dioxide emissions - Community heating scheme
Energy kWh/year Emission factor kg CO2/kWh Emissions kg CO2/year
Efficiency of heat source Heat pump 989.3952 0.5190 513.4961 (367a)
Efficiency of heat source Boilers 175.4052 0.5190 91.0353 (368)
Space heating from Boilers 33.3270 0.5190 17.2967 (372)
Electrical energy for heat distribution 621.8281 (373)
Total CO2 associated with community systems (negative value allowed since DPEE <= TPFE) 621.8281 (373)
Space and water heating 621.8281 (376)
Pumps and fans 113.6052 0.5190 58.9611 (378)
Energy for lighting 252.6067 0.5190 131.1029 (379)
Total CO2, kg/year 811.8921 (383)
Dwelling Carbon Dioxide Emission Rate (DER) 14.7300 (384)

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

DER 14.7300 ZC1
Total Floor Area 55.1000 TFA
Assumed number of occupants 1.8403 N
CO2 emission factor in Table 12 for electricity displaced from grid 0.5190 EF
CO2 emissions from appliances, equation (L14) 17.2551 ZC2
CO2 emissions from cooking, equation (L16) 2.9613 ZC3
Total CO2 emissions 34.9463 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 34.9463 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)
55.1000 (1b) x 2.6000 (2b) = 143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 55.1000
Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.2600 (5)

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 * 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)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1396 (8)
Pressure test Yes
Measured/design AP50 5.0000
Infiltration rate 0.3896 (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) = 0.3312 (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	0.4222	0.4140	0.4057	0.3643	0.3560	0.3146	0.3146	0.3063	0.3312	0.3560	0.3726	0.3891 (22b)
Effective ac	0.5891	0.5857	0.5823	0.5664	0.5634	0.5495	0.5495	0.5469	0.5548	0.5634	0.5694	0.5757 (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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			11.4600	1.3258	15.4583		(27)
External Wall	45.8900	11.6600	34.2300	0.1800	6.1614		(29a)
Corridor	10.5300	2.1000	8.4300	0.1800	1.5174		(29a)
Main Roof	55.1000		55.1000	0.1300	7.1630		(30)
Total net area of external elements Aum(A, m2)			111.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	32.4001		(33)

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) = 47.8911 (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
27.8521 27.6885 27.5281 26.7747 26.6337 25.9775 25.9775 25.8560 26.2303 26.6337 26.9189 27.2170 (38)
Heat transfer coeff 75.7433 75.5796 75.4192 74.6658 74.5249 73.8687 73.8687 73.7471 74.1214 74.5249 74.8100 75.1081 (39)
Average = Sum(39)m / 12 = 74.6651 (39)
HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
1.3747 1.3717 1.3688 1.3551 1.3525 1.3406 1.3406 1.3384 1.3452 1.3525 1.3577 1.3631 (40)
HLP (average) 1.3551 (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 1.8403 (42)
Average daily hot water use (litres/day) 77.9069 (43)
Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
85.6976 82.5813 79.4650 76.3487 73.2325 70.1162 70.1162 73.2325 76.3487 79.4650 82.5813 85.6976 (44)
Energy conte 127.0870 111.1511 114.6980 99.9965 95.9490 82.7967 76.7233 88.0411 89.0926 103.8288 113.3373 123.0770 (45)
Energy content (annual) Total = Sum(45)m = 1225.7783 (45)
Distribution loss (46)m = 0.15 x (45)m
19.0630 16.6727 17.2047 14.9995 14.3923 12.4195 11.5085 13.2062 13.3639 15.5743 17.0006 18.4615 (46)
Water storage loss:
Store volume 3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 0.2602 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.1405 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (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(62)m =												0.0000 (63)
Output from w/h	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Heat gains from water heating, kWh/month	64.3506	56.9137	60.2312	54.6303	53.9972	48.9113	47.6046	51.3678	51.0047	56.6172	59.0661	63.0172 (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	
92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
(66)m	14.3355	12.7327	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
(66)m	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
(66)m	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	(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)												
(66)m	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	(71)
Water heating gains (Table 5)												
(66)m	86.4927	84.6931	80.9559	75.8753	72.5769	67.9324	63.9847	69.0428	70.8399	76.0984	82.0362	84.7006 (72)
Total internal gains	314.8758	313.1383	302.8279	286.3000	269.7475	253.5937	242.9653	247.9612	256.3316	273.0374	292.2292	306.4030 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a	Specific data g W/m2	Specific data or Table 6b	FF	Access factor Table 6d	Gains W					
North	5.6600	10.6334	0.6300	0.7000	0.7000	0.7700	18.3933 (74)					
West	6.0000	19.6403	0.6300	0.7000	0.7000	0.7700	36.0139 (80)					
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421	331.2781	276.0875	206.7531	125.4381	67.5956	44.9497 (83)
Total gains	369.2831	418.7397	478.5798	551.4527	606.3641	604.2358	574.2433	524.0488	463.0847	398.4755	359.8249	351.3526 (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	
50.5179	50.6273	50.7349	51.2469	51.3438	51.7999	51.7999	51.8853	51.6233	51.3438	51.1481	50.9451	
alpha	4.3679	4.3752	4.3823	4.4165	4.4229	4.4533	4.4533	4.4590	4.4416	4.4229	4.4099	4.3963
util living area	0.9967	0.9938	0.9848	0.9527	0.8656	0.7050	0.5456	0.6111	0.8543	0.9737	0.9939	0.9974 (86)
MIT	19.5315	19.6882	19.9800	20.3788	20.7235	20.9230	20.9807	20.9687	20.8094	20.3637	19.8796	19.5046 (87)
Th 2	19.7828	19.7851	19.7874	19.7979	19.7999	19.8091	19.8091	19.8109	19.8056	19.7999	19.7959	19.7917 (88)
util rest of house	0.9956	0.9916	0.9791	0.9342	0.8138	0.6029	0.4081	0.4704	0.7774	0.9599	0.9914	0.9965 (89)
MIT 2	17.8520	18.0820	18.5065	19.0795	19.5346	19.7597	19.8026	19.7987	19.6539	19.0701	18.3693	17.8188 (90)
Living area fraction									FLA = Living area / (4) =			0.5145 (91)
MIT	18.7161	18.9084	19.2646	19.7480	20.1463	20.3582	20.4087	20.4007	20.2484	19.7357	19.1464	18.6862 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7161	18.9084	19.2646	19.7480	20.1463	20.3582	20.4087	20.4007	20.2484	19.7357	19.1464	18.6862 (93)

8. Space heating requirement												
Utilisation	0.9942	0.9895	0.9759	0.9332	0.8305	0.6528	0.4793	0.5431	0.6096	0.9590	0.9894	0.9953 (94)
Useful gains	367.1310	414.3363	467.0603	514.6630	503.5910	384.4150	275.2380	284.6363	374.9300	382.1199	356.0276	349.6961 (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	1091.9246	1058.7516	962.6977	809.9737	629.4602	425.3538	281.3466	295.0395	455.7300	680.8359	901.1891	1088.0326 (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	1.0000 (97a)
Space heating kWh	539.2464	433.0471	368.7543	212.6381	93.6467	0.0000	0.0000	0.0000	222.2447	392.5163	549.3223 (98)	2811.4159 (99)
Space heating												(98) / (4) =
Space heating per m2												51.0239 (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												3006.8619 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	539.2464	433.0471	368.7543	212.6381	93.6467	0.0000	0.0000	0.0000	0.0000	222.2447	392.5163	549.3223 (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)	576.7342	463.1520	394.3896	227.4204	100.1569	0.0000	0.0000	0.0000	0.0000	237.6948	419.8035	587.5105 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Water heating	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Efficiency of water heater	87.8733	87.6884	87.2425	86.1848	84.0861	79.8000	79.8000	79.8000	79.8000	86.2043	87.4174	79.8000 (216)
Fuel for water heating, kWh/month	176.0543	155.2041	163.1265	147.0367	146.9525	137.2475	130.7531	144.9358	145.1371	152.4826	160.2245	171.3198 (219)
Water heating fuel used												1830.4744 (219)
Annual totals kWh/year												
Space heating fuel - main system												3006.8619 (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)												253.1691 (232)
Total delivered energy for all uses												5165.5055 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
Energy kWh/year	3006.8619	Emission factor kg CO2/kWh	0.2160	Emissions kg CO2/year	649.4822 (261)							
Space heating - main system 1	3006.8619	0.2160	0.0000	0.0000	0.0000 (263)							
Space heating - secondary	0.0000	0.2160	0.0000	0.0000	0.0000 (264)							
Water heating (other fuel)	1830.4744	0.2160	0.0000	0.0000	1044.8646 (265)							
Space and water heating					38.9250 (267)							
Pumps and fans	75.0000	0.5190	0.0000	0.0000	131.3948 (268)							
Energy for lighting	253.1691	0.5190	0.0000	0.0000	1215.1846 (272)							
Total CO2, kg/m2/year					18.9631 (272a)							
Emissions per m2 for space and water heating					2.3847 (272b)							
Fuel factor (electricity)					0.7064 (272c)							
Emissions per m2 for lighting					32.4800 (273)							
Emissions per m2 for pumps and fans												
Target Carbon Dioxide Emission Rate (TER) = (18.9631 * 1.55) + 2.3847 + 0.7064, rounded to 2 d.p.												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-06 Mid MF					Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-06 - Mid MF CLEAN			Prop Type Ref	W Core		
Property	1B2P-C1-06 Mid MF, St Ann's Hospital, London, N15						
SAP Rating		84 B	DER	13.06	TER	26.08	
Environmental		91 B	% DER<TER	49.92			
CO ₂ Emissions (t/year)		0.65	DFEE	40.09	TFEE	47.38	
General Requirements Compliance		Pass	% DFEE<TFEE	15.39			
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 58 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 26.08 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.06 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 47.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 40.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor (no floor)			
Roof (no roof)			
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.56
Maximum	1.5
MVHR efficiency:	87% OK
Minimum:	70% OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	2.88 m ² , No overhang	
Windows facing West:	9.68 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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) (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	58.2000 (1b)	x 2.6000 (2b)	= 151.3200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	58.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.3200 (5)

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 fires	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 flameless 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
Measured/design AP50 2.5000
Infiltration rate 0.1250 (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) = 0.0969 (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 0.9250 1.0000 1.0750 1.1250 1.1750 (22a)

Adj infiltr rate 0.1235 0.1211 0.1187 0.1066 0.1041 0.0920 0.0920 0.0896 0.0969 0.1041 0.1090 0.1138 (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) = 0.5000 (23a)
73.9500 (23c)

Effective ac 0.2598 0.2513 0.2489 0.2368 0.2344 0.2223 0.2223 0.2199 0.2271 0.2344 0.2392 0.2441 (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
Glazing North (Uw = 0.80)				2.8800	2.2326		(27)
Glazing E, S, W (Uw = 0.80)				9.6800	7.7552		(27)
Corridor Door			2.1000	0.5000	1.0500		(26)
External Wall	31.3300	12.5600	18.7700	0.1500	2.8155	14.0000	262.7800 (22a)
Corridor	24.7000	2.1000	22.6000	0.1500	3.3900	316.4000 (29a)	
Lift / Stair Wall	18.0700		18.0700	0.2500	4.5175	9.0000	162.6300 (29a)
Total net area of external elements Aum(A, m2)			74.1000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.5094		(33)
Party Wall 1			11.3100	0.0000	0.0000	20.0000	226.2000 (32)
Party Floor 1			58.2000			40.0000	2328.0000 (32a)
Party Ceilings 1			58.2000			40.0000	2328.0000 (32c)
Timber Frame			104.7800			9.0000	943.0200 (32c)

Heat capacity Cm = Sum(A x K) (28)...(30) + (32) + (32a)...(32e) = 6567.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 112.8356 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 13.3847 (36)
Total fabric heat loss (33) + (36) = 34.8941 (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
12.6719 12.5510 12.4301 11.8254 11.7044 11.0997 11.0997 10.9788 11.3416 11.7044 11.9463 12.1882 (38)

Heat transfer coeff 47.5661 47.4451 47.3242 46.7195 46.5986 45.9939 45.9939 45.8729 46.2357 46.5986 46.8404 47.0823 (39)
Average = Sum(39)m / 12 = 46.6893 (39)

HLP (average) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
0.8173 0.8152 0.8131 0.8027 0.8007 0.7903 0.7903 0.7882 0.7944 0.8007 0.8048 0.8090 (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 1.9303 (42)
Average daily hot water use (litres/day) 80.0449 (43)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Daily hot water use 698.3247 680.6816 623.1943 525.3989 407.4962 274.9372 184.2992 192.8026 296.5852 442.9655 579.4767 693.5671 (97)



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

Energy conte 88.0494 84.8476 81.6458 78.4440 75.2422 72.0404 72.0404 75.2422 78.4440 81.6458 84.8476 88.0494 (44)
Energy content (annual) 130.57147 114.2014 117.8456 102.7407 98.5821 85.0689 78.8288 90.4572 91.5376 106.6782 116.4476 126.4546 (45)
Distribution loss (46)m = 0.15 x (45)m 19.5862 17.1302 17.6768 15.4111 14.7873 12.7603 11.8243 13.5686 13.7306 16.0017 17.4671 18.9682 (46)

Water storage loss:
Store volume 3.0000 (47)
b) If manufacturer declared loss factor is not known :
Hot water storage loss factor from Table 2 (kWh/litre/day)
Volume factor from Table 2a
Temperature factor from Table 2b
Enter (49) or (54) in (55)
Total storage loss 6.7353 6.0835 6.7353 6.5180 6.7353 6.5180 6.7353 6.7353 6.5180 6.7353 6.5180 6.7353 (56)

If cylinder contains dedicated solar storage 6.7353 6.0835 6.7353 6.5180 6.7353 6.5180 6.7353 6.7353 6.5180 6.7353 6.5180 6.7353 (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 160.5724 141.2961 147.8433 131.7707 128.5798 114.0989 108.8265 120.4549 120.5676 136.6759 145.4777 156.4523 (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 160.5724 141.2961 147.8433 131.7707 128.5798 114.0989 108.8265 120.4549 120.5676 136.6759 145.4777 156.4523 (64)
Heat gains from water heating, kWh/month 67.4142 59.6477 63.1818 57.3853 56.7767 51.5094 50.2087 54.0752 53.6603 59.4687 61.9429 66.0443 (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
96.5155 96.5155 96.5155 96.5155 96.5155 96.5155 96.5155 96.5155 96.5155 96.5155 96.5155 96.5155 (66)

Lighting gains (calculated in Appendix L, equation L19 or L19a), also see Table 5
15.0285 13.3482 10.8555 8.2183 6.1433 5.1864 5.6041 7.2844 9.7771 12.4143 14.4893 15.4462 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5
129.9723 129.9723 129.9723 129.9723 129.9723 129.9723 129.9723 129.9723 129.9723 129.9723 129.9723 129.9723 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5
32.6516 32.6516 32.6516 32.6516 32.6516 32.6516 32.6516 32.6516 32.6516 32.6516 32.6516 32.6516 (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)
-77.2124 -77.2124 -77.2124 -77.2124 -77.2124 -77.2124 -77.2124 -77.2124 -77.2124 -77.2124 -77.2124 -77.2124 (71)

Water heating gains (Table 5)
90.6105 88.7615 84.9218 79.7018 76.3128 71.5409 67.4849 72.6817 74.5281 79.9310 86.0317 88.7692 (72)
Total internal gains 325.9792 324.1972 313.4616 296.2306 278.9338 262.0838 251.0159 256.1457 264.8881 282.3019 302.3105 317.1260 (73)

6. Solar gains

[Jan] Area m2 Solar flux W/m2 g Specific data or Table 6b Specific data or Table 6c FP Access factor Table 6d Gains W
North 2.8800 10.6334 0.5000 0.8000 0.7700 8.4890 (74)
West 9.6800 19.6403 0.4200 0.8000 0.7700 44.2685 (80)

Solar gains 52.7576 102.8216 170.1824 252.2757 314.5557 324.7983 308.0455 260.6949 199.0121 122.0679 65.6700 43.4812 (83)
Total gains 378.7368 427.0188 483.6440 548.5063 593.4894 586.8821 559.0614 516.8406 463.9001 404.3698 367.9804 360.6071 (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, nil,m (see Table 9a)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
tau 38.3504 38.4481 38.5464 39.0453 39.1466 39.6613 39.6613 39.7658 39.4538 39.1466 38.9445 38.7444 (85)
alpha 3.5567 3.5632 3.5698 3.6030 3.6098 3.6441 3.6441 3.6511 3.6503 3.6498 3.6493 3.6493 (86)

util living area 0.9611 0.9403 0.8939 0.7944 0.6475 0.4805 0.3562 0.3990 0.6207 0.8478 0.9398 0.9665 (86)

MIT 19.6267 19.8428 20.1886 20.5843 20.8424 20.9601 20.9897 20.9845 20.9601 20.9447 20.9214 19.5838 (87)
Th 2 20.2384 20.2402 20.2420 20.2510 20.2528 20.2618 20.2618 20.2636 20.2582 20.2528 20.2492 20.2456 (88)

util rest of house 0.9557 0.9322 0.8799 0.7694 0.6092 0.4306 0.2986 0.3384 0.5688 0.8227 0.9303 0.9618 (89)
MIT 2 18.3867 18.6978 19.1899 19.7420 20.0788 20.2255 20.2547 20.2524 20.1598 19.7020 18.9647 18.3299 (90)

Living area fraction MIT 18.9812 19.2467 19.6686 20.1458 20.4448 20.5777 20.6070 20.6034 20.5146 20.1060 19.4713 18.9310 (92)
Temperature adjustment adjusted MIT 18.9812 19.2467 19.6686 20.1458 20.4448 20.5777 20.6070 20.6034 20.5146 20.1060 19.4713 18.9310 (93)

8. Space heating requirement

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Utilisation 0.9447 0.9197 0.8679 0.7656 0.6193 0.4523 0.3258 0.3666 0.5873 0.8173 0.9186 0.9515 (94)

Useful gains 357.7776 392.7182 419.7788 419.9371 367.5735 265.4371 182.1209 189.4830 272.4588 330.4772 338.0318 343.1160 (95)
Ext temp. 4.3000 4.9000 6.5000 8.9000 11.7000 14.6000 16.6000 16.6000 16.6000 14.1000 12.1000 10.4000 (96)

Heat loss rate W 698.3247 680.6816 623.1943 525.3989 407.4962 274.9372 184.2992 192.8026 296.5852 442.9655 579.4767 693.5671 (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



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	253.3670	193.5114	151.3411	75.9325	29.7025	0.0000	0.0000	0.0000	0.0000	83.6913	173.8403	260.7356 (98)
Space heating per m2										(98) / (4) =		20.9987 (99)

8c. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1222.1217 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1219.0664 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	64.1614 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	1612.6162 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1608.5847 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	84.6624 (310b)
Electricity used for heat distribution	29.7647 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7000)	
mechanical ventilation fans (SFP = 0.7000)	129.2273 (330a)
Total electricity for the above, kWh/year	129.2273 (331)
Electricity for lighting (calculated in Appendix L)	265.4077 (332)
Total delivered energy for all uses	3371.1097 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	883.6410	0.5190	458.6097 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	156.6566	0.5190	81.3048 (368)
Electrical energy for heat distribution	29.7647	0.5190	15.4479 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFER)			555.3623 (373)
Space and water heating			555.3623 (376)
Pumps and fans	129.2273	0.5190	67.0690 (378)
Energy for lighting	265.4077	0.5190	137.7466 (379)
Total CO2, kg/year			760.1779 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			13.0600 (384)

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

DER			13.0600 EC1
Total Floor Area	TFA	58.2000	
Assumed number of occupants	N	1.9303	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		17.1446 EC2	
CO2 emissions from cooking, equation (L16)		2.8407 EC3	
Total CO2 emissions		33.0453 EC4	
Residual CO2 emissions offset from biofuel CHP		0.0000 EC5	
Additional allowable electricity generation, kWh/m ² /year		0.0000 EC6	
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 EC7	
Net CO2 emissions		33.0453 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	58.2000 (1b)	x 2.6000 (2b)	= 151.3200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	58.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.3200 (5)

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 * 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) =	0.1322	(8)	
Pressure test									Yes			
Measured/design AP50										5.0000		
Infiltration rate										0.3822	(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) =	0.2962	(21)	
Wind speed	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	0.3776	0.3702	0.3628	0.3258	0.3184	0.2814	0.2814	0.2740	0.2962	0.3184	0.3332	0.3480 (22b)
Effective ac	0.5713	0.5685	0.5658	0.5531	0.5507	0.5396	0.5396	0.5375	0.5439	0.5507	0.5555	0.5606 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			12.4400	1.3258	16.4924		(27)					
External Wall	31.3300	12.4400	18.8900	0.1800	3.4002		(29a)					
Corridor	24.7000	2.1000	22.6000	0.1800	4.0680		(29a)					
Lift / Stair Wall	18.0700		18.0700	0.1800	3.2526		(29a)					
Total net area of external elements Sum(A, m2)			74.1000				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	29.3132		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum[L x Psi] calculated using Appendix K)							5.9030 (36)					
Total fabric heat loss						(33) + (36) =	35.2162 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 28.5284	Feb 28.3901	Mar 28.2546	Apr 27.6180	May 27.4989	Jun 26.9445	Jul 26.9445	Aug 26.8418	Sep 27.1581	Oct 27.4989	Nov 27.7399	Dec 27.9917 (38)
Heat transfer coeff	63.7446	63.6063	63.4708	62.8342	62.7152	62.1607	62.1607	62.0581	62.3743	62.7152	62.9561	63.2080 (39)
Average = Sum(39)m / 12 =												62.8337 (39)
HLP	Jan 1.0953	Feb 1.0929	Mar 1.0906	Apr 1.0796	May 1.0776	Jun 1.0681	Jul 1.0681	Aug 1.0663	Sep 1.0717	Oct 1.0776	Nov 1.0817	Dec 1.0860 (40)
HLP (average)												1.0796 (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													1.9303 (42)
Average daily hot water use (litres/day)													80.0449 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	88.0494	84.8476	81.6458	78.4440	75.2422	72.0404	72.0404	75.2422	78.4440	81.6458	84.8476	88.0494 (44)	
Energy content (annual)	130.5747	114.2014	117.8456	102.7407	98.5821	85.0689	78.8288	90.4572	91.5376	106.6782	116.4476	126.4546 (45)	
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1259.4175 (45)	
	19.5862	17.1302	17.6768	15.4111	14.7873	12.7603	11.8243	13.5686	13.7306	16.0017	17.4671	18.9682 (46)	
Water storage loss:													
Store volume												3.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												0.2602 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.1405 (55)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	158.1923	139.1464	145.4633	129.4675	126.1998	111.7957	106.4465	118.0749	118.2644	134.2959	143.1744	154.0723 (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	158.1923	139.1464	145.4633	129.4675	126.1998	111.7957	106.4465	118.0749	118.2644	134.2959	143.1744	154.0723 (64)
Heat gains from water heating, kWh/month	65.5102	57.9280	61.2778	55.5427	54.8727	49.6668	48.3047	52.1712	51.8177	57.5646	60.1003	64.1403 (65)
Total per year (kWh/year) =	Sum(64)m = 1584.5934 (64)											

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.0360	13.3549	10.8609	8.2224	6.1463	5.1890	5.6069	7.2881	9.7820	12.4205	14.4966	15.4539 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	168.3855	170.1329	165.7297	156.3558	144.5230	133.4019	125.9723	124.2250	128.6281	138.0020	149.8348	160.9559 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516 (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)	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124 (71)
Water heating gains (Table 5)	88.0514	86.2023	82.3627	77.1426	73.7536	68.9817	64.9257	70.1225	71.9690	77.3718	83.4726	86.2101 (72)
Total internal gains	326.4276	324.6447	313.9079	296.6756	279.3777	262.5273	251.4595	256.5902	265.3338	282.7490	302.7586	317.5746 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W				
North	2.8500	10.6334	0.6300	0.7000	0.7000	0.7000	0.7000	9.2617 (74)				
West	9.5900	19.6403	0.6300	0.7000	0.7000	0.7000	0.7000	57.5622 (80)				
Solar gains	66.8239	130.3035	215.5185	318.7665	396.5325	406.9706	388.0739	329.0821	251.8383	154.6630	83.1988	55.0574 (83)
Total gains	393.2515	454.9482	529.4264	615.4421	675.9102	671.4978	639.5334	585.6723	517.1722	437.4320	385.9574	372.6319 (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, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	63.4041	63.5419	63.6776	64.3227	64.4448	65.0196	65.0196	65.1272	64.7970	64.4448	64.1982	63.9424
alpha	5.2269	5.2361	5.2452	5.2882	5.2963	5.3346	5.3346	5.3418	5.3198	5.2963	5.2799	5.2628
util living area	0.9965	0.9920	0.9759	0.9153	0.7733	0.5771	0.4250	0.4820	0.7557	0.9568	0.9925	0.9974 (86)
MIT	19.9036	20.0661	20.3415	20.6780	20.9010	20.9831	20.9972	20.9948	20.9352	20.6178	20.1961	19.8730 (87)
Th 2	20.0047	20.0066	20.0085	20.0175	20.0192	20.0270	20.0270	20.0285	20.0240	20.0192	20.0158	20.0122 (88)
util rest of house	0.9954	0.9894	0.9679	0.8891	0.7163	0.4959	0.3325	0.3830	0.6757	0.9378	0.9896	0.9965 (89)
MIT 2	18.5493	18.7868	19.1843	19.6551	19.9292	20.0166	20.0260	20.0264	19.9760	19.5868	18.9839	18.5102 (90)
Living area fraction	19.1985	19.4001	19.7390	20.1455	20.3951	20.4800	20.4916	20.4906	20.4358	20.0811	19.5650	19.1635 (92)
Temperature adjustment												
adjusted MIT	19.1985	19.4001	19.7390	20.1455	20.3951	20.4800	20.4916	20.4906	20.4358	20.0811	19.5650	19.1635 (93)

8. Space heating requirement												
Utilisation	0.9941	0.9873	0.9653	0.8929	0.7393	0.5344	0.3769	0.4306	0.7114	0.9392	0.9879	0.9955 (94)
Useful gains	390.9457	449.1798	511.0357	549.5502	499.7204	358.8692	241.0623	252.1458	367.9089	410.8333	381.2756	370.9489 (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	949.7015	922.2951	840.2922	706.6000	545.3124	365.5021	241.9053	253.8576	395.1916	594.6703	784.7463	945.8134 (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	415.7143	317.9334	244.9669	113.0759	33.9205	0.0000	0.0000	0.0000	0.0000	136.7278	290.4990	427.6992 (98)
Space heating												1980.5369 (98)
Space heating per m2										(98) / (4) =		34.0298 (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												2118.2213 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	415.7143	317.9334	244.9669	113.0759	33.9205	0.0000	0.0000	0.0000	0.0000	136.7278	290.4990	427.6992 (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)	444.6143	340.0357	261.9966	120.9368	36.2786	0.0000	0.0000	0.0000	0.0000	146.2330	310.6941	457.4322 (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	158.1923	139.1464	145.4633	129.4675	126.1998	111.7957	106.4465	118.0749	118.2644	134.2959	143.1744	154.0723 (64)
Water heating												79.8000 (216)
Efficiency of water heater	87.2744	86.9508	86.1941	84.4552	81.8501	79.8000	79.8000	79.8000	79.8000	84.8617	86.6636	87.3965 (217)
Fuel for water heating, kWh/month	181.2586	160.0290	168.7626	153.2971	154.1841	140.0948	133.3916	147.9635	148.2010	158.2527	165.2070	176.2910 (219)
Water heating fuel used												1886.9331 (219)
Annual totals kWh/year												
Space heating fuel - main system												2118.2213 (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)												265.5411 (232)
Total delivered energy for all uses												4345.6954 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
Energy kWh/year	2118.2213	Emission factor kg CO2/kWh	0.2160	Emissions kg CO2/year	457.5358 (261)							
Space heating - main system 1	0.0000				0.0000 (263)							
Space heating - secondary	1886.9331		0.2160		407.5775 (264)							
Water heating (other fuel)					865.1133 (265)							
Space and water heating					38.9250 (267)							
Pumps and fans					137.8158 (268)							
Energy for lighting					1041.8542 (272)							
Total CO2, kg/m2/year					14.8645 (272a)							
Emissions per m2 for space and water heating					1.5500							
Fuel factor (electricity)					2.3680 (272b)							
Emissions per m2 for lighting					0.6688 (272c)							
Emissions per m2 for pumps and fans					26.0800 (273)							
Target Carbon Dioxide Emission Rate (TER) = (14.8645 * 1.55) + 2.3680 + 0.6688, rounded to 2 d.p.												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-D3-01 Mid MF				Issued on Date	06/02/2024
Assessment Reference	1B2P-D3-01 Mid MF CLEAN	Prop Type Ref	E			
Property	1B2P-D3-01 Mid MF, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	12.79	TER	26.35	
Environmental	91 B	% DER<TER	51.45			
CO ₂ Emissions (t/year)	0.58	DFEE	38.75	TFEE	45.88	
General Requirements Compliance	Pass	% DFEE<TFEE	15.53			
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 53 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 26.35 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 12.79 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)45.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)38.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls:

No cylinder thermostat

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:	0.52	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	2.06 m ² , No overhang	
Windows facing East:	9.81 m ² , No overhang	
Windows facing South:	2.06 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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) (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	52.6000 (1b)	x 2.6000 (2b)	= 136.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 136.7600 (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 fires	0	0	0	0	0.0000 (6b)
Number of intermittent fans	0	0	0	0	0.0000 (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) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes		
Measured/design AP50	2.5000		
Infiltration rate	0.1250 (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) =	0.0969 (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	0.1235	0.1211	0.1187	0.1066	0.1041	0.0920	0.0920	0.0896	0.0969	0.1041	0.1090	0.1138 (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	0.2325	0.2301	0.2277	0.2156	0.2131	0.2010	0.2010	0.1986	0.2059	0.2131	0.2180	0.2228 (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
Glazing North (Uw = 0.80)			4.1200	0.7752	3.1938		(27)
Glazing E, S, W (Uw = 0.80)			9.8100	0.7752	7.6047		(27)
Corridor Door			2.1000	0.5000	1.0500		(26)
External Wall	38.4800	13.9300	24.5500	0.1500	3.6825	14.0000	343.7000 (29a)
Corridor	28.9900	2.1000	26.8900	0.1500	4.0335	14.0000	376.4600 (29a)
Total net area of external elements Aum(A, m2)			67.4700				(31)
Fabric heat loss, W/K = Sum (A x U)							(33)
Party Wall 1			29.9000	0.0000	0.0000	20.0000	598.0000 (32)
Party Floor 1			52.6000			40.0000	2104.0000 (32d)
Party Ceilings 1			52.6000			40.0000	2104.0000 (32b)
Timber Frame			85.8000			9.0000	772.2000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	6298.3600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		119.7407 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		12.8768 (36)
Total fabric heat loss	(33) + (36) =	32.4413 (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	10.4936	10.3843	10.2750	9.7285	9.6192	9.0727	9.0727	9.2913	9.6192	9.8378	10.0564 (38)	
Heat transfer coeff	42.9349	42.8256	42.7163	42.1698	42.0605	41.5140	41.5140	41.4047	41.7326	42.0605	42.4977 (39)	
Average = Sum(39)m / 12 =											42.1425 (39)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8163	0.8142	0.8121	0.8017	0.7996	0.7892	0.7892	0.7872	0.7934	0.7996	0.8038	0.8079 (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												1.7668 (42)
Average daily hot water use (litres/day)												76.1608 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	83.7768	80.7304	77.6840	74.6375	71.5911	68.5447	68.5447	71.5911	74.6375	77.6840	80.7304	83.7768 (44)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy conte	124.2386	108.6599	112.1273	97.7553	93.7985	80.9410	75.0037	86.0679	87.0958	101.5017	110.7971	120.3185 (45)
Energy content (annual)												Total = Sum(45)m = 1198.3053 (45)
Distribution loss (46)m = 0.15 x (45)m												
	18.6358	16.2990	16.8191	14.6633	14.0698	12.1411	11.2506	12.9102	13.0644	15.2253	16.6196	18.0478 (46)
Water storage loss:												3.0000 (47)
Store volume												
b) If manufacturer declared loss factor is not known :												0.0212 (51)
Hot water storage loss factor from Table 2												3.4200 (52)
Volume factor from Table 2a												1.0000 (53)
Temperature factor from Table 2b												0.2173 (55)
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage												6.7353 (57)
Primary loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (57)
Total heat required for water heating calculated for each month	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)
Solar input	154.2363	135.7546	142.1250	126.7853	123.7962	109.9710	105.0014	116.0656	116.1258	131.4994	139.8271	150.3162 (62)
Solar input (sum of months) = Sum(63)m =	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	154.2363	135.7546	142.1250	126.7853	123.7962	109.9710	105.0014	116.0656	116.1258	131.4994	139.8271	150.3162 (64)
Heat gains from water heating, kWh/month	65.3075	57.8052	61.2805	55.7277	55.1862	50.1369	48.9369	52.6157	52.1834	57.7475	60.0641	64.0040 (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	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
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)												
Water heating gains (Table 5)												
Total internal gains	304.9895	303.2932	293.3364	277.3888	261.4482	245.8640	235.5923	240.4740	248.5343	264.6558	283.1765	296.8250 (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	2.0600	10.6334	0.5000	0.8000	0.7700	6.0720 (74)
South	2.0600	46.7521	0.5000	0.8000	0.7700	26.6969 (74)
East	9.8100	19.6403	0.4200	0.8000	0.7700	44.8631 (76)

Solar gains	77.6320	143.0883	219.9438	305.4091	366.5909	373.2480	356.0858	309.9919	249.9827	165.1086	95.0745	65.0237 (83)
Total gains	382.6215	446.3815	513.2802	582.7979	628.0391	619.1121	591.6781	550.4659	498.5170	429.7644	378.2510	361.8488 (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, nil,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	40.7488	40.8528	40.9573	41.4881	41.5959	42.1435	42.1435	42.2547	41.9227	41.5959	41.3808	41.1680
alpha	3.7166	3.7235	3.7305	3.7659	3.7731	3.8096	3.8096	3.8170	3.7948	3.7731	3.7587	3.7445
util living area	0.9524	0.9199	0.8557	0.7348	0.5789	0.4192	0.3063	0.3420	0.5449	0.7974	0.9225	0.9597 (86)
MIT	19.8060	20.0550	20.3890	20.7208	20.9060	20.9790	20.9951	20.9925	20.9443	20.6774	20.1881	19.7548 (87)
Th 2	20.2393	20.2411	20.2429	20.2519	20.2537	20.2627	20.2627	20.2645	20.2591	20.2537	20.2501	20.2465 (88)
util rest of house	0.9457	0.9094	0.8381	0.7065	0.5407	0.3738	0.2559	0.2888	0.4945	0.7675	0.9105	0.9540 (89)
MIT 2	18.6399	18.9951	19.4637	19.9180	20.1529	20.2442	20.2595	20.2594	20.2065	19.8736	19.1963	18.5716 (90)
Living area fraction	19.2263	19.5281	19.9290	20.3217	20.5316	20.6137	20.6294	20.6280	20.5775	20.2778	19.6950	19.1666 (92)
MIT	19.2263	19.5281	19.9290	20.3217	20.5316	20.6137	20.6294	20.6280	20.5775	20.2778	19.6950	19.1666 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2263	19.5281	19.9290	20.3217	20.5316	20.6137	20.6294	20.6280	20.5775	20.2778	19.6950	19.1666 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9350	0.8981	0.8301	0.7092	0.5552	0.3956	0.2811	0.3153	0.5166	0.7685	0.9003	0.9440 (94)
Useful gains	357.7644	400.8750	426.0595	413.3331	348.6820	244.9101	166.2981	173.5488	257.5116	330.2794	340.5536	341.5809 (95)
Ext temp.	4.3000	4.0000	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	640.8580	626.4567	573.6733	481.6509	371.4623	249.6532	167.2753	175.0610	270.3220	407.0520	532.5061	636.0454 (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												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	210.6217	151.5909	109.7979	49.1888	16.9485	0.0000	0.0000	0.0000	0.0000	57.1188	138.2058	219.0816 (98)
Space heating per m2	(98) / (4) =											18.1094 (99)

8c. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	952.5540 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	950.1726 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	50.0091 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)

Water heating	
Annual water heating requirement	1551.5039 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1547.6252 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	81.4540 (310b)
Electricity used for heat distribution	26.2926 (313)
Annual totals kWh/year	

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)	
mechanical ventilation fans (SFP = 0.6500)	108.4507 (330a)
Total electricity for the above, kWh/year	108.4507 (331)
Electricity for lighting (calculated in Appendix L)	242.4331 (332)
Total delivered energy for all uses	2980.1446 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	780.5618	0.5190	405.1116 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	138.3821	0.5190	71.8203 (368)
Electrical energy for heat distribution	26.2926	0.5190	13.6459 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFER)			490.5778 (373)
Space and water heating			490.5778 (376)
Pumps and fans	108.4507	0.5190	56.2859 (378)
Energy for lighting	242.4331	0.5190	125.8228 (379)
Total CO2, kg/year			672.6865 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			12.7900 (384)

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

DER			12.7900 EC1
Total Floor Area	TFA	52.6000	
Assumed number of occupants	N	1.7668	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		17.3472 EC2	
CO2 emissions from cooking, equation (L16)		3.0685 EC3	
Total CO2 emissions		33.2057 EC4	
Residual CO2 emissions offset from biofuel CHP		0.0000 EC5	
Additional allowable electricity generation, kWh/m ² /year		0.0000 EC6	
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 EC7	
Net CO2 emissions		33.2057 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	52.6000 (1b)	x 2.6000 (2b)	= 136.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 136.7600 (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					2 * 10 = 20.0000 (7a)							
Number of passive vents					0 * 10 = 0.0000 (7b)							
Number of flueless gas fires					0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour							
Pressure test				20.0000 / (5) =	0.1462 (8)							
Measured/design AP50					Yes							
Infiltration rate					5.0000							
Number of sides sheltered					0.3962 (18)							
					3 (19)							
Shelter factor					(20) = 1 - [0.075 x (19)] =							
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.7750 (20)							
					0.3071 (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	0.3915	0.3839	0.3762	0.3378	0.3301	0.2917	0.2917	0.2841	0.3071	0.3301	0.3455	0.3608 (22b)
Effective ac	0.5767	0.5737	0.5708	0.5571	0.5545	0.5426	0.5426	0.5403	0.5472	0.5545	0.5597	0.5651 (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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			11.0400	1.3258	14.6164		(27)
External Wall	38.4800	11.0400	27.4400	0.1800	4.9392		(29a)
Corridor	28.9900	2.1000	26.8900	0.1800	4.8402		(29a)
Total net area of external elements Aum(A, m2)			67.4700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.5158		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.4030 (36)
Total fabric heat loss						(33) + (36) =	31.9188 (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
	26.0247	25.8904	25.7587	25.1402	25.0245	24.4859	24.4859	24.3861	24.6934	25.0245	25.2586	25.5033 (38)
Heat transfer coeff												
	57.9435	57.8091	57.6775	57.0590	56.9433	56.4047	56.4047	56.3049	56.6121	56.9433	57.1774	57.4221 (39)
Average = Sum(39)m / 12 =												57.0585 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.1016	1.0990	1.0965	1.0848	1.0826	1.0723	1.0723	1.0704	1.0763	1.0826	1.0870	1.0917 (40)
HLP (average)												1.0848 (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												1.7668 (42)
Average daily hot water use (litres/day)												76.1608 (43)
Daily hot water use	Jan 83.7768	Feb 80.7304	Mar 77.6840	Apr 74.6375	May 71.5911	Jun 68.5447	Jul 68.5447	Aug 71.5911	Sep 74.6375	Oct 77.6840	Nov 80.7304	Dec 83.7768 (44)
Energy conte	124.2386	108.6599	112.1273	97.7553	93.7985	80.9410	75.0037	86.0679	87.0958	101.5017	110.7971	120.3185 (45)
Energy content (annual)										Total = Sum(45)m =		1198.3053 (45)
Distribution loss (46)m = 0.15 x (45)m	18.6358	16.2990	16.8191	14.6633	14.0698	12.1411	11.2506	12.9102	13.0644	15.2253	16.6196	18.0478 (46)
Water storage loss:												3.0000 (47)
Store volume												0.2602 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.1405 (55)
Enter (49) or (54) in (55)												
Total storage loss												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	151.8563	133.6049	139.7449	124.4821	121.4162	107.6678	102.6214	113.6855	113.8226	129.1194	137.5239	147.9361 (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	151.8563	133.6049	139.7449	124.4821	121.4162	107.6678	102.6214	113.6855	113.8226	129.1194	137.5239	147.9361 (64)
Heat gains from water heating, kWh/month	63.4035	56.0854	59.3765	53.8851	53.2821	48.2943	47.0329	50.7117	50.3408	55.8435	58.2215	62.1000 (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	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384 (66)
Lighting gains (calculated in Appendix L, equation L10 or L9a), also see Table 5	13.7657	12.2266	9.9433	7.5278	5.6271	4.7506	5.1332	6.6723	8.9556	11.3712	13.2719	14.1483 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	153.9815	155.5794	151.5529	142.8809	132.1603	121.9804	115.1964	113.5985	117.6251	126.1970	137.0176	147.1875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338 (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)	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707 (71)
Water heating gains (Table 5)	85.2197	83.4604	79.8071	74.8404	71.6158	67.0754	63.2162	68.1609	69.9177	75.0584	80.8631	83.4678 (72)
Total internal gains	305.4685	303.7680	293.8048	277.8505	261.9047	246.3180	236.0474	240.9333	248.9999	265.1282	283.6542	297.3051 (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		1.6300	10.6334	0.6300	0.7000	0.7700	5.2970 (74)					
East		7.7800	19.6403	0.6300	0.7000	0.7700	46.6980 (76)					
South		1.6300	46.7521	0.6300	0.7000	0.7700	23.2895 (78)					
Solar gains	75.2846	139.6164	216.2302	301.9543	363.3396	370.1779	353.0686	306.8745	246.4066	161.5859	92.3675	62.9423 (83)
Total gains	380.7531	443.3843	510.0350	579.8048	625.2442	616.4959	589.1160	547.8078	495.4065	426.7141	376.0217	360.2475 (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	63.0404	63.1869	63.3311	64.0175	64.1476	64.7602	64.7602	64.8749	64.5229	64.1476	63.8850	63.6128
alpha	5.2027	5.2125	5.2221	5.2678	5.2765	5.3173	5.3173	5.3250	5.3015	5.2765	5.2590	5.2409
util living area	0.9953	0.9889	0.9691	0.9040	0.7636	0.5710	0.4188	0.4681	0.7275	0.9432	0.9896	0.9964 (86)
MIT	19.9395	20.1129	20.3833	20.6996	20.9058	20.9837	20.9974	20.9954	20.9454	20.6570	20.2366	19.9069 (87)
Th 2	19.9995	20.0016	20.0037	20.0133	20.0151	20.0235	20.0235	20.0251	20.0203	20.0151	20.0114	20.0076 (88)
util rest of house	0.9937	0.9854	0.9592	0.8756	0.7059	0.4901	0.3272	0.4644	0.9186	0.9857	0.9952 (89)	
MIT 2	18.5977	18.8505	19.2389	19.6786	19.9301	20.0135	20.0226	20.0233	19.9807	19.6346	19.0390	18.5561 (90)
Living area fraction	fL0A = Living area / (4) = 0.5029 (91)											
MIT	19.2724	19.4853	19.8143	20.1920	20.4207	20.5014	20.5128	20.5121	20.4658	20.1487	19.6412	19.2353 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2724	19.4853	19.8143	20.1920	20.4207	20.5014	20.5128	20.5121	20.4658	20.1487	19.6412	19.2353 (93)

8. Space heating requirement

Utilisation	0.9922	0.9831	0.9570	0.8813	0.7308	0.5304	0.3734	0.4202	0.6850	0.9233	0.9838	0.9940 (94)
Useful gains	377.7812	435.8712	498.1029	510.8690	456.8524	326.9465	219.9501	230.1628	339.3742	394.0016	369.9149	358.0869 (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	867.5549	843.1613	767.9364	644.3107	496.5864	332.8656	220.6974	231.5314	360.3798	543.7351	717.0730	863.3592 (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	364.3842	273.6989	208.1961	96.0060	29.4877	0.0000	0.0000	0.0000	0.0000	111.4017	249.9538	375.9226 (98)
Space heating												1709.0510 (99)
Space heating per m2										(98) / (4) =		33.4915 (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												1827.8620 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	364.3842	273.6989	208.1961	96.0060	29.4877	0.0000	0.0000	0.0000	0.0000	111.4017	249.9538	375.9226 (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)	389.7157	292.7261	222.6696	102.6802	31.5376	0.0000	0.0000	0.0000	0.0000	119.1462	267.3303	402.0562 (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	151.8563	133.6049	139.7449	124.4821	121.4162	107.6678	102.6214	113.6855	113.8226	129.1194	137.5239	147.9361 (64)
Efficiency of water heater	87.0659	86.6872	85.8753	84.1312	81.6873	79.8000	79.8000	79.8000	79.8000	84.4231	86.3888	79.8000 (216)
(217)m												87.1982 (217)
Fuel for water heating, kWh/month	174.4153	154.1229	162.7300	147.9619	148.6354	134.9220	128.5982	142.4631	142.6348	152.9432	159.1918	169.6550 (219)
Water heating fuel used												1818.2737 (219)
Annual totals kWh/year												
Space heating fuel - main system												1827.8620 (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)												243.1073 (232)
Total delivered energy for all uses												3964.2430 (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	394.8182 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	0.2160	392.7471 (264)
Space and water heating		787.5653 (265)
Pumps and fans	0.5190	38.9250 (267)
Energy for lighting	0.5190	126.1127 (268)
Total CO2, kg/m2/year		952.6630 (272)
Emissions per m2 for space and water heating		14.9727 (272a)
Fuel factor (electricity)		1.5500
Emissions per m2 for lighting		2.3987 (272b)
Emissions per m2 for pumps and fans		0.7400 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.9727 * 1.55) + 2.3987 + 0.7400, rounded to 2 d.p.		26.3500 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D2-01 Mid MF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D2-01 Mid MF CLEAN	Prop Type Ref	W / E			
Property	2B4P-D2-01 Mid MF, St Ann's Hospital, London, N15					
SAP Rating	86 B	DER	9.80	TER	20.17	
Environmental	92 A	% DER<TER	51.41			
CO ₂ Emissions (t/year)	0.73	DFEE	30.05	TFEE	35.63	
General Requirements Compliance	Pass	% DFEE<TFEE	15.67			
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 86 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 20.17 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 9.80 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 35.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 30.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor (no floor)			
Roof (no roof)			
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Community heating scheme -

Secondary heating system: None

5 Cylinder insulation

Hot water storage: Nominal cylinder loss: 0.22 kWh/day

Permitted by DBSOG 0.35 OK

Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls:

No cylinder thermostat

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:	0.52	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overheating:

Windows facing North: 2.14 m², No overhang

Windows facing East: 6.68 m², No overhang

Windows facing West: 6.22 m², No overhang

Air change rates: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value	0.00 W/m ² K
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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) (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	86.1000 (1b)	x 2.6000 (2b)	= 223.8600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	223.8600 (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	0.0000 (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) =	0.0000 / (5) =	0.0000 (8)
Pressure test		2.5000
Measured/design AP50		0.1250 (18)
Infiltration rate		2 (19)
Number of sides sheltered		

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1063 (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	0.9250	1.1250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj Infiltr rate	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation:												78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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
Glazing North (Uw = 0.80)			2.1400	0.7752	1.6589	10.0000	(27)
Glazing E, S, W (Uw = 0.80)			12.9000	0.7752	10.0000		(27)
Corridor Door			2.1000	0.5000	1.0500		(26)
External Wall	36.2700	15.0400	21.2300	0.1500	3.1845	14.0000	297.2200 (29a)
Corridor	4.7100	2.1000	2.6100	0.1500	0.3915	36.9400 (29a)	
Core Wall	7.5700		7.5700	0.2500	1.8925	9.0000	68.1300 (29a)
Total net area of external elements Aum(A, m2)			48.5500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	18.1774			(33)
Party Wall 1			55.6400	0.0000	0.0000	20.0000	1112.8000 (32)
Party Floor 1			73.4000			40.0000	2936.0000 (32a)
Corridor			73.4000			40.0000	2936.0000 (32b)
Timber Frame			123.2400			9.0000	1109.1600 (32c)
Heat capacity Cm = Sum(A x k)							8495.8500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							98.6742 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							13.5038 (36)
Total fabric heat loss							(33) + (36) = 31.6812 (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	18.0598	17.8636	17.6674	16.6862	16.4900	15.5089	15.5089	15.3127	15.9013	16.4900	16.8825	17.2749 (38)
Average = Sum(39)m / 12 =	49.7410	49.5448	49.3486	48.3674	48.1712	47.1901	47.1901	46.9938	47.5825	48.1712	48.5636	48.9561 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.5777	0.5754	0.5732	0.5618	0.5595	0.5481	0.5481	0.5458	0.5526	0.5595	0.5640	0.5686 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

												2.5685 (42)
Average daily hot water use (litres/day)												95.2016 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218 (44)	
Energy content (annual)	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974 (45)	
Distribution loss (46) = 0.15 x (45)m										Total = Sum(45)m =	1497.8923 (45)	
Water storage loss:	23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	19.0317	20.7746	
Store volume												3.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0212 (51)
Volume factor from Table 2a												3.4200 (52)
Temperature factor from Table 2b												1.0000 (53)
Enter (49) or (54) in (55)												0.2173 (55)
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (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	185.2971	162.9205	170.1578	151.2250	147.2467	130.2070	123.7530	137.5833	137.9005	156.8758	167.5274	180.3969 (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	185.2971	162.9205	170.1578	151.2250	147.2467	130.2070	123.7530	137.5833	137.9005	156.8758	167.5274	180.3969 (64)
Heat gains from water heating, kWh/month	75.6352	66.8378	70.6014	63.8538	62.9834	56.8654	55.1718	59.7704	59.4235	66.1851	69.2744	74.0059 (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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245 (66)
Lighting gains (calculated in Appendix L, equation L19 or L19a), also see Table 5	21.2040	18.8332	15.3162	11.5954	8.6677	7.3176	7.9069	10.2777	13.7947	17.5156	20.4433	21.7933 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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 (70)
Pumps, fans	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396 (71)
Losses e.g. evaporation (negative values) (Table 5)	101.6602	99.4611	94.8943	88.6859	84.6552	78.9797	74.1556	80.3365	82.5326	88.9585	96.2144	99.4703 (72)
Total internal gains	416.1087	413.9432	399.8002	376.9715	353.7298	331.4003	316.9417	323.0888	334.8612	357.9074	384.3743	404.2841 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	q Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	2.1400	2.1400	0.8000	0.7700		6.3078 (74)
East	6.6800	19.6403	0.4200	0.8000	0.7700	30.5490 (76)
West	6.2200	19.6403	0.4200	0.8000	0.7700	28.4453 (80)
Solar gains	65.3020	127.4598	210.3396	310.0873	384.0230	395.1924
Total gains	481.4107	541.4030	610.3398	687.0588	737.7528	726.5927
			692.3073	642.6158	580.5321	509.1948
						465.7146
						458.0566 (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	4.1649	4.2222	4.2328	4.2848	4.2923	4.3027	4.3097	4.3097	4.3018	4.2972	4.2891	4.2852	
alpha	4.1630	4.1755	4.1881	4.2528	4.2661	4.3340	4.3340	4.3479	4.3065	4.2661	4.2397	4.2137	
util living area	0.9538	0.9264	0.8656	0.7397	0.5766	0.4102	0.2988	0.3344	0.5434	0.8035	0.9250	0.9605 (86)	
MIT	20.0289	20.2251	20.5094	20.7973	20.9405	20.9895	20.9979	20.9967	20.9660	20.7579	20.3576	19.9961 (87)	
Th 2	20.4501	20.4522	20.4542	20.4645	20.4666	20.4769	20.4769	20.4790	20.4728	20.4666	20.4625	20.4583 (88)	
util rest of house	0.9488	0.9188	0.8526	0.7186	0.5485	0.3780	0.2637	0.2972	0.5066	0.7812	0.9161	0.9562 (89)	
MIT 2	19.1232	19.4055	19.8088	20.2114	20.3985	20.4667	20.4753	20.4763	20.4375	20.1675	19.6062	19.0822 (90)	
Living area fraction									fLA = Living area			0.3389 (91)	
MIT	19.4482	19.6996	20.0602	20.4217	20.5930	20.6543	20.6629	20.6630	20.6271	20.3794	19.8759	19.4102 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.4482	19.6996	20.0602	20.4217	20.5930	20.6543	20.6629	20.6630	20.6271	20.3794	19.8759	19.4102 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9379	0.9069	0.8425	0.7168	0.5553	0.3890	0.2762	0.3104	0.5175	0.7773	0.9050	0.9460 (94)
Useful gains	451.5249	490.9442	514.2022	492.1515	409.6442	282.6471	191.1953	199.4670	300.4443	395.8138	421.4485	433.3419 (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	753.4876	733.2454	669.1787	557.2735	428.3869	285.7025	191.7269	200.3370	310.5777	471.0839	620.4432	744.6325 (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)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating kWh	224.6587	162.7923	115.3025	46.6431	13.9445	0.0000	0.0000	0.0000	0.0000	56.0009	143.2761	231.6002 (98)
Space heating												994.2184 (98)
Space heating per m2										(98) / (4) =		11.5473 (99)

8c. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	994.2184 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	991.7329 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	52.1965 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	1851.0910 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1846.4632 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	97.1823 (310b)
Electricity used for heat distribution	29.8757 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)	
mechanical ventilation fans (SFP = 0.6500)	177.5210 (330a)
Total electricity for the above, kWh/year	177.5210 (331)
Electricity for lighting (calculated in Appendix L)	374.4696 (332)
Total delivered energy for all uses	3539.5655 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	886.9363	0.5190	460.3199 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	157.2408	0.5190	81.6080 (368)
Electrical energy for heat distribution	29.8757	0.5190	15.5055 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			557.4334 (373)
Space and water heating			557.4334 (376)
Pumps and fans	177.5210	0.5190	92.1334 (378)
Energy for lighting	374.4696	0.5190	194.3497 (379)
Total CO2, kg/year			843.9165 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			9.8000 (384)

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

Total Floor Area	86.1000	9.8000 ZC1
Assumed number of occupants	N	2.5685
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		15.9478 ZC2
CO2 emissions from cooking, equation (L16)		2.0981 ZC3
Total CO2 emissions		27.8459 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		27.8459 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	86.1000 (1b)	x 2.6000 (2b)	= 223.8600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	223.8600 (5)

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 * 20 =	0.0000 (6b)				
Number of intermittent fans							3 * 10 =	30.0000 (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) =							30.0000 / (5) =	0.1340 (8)				
Pressure test								Yes				
Measured/design AP50								5.0000				
Infiltration rate								0.3840 (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) =	0.3264 (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	0.4162	0.4080	0.3999	0.3591	0.3509	0.3101	0.3101	0.3019	0.3264	0.3509	0.3672	0.3835 (22b)
	0.5866	0.5832	0.5799	0.5645	0.5616	0.5481	0.5481	0.5456	0.5533	0.5616	0.5674	0.5735 (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 x K					
TER Opaque door			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			15.0400	1.3258	19.9394		(27)					
External Wall	36.2700	15.0400	21.2300	0.1800	3.8214		(29a)					
Corridor	4.7100	2.1000	2.6100	0.1800	0.4698		(29a)					
Core Wall	7.5700		7.5700	0.1800	1.3626		(29a)					
Total net area of external elements Aum(A, m2)			48.5500				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.6932		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.3308 (36)					
Total fabric heat loss						(33) + (36) =	32.0240 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.3344	Feb 43.0860	Mar 42.8425	Apr 41.6987	May 41.4847	Jun 40.4886	Jul 40.4886	Aug 40.3041	Sep 40.8723	Oct 41.4847	Nov 41.9176	Dec 42.3702 (38)
Heat transfer coeff	75.3584	75.1100	74.8665	73.7227	73.5087	72.5126	72.5126	72.3281	72.8963	73.5087	73.9416	74.3942 (39)
Average = Sum(39)m / 12 =												73.7217 (39)
HLP	Jan 0.8752	Feb 0.8724	Mar 0.8695	Apr 0.8562	May 0.8538	Jun 0.8422	Jul 0.8422	Aug 0.8400	Sep 0.8466	Oct 0.8538	Nov 0.8588	Dec 0.8640 (40)
HLP (average)												0.8562 (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												2.5685 (42)
Average daily hot water use (litres/day)												95.2016 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218 (44)
Energy conte	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974	150.3992 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1497.9232 (45)
	23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	19.0317	20.7746	22.5599 (46)
Water storage loss:												
Store volume												3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.2602 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.1405 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9398	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553	(56)
If cylinder contains dedicated solar storage	4.3553	3.9398	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553	(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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168	(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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168	(64)
Heat gains from water heating, kWh/month	73.7312	65.1181	68.6974	62.0113	61.0794	55.0228	53.2678	57.8664	57.5809	64.2811	67.4318	72.1019	(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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.2040	18.8332	15.3162	11.5954	8.6677	7.3176	7.9069	10.2777	13.7947	17.5156	20.4433	21.7933	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	(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)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	(71)
Water heating gains (Table 5)	99.1011	96.9019	92.3352	86.1267	82.0960	76.4205	71.5965	77.7774	79.9734	86.3993	93.6553	96.9111	(72)
Total internal gains	416.5495	414.3841	400.2411	377.4123	354.1707	331.8412	317.3825	323.5297	335.3020	358.3482	384.8151	404.7249	(73)

6. Solar gains													
[Jan]	Area m2	Solar flux Table 6a	Specific data g W/m2	Specific data FF or Table 6c	Access factor Table 6d	Gains W							
North	2.1400	10.6334	0.6300	0.7000	0.7700	6.9544	(74)						
East	6.6800	19.6403	0.6300	0.7000	0.7700	40.7000	(76)						
West	6.2200	19.6403	0.6300	0.7000	0.7700	37.3344	(80)						
Solar gains	84.3843	164.7595	272.0317	400.0801	494.7225	508.7259	483.3646	411.9986	317.2712	195.5513	105.1251	69.4721	(83)
Total gains	500.9338	579.1436	672.2727	777.4925	848.8932	840.5671	800.7471	735.5283	652.5733	553.8996	489.9402	474.1970	(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, nL1,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	79.3431	79.6055	79.8644	81.1034	81.3395	82.4569	82.4569	82.6673	82.0229	81.3395	80.8633	80.3714	
alpha	6.2895	6.3070	6.3243	6.4069	6.4226	6.4971	6.4971	6.5112	6.4682	6.4226	6.3909	6.3581	
util living area	0.9982	0.9950	0.9810	0.9167	0.7565	0.5468	0.3978	0.4509	0.7325	0.9617	0.9954	0.9987	(86)
MIT	20.1291	20.2727	20.5103	20.7933	20.9522	20.9949	20.9994	20.9988	20.9712	20.7327	20.3779	20.1068	(87)
Th 2	20.1886	20.1911	20.1935	20.2049	20.2070	20.2169	20.2169	20.2188	20.2131	20.2070	20.2027	20.1982	(88)
util rest of house	0.9976	0.9934	0.9750	0.8931	0.7063	0.4823	0.3274	0.3751	0.6634	0.9457	0.9936	0.9983	(89)
MIT 2	19.0154	19.2265	19.5710	19.9701	20.1634	20.2137	20.2167	20.2183	20.1916	19.8990	19.3895	18.9901	(90)
Living area fraction									fLA = Living area / (4) =			0.3589	(91)
MIT	19.4151	19.6020	19.9081	20.2656	20.4465	20.4940	20.4976	20.4984	20.4714	20.1982	19.7442	19.3908	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4151	19.6020	19.9081	20.2656	20.4465	20.4940	20.4976	20.4984	20.4714	20.1982	19.7442	19.3908	(93)

8. Space heating requirement													
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	499.3292	574.4001	653.6949	695.9249	612.9499	424.7829	282.4155	295.9513	448.3366	523.7328	486.1569	473.0945	(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	1139.0464	1104.2645	1003.8167	837.9001	642.9450	427.3928	282.6262	296.4284	464.4483	705.5551	934.9318	1130.1111	(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	(98)
Space heating kWh	475.9496	356.0689	260.4906	102.2222	22.3163	0.0000	0.0000	0.0000	0.0000	135.2758	323.1180	488.8203	(98)
Space heating												2164.2616	(98)
Space heating per m2										(98) / (4) =		25.1366	(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													2314.7183 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
475.9496	356.0689	260.4906	102.2222	22.3163	0.0000	0.0000	0.0000	0.0000	0.0000	135.2758	323.1180	488.8203	(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)	509.0370	380.8223	278.5995	109.3285	23.8677	0.0000	0.0000	0.0000	0.0000	144.6800	345.5807	522.8025	(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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168	(64)
Water heating requirement	87.2520	86.8764	85.9834	83.8344	81.0796	79.8000	79.8000	79.8000	79.8000	84.4619	86.5726	87.3729	(216)
Efficiency of water heater	209.6422	185.0569	195.1281	177.6380	178.6721	160.2804	152.0965	169.4277	169.9214	182.9178	190.8505	203.7447	(219)
Fuel for water heating, kWh/month	209.6422	185.0569	195.1281	177.6380	178.6721	160.2804	152.0965	169.4277	169.9214	182.9178	190.8505	203.7447	(219)
Water heating fuel used	209.6422	185.0569	195.1281	177.6380	178.6721	160.2804	152.0965	169.4277	169.9214	182.9178	190.8505	203.7447	(219)
Annual totals kWh/year												2175.3762	(219)
Space heating fuel - main system												2314.7183	(211)
Space heating fuel - secondary												0.0000	(215)
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												374.4696	(232)
Electricity for lighting (calculated in Appendix L)												4939.5642	(238)
Total delivered energy for all uses													

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP													
Energy kWh/year	2314.7183												
Emission factor kg CO2/kWh	0.2160												
Emissions kg CO2/year	499.9792	(261)											
Space heating - main system 1	0.2160												
Space heating - secondary	0.0000												
Water heating (other fuel)	0.2160												
Space and water heating	0.2160												
Pumps and fans	75.0000												
Energy for lighting	374.4696												
Total CO2, kg/m2/year													
Emissions per m2 for space and water heating													11.2643 (272a)
Fuel factor (electricity)													1.5500
Emissions per m2 for lighting													2.2573 (272b)
Emissions per m2 for pumps and fans													0.4521 (272c)
Target Carbon Dioxide Emission Rate (TER) = (11.2643 * 1.55) + 2.2573 + 0.4521, rounded to 2 d.p.													20.1700 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End EF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D3-01 End EF CLEAN	Prop Type Ref	N / E			
Property	2B4P-D3-01 End EF, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	12.65	TER	27.44	
Environmental	90 B	% DER<TER	53.90			
CO ₂ Emissions (t/year)	0.81	DFEE	42.04	TFEE	56.98	
General Requirements Compliance	Pass	% DFEE<TFEE	26.22			
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 74 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 27.44 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 12.65 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 57.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 42.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof (no roof)			
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system: Community heating scheme -

Secondary heating system: None

5 Cylinder insulation

Hot water storage: Nominal cylinder loss: 0.22 kWh/day

Permitted by DBSOG 0.35 OK

Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and TRVsOK

Hot water controls:

No cylinder stat

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:	0.55	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley): Medium OK

Based on:

Overheating:

Windows facing North: 9.86 m², No overhang

Windows facing East: 8.63 m², No overhang

Air change rate: 4.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Exposed floor U-value 0.12 W/m²K

Door U-value 0.50 W/m²K

Window U-value 0.80 W/m²K

Window U-value 0.80 W/m²K

Air permeability 2.5 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	74.1000 (1b)	x 2.6000 (2b)	= 192.6600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.6600 (5)

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 fires	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 flameless 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		2.5000
Measured/design AP50		0.1250 (18)
Infiltration rate		2 (19)
Number of sides sheltered		

Shelter factor	(20) = 1 - (0.075 x (19)) =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation:												78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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
Glazing North (Uw = 0.80)	9.8600	0.7752	7.6434	0.7752	6.6899		(27)
Glazing E, S, W (Uw = 0.80)	6.6300	0.7752	2.1000	0.5000	8.8920		(27)
Corridor Door	48.1000	18.4900	2.1000	0.1200	4.4418	14.0000	(26)
Exposed Floor	4.2900	2.1000	2.1900	0.1500	0.3285	14.0000	(28b)
External Wall	5.3300		5.3300	0.2500	1.3325	9.0000	(29a)
Corridor							(29a)
Core Wall							(31)
Total net area of external elements Sum(A, m2)			131.8200				(32)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.3778		(33)
Party Wall 1			41.0800	0.0000	0.0000	20.0000	(32)
Party Ceilings 1			74.1000			40.0000	(32b)
Timber Frame			139.6200			9.0000	(32c)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =		5535.3500 (34)		(35)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K					74.7011 (35)		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)					17.0949 (36)		
Total fabric heat loss			(33) + (36) =		47.4727 (37)		

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul
Heat transfer coeff	15.5428	15.3739	15.2050	14.3606	14.1918	13.3474	13.3474
Average = Sum(39)m / 12 =	63.0155	62.8467	62.6778	61.8334	61.6645	60.8201	60.8201
	60.6512	61.1579	61.6645	62.0023	62.3400 (39)	61.7912 (39)	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul
HLP (average)	0.8504	0.8481	0.8459	0.8345	0.8322	0.8208	0.8208
Days in month	31	28	31	30	31	30	31
							31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy							
Average daily hot water use (litres/day)							2.3414 (42)
							89.8086 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Daily hot water use							

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy cont	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.4517	141.8793 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Store volume												3.0000 (47)
b) If manufacturer declared loss factor is not known :												0.0212 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)												3.4200 (52)
Volume factor from Table 2a												1.0000 (53)
Temperature factor from Table 2b												0.2173 (55)
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (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	176.4996	155.2262	162.2179	144.3028	140.6047	124.4755	118.4419	131.4887	131.7332	149.6883	159.6817	171.8770 (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	176.4996	155.2262	162.2179	144.3028	140.6047	124.4755	118.4419	131.4887	131.7332	149.6883	159.6817	171.8770 (64)
Heat gains from water heating, kWh/month	72.7100	64.2795	67.9614	61.5522	60.7750	54.9596	53.4059	57.7439	57.3728	63.7953	66.6657	71.1730 (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	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707 (66)
Lighting gains (calculated in Appendix L, equation L18 or L19a), also see Table 5	18.4249	16.3648	13.3088	10.0756	7.5316	6.3585	6.8706	8.9307	11.9867	15.2199	17.7639	18.9370 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071 (69)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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 (70)
Pumps, fans	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566 (71)
Losses e.g. evaporation (negative values) (Table 5)	97.7285	95.6540	91.3459	85.4892	81.6868	76.3328	71.7821	77.6128	79.6845	85.7464	92.5913	95.6627 (72)
Water heating gains (Table 5)	380.9458	378.9558	366.1873	345.5923	324.7227	304.5458	291.3883	297.1345	307.6666	328.4668	352.3788	370.2731 (73)
Total internal gains												

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	q Specific data or Table 6b	FP Specific data or Table 6c	Access factor Table 6d	Gains W
North	9.8600	10.6334	0.5000	0.8000	0.7700	29.0631 (74)
East	8.6300	19.6403	0.4200	0.8000	0.7700	39.4667 (76)

Solar gains	68.5298	132.7463	221.5238	337.0299	431.4697	451.2538	425.5866	352.1807	261.3488	157.7249	85.0634	56.6839 (83)
Total gains	449.4756	911.7020	987.7112	682.6221	756.1924	755.7996	716.9749	649.3152	569.0154	486.1916	437.4422	426.9570 (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, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	24.4003	24.4659	24.5318	24.6868	24.9349	25.2811	25.2811	25.3515	25.1414	24.9349	24.7991	24.6647
alpha	2.6267	2.6311	2.6355	2.6578	2.6623	2.6854	2.6854	2.6901	2.6761	2.6623	2.6533	2.6443
util living area	0.9357	0.9102	0.8591	0.7590	0.6206	0.4690	0.3562	0.4032	0.6125	0.8184	0.9111	0.9426 (86)
MIT	18.9527	19.2286	19.6883	20.2489	20.6595	20.8857	20.9599	20.9436	20.7591	20.2045	19.4891	18.9014 (87)
Th 2	20.2099	20.2118	20.2138	20.2236	20.2255	20.2354	20.2354	20.2373	20.2314	20.2255	20.2216	20.2177 (88)
util rest of house	0.9291	0.9011	0.8450	0.7358	0.5858	0.4221	0.2992	0.3435	0.5651	0.7949	0.9006	0.9366 (89)
MIT 2	17.4334	17.8305	18.4874	19.2771	19.8295	20.1214	20.2037	20.1907	19.9749	19.2342	18.2172	17.3642 (90)
Living area fraction	17.9521	18.3079	18.8974	19.6089	20.1129	20.3823	20.4619	20.4478	20.2426	19.5655	18.6515	17.8880 (92)
MIT	17.9521	18.3079	18.8974	19.6089	20.1129	20.3823	20.4619	20.4478	20.2426	19.5655	18.6515	17.8880 (93)
Temperature adjustment												0.0000
adjusted MIT	17.9521	18.3079	18.8974	19.6089	20.1129	20.3823	20.4619	20.4478	20.2426	19.5655	18.6515	17.8880 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	406.3769	447.0347	480.1371	488.3943	438.9759	326.0537	226.8602	234.0301	321.9796	375.2567	382.3149	389.7970 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	860.2962	842.6396	777.0425	662.1692	518.7776	351.6813	234.8795	245.5024	375.6696	552.8526	716.2165	853.3736 (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												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	337.7159	265.8465	220.8976	125.1179	59.3725	0.0000	0.0000	0.0000	0.0000	132.1313	240.4092	344.9010 (98)
Space heating per m2										(98) / (4) =		1726.3918 (98)
												23.2981 (99)

Sc. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1726.3918 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1726.0759 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	90.4356 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)

Water heating	
Annual water heating requirement	1766.2375 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1761.8219 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	92.7275 (310b)
Electricity used for heat distribution	36.6726 (313)
Annual totals kWh/year	

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6875)	
mechanical ventilation fans (SFP = 0.6875)	161.5936 (330a)
Total electricity for the above, kWh/year	161.5936 (331)
Electricity for lighting (calculated in Appendix L)	325.3892 (332)
Total delivered energy for all uses	4154.2436 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	1088.7181	0.5190	565.0447 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	193.0137	0.5190	100.1741 (368)
Electrical energy for heat distribution	36.6726	0.5190	19.0331 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFER)			684.2519 (373)
Space and water heating			684.2519 (376)
Pumps and fans	161.5936	0.5190	83.8671 (378)
Energy for lighting	325.3892	0.5190	168.8770 (379)
Total CO2, kg/year			936.9959 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			12.6500 (384)

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

DER		12.6500 EC1
Total Floor Area	TFA	74.1000
Assumed number of occupants	N	2.3414
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.5275 EC2
CO2 emissions from cooking, equation (L16)		2.3643 EC3
Total CO2 emissions		31.5418 EC4
Residual CO2 emissions offset from biofuel CHP		0.0000 EC5
Additional allowable electricity generation, kWh/m ² /year		0.0000 EC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 EC7
Net CO2 emissions		31.5418 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	74.1000 (1b)	x 2.6000 (2b)	= 192.6600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.6600 (5)

2. Ventilation rate

	main		secondary		other				total	m3 per hour		
	heating		heating									
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									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) =									Air changes per hour			
Pressure test									30.0000 / (5) =	0.1557 (8)		
Measured/design AP50									Yes			
Infiltration rate									5.0000			
Number of sides sheltered									0.4057 (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) =	0.3449 (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	0.4397	0.4311	0.4225	0.3793	0.3707	0.3276	0.3276	0.3190	0.3449	0.3707	0.3880	0.4052 (22b)
Effective ac	0.5967	0.5929	0.5892	0.5720	0.5687	0.5537	0.5537	0.5509	0.5595	0.5687	0.5753	0.5821 (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					2.1000		1.0000		2.1000					(26)
TER Opening Type (Uw = 1.40)					16.4300		1.3258		21.7822					(27)
Exposed Floor					74.1000		0.1300		9.6330					(28b)
External Wall		48.1000		16.4300	31.6700		0.1800		5.7006					(29a)
Corridor		4.2900		2.1000	2.1900		0.1800		0.3942					(29a)
Core Wall		5.3300			5.3300		0.1800		0.9594					(29a)
Total net area of external elements Aum(A, m2)					131.8200									(31)
Fabric heat loss, W/K = Sum (A x U)							(26)... (30) + (32) =		40.5694					(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K														250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														12.0415 (36)
Total fabric heat loss												(33) + (36) =		52.6109 (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	37.9347	37.6960	37.4621	36.3634	36.1578	35.2008	35.2008	35.0236	35.5694	36.1578	36.5737	37.0084	(38)	
Average	90.5456	90.3069	90.0730	88.9743	88.7687	87.8117	87.8117	87.6345	88.1803	88.7687	89.1846	89.6193	(39)	
Average = Sum(39)m / 12 =												88.9733	(39)	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.2219	1.2187	1.2156	1.2007	1.1980	1.1850	1.1850	1.1827	1.1900	1.1980	1.2036	1.2094	(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												2.3414 (42)
Average daily hot water use (litres/day)												89.8086 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.7993 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Store volume												3.0000 (47)
a) if manufacturer declared loss factor is known (kWh/day):												0.2602 (48)
Temperature factor from Table 2b												0.5400 (49)

HODKINSON

HODKINSON

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End MF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D3-01 End MF CLEAN	Prop Type Ref	N / E			
Property	2B4P-D3-01 End MF, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	11.31	TER	23.27	
Environmental	91 B	% DER<TER	51.41			
CO ₂ Emissions (t/year)	0.72	DFEE	33.87	TFEE	43.23	
General Requirements Compliance	Pass	% DFEE<TFEE	21.65			
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 74 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 23.27 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 11.31 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 43.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 33.9 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.68	
Maximum	1.5	OK
MVHR efficiency:	87%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	9.86 m ² , No overhang	
Windows facing East:	8.63 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h

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

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					
Glazing North (Uw = 0.80)			9.8600	0.7752	7.6434		(27)					
Glazing E, S, W (Uw = 0.80)			8.6300	0.7752	6.6899		(27a)					
Corridor Door			2.1000	0.3600	1.0500		(26)					
External Wall	48.1000	18.4900	29.6100	0.1500	4.4415	14.0000	414.5400 (29a)					
Corridor	4.2900	2.1000	2.1900	0.1500	0.3285	14.0000	30.9600 (29a)					
Core Wall	5.3300		5.3300	0.2500	1.3325	9.0000	47.9700 (29a)					
Total net area of external elements Aum(A, m ²)			57.7200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	21.4858			(32)					
Party Wall 1			41.0800	0.0000	0.0000	20.0000	821.6000 (32)					
Party Floor 1			74.1000			40.0000	2964.0000 (32a)					
Party Ceilings 1			74.1000			40.0000	2964.0000 (32b)					
Timber Frame			139.6200			9.0000	1256.5800 (32c)					
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =	8499.3500 (34)							
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							114.7011 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.7342 (36)					
Total fabric heat loss						(33) + (36) =	34.2200 (37)					
Ventilation heat loss calculated monthly (Hmp = 0.33 x 253)m x (5)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38m) 16.8938	16.7249	16.5561	15.7117	15.5428	14.6984	14.6984	14.5295	15.0361	15.5428	15.8805	16.2183 (38)	
Heat transfer coeff												
51.1138	50.9449	50.7760	49.9317	49.7628	48.9184	48.9184	48.7495	49.2561	49.7628	50.1005	50.4383 (39)	
Average = Sum(38m) / 12 =											49.8894 (39)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6998	0.6875	0.6852	0.6738	0.6716	0.6602	0.6602	0.6579	0.6647	0.6716	0.6761	0.6807 (40)
HLP (average)												0.6733 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

[illegible]

HODKINSON

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	250.2041	183.1442	131.0122	52.8979	15.0893	0.0000	0.0000	0.0000	0.0000	67.2993	163.8809	258.3895 (98)
Space heating per m2										(98) / (4) =		15.1406 (99)

Sc. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1121.9172 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1119.1129 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	58.9007 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	1766.2375 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1761.8219 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	92.7275 (310b)
Electricity used for heat distribution	30.3256 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8500)	
mechanical ventilation fans (SFP = 0.8500)	199.7884 (330a)
Total electricity for the above, kWh/year	199.7884 (331)
Electricity for lighting (calculated in Appendix L)	325.3892 (332)
Total delivered energy for all uses	3557.7401 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	900.2920	0.5190	467.2515 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	159.6086	0.5190	82.8368 (368)
Electrical energy for heat distribution	30.3256	0.5190	15.7390 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFER)			565.8274 (373)
Space and water heating			565.8274 (376)
Pumps and fans	199.7884	0.5190	103.6902 (378)
Energy for lighting	325.3892	0.5190	168.8770 (379)
Total CO2, kg/year			838.3946 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			11.3100 (384)

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

DER			11.3100 EC1
Total Floor Area	TFA	74.1000	
Assumed number of occupants	N	2.3414	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		16.5275 EC2	
CO2 emissions from cooking, equation (L16)		2.3643 EC3	
Total CO2 emissions		30.2018 EC4	
Residual CO2 emissions offset from biofuel CHP		0.0000 EC5	
Additional allowable electricity generation, kWh/m ² /year		0.0000 EC6	
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 EC7	
Net CO2 emissions		30.2018 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	74.1000 (1b)	x 2.6000 (2b)	= 192.6600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.6600 (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					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) =					Air changes per hour 30.0000 / (5) = 0.1557 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.4057 (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) =		0.3449 (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	0.4397	0.4311	0.4225	0.3793	0.3707	0.3276	0.3276	0.3190	0.3449	0.3707	0.3880	0.4052 (22b)
Effective ac	0.5967	0.5929	0.5892	0.5720	0.5687	0.5537	0.5537	0.5509	0.5595	0.5687	0.5753	0.5821 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			16.4300	1.3258	21.7822		(27)					
External Wall	48.1000	16.4300	31.6700	0.1800	5.7006		(29a)					
Corridor	4.2900	2.1000	2.1900	0.1800	0.3942		(29a)					
Core Wall	5.3300		5.3300	0.1800	0.9594		(29a)					
Total net area of external elements Aum(A, m2)			57.7200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		30.9364		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.9010 (36)					
Total fabric heat loss						(33) + (36) =	36.8374 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37,9347	Feb 37,6960	Mar 37,4621	Apr 36,3634	May 36,1578	Jun 35,2008	Jul 35,2008	Aug 35,0236	Sep 35,5694	Oct 36,1578	Nov 36,5737	Dec 37,0084 (38)
Heat transfer coeff	74.7721	74.5334	74.2995	73.2008	72.9952	72.0382	72.0382	71.8610	72.4068	72.9952	73.4111	73.8458 (39)
Average = Sum(39)m / 12 =												73.1998 (39)
HLP	Jan 1.0091	Feb 1.0058	Mar 1.0027	Apr 0.9879	May 0.9851	Jun 0.9722	Jul 0.9722	Aug 0.9698	Sep 0.9772	Oct 0.9851	Nov 0.9907	Dec 0.9966 (40)
HLP (average)												0.9879 (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												2.3414 (42)
Average daily hot water use (litres/day)												89.8086 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy conte	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.8793 (45)
Energy content (annual)												1413.0389 (45)
Distribution loss (46)m = 0.15 x (45)m												
	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Water storage loss:												
Store volume												3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												
Temperature factor from Table 2b												0.2602 (48)
Enter (49) or (54) in (55)												0.5400 (49)
												0.1405 (55)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	174.1196	153.0765	159.8379	141.9996	138.2247	122.1722	116.0619	129.1087	129.4299	147.3083	157.3785	169.4969 (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	174.1196	153.0765	159.8379	141.9996	138.2247	122.1722	116.0619	129.1087	129.4299	147.3083	157.3785	169.4969 (64)
Heat gains from water heating, kWh/month	70.8060	62.5597	66.0574	59.7096	58.8710	53.1170	51.5018	55.8399	55.5302	61.8913	64.8231	69.2690 (65)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.4271	16.3668	13.3104	10.0768	1.5325	6.3593	6.8714	8.9318	11.9882	15.2218	17.7660	18.9393 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.6711	208.8157	203.4114	191.9063	177.3831	163.7333	154.6144	152.4698	157.8741	169.3793	183.9025	197.5523 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071 (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)	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566 (71)
Water heating gains (Table 5)	95.1694	93.0948	88.7868	82.9300	79.1276	73.7737	69.2229	75.0536	77.1253	83.1872	90.0321	93.1035 (72)
Total internal gains	381.3889	379.3986	366.6298	346.0344	325.1645	304.9875	291.8300	297.5764	308.1089	328.9095	352.8219	370.7163 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	8.7700	10.6334	0.6300	0.7000	0.7700	28.4999 (74)						
East	7.6600	19.6403	0.6300	0.7000	0.7700	45.9778 (76)						
Solar gains	74.4777	144.4070	240.6710	364.6846	465.0045	485.3972	458.1706	380.4293	283.5460	171.5573	92.4872	61.5688 (83)
Total gains	455.8666	323.8056	607.3009	710.7189	790.1690	790.3847	750.0005	678.0058	591.6548	500.4667	445.3090	432.2851 (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, nil,m (see Table 9a)												
tau	68.8203	69.0406	69.2380	70.2975	70.4955	71.4320	71.4320	71.6081	71.0683	70.4955	70.0962	69.6835
alpha	5.5880	5.6027	5.6172	5.6865	5.6997	5.7621	5.7621	5.7739	5.7379	5.6997	5.6731	5.6456
util living area	0.9977	0.9946	0.9822	0.9267	0.7793	0.5721	0.4209	0.4836	0.7712	0.9662	0.9949	0.9983 (86)
MIT	19.9673	20.1162	20.3737	20.7034	20.9176	20.9884	20.9983	20.9965	20.9433	20.6399	20.2463	19.9451 (87)
Th 2	20.0758	20.0785	20.0811	20.0935	20.0958	20.1066	20.1066	20.1086	20.1024	20.0958	20.0911	20.0862 (88)
util rest of house	0.9970	0.9928	0.9762	0.9038	0.7256	0.4971	0.3364	0.3920	0.6966	0.9510	0.9929	0.9977 (89)
MIT 2	18.6943	18.9131	19.2871	19.7548	20.0202	20.0994	20.1060	20.1072	20.0594	19.6801	19.1131	18.6695 (90)
Living area fraction	19.1289	19.3239	19.6581	20.0787	20.3266	20.4029	20.4106	20.4108	20.3612	20.0078	19.5000	19.1051 (92)
MIT	19.1289	19.3239	19.6581	20.0787	20.3266	20.4029	20.4106	20.4108	20.3612	20.0078	19.5000	19.1051 (93)
Temperature adjustment												0.0000
adjusted MIT	19.1289	19.3239	19.6581	20.0787	20.3266	20.4029	20.4106	20.4108	20.3612	20.0078	19.5000	19.1051 (93)

8. Space heating requirement												
Utilisation	0.9959	0.9908	0.9727	0.9034	0.7401	0.5225	0.3653	0.4233	0.7196	0.9492	0.9911	0.9969 (94)
Useful gains	453.9913	318.9822	590.7305	642.0320	584.8272	412.9482	275.9804	287.0304	425.7653	475.0529	441.3371	430.9406 (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	1108.7908	1075.0610	977.6424	818.2883	629.6991	418.0327	274.5125	288.2205	453.3517	686.7264	910.2986	1100.6763 (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	487.1708	373.6850	287.8625	126.9045	33.3847	0.0000	0.0000	0.0000	0.0000	157.4851	337.6523	498.2834 (98)
Space heating												2302.4283 (98)
Space heating per m2										(98) / (4) =		31.0719 (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												2462.4902 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
487.1708	373.6850	287.8625	126.9045	33.3847	0.0000	0.0000	0.0000	0.0000	0.0000	157.4851	337.6523	498.2834 (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)	521.0383	399.6631	307.8744	135.7268	35.7056	0.0000	0.0000	0.0000	0.0000	168.4333	361.1254	532.9234 (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	174.1196	153.0765	159.8379	141.9996	138.2247	122.1722	116.0619	129.1087	129.4299	147.3083	157.3785	169.4969 (64)
Efficiency of water heater (217)m	87.4139	87.1059	86.3656	84.5158	81.6787	79.8000	79.8000	79.8000	79.8000	84.9922	86.7999	79.8000 (216)
Fuel for water heating, kWh/month	199.1899	175.7361	185.0713	168.0155	169.2298	153.0980	145.4410	161.7904	162.1929	173.3199	181.3118	193.6636 (219)
Water heating fuel used												2068.0601 (219)
Annual totals kWh/year												
Space heating fuel - main system												2462.4902 (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)												325.4292 (232)
Total delivered energy for all uses												4930.9795 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
Energy kWh/year	2462.4902	Emission factor kg CO2/kWh	0.2160	Emissions kg CO2/year	531.8979 (261)							
Space heating - main system 1	0.0000	0.0000	0.0000	0.0000 (263)								
Space heating - secondary	0.0000	0.2160	0.0000	446.7010 (264)								
Water heating (other Fuel)	2068.0601	0.2160	0.0000	978.5989 (265)								
Space and water heating				38.9250 (267)								
Pumps and fans	75.0000	0.5190	0.0000	168.8977 (268)								
Energy for lighting	325.4292	0.5190	0.0000	168.8977 (268)								
Total CO2, kg/m2/year				1186.4216 (272)								
Emissions per m2 for space and water heating				13.2065 (272a)								
Fuel factor (electricity)				1.5500								
Emissions per m2 for lighting				2.2793 (272b)								
Emissions per m2 for pumps and fans				0.5253 (272c)								
Target Carbon Dioxide Emission Rate (TER) = (13.2065 * 1.55) + 2.2793 + 0.5253, rounded to 2 d.p.				23.2700 (273)								

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End TF					Issued on Date	06/02/2024	
Assessment Reference	2B4P-D3-01 End TF CLEAN				Prop Type Ref	N / E		
Property	2B4P-D3-01 End TF, St Ann's Hospital, London, N15							
SAP Rating		84 B	DER	13.33	TER	28.81		
Environmental		90 B	% DER<TER	53.73				
CO ₂ Emissions (t/year)		0.82	DFEE	45.05	TFEE	61.53		
General Requirements Compliance		Pass	% DFEE<TFEE	26.79				
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 74 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 28.81 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 13.33 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)61.5 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (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	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.68	
Maximum	1.5	OK
MVHR efficiency:	87%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
Based on:		
Overheating:	Average	
Windows facing North:	9.86 m ² , No overhang	
Windows facing East:	8.63 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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) (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	74.1000 (1b)	x 2.6000 (2b)	= 192.6600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.6600 (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	0.0000 (7a)
Number of passive vents	0	0	0	0	0.0000 (7b)
Number of flameless gas fires	0	0	0	0	0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =

Pressure test	0.0000 / (5) =	0.0000 (8)
Measured/design AP50	2.5000	
Infiltration rate	0.1250 (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) =	0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation:												73.9500 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2657	0.2631	0.2604	0.2471	0.2445	0.2312	0.2312	0.2285	0.2365	0.2445	0.2498	0.2551 (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
Glazing North (Uw = 0.80)			9.8600	0.7752	7.6434		(27)
Glazing E, S, W (Uw = 0.80)			8.6300	0.7752	6.6899		(27)
Corridor Door			2.1000	0.5000	1.0500		(26)
External Wall	48.1000	18.4900	29.6100	0.1500	4.4415	14.0000	414.5400 (29a)
Corridor	4.2900	2.1000	2.1900	0.1500	0.3285	30.6600	(29a)
Core Wall	5.3300		5.3300	0.2500	1.3325	9.0000	47.9700 (29a)
Main Roof	74.1000		74.1000	0.1000	7.4100	100.0000	(30)
Total net area of external elements Sum(A, m2)			131.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		28.8958		(33)
Party Wall 1			41.0800	0.0000	0.0000	20.0000	821.6000 (32)
Party Floor 1			74.1000			40.0000	2964.0000 (32a)
Timber Frame			139.6200			9.0000	1256.5800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12945.3500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		174.7011 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		20.5534 (36)
Total fabric heat loss	(33) + (36) =	49.4492 (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	16.8938	16.7249	16.5561	15.7117	15.5428	14.6984	14.6984	14.5295	15.0361	15.5428	15.8905	16.2183 (38)
Average = Sum(39m) / 12 =	66.3431	66.1742	66.0053	65.1609	64.9920	64.1476	64.1476	63.9788	64.4854	64.9920	65.3298	65.6675 (39)
												65.1187 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8953	0.8930	0.8908	0.8794	0.8771	0.8657	0.8657	0.8634	0.8702	0.8771	0.8816	0.8862 (40)
Days in month												0.8788 (40)
	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3414 (42)
Average daily hot water use (litres/day)												89.8086 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy cont	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.4517	141.8793 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Store volume												3.0000 (47)
b) If manufacturer declared loss factor is not known :												0.0212 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)												3.4200 (52)
Volume factor from Table 2a												1.0000 (53)
Temperature factor from Table 2b												0.2173 (55)
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (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	176.4996	155.2262	162.2179	144.3028	140.6047	124.4755	118.4419	131.4887	131.7332	149.6883	159.6817	171.8770 (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	176.4996	155.2262	162.2179	144.3028	140.6047	124.4755	118.4419	131.4887	131.7332	149.6883	159.6817	171.8770 (64)
Heat gains from water heating, kWh/month	72.7100	64.2795	67.9614	61.5522	60.7750	54.9596	53.4059	57.7439	57.3728	63.7953	66.6657	71.1730 (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	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707 (66)
Lighting gains (calculated in Appendix L, equation L18 or L19a), also see Table 5	18.4249	16.3648	13.3088	10.0756	7.5316	6.3585	6.8706	8.9307	11.9867	15.2199	17.7639	18.9370 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071 (69)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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 (70)
Pumps, fans	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566 (71)
Losses e.g. evaporation (negative values) (Table 5)	97.7285	95.6540	91.3459	85.4892	81.6668	76.3328	71.7821	77.6128	79.6485	85.7464	92.5913	95.6627 (72)
Water heating gains (Table 5)	380.9458	378.9558	366.1873	345.5923	324.7227	304.5458	291.3883	297.1345	307.6666	328.4668	352.3788	370.2731 (73)
Total internal gains												

6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	q Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North		9.8600	10.6334	0.5000	0.8000	0.7700	29.0631 (74)
East		8.6300	19.6403	0.4200	0.8000	0.7700	39.4667 (76)
Solar gains	68.5298	132.7463	221.5238	337.0299	431.4697	451.2538	425.5866
Total gains	449.4756	911.7020	587.7112	682.6221	756.1924	755.7996	716.9749
							649.3152
							569.0154
							486.1916
							437.4422
							426.9570 (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	54.2021	54.3404	54.4794	55.1854	55.3288	56.0571	56.0571	56.2051	55.7635	55.3288	55.0427	54.7596
alpha	4.6135	4.6227	4.6320	4.6790	4.6886	4.7371	4.7371	4.7470	4.7176	4.6886	4.6695	4.6506
util living area	0.9907	0.9822	0.9569	0.8776	0.7214	0.5290	0.3908	0.4474	0.7112	0.9293	0.9826	0.9926 (86)
MIT	19.8262	20.0025	20.3001	20.6632	20.8952	20.9808	20.9963	20.9932	20.9282	20.6011	20.1499	19.7937 (87)
Th 2	20.1715	20.1734	20.1754	20.1851	20.1870	20.1968	20.1968	20.1987	20.1929	20.1870	20.1831	20.1792 (88)
util rest of house	0.9886	0.9783	0.9475	0.8531	0.6755	0.4676	0.3208	0.3721	0.6482	0.9092	0.9781	0.9909 (89)
MIT 2	18.5925	18.8492	19.2772	19.7865	20.0807	20.1821	20.1949	20.1950	20.1300	19.7152	19.0718	18.5507 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.0137	19.2430	19.6264	20.0859	20.3588	20.4548	20.4685	20.4675	20.4025	20.0177	19.4399	18.3751 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.0137	19.2430	19.6264	20.0859	20.3588	20.4548	20.4685	20.4675	20.4025	20.0177	19.4399	18.3751 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9847	0.9727	0.9400	0.8498	0.6856	0.4876	0.3446	0.3976	0.6654	0.9043	0.9728	0.9876 (94)
Useful gains	442.6131	497.7075	552.4271	580.0904	518.4822	368.5641	247.0869	258.1910	378.6199	439.6618	425.5514	421.6504 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	14.6000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	976.1540	949.1342	886.4142	728.8804	562.7535	375.5710	248.1546	260.2338	406.4194	612.0725	806.1641	970.2437 (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												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	396.9544	303.3588	233.6064	107.1288	32.9378	0.0000	0.0000	0.0000	0.0000	128.2736	274.0411	408.1534 (98)
Space heating per m2										(98) / (4) =		1884.4543 (98)
												25.4312 (99)

8c. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1884.4543 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1879.7432 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	98.7339 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)

Water heating	
Annual water heating requirement	1766.2375 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1761.8219 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	92.7275 (310b)
Electricity used for heat distribution	38.3323 (313)
Annual totals kWh/year	

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8500)	
mechanical ventilation fans (SFP = 0.8500)	199.7884 (330a)
Total electricity for the above, kWh/year	199.7884 (331)
Electricity for lighting (calculated in Appendix L)	325.3892 (332)
Total delivered energy for all uses	4358.4041 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	1137.9891	0.5190	590.6163 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	201.7488	0.5190	104.7076 (368)
Electrical energy for heat distribution	38.3323	0.5190	19.8944 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFER)			715.2184 (373)
Space and water heating			715.2184 (376)
Pumps and fans	199.7884	0.5190	103.6902 (378)
Energy for lighting	325.3892	0.5190	168.8770 (379)
Total CO2, kg/year			987.7856 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			13.3300 (384)

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

DER		13.3300 EC1
Total Floor Area	TFA	74.1000
Assumed number of occupants	N	2.3414
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.5275 EC2
CO2 emissions from cooking, equation (L16)		2.3643 EC3
Total CO2 emissions		32.2218 EC4
Residual CO2 emissions offset from biofuel CHP		0.0000 EC5
Additional allowable electricity generation, kWh/m ² /year		0.0000 EC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 EC7
Net CO2 emissions		32.2218 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	74.1000 (1b)	x 2.6000 (2b)	= 192.6600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.6600 (5)

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 * 20 =	0.0000 (6b)				
Number of intermittent fans							3 * 10 =	30.0000 (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) =						30.0000 / (5) =	0.1557 (8)				
Pressure test								Yes				
Measured/design AP50								5.0000				
Infiltration rate								0.4057 (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) =	0.3449 (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	0.4397	0.4311	0.4225	0.3793	0.3707	0.3276	0.3276	0.3190	0.3449	0.3707	0.3880	0.4052 (22b)
	0.5967	0.5929	0.5892	0.5720	0.5687	0.5537	0.5537	0.5509	0.5595	0.5687	0.5753	0.5821 (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					2.1000		1.0000		2.1000					(26)
TER Opening Type (Uw = 1.40)					16.4300		1.3258		21.7822					(27)
External Wall	48.1000		16.4300		31.6700		0.1800		5.7006					(29a)
Corridor	4.2900		2.1000		2.1900		0.1800		0.3942					(29a)
Core Wall	5.3300				5.3300		0.1800		0.9594					(29a)
Main Roof	74.1000				74.1000		0.1300		9.6330					(30)
Total net area of external elements Aum(A, m2)					131.8200									(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...	(30) + (32) =			40.5694					(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													250.0000	(35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													17.2865	(36)
Total fabric heat loss											(33) + (36) =		57.8559	(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	37.9347	37.6960	37.4621	36.3634	36.1578	35.2008	35.2008	35.0236	35.5694	36.1578	36.5737	37.0084	(38)	
Average = Sum(39)m / 12 =	95.7906	95.5519	95.3180	94.2193	94.0137	93.0567	93.0567	92.8795	93.4253	94.0137	94.4296	94.8643	(39)	
												94.2183	(39)	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.2927	1.2895	1.2863	1.2715	1.2687	1.2558	1.2558	1.2534	1.2608	1.2687	1.2744	1.2802	(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												2.3414 (42)
Average daily hot water use (litres/day)												89.8086 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.7993 (45)
Distribution loss (46)m = 0.15 x (45)m												
										Total = Sum(45)m =	1413.3895	(45)
Water storage loss:												
	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Store volume												3.0000 (47)
a) if manufacturer declared loss factor is known (kWh/day):												0.2602 (48)
Temperature factor from Table 2b												0.5400 (49)

8c. Space cooling requirement

Not applicable

HODKINSON

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	3706.2306	0.2160	800.5458 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2048.5873	0.2160	442.4949 (284)
Space and water heating			1243.0407 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	325.4292	0.5190	168.8977 (268)
Total CO ₂ , kg/m ² /year			1450.8634 (272)
Emissions per m ² for space and water heating			16.7752 (272a)
Fuel factor (electricity)			1.5500
Emissions per m ² for lighting			2.7793 (272b)
Emissions per m ² for pumps and fans			0.5253 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.7752 + 1.55) + 2.7793 + 0.5253, rounded to 2 d.p.			28.8100 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	3B5P-D1-01 End MF					Issued on Date	06/02/2024	
Assessment Reference	3B5P-D1-01 End MF CLEAN				Prop Type Ref	S / E		
Property	3B5P-D1-01 End MF, St Ann's Hospital, London, N15							
SAP Rating		86 B	DER	10.19	TER	20.27		
Environmental		92 A	% DER<TER	49.73				
CO ₂ Emissions (t/year)		0.77	DFEE	29.63	TFEE	36.58		
General Requirements Compliance		Pass	% DFEE<TFEE	19.01				
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 86 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 20.27 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 10.19 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 36.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 29.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor (no floor)			
Roof (no roof)			
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.68
Maximum	1.5 OK
MVHR efficiency:	87%
Minimum:	70% OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing East:	5.36 m ² , No overhang	
Windows facing South:	14.61 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 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) (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	86.1000 (1b)	x 2.6000 (2b)	= 223.8600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 223.8600 (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	0	0	0	0 * 10 =	0.0000 (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) =					0.0000 / (5) = 0.0000 (8)							
Pressure test					Yes							
Measured/design AP50					2.5000							
Infiltration rate					0.1250 (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) =				0.1063 (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	
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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	
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	0.2657	0.2631	0.2604	0.2471	0.2445	0.2312	0.2312	0.2285	0.2365	0.2445	0.2498	0.2551 (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						
Glazing E, S, W (Uw = 0.80)			19.9700	0.7752	15.4806		(27)						
Corridor Door			2.1000	0.5000	1.0500		(26)						
External Wall	56.9400	19.9700	36.9700	0.1500	5.5455	14.0000	517.5800 (29a)						
Corridor	24.3100	2.1000	22.2100	0.1500	3.3315	14.0000	310.9400 (29a)						
Total net area of external elements Aum(A, m2)			81.2500	(26)...(30) + (32) =	25.4076		(31)						
Fabric heat loss, W/K = Sum (A x U)													
Party Wall 1			32.6300	0.0000	0.0000	20.0000	652.6000 (32)						
Party Floor 1			86.1000			40.0000	3444.0000 (32a)						
Party Ceilings 1			86.1000			40.0000	3444.0000 (32b)						
Timber Frame			181.5300			9.0000	1633.7000 (32c)						
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10002.8900 (34)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							116.1776 (35)						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							13.8165 (36)						
Total fabric heat loss						(33) + (36) =	39.2241 (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	19.6297	19.4334	19.2372	18.2561	18.0598	17.0787	17.0787	16.8825	17.4712	18.0598	18.4523	18.8447	(38)
Average = Sum(39m) / 12 =	58.8538	58.6576	58.4613	57.4802	57.2840	56.3028	56.3028	56.1066	56.6953	57.2840	57.6764	58.0689	(39)
	57.4331												(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6836	0.6813	0.6790	0.6676	0.6653	0.6539	0.6539	0.6516	0.6585	0.6653	0.6699	0.6744	(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												2.5685 (42)
Average daily hot water use (litres/day)												95.2016 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218 (44)
Energy conte	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974	150.3992 (45)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	Total = Sum(45)m = 1497.8923 (45)											
Distribution loss (46)m = 0.15 x (45)m	23.2949											
Water storage losses:	3.0000 (47)											
Store volume	0.0212 (51)											
b) If manufacturer declared loss factor is not known :	3.4200 (52)											
Hot water storage loss factor from Table 2 (kWh/litre/day)	1.0000 (53)											
Volume factor from Table 2a	0.2173 (55)											
Temperature factor from Table 2b												
Enter (49) or (54) in (55)												
Total storage loss	6.7353 (56)											
If cylinder contains dedicated solar storage	6.7353 (57)											
Primary loss	23.2624 (59)											
Total heat required for water heating calculated for each month	185.2971 (60)											
Solar input	0.0000 (63)											
Output from w/h	185.2971 (64)											
Heat gains from water heating, kWh/month	75.6352 (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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245 (66)
Lighting gains (calculated in Appendix L, equation 19 or 19a), also see Table 5	20.6577	18.3480	14.9216	11.2966	8.4444	7.1291	7.7032	10.0129	13.4394	17.0643	19.9166	21.2319 (67)
Appliances gains (calculated in Appendix L, equation 113 or 113a), also see Table 5	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931 (68)
Cooking gains (calculated in Appendix L, equation 115 or 115a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424 (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)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396 (71)
Water heating gains (Table 5)	101.6602	99.4611	94.8943	88.6859	84.6552	78.9797	74.1556	80.3365	82.5326	88.9585	96.2144	99.4703 (72)
Total internal gains	415.5624	413.4580	399.4056	376.6728	353.5065	331.2118	316.7380	322.8241	334.5058	357.4361	383.8476	403.7226 (73)

6. Solar gains

[Jan]	Area m2	Solar Flux Table 6a	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
East	5.3600	19.6403	0.4200	0.8000	0.7700	24.5123 (76)						
South	14.6100	46.7521	0.4200	0.8000	0.7700	159.0463 (78)						
Solar gains	183.5586	308.4281	410.7703	490.1790	531.9281	520.5627	505.0063	475.0033	438.4498	337.8470	219.0881	157.5884 (83)
Total gains	599.1210	721.8862	810.1759	866.8518	885.4346	851.7745	821.7443	797.8274	772.9556	695.3031	602.9357	561.3110 (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	47.2116	47.3695	47.5285	48.3398	48.5054	49.3506	49.3506	49.2332	49.0909	48.5054	48.1755	47.8497
alpha	4.1474	4.1580	4.1686	4.2227	4.2337	4.2900	4.2900	4.2505	4.2673	4.2337	4.2117	4.1900
util living area	0.9456	0.8972	0.8243	0.7108	0.5717	0.4169	0.3002	0.3218	0.4920	0.7418	0.9035	0.9556 (86)
MIT	20.0768	20.3414	20.6005	20.8229	20.9407	20.9882	20.9977	20.9969	20.9757	20.8215	20.4272	20.0228 (87)
Th 2	20.3574	20.3574	20.3594	20.3695	20.3716	20.3817	20.3817	20.3817	20.3777	20.3716	20.3675	20.3635 (88)
util rest of house	0.9388	0.8857	0.8066	0.6852	0.5386	0.3783	0.2585	0.2793	0.4512	0.7127	0.8907	0.9499 (89)
MIT 2	19.1152	19.4885	19.8493	20.1561	20.3067	20.3710	20.3801	20.3815	20.3543	20.1616	19.6227	19.0422 (90)
Living area fraction	0.9388	0.8857	0.8066	0.6852	0.5386	0.3783	0.2585	0.2793	0.4512	0.7127	0.8907	0.9499 (89)
MIT	19.4322	19.7708	20.0980	20.3768	20.5166	20.5753	20.5846	20.5852	20.5600	20.3800	19.8890	19.3668 (92)
Temperature adjustment	0.6744	0.6744	0.6744	0.6744	0.6744	0.6744	0.6744	0.6744	0.6744	0.6744	0.6744	0.6744 (93)
adjusted MIT	19.4322	19.7708	20.0980	20.3768	20.5166	20.5753	20.5846	20.5852	20.5600	20.3800	19.8890	19.3668 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9273	0.8741	0.7988	0.6855	0.5464	0.3905	0.2722	0.2832	0.4633	0.7131	0.8799	0.9392 (94)
Useful gains	555.5841	630.9666	647.1678	594.1992	483.7786	332.6148	223.7198	23.7578	35.1841	49.6267	530.5198	52.1842 (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	890.5855	872.2865	794.9554	659.6911	505.0480	336.4265	224.3422	234.8190	366.2488	560.2383	737.6226	880.7195 (97)
Month frost	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.2000	1.0000	1.0000 (98)
Space heating kWh	249.2410	162.1670	109.9539	47.1527	15.8244	0.0000	0.0000	0.0000	0.0000	47.9222	149.1140	263.0033 (98)
Space heating												104.4056 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating per m2 (98) / (4) = 12.1301 (99)

8c. Space cooling requirement

Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (301)
Fraction of space heat from community system 1.0000 (302)
Fraction of heat from community Heat pump 0.9500 (303a)
Fraction of heat from community Boilers 0.0500 (303b)
Fraction of total space heat from community Heat pump 0.9500 (304a)
Fraction of total space heat from community Boilers 0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating 1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating 1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system 1.0500 (306)
Space heating:
Annual space heating requirement 1044.4056 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05 1041.7846 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05 54.8313 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) 0.0000 (308)
Space heating fuel for secondary/supplementary system 0.0000 (309)
Water heating:
Annual water heating requirement 1851.0910 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05 1846.4632 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05 97.1823 (310b)
Electricity used for heat distribution 30.4027 (313)
Annual totals kWh/year
Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8500)
mechanical ventilation fans (SFP = 0.8500) 232.1428 (330a)
Total electricity for the above, kWh/year 232.1428 (331)
Electricity for lighting (calculated in Appendix L) 364.8223 (332)
Total delivered energy for all uses 3637.2365 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	902.5806	0.5190	468.4393 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	160.0143	0.5190	83.0474 (368)
Electrical energy for heat distribution	30.4027	0.5190	15.7790 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFER)			567.2657 (373)
Space and water heating	232.1428	0.5190	567.2657 (376)
Pumps and fans			120.4821 (378)
Energy for lighting	364.8223	0.5190	189.3428 (379)
Total CO2, kg/year			877.0906 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			10.1900 (384)

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

	TFA	EF	CO2
Total Floor Area	86.1000		10.1900 ZC1
Assumed number of occupants	2.5685		2.5685
CO2 emission factor in Table 12 for electricity displaced from grid		0.5190	0.5190
CO2 emissions from appliances, equation (L14)			15.9478 ZC2
CO2 emissions from cooking, equation (L16)			2.0981 ZC3
Total CO2 emissions			28.2359 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			28.2359 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	86.1000 (1b)	2.6000 (2b)	223.8600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 223.8600 (5)

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				3	3 * 10 = 30.0000 (7a)							
Number of passive vents				0	0 * 10 = 0.0000 (7b)							
Number of fuelless gas fires				0	0 * 40 = 0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1340 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.3840 (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) =	0.3264 (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	0.4162	0.4080	0.3999	0.3591	0.3509	0.3101	0.3101	0.3019	0.3264	0.3509	0.3672	0.3835 (22b)
	0.5866	0.5832	0.5799	0.5645	0.5616	0.5481	0.5481	0.5456	0.5533	0.5616	0.5674	0.5735 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			19.4200	1.3258	25.7462		(27)					
External Wall	56.9400	19.4200	37.5200	0.1800	6.7536		(29a)					
Corridor	24.3100	2.1000	22.2100	0.1800	3.9978		(29a)					
Total net area of external elements Aum(A, m2)			81.2500				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	38.5976	(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							1.2270 (36)					
Total fabric heat loss							(33) + (36) = 45.8246 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.3344	Feb 43.0860	Mar 42.8425	Apr 41.6987	May 41.4847	Jun 40.4886	Jul 40.4886	Aug 40.3041	Sep 40.8723	Oct 41.4847	Nov 41.9176	Dec 42.3702 (38)
Heat transfer coeff	89.1590	88.9106	88.6671	87.5233	87.3094	86.3132	86.3132	86.1287	86.6969	87.3094	87.7422	88.1948 (39)
Average = Sum(39)m / 12 =												87.5223 (39)
HLP	Jan 1.0355	Feb 1.0326	Mar 1.0298	Apr 1.0165	May 1.0140	Jun 1.0025	Jul 1.0025	Aug 1.0003	Sep 1.0069	Oct 1.0140	Nov 1.0191	Dec 1.0243 (40)
HLP (average)												1.0165 (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												2.5685 (42)
Average daily hot water use (litres/day)												95.2016 (43)
Daily hot water use	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218 (44)
Energy conte	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974	150.3992 (45)
Energy content (annual)										Total = Sum(45)m =		1497.8923 (45)
Distribution loss (46)m = 0.15 x (45)m	23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	19.0317	20.7746	22.5599 (46)
Water storage loss:												3.0000 (47)
Store volume												0.2602 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.1405 (55)
Enter (49) or (54) in (55)												
Total storage loss												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168 (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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168 (64)
Heat gains from water heating, kWh/month	73.7312	65.1181	68.6974	62.0113	61.0794	55.0228	53.2678	57.8664	57.5809	64.2811	67.4318	72.1019 (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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245 (66)
Lighting gains (calculated in Appendix L, equation L10 or L1a), also see Table 5	20.6543	18.3450	14.9192	11.2948	8.4430	7.1279	7.7020	10.0113	13.4371	17.0615	19.9133	21.2284 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424 (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)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396 (71)
Water heating gains (Table 5)	99.1011	96.9019	92.3352	86.1267	82.0960	76.4205	71.5965	77.7774	79.9734	86.3993	93.6553	96.9111 (72)
Total internal gains	415.9998	413.8958	399.8440	377.1117	353.9460	331.6515	317.1775	323.2632	334.9444	357.8942	384.2851	404.1599 (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
East	5.2100	19.6403	0.6300	0.7000	0.7700	31.2721 (76)
South	14.2100	46.7521	0.6300	0.7000	0.7700	203.0330 (78)
Solar gains	234.3051	393.6906	524.3124	625.6541	678.9288	664.4174
Total gains	650.3049	807.5865	1048.1564	1252.7058	1347.8576	1368.4504

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, nil,m (see Table 9a)	0.9939	0.9806	0.9481	0.8696	0.7306	0.5454	0.3936	0.4242	0.6437	0.9004	0.9840	0.9958 (86)
MIT	20.0613	20.2872	20.5434	20.7909	20.9359	20.9897	20.9986	20.9979	20.9749	20.7791	20.3672	20.0188 (87)
Th 2	20.0538	20.0562	20.0586	20.0696	20.0716	20.0813	20.0813	20.0831	20.0776	20.0716	20.0675	20.0631 (88)
util rest of house	0.9920	0.9749	0.9334	0.8365	0.6740	0.4711	0.3121	0.3407	0.5675	0.8668	0.9783	0.9944 (89)
MIT 2	18.8146	19.1416	19.5040	19.8423	20.0147	20.0750	20.0808	20.0822	20.0603	19.8375	19.2684	18.7598 (90)
Living area fraction	0.9920	0.9749	0.9334	0.8365	0.6740	0.4711	0.3121	0.3407	0.5675	0.8668	0.9783	0.9944 (91)
MIT	19.2273	19.5208	19.8480	20.1563	20.3196	20.3778	20.3846	20.3853	20.3630	20.1492	19.6321	19.1766 (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	19.2273	19.5208	19.8480	20.1563	20.3196	20.3778	20.3846	20.3853	20.3630	20.1492	19.6321	19.1766 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	643.6288	784.0222	859.1027	842.1584	712.4936	493.5389	326.1594	342.4537	529.4363	686.5349	647.2742	600.8697 (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	1330.9024	1299.9470	1183.5292	985.1857	752.5724	498.6997	326.6600	343.2519	542.9837	833.7330	1099.5967	1320.8547 (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	511.3316	346.7015	241.3733	102.9797	29.8186	0.0000	0.0000	0.0000	0.0000	109.5153	325.6722	535.6689 (98)
Space heating												2203.0611 (98)
Space heating per m2												25.3872 (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													2356.2151 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency (main heating system 1)	511.3316	346.7015	241.3733	102.9797	29.8186	0.0000	0.0000	0.0000	0.0000	109.5153	325.6722	535.6689	(98)
Space heating efficiency (secondary/supplementary 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)	546.8787	370.8037	258.1533	110.1387	31.8916	0.0000	0.0000	0.0000	0.0000	117.1287	348.3125	572.9079	(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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168	(64)
Efficiency of water heater	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	(216)
(217)7	87.4119	86.8123	85.7833	83.8530	81.4437	79.8000	79.8000	79.8000	79.8000	83.9156	86.5921	87.5712	(217)
Fuel for water heating, kWh/month	209.2588	185.1936	195.5832	177.5986	177.8734	160.2804	152.0965	169.4277	169.9214	184.1086	190.8074	203.2825	(219)
Water heating fuel used													
Annual totals kWh/year													2175.4320 (219)
Space heating fuel - main system													2356.2151 (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)													364.7619 (232)
Total delivered energy for all uses													4971.4090 (238)

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

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
2356.2151	0.2160	508.9425 (261)
0.0000	0.0000	0.0000 (263)
2175.4320	0.2160	469.8933 (264)
Space and water heating		978.8358 (265)
Pumps and fans		38.9250 (267)
Energy for lighting		189.3114 (268)
Total CO2, kg/m2/year		1207.0722 (272)
Emissions per m2 for space and water heating		11.3686 (272a)
Fuel factor (electricity)		1.5500
Emissions per m2 for lighting		2.1987 (272b)
Emissions per m2 for pumps and fans		0.4521 (272c)
Target Carbon Dioxide Emission Rate (TER) = (11.3686 * 1.55) + 2.1987 + 0.4521, rounded to 2 d.p.		20.2700 (273)

Appendix D

TER / DER Worksheets – *Be Green*

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End EF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End EF GREEN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End EF, St Ann's Hospital, London, N15					
SAP Rating	83 B	DER	8.26	TER	30.76	
Environmental	95 A	% DER<TER	73.15			
CO ₂ Emissions (t/year)	0.33	DFEE	45.77	TFEE	61.28	
General Requirements Compliance	Pass	% DFEE<TFEE	25.31			
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 55 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 30.76 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 8.26 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)61.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof (no roof)			
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls:

No cylinderstat

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:	0.52	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	7.58 m ² , No overhang	
Windows facing West:	8.03 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
Exposed floor U-value	0.12 W/m ² K
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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												
Ground floor	Area (m2)		Storey height (m)		Volume (m3)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		2.6000 (2b)		= 143.2600 (1b) - (3b)							
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 143.2600 (5)							

2. Ventilation rate												
Number of chimneys	main heating		secondary heating		other		total		m3 per hour			
Number of open flues	0		0		0		0		0.0000 (6a)			
Number of intermittent fans	0		0		0		0		0.0000 (6b)			
Number of passive vents	0		0		0		0		0.0000 (7a)			
Number of fuelless gas fires	0		0		0		0		0.0000 (7c)			
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =							0.0000 / (5) =		0.0000 (8)			
Pressure test	Yes						2.5000		1.1750 (22a)			
Measured/design AP50									0.1250 (18)			
Infiltration rate									2 (19)			
Number of sides sheltered												
Shelter factor					(20) = 1 - (0.075 x (19)) =				0.8500 (20)			
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) =				0.1063 (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 (22a)
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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =											0.5000 (23a)	
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (23c)

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	
Glazing North (Uw = 0.80)	7.5800		0.7752		5.8760		6.2248		47.3000 (27)			
Glazing E, S, W (Uw = 0.80)	8.0300		0.7752		6.2248		47.3000 (27)					
Corridor Door	2.1000		0.5000		1.6000		1.0500		16.0500 (26)			
Exposed Floor	55.1000		0.1200		6.6120		1.1250		61.8125 (28b)			
External Wall	30.2800		0.1500		4.5420		14.0000		423.9200 (29a)			
Corridor	10.5300		2.1000		8.4300		0.1500		12.6450 (29a)			
Total net area of external elements Aum(A, m2)	111.5200											
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =		25.5693		402.3700 (34)			
Party Wall 1	27.5600		0.0000		0.0000		20.0000		551.2000 (32)			
Party Ceilings 1	55.1000		2204.0000		0.0000		9.0000		742.2300 (32c)			
Timber Frame	82.4700											
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =		4039.3700 (34)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											73.3098 (35)	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											15.0450 (36)	
Total fabric heat loss									(33) + (36) =		40.6143 (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	11.5575	11.4319	11.3063	10.6784	10.5528	9.9250	9.9250	9.7994	10.1761	10.5528	10.8040	11.0552 (38)
Heat transfer coeff	52.1718	52.0462	51.9206	51.2927	51.1672	50.5393	50.5393	50.4137	50.7904	51.1672	51.6695 (39)	
Average = Sum(39)m / 12 =											51.2613 (39)	
HLP	0.9469	0.9446	0.9423	0.9309	0.9286	0.9172	0.9172	0.9149	0.9218	0.9286	0.9332	Dec
HLP (average)											0.9377 (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											1.8403 (42)	
Average daily hot water use (litres/day)											77.9069 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)	
Distribution loss (46)m = 0.15 x (45)m										Sum(45)m =	1225.7783 (45)	
19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)	
Water storage loss:												
Store volume											3.0000 (47)	
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)											0.0212 (51)	
Volume factor from Table 2a											3.4200 (52)	
Temperature factor from Table 2b											1.0000 (53)	
Enter (49) or (54) in (55)											0.2173 (55)	
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.5180	6.7353	6.5180	6.7353 (56)	
If cylinder contains dedicated solar storage												
Primary loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.5180	6.7353	6.5180	6.7353 (57)	
23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Total heat required for water heating calculated for each month												
157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (62)	
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												
Output from w/h	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (64)
Heat gains from water heating, kWh/month	66.2546	58.6335	62.1352	56.4728	55.9012	50.7539	49.5087	53.2718	52.8473	58.5212	60.9087	64.9212 (65)
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
14.3036	12.7044	10.3319	7.8219	5.8470	4.9363	5.3338	6.9331	9.3055	11.8155	13.7905	14.7012 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (69)	
Losses, 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)
Pumps, e.g. evaporation (negative values) (Table 5)												
-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)	
Water heating gains (Table 5)												
89.0519	87.2522	83.5151	78.4345	75.1360	70.4916	66.5439	71.6019	73.3990	78.6576	84.5954	87.2597 (72)	
Total internal gains	314.4031	312.6691	302.3640	285.8418	269.2936	253.1419	242.5126	247.5050	255.8701	272.5703	291.7577	305.9294 (73)
6. Solar gains												
[Jan]		Area m2		Solar Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North		7.5800		10.6334		0.5000		0.8000		0.7700		22.3426 (74)
West		8.0300		19.6403		0.4200		0.8000		0.7000		36.7228 (80)
Solar gains	59.0654	114.5354	190.8603	289.0831	368.4482	384.5276	362.9914	301.5090	224.8286	136.0675	73.3515	48.8249 (83)
Total gains	373.4685	427.2046	493.2244	574.9249	637.7418	637.6694	605.5039	549.0140	480.6987	408.6378	365.1092	354.7543 (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	21.5068	21.5587	21.5587	21.8754	21.9291	22.2015	22.2015	22.2568	22.0917	21.9291	21.8219	21.7159
alpha	2.4338	2.4372	2.4407	2.4584	2.4619	2.4801	2.4801	2.4838	2.4728	2.4619	2.4548	2.4477
util living area	0.9231	0.8947	0.8398	0.7375	0.6016	0.4560	0.3473	0.3922	0.5933	0.7978	0.8957	0.9307 (86)
MIT	18.7802	19.0767	19.5692	20.1650	20.6081	20.8603	20.9483	20.9291	20.7218	20.1238	19.3554	18.7229 (87)
Th 2	20.1279	20.1298	20.1317	20.1413	20.1432	20.1529	20.1529	20.1548	20.1490	20.1432	20.1394	20.1355 (88)
util rest of house	0.9150	0.8839	0.8255	0.7119	0.5643	0.4060	0.2862	0.3283	0.5425	0.7713	0.8833	0.9233 (89)
MIT 2	17.1389	17.5643	18.2655	19.1006	19.6940	20.0166	20.1135	20.0982	19.8588	19.0655	17.9773	17.0611 (90)
Living area fraction									fLA = Living area / (4)			0.5145 (91)
MIT	17.9934	18.3424	18.9363	19.6482	20.1643	20.4507	20.5430	20.5257	20.3028	19.6100	18.6863	17.9161 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9934	18.3424	18.9363	19.6482	20.1643	20.4507	20.5430	20.5257	20.3028	19.6100	18.6863	17.9161 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8895	0.8567	0.7975	0.6958	0.5652	0.4240	0.3148	0.3570	0.5521	0.7526	0.8573	0.8989 (94)
Useful gains	332.2099	365.9804	393.3380	400.0268	360.4689	270.3684	190.6030	195.991	265.4132	307.5596	313.0211	318.8878 (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												
713.8852	699.6275	645.7011	551.3070	443.0932	295.6914	199.2775	207.9936	315.0445	461.0159	595.7496	708.7053 (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 (97)
Space heating kWh	283.9664	224.2109	187.7581	108.9217	54.0325	0.0000	0.0000	0.0000	0.0000	114.7115	203.5645	290.0242 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating
Space heating per m2
(98) / (4) = 1466.6500 (98)
26.6180 (99)

8c. Space cooling requirement

Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)
Fraction of space heat from community system
Fraction of heat from community Heat pump
Fraction of heat from community Boilers
Fraction of total space heat from community Heat pump
Fraction of total space heat from community Boilers
Factor for control and charging method (Table 4c(3)) for community space heating
Factor for control and charging method (Table 4c(3)) for community water heating
Distribution loss factor (Table 12c) for community heating system
Space heating:
Annual space heating requirement
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)
Space heating fuel for secondary/supplementary system
Water heating
Annual water heating requirement
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05
Electricity used for heat distribution
Annual totals kWh/year
Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)
mechanical ventilation fans (SFP = 0.6500)
Total electricity for the above, kWh/year
Electricity for lighting (calculated in Appendix L)
Energy saving/generation technologies (Appendices M, N and Q)
PV Unit 0 (0.80 + 0.84 + 951 + 1.00) =
Total delivered energy for all uses

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	949.3790	0.5190	492.7277 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	168.3110	0.5190	87.3534 (368)
Electrical energy for heat distribution	31.9791	0.5190	16.5971 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEF)			596.6783 (373)
Space and water heating			596.6783 (376)
Pumps and fans	113.6052	0.5190	58.9611 (378)
Energy for lighting	252.6067	0.5190	131.1029 (379)
Energy saving/generation technologies			
PV Unit	-638.8140	0.5190	-331.5444 (380)
Total CO2, kg/year			455.1978 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			8.2600 (384)

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

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	55.1000 (1b)	2.6000 (2b)	143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.2600 (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) =	0.1396 (8)							
Pressure test				Yes								
Measured/design AP50					5.0000							
Infiltration rate					6.3896 (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) =	0.3312 (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	0.4222	0.4140	0.4057	0.3643	0.3560	0.3146	0.3146	0.3063	0.3312	0.3560	0.3726	0.3891 (22b)
Effective ac	0.5891	0.5857	0.5823	0.5664	0.5634	0.5495	0.5495	0.5469	0.5548	0.5634	0.5694	0.5757 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			11.6600	1.3258	15.4583		(27)					
Exposed Floor			55.1000	0.1300	7.1630		(28b)					
External Wall	45.8900	11.6600	34.2300	0.1800	6.1614		(29a)					
Corridor	10.5300	2.1000	8.4300	0.1800	1.5174		(29a)					
Total net area of external elements Aum(A, m2)			111.5300				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	32.4001		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.7310 (36)					
Total fabric heat loss						(33) + (36) =	43.1311 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.8521	Feb 27.6885	Mar 27.5281	Apr 26.7747	May 26.6337	Jun 25.9775	Jul 25.9775	Aug 25.8560	Sep 26.2303	Oct 26.6337	Nov 26.9189	Dec 27.2170 (38)
Heat transfer coeff	70.9833	70.8196	70.6592	69.9058	69.7649	69.1087	69.1087	68.9871	69.3614	69.7649	70.0500	70.3481 (39)
Average = Sum(39)m / 12 =												69.9051 (39)
HLP	Jan 1.2883	Feb 1.2853	Mar 1.2824	Apr 1.2687	May 1.2661	Jun 1.2542	Jul 1.2542	Aug 1.2520	Sep 1.2588	Oct 1.2661	Nov 1.2713	Dec 1.2767 (40)
HLP (average)												1.2687 (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												1.8403 (42)
Average daily hot water use (litres/day)												77.9069 (43)
Daily hot water use	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)
Energy conte	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)
Energy content (annual)												Total = Sum(45)m = 1225.7783 (45)
Distribution loss (46)m = 0.15 x (45)m												
19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)	
Water storage loss:												
Store volume												3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.2602 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.1405 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9398	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9398	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (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(62)m =												0.0000 (63)
Output from w/h	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Heat gains from water heating, kWh/month	64.3506	56.9137	60.2312	54.6303	53.9972	48.9113	47.6046	51.3678	51.0047	56.6172	59.0661	63.0172 (65)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.3355	12.7327	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.561	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)
Water heating gains (Table 5)	86.4927	84.6931	80.9559	75.8753	72.5769	67.9324	63.9847	69.0428	70.8399	76.0984	82.0362	84.7006 (72)
Total internal gains	314.8758	313.1383	302.8279	286.3000	269.7475	253.5937	242.9653	247.9612	256.3316	273.0374	292.2292	306.4030 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g	Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
North	5.6600	10.6334	0.6300	0.7000	0.7000	0.7700	18.3933 (74)					
West	6.0000	19.6403	0.6300	0.7000	0.7000	0.7700	36.0139 (80)					
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421	331.2781	276.0875	206.7531	125.4381	67.5956	44.9497 (83)
Total gains	369.2831	418.7397	478.5798	551.4527	606.3641	604.2358	574.2433	524.0488	463.0847	398.4755	359.8249	351.3526 (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, nil,m (see Table 9a)												
tau	53.9055	54.0301	54.1327	54.7363	54.8469	55.3677	55.3677	55.4652	55.1660	54.8469	54.6237	54.3922
alpha	4.5937	4.6020	4.6102	4.6491	4.6565	4.6912	4.6912	4.6977	4.6777	4.6565	4.6416	4.6261
util living area	0.9968	0.9937	0.9838	0.9477	0.8499	0.6773	0.5166	0.5815	0.8372	0.9714	0.9938	0.9974 (86)
MIT	19.6411	19.7955	20.0784	20.4607	20.7772	20.9448	20.9875	20.9789	20.8480	20.4350	19.9726	19.6149 (87)
Th 2	19.8500	19.8524	19.8547	19.8654	19.8674	19.8769	19.8769	19.8786	19.8732	19.8674	19.8634	19.8591 (88)
util rest of house	0.9956	0.9915	0.9780	0.9281	0.7967	0.5798	0.3913	0.4515	0.7592	0.9569	0.9912	0.9965 (89)
MIT 2	18.0575	18.2840	18.6953	19.2430	19.6554	19.8417	19.8726	19.8704	19.7536	19.2190	18.5508	18.0255 (90)
Living area fraction	18.8723	19.0617	19.4070	19.8695	20.2326	20.4093	20.4462	20.4408	20.3167	19.8447	19.2823	18.8433 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8723	19.0617	19.4070	19.8695	20.2326	20.4093	20.4462	20.4408	20.3167	19.8447	19.2823	18.8433 (93)

8. Space heating requirement												
Utilisation	0.9943	0.9895	0.9750	0.9282	0.8155	0.6281	0.4561	0.5187	0.7933	0.9566	0.9894	0.9954 (94)
Useful gains	367.1838	414.3256	466.6218	511.8630	494.5082	379.5360	261.9111	271.8451	367.3496	381.1638	356.0158	349.7512 (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	1034.3890	1002.9236	911.9954	766.8327	595.2758	401.4697	265.8084	278.7600	431.2018	644.9532	853.3703	1030.1260 (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	496.4007	395.5379	331.3580	183.5782	74.9711	0.0000	0.0000	0.0000	0.0000	196.2593	358.0952	506.1989 (98)
Space heating												2542.3991 (98)
Space heating per m2										(98) / (4) =		46.1415 (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												2719.1435 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	496.4007	395.5379	331.3580	183.5782	74.9711	0.0000	0.0000	0.0000	0.0000	196.2593	358.0952	506.1989 (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)	530.9098	423.0352	354.3935	196.3403	80.1830	0.0000	0.0000	0.0000	0.0000	209.9030	382.9895	541.3892 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Water heating requirement	496.4007	395.5379	331.3580	183.5782	74.9711	0.0000	0.0000	0.0000	0.0000	196.2593	358.0952	506.1989 (98)
Efficiency of water heater	87.7058	87.4967	86.9953	85.8016	83.5293	79.8000	79.8000	79.8000	79.8000	85.8811	87.2121	79.8000 (216)
Fuel for water heating, kWh/month	176.3905	155.5443	163.5900	147.6933	147.9322	137.2475	130.7531	144.9358	145.1371	153.0565	160.6016	171.6353 (219)
Water heating fuel used												1834.5173 (219)
Annual totals kWh/year												
Space heating fuel - main system												2719.1435 (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)												253.1691 (232)
Total delivered energy for all uses												4881.8299 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
Energy kWh/year	2719.1435	Emission factor kg CO2/kWh	0.2160	Emissions kg CO2/year	587.3350 (261)							
Space heating - main system 1	2719.1435	0.0000	0.2160	0.0000	0.0000 (263)							
Space heating - secondary	0.0000	0.2160	0.0000	0.0000	0.0000 (264)							
Water heating (other fuel)	1834.5173	0.2160	0.2160	398.2557	398.2557 (265)							
Space and water heating				398.2557	398.2557 (265)							
Pumps and fans	75.0000	0.5190	0.5190	38.9250	38.9250 (267)							
Energy for lighting	253.1691	0.5190	0.5190	131.3948	131.3948 (268)							
Total CO2, kg/m2/year				1153.9105	1153.9105 (272)							
Emissions per m2 for space and water heating				17.8510	17.8510 (272a)							
Fuel factor (electricity)				1.5500	1.5500 (272b)							
Emissions per m2 for lighting				2.3847	2.3847 (272b)							
Emissions per m2 for pumps and fans				0.7064	0.7064 (272c)							
Target Carbon Dioxide Emission Rate (TER) = (17.8510 * 1.55) + 2.3847 + 0.7064, rounded to 2 d.p.				30.7600	30.7600 (273)							



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End MF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End MF GREEN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End MF, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	6.46	TER	26.11	
Environmental	96 A	% DER<TER	75.25			
CO ₂ Emissions (t/year)	0.24	DFEE	37.76	TFEE	46.00	
General Requirements Compliance	Pass	% DFEE<TFEE	17.92			
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 55 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 26.11 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 6.46 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)46.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)37.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor (no floor)			
Roof (no roof)			
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.52	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	7.58 m ² , No overhang	
Windows facing West:	8.03 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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	55.1000 (1b)	x 2.6000 (2b)	= 143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 143.2600 (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 * 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) =					0.0000 / (5) = 0.0000 (8)								
Pressure test					Yes								
Measured/design AP50					2.5000								
Infiltration rate					0.1250 (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) =				0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)	
Balanced mechanical ventilation with heat recovery													0.5000 (23a)
If mechanical ventilation:													78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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					
Glazing North (Uw = 0.80)			7.5800	0.7752	5.8760	6.2248	(27)					
Glazing E, S, W (Uw = 0.80)			8.0300	0.7752	6.2248		(28)					
Corridor Door		2.1000	2.1000	0.5000	1.0500		(29)					
External Wall	45.8900	15.6100	30.2800	0.1500	4.5420	14.0000	423.9200 (29a)					
Corridor	10.5300	2.1000	8.4300	0.1500	1.2645	14.0000	118.0200 (29b)					
Total net area of external elements Aum(A, m2)			56.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	18.9573	0.0000						
Party Wall 1			27.5600	0.0000	0.0000	20.0000	551.2000 (32)					
Party Floor 1			55.1000			40.0000	2204.0000 (32a)					
Party Ceilings 1			55.1000			40.0000	2204.0000 (32b)					
Timber Frame			82.4700			9.0000	742.2300 (32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		6243.3700 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							113.3098 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.8888 (36)					
Total fabric heat loss						(33) + (36) =	30.8461 (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	11.5575	11.4319	11.3063	10.6784	10.5528	9.9250	9.9250	9.7994	10.1761	10.5528	10.8040	11.0552 (38)
Heat transfer coeff	42.4035	42.2779	42.1524	41.5245	41.3989	40.7710	40.7710	40.6455	41.0222	41.3989	41.6501	41.9012 (39)
Average = Sum(39)m / 12 =												41.4931 (39)
HLP	0.7696	0.7673	0.7650	0.7536	0.7513	0.7399	0.7399	0.7377	0.7445	0.7513	0.7559	0.7605 (40)
HLP (average)												0.7531 (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												
Average daily hot water use (litres/day)												
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
	19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)
Water storage loss:												
Store volume												
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												
Volume factor from Table 2a												
Temperature factor from Table 2b												
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage												
	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (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 (58)
Total heat required for water heating calculated for each month	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (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 =												
Output from w/h	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (64)
Heat gains from water heating, kWh/month	66.2546	58.6335	62.1352	56.4728	55.9012	50.7539	49.5087	53.2718	52.8473	58.5212	60.9087	64.9212 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.3036	12.7044	10.3319	7.8219	5.8470	4.9363	5.3338	6.9331	9.3055	11.8155	13.7905	14.7012 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)
Water heating gains (Table 5)	89.0519	87.2522	83.5151	78.4345	75.1360	70.4916	66.5439	71.6019	73.3990	78.6576	84.5954	87.2597 (72)
Total internal gains	314.4031	312.6691	302.3640	285.8418	269.2936	253.1419	242.5126	247.5050	255.8701	272.5703	291.7577	305.9294 (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		7.9800	10.6334	0.5000	0.8000	0.7700	22.3426 (74)
West		8.0300	19.6403	0.4200	0.8000	0.7700	36.7228 (80)
Solar gains	59.0654	114.5354	190.8603	289.0831	368.4482	384.5276	362.9914
Total gains	373.4685	427.2046	493.2244	574.9249	637.7418	637.6694	605.5039
							549.0140
							480.6987
							408.6378
							365.1092
							354.7543 (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, nilm (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	40.8992	41.0207	41.1429	41.7650	41.8917	42.5368	42.5368	42.6682	42.2764	41.8917	41.6391	41.3895
alpha	3.7266	3.7347	3.7429	3.7843	3.7928	3.8358	3.8358	3.8445	3.8184	3.7928	3.7759	3.7593
util living area	0.9542	0.9265	0.8645	0.7347	0.5650	0.4012	0.2943	0.3370	0.5541	0.8115	0.9272	0.9608 (86)
MIT	19.7972	20.0251	20.3670	20.7247	20.9150	20.9825	20.9959	20.9932	20.9423	20.6594	20.1738	19.7543 (87)
Th 2	20.2798	20.2818	20.2838	20.2937	20.2957	20.3057	20.3057	20.3057	20.3017	20.2957	20.2917	20.2877 (88)
util rest of house	0.9481	0.9173	0.8485	0.7080	0.5293	0.3599	0.2486	0.2875	0.5062	0.7842	0.9164	0.9555 (89)
MIT 2	18.6597	18.9863	19.4685	19.9608	20.2899	20.3029	20.3029	20.3029	20.2458	19.8877	19.2104	18.6037 (90)
Living area fraction	19.2449	19.5208	19.9308	20.3538	20.5695	20.6462	20.6594	20.6580	20.6042	20.2847	19.7061	19.1957 (92)
Temperature adjustment	19.2449	19.5208	19.9308	20.3538	20.5695	20.6462	20.6594	20.6580	20.6042	20.2847	19.7061	19.1957 (93)
adjusted MIT	19.2449	19.5208	19.9308	20.3538	20.5695	20.6462	20.6594	20.6580	20.6042	20.2847	19.7061	19.1957 (93)

8. Space heating requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating
Space heating per m2
(98) / (4) = 960.7746 (98)
17.4369 (99)

8c. Space cooling requirement

Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)
Fraction of space heat from community system
Fraction of heat from community Heat pump
Fraction of heat from community Boilers
Fraction of total space heat from community Heat pump
Fraction of total space heat from community Boilers
Factor for control and charging method (Table 4c(3)) for community space heating
Factor for control and charging method (Table 4c(3)) for community water heating
Distribution loss factor (Table 12c) for community heating system
Space heating:
Annual space heating requirement
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)
Space heating fuel for secondary/supplementary system
Water heating
Annual water heating requirement
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05
Electricity used for heat distribution
Annual totals kWh/year
Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)
mechanical ventilation fans (SFP = 0.6500)
Total electricity for the above, kWh/year
Electricity for lighting (calculated in Appendix L)
Energy saving/generation technologies (Appendices M, N and Q)
PV Unit 0 (0.80 * 0.84 * 951 * 1.00) =
Total delivered energy for all uses

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	791.6882	0.5190	410.8862 (367)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	140.3547	0.5190	72.8441 (368)
Electrical energy for heat distribution	26.6674	0.5190	13.8404 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEF)			497.5706 (373)
Space and water heating			58.9611 (378)
Pumps and fans	113.6052	0.5190	58.9611 (378)
Energy for lighting	252.6067	0.5190	131.1029 (379)
Energy saving/generation technologies			
PV Unit			
Total CO2, kg/year	-638.8140	0.5190	-331.5444 (380)
Dwelling Carbon Dioxide Emission Rate (DER)			356.0902 (383)

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

	TFA	N	EF	CO2
DER				6.4600 ZC1
Total Floor Area	55.1000			
Assumed number of occupants	1.8403			
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190			
CO2 emissions from appliances, equation (L14)				17.2551 ZC2
CO2 emissions from cooking, equation (L16)				2.9613 ZC3
Total CO2 emissions				26.6763 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				26.6763 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	55.1000 (1b)	2.6000 (2b)	143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		
Dwelling volume = (3a)+(3b)+(3c)+(3d)+(3e)...(3n)			143.2600 (5)

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	2 * 10 = 20.0000 (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) =				20.0000 / (5) =	0.1396 (8)							
Pressure test					Yes							
Measured/design AFS0					5.0000							
Infiltration rate					0.3896 (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) =	0.3312 (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	0.4222	0.4140	0.4057	0.3643	0.3560	0.3146	0.3146	0.3063	0.3312	0.3560	0.3726	0.3891 (22b)
Effective ac	0.5891	0.5857	0.5823	0.5664	0.5634	0.5495	0.5495	0.5469	0.5548	0.5634	0.5694	0.5757 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			11.6600	1.3258	15.4583		(27)					
External Wall	45.8900	11.6600	34.2300	0.1800	6.1614		(29a)					
Corridor	10.5300	2.1000	8.4300	0.1800	1.5174		(29a)					
Total net area of external elements Aum(A, m2)			56.4200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.2371		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.2100 (36)					
Total fabric heat loss							(33) + (36) = 30.4471 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 27.8521	Feb 27.6885	Mar 27.5281	Apr 26.7747	May 26.6337	Jun 25.9775	Jul 25.9775	Aug 25.8560	Sep 26.2303	Oct 26.6337	Nov 26.9189	Dec 27.2170 (38)
Heat transfer coeff	58.2993	58.1356	57.9752	57.2218	57.0809	56.4247	56.4247	56.3031	56.6774	57.0809	57.3660	57.6641 (39)
Average = Sum(39)m / 12 =												57.2211 (39)
HLP	Jan 1.0581	Feb 1.0551	Mar 1.0522	Apr 1.0385	May 1.0360	Jun 1.0240	Jul 1.0240	Aug 1.0218	Sep 1.0286	Oct 1.0360	Nov 1.0411	Dec 1.0465 (40)
HLP (average)												1.0385 (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												1.8403 (42)
Average daily hot water use (litres/day)												77.9069 (43)
Daily hot water use	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)
Energy conte	127.0870	111.1511	114.6980	99.9965	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770	123.0770 (45)
Energy content (annual)												Total = Sum(45)m = 1225.7783 (45)
Distribution loss (46)m = 0.15 x (45)m	19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)
Water storage loss:												3.0000 (47)
Store volume												0.2602 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.1405 (55)
Enter (49) or (54) in (55)												
Total storage loss												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Heat gains from water heating, kWh/month	64.3506	56.3137	60.2312	54.6303	53.9972	48.9113	47.6046	51.3678	51.0047	56.6172	59.0661	63.0172 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	(66)
Lighting gains (calculated in Appendix L, equation L10 or L9a), also see Table 5	14.3355	12.7327	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	(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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	(71)
Water heating gains (Table 5)	86.4927	84.6931	80.9559	75.8753	72.5769	67.9324	63.9847	69.0428	70.8399	76.0984	82.0362	84.7006 (72)
Total internal gains	314.8758	313.1383	302.8279	286.3000	269.7475	253.5937	242.9653	247.9612	256.3316	273.0374	292.2292	306.4030 (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	5.6600	10.6334	0.6300	0.7000	0.7700	18.3933 (74)
West	6.0000	19.6403	0.6300	0.7000	0.7700	36.0139 (80)
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421
Total gains	369.2831	418.7397	478.5798	551.4527	606.3641	604.2358

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, nil,m (see Table 9a)	65.6336	65.8183	66.0004	66.8694	67.0345	67.8141	67.8141	67.9605	67.5117	67.0345	66.7013	66.3565
tau	5.3756	5.3879	5.4000	5.4580	5.4690	5.5209	5.5209	5.5307	5.5008	5.4690	5.4468	5.4238
util living area	0.9966	0.9927	0.9789	0.9237	0.7842	0.5831	0.4299	0.4891	0.7668	0.9598	0.9928	0.9974 (86)
MIT	19.9503	20.0976	20.3541	20.6816	20.9036	20.9847	20.9976	20.9953	20.9373	20.6324	20.2346	19.9259 (87)
Th 2	20.0352	20.0377	20.0401	20.0514	20.0535	20.0633	20.0633	20.0652	20.0595	20.0535	20.0492	20.0447 (88)
util rest of house	0.9955	0.9903	0.9718	0.8997	0.7291	0.5040	0.3397	0.3924	0.6895	0.9420	0.9900	0.9965 (89)
MIT 2	18.6395	18.8555	19.2270	19.6896	19.9650	20.0538	20.0625	20.0633	20.0123	19.6348	19.0645	18.6109 (90)
Living area fraction	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319	0.1319 (91)
MIT	19.3139	19.4946	19.8069	20.2000	20.4480	20.5328	20.5436	20.5429	20.4882	20.1481	19.6665	19.2875 (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	19.3139	19.4946	19.8069	20.2000	20.4480	20.5328	20.5436	20.5429	20.4882	20.1481	19.6665	19.2875 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9944	0.9886	0.9698	0.9039	0.7532	0.5443	0.3862	0.4423	0.7267	0.9441	0.9885	0.9956 (94)
Ext temp	367.2110	413.9656	464.1087	498.4552	456.7383	328.9020	221.7891	231.7765	336.5043	376.2138	355.6844	349.8158 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Month fracti	875.2994	848.4653	771.4728	646.6061	499.3412	334.7549	222.5172	233.2556	362.0682	545.0120	720.8906	870.0053 (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	378.0178	291.9838	228.6789	106.6687	31.6965	0.0000	0.0000	0.0000	0.0000	125.5859	262.9485	387.0210 (98)
Space heating per m2												1812.6010 (98)
												32.8966 (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												1938.6107 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	378.0178	291.9838	228.6789	106.6687	31.6965	0.0000	0.0000	0.0000	0.0000	125.5859	262.9485	387.0210 (98)
Space heating fuel (main heating system)	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)
Water heating requirement	404.2971	312.2821	244.5764	114.0841	33.9000	0.0000	0.0000	0.0000	0.0000	134.3165	281.2283	413.9262 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Efficiency of water heater	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000	93.5000 (216)
Fuel for water heating, kWh/month	177.6008	156.7930	165.3434	150.2200	151.1080	137.2475	130.7531	144.9358	145.1371	155.2044	161.9791	172.7705 (219)
Water heating fuel used												1849.0927 (219)
Annual totals kWh/year												1938.6107 (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												251.1691 (232)
Electricity for lighting (calculated in Appendix L)												4115.8725 (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	418.7399 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	0.2160	399.4040 (264)
Space and water heating	0.5190	818.1439 (265)
Pumps and fans	0.5190	38.9250 (267)
Energy for lighting	0.5190	131.3948 (268)
Total CO2, kg/m2/year		988.4637 (272)
Emissions per m2 for space and water heating		14.8483 (272a)
Fuel factor (electricity)		1.5500
Emissions per m2 for lighting		2.3847 (272b)
Emissions per m2 for pumps and fans		0.7064 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.8483 * 1.55) + 2.3847 + 0.7064, rounded to 2 d.p.		26.1100 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-01 - End TF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-01 - End TF GREEN	Prop Type Ref	N / W			
Property	1B2P-C1-01 - End TF, St Ann's Hospital, London, N15					
SAP Rating	83 B	DER	8.72	TER	32.48	
Environmental	95 A	% DER<TER	73.16			
CO ₂ Emissions (t/year)	0.32	DFEE	50.29	TFEE	66.97	
General Requirements Compliance	Pass	% DFEE<TFEE	24.92			
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 55 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 32.48 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 8.72 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 67.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 50.3 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (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	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day
Permitted by DBSOG 0.35	OK
Primary pipework insulated:	No primary pipework

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder stat

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:	0.52
Maximum	1.5 OK
MVHR efficiency:	92%
Minimum:	70% OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	7.58 m ² , No overhang	
Windows facing West:	8.03 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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	55.1000 (1b)	2.6000 (2b)	143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	143.2600 (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 fires	0	0	0	0	0.0000 (6b)
Number of intermittent fans	0	0	0	0	0.0000 (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) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes		2.5000
Measured/design AP50	14.3036		0.1250 (18)
Infiltration rate			2 (19)
Number of sides sheltered			

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)

Balanced mechanical ventilation with heat recovery												0.5000 (22c)
If mechanical ventilation:												78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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
Glazing North (Uw = 0.80)	7.5800		7.5800	0.7752	5.8760		(27)
Glazing E, S, W (Uw = 0.80)	8.0300		8.0300	0.7752	6.2248		(27)
Corridor Door	2.1000		2.1000	0.5000	1.0500		(26)
External Wall	45.8900	15.6100	30.2800	0.1500	4.5420	14.0000	423.9200 (29a)
Corridor	10.5300	2.1000	8.4300	0.1500	1.2648	118.0200	(29a)
Main Roof	55.1000		55.1000	0.1000	5.5100	100.0000	5510.0000 (30)
Total net area of external elements Aum(A, m2)			111.5200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.4673		(33)
Party Wall 1			27.5600	0.0000	0.0000	20.0000	551.2000 (32)
Party Floor 1			55.1000	0.0000	0.0000	2204.0000	(32a)
Timber Frame			82.4700	0.0000	0.0000	9.0000	742.2300 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9549.3700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		173.3098 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		19.0375 (36)
Total fabric heat loss	(33) + (36) =	43.5048 (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	11.5575	11.4319	11.3063	10.6784	10.5528	9.9250	9.9250	9.7994	10.1761	10.5528	10.8040	11.0552 (38)
Average = Sum(39)m / 12 =	55.0623	54.9367	54.8111	54.1832	54.0577	53.4298	53.4298	53.3042	53.6809	54.0577	54.5600 (39)	54.1518 (39)

HLP	0.9993	0.9970	0.9948	0.9834	0.9811	0.9697	0.9697	0.9674	0.9742	0.9811	0.9856	0.9902 (40)
HLP (average)												0.9828 (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												1.8403 (42)
Average daily hot water use (litres/day)												77.9069 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy conte	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)
Energy content (annual)												1225.7783 (45)
Distribution loss (46)m = 0.15 x (45)m												
19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)	
Water storage loss:												3.0000 (47)
Store volume												0.0212 (51)
b) If manufacturer declared loss factor is not known :												3.4200 (52)
Hot water storage loss factor from Table 2 (kWh/litre/day)												1.0000 (53)
Volume factor from Table 2a												0.2173 (55)
Temperature factor from Table 2b												
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (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 (58)
Total heat required for water heating calculated for each month	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (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	157.0847	138.2458	144.6957	129.0265	125.9467	111.8267	106.7210	118.0388	118.1226	133.8265	142.3673	153.0747 (64)
Heat gains from water heating, kWh/month	66.2546	58.6335	62.1352	56.4728	55.9012	50.7539	49.5087	53.2718	52.8473	58.5212	60.9087	64.9212 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.3036	12.7044	10.3319	7.8219	5.8470	4.9363	5.3338	6.9331	9.3055	11.8155	13.7905	14.7012 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014 (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)	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116 (71)
Water heating gains (Table 5)	89.0519	87.2522	83.5151	78.4345	75.1360	70.4916	66.5439	71.6019	73.3990	78.6576	84.5954	87.2597 (72)
Total internal gains	314.4031	312.6691	302.3640	285.8418	269.2936	253.1419	242.5126	247.5050	255.8701	272.5703	291.7577	305.9294 (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		7.5800	10.6334	0.5000	0.8000	0.7700	22.3426 (74)
West		8.0300	19.6403	0.4200	0.8000	0.7700	36.7228 (80)
Solar gains	59.0654	114.5354	190.8603	289.0831	368.4482	384.5276	362.9914
Total gains	373.4685	427.2046	493.2244	574.9249	637.7418	637.6694	605.5039
						549.0140	480.6987
						408.6378	365.1092
							354.7543 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil/m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	4.2116	4.2190	4.2264	4.2637	4.2713	4.3098	4.3098	4.3176	4.2943	4.2713	4.2562	4.2412
util living area	0.9865	0.9755	0.9449	0.8591	0.7038	0.5187	0.3842	0.4389	0.6934	0.9141	0.9760	0.9890 (86)
MIT	19.7133	19.9073	20.2317	20.6210	20.8735	20.9736	20.9942	20.9900	20.9129	20.5575	20.0663	19.6761 (87)
Th 2	20.0839	20.0858	20.0877	20.0972	20.0991	20.1087	20.1087	20.1106	20.1049	20.0991	20.0953	20.0915 (88)
util rest of house	0.9835	0.9701	0.9330	0.8312	0.6543	0.4525	0.3082	0.3574	0.6234	0.8900	0.9699	0.9865 (89)
MIT 2	18.3680	18.6494	19.1135	19.6548	19.9728	20.0888	20.1058	20.1052	20.0302	19.5845	18.8887	18.3193 (90)
Living area fraction	19.0602	19.2966	19.6889	20.1520	20.4362	20.5441	20.5629	20.5605	20.4843	20.0852	19.4946	19.0174 (92)
Temperature adjustment	19.0602	19.2966	19.6889	20.1520	20.4362	20.5441	20.5629	20.5605	20.4843	20.0852	19.4946	19.0174 (92)
adjusted MIT	19.0602	19.2966	19.6889	20.1520	20.4362	20.5441	20.5629	20.5605	20.4843	20.0852	19.4946	19.0174 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9792	0.9644	0.9270	0.8330	0.6735	0.4853	0.3472	0.3991	0.6555	0.8896	0.9647	0.9827 (94)
Useful gains	365.6988	411.9801	457.1952	478.9119	429.5238	309.4863	210.2454	219.1106	315.1039	363.5295	352.2293	348.6208 (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	812.7310	790.9016	722.8962	609.6674	472.2610	317.5903	211.7380	221.7712	342.7174	512.7453	673.1365	808.4377 (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	332.5919	254.6352	197.6815	94.1440	31.7965	0.0000	0.0000	0.0000	0.0000	111.0165	231.0532	342.1038

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating
Space heating per m2
(98) / (4) = 1595.0226 (98)
28.9478 (99)

8c. Space cooling requirement

Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)
Fraction of space heat from community system
Fraction of heat from community Heat pump
Fraction of heat from community Boilers
Fraction of total space heat from community Heat pump
Fraction of total space heat from community Boilers
Factor for control and charging method (Table 4c(3)) for community space heating
Factor for control and charging method (Table 4c(3)) for community water heating
Distribution loss factor (Table 12c) for community heating system
Space heating:
Annual space heating requirement
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)
Space heating fuel for secondary/supplementary system
Water heating
Annual water heating requirement
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05
Electricity used for heat distribution
Annual totals kWh/year
Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)
mechanical ventilation fans (SFP = 0.6500)
Total electricity for the above, kWh/year
Electricity for lighting (calculated in Appendix L)
Energy saving/generation technologies (Appendices M, N and Q)
PV Unit 0 (0.80 * 0.84 * 951 * 1.00) =
Total delivered energy for all uses

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			320.0000 (367a)
Space heating from Heat pump	989.3952	0.5190	513.4961 (367b)
Efficiency of heat source Boilers			95.0000 (367b)
Space heating from Boilers	175.4052	0.5190	91.0353 (368)
Electrical energy for heat distribution	33.3270	0.5190	17.2967 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEF)			621.8281 (373)
Space and water heating			621.8281 (376)
Pumps and fans	113.6052	0.5190	58.9611 (378)
Energy for lighting	252.6067	0.5190	131.1029 (379)
Energy saving/generation technologies			
PV Unit	-638.8140	0.5190	-331.5444 (380)
Total CO2, kg/year			480.3477 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			8.7200 (384)

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

	TFA	N	EF	CO2
Total Floor Area	55.1000			8.7200 ZC1
Assumed number of occupants	1.8403			55.1000
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190			1.8403
CO2 emissions from appliances, equation (L14)	17.2551			2.9613 ZC2
CO2 emissions from cooking, equation (L16)	2.9613			28.9363 ZC4
Total CO2 emissions	0.0000			0.0000 ZC5
Residual CO2 emissions offset from biofuel CHP	0.0000			0.0000 ZC6
Additional allowable electricity generation, kWh/m²/year	0.0000			0.0000 ZC7
Resulting CO2 emissions offset from additional allowable electricity generation	28.9363			28.9363 ZC8
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

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	55.1000 (1b)	2.6000 (2b)	143.2600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	55.1000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 143.2600 (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) =	0.1396 (8)							
Pressure test				Yes								
Measured/design AP50				5.0000								
Infiltration rate				6.3896 (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) =	0.3312 (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	0.4222	0.4140	0.4057	0.3643	0.3560	0.3146	0.3146	0.3063	0.3312	0.3560	0.3726	0.3891 (22b)
	0.5891	0.5857	0.5823	0.5664	0.5634	0.5495	0.5495	0.5469	0.5548	0.5634	0.5694	0.5757 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			11.4600	1.3258	15.4583		(27)					
External Wall	45.8900	11.6600	34.2300	0.1800	6.1614		(29a)					
Corridor	10.5300	2.1000	8.4300	0.1800	1.5174		(29a)					
Main Roof	55.1000		55.1000	0.1300	7.1630		(30)					
Total net area of external elements Aum(A, m2)			111.5000				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	32.4001		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							15.4910 (36)					
Total fabric heat loss						(33) + (36) =	47.8911 (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	27.8521	27.6885	27.5281	26.7747	26.6337	25.9775	25.9775	25.8560	26.2303	26.6337	26.9189	27.2170 (38)
Average = Sum(39)m / 12 =	75.7433	75.5796	75.4192	74.6658	74.5249	73.8687	73.8687	73.7471	74.1214	74.5249	74.8100	75.1081 (39)
												74.6651 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3747	1.3717	1.3688	1.3551	1.3525	1.3406	1.3406	1.3384	1.3452	1.3525	1.3577	1.3631 (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												1.8403 (42)
Average daily hot water use (litres/day)												77.9069 (43)
Daily hot water use	85.6976	82.5813	79.4650	76.3487	73.2325	70.1162	70.1162	73.2325	76.3487	79.4650	82.5813	85.6976 (44)
Energy conte	127.0870	111.1511	114.6980	99.9965	95.9490	82.7967	76.7233	88.0411	89.0926	103.8288	113.3373	123.0770 (45)
Energy content (annual)												Total = Sum(45)m = 1225.7783 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	19.0630	16.6727	17.2047	14.9995	14.3923	12.4195	11.5085	13.2062	13.3639	15.5743	17.0006	18.4615 (46)
Store volume												3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.2602 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.1405 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (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(62)m =												0.0000 (63)
Output from w/h	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Heat gains from water heating, kWh/month	64.3506	56.9137	60.2312	54.6303	53.9972	48.9113	47.6046	51.3678	51.0047	56.6172	59.0661	63.0172 (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	
92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	92.0145	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
(66)m	14.3355	12.7327	10.3549	7.8393	5.8600	4.9472	5.3457	6.9485	9.3263	11.8418	13.8212	14.7339 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
(66)m	160.4433	162.1082	157.9127	148.9810	137.7063	127.1097	120.0305	118.3656	122.5611	131.4928	142.7675	153.3641 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
(66)m	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	32.2014	(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)												
(66)m	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	-73.6116	(71)
Water heating gains (Table 5)												
(66)m	86.4927	84.6931	80.9559	75.8753	72.5769	67.9324	63.9847	69.0428	70.8399	76.0984	82.0362	84.7006 (72)
Total internal gains	314.8758	313.1383	302.8279	286.3000	269.7475	253.5937	242.9653	247.9612	256.3316	273.0374	292.2292	306.4030 (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	5.6600	10.6334	0.6300	0.7000	0.7700	18.3933 (74)						
West	6.0000	19.6403	0.6300	0.7000	0.7700	36.0139 (80)						
Solar gains	54.4072	105.6014	175.7520	265.1527	336.6166	350.6421	331.2781	276.0875	206.7531	125.4381	67.5956	44.9497 (83)
Total gains	369.2831	418.7397	478.5798	551.4527	606.3641	604.2358	574.2433	524.0488	463.0847	398.4755	359.8249	351.3526 (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	
50.5179	50.6273	50.7349	51.2469	51.3438	51.7999	51.7999	51.8853	51.6233	51.3438	51.1481	50.9451	
alpha	4.3679	4.3752	4.3823	4.4165	4.4229	4.4533	4.4533	4.4590	4.4416	4.4229	4.4099	4.3963
util living area	0.9967	0.9938	0.9848	0.9527	0.8656	0.7050	0.5456	0.6111	0.8543	0.9737	0.9939	0.9974 (86)
MIT	19.5315	19.6882	19.9800	20.3788	20.7235	20.9230	20.9807	20.9687	20.8094	20.3637	19.8796	19.5046 (87)
Th 2	19.7828	19.7851	19.7874	19.7979	19.7999	19.8091	19.8091	19.8109	19.8056	19.7999	19.7959	19.7917 (88)
util rest of house	0.9956	0.9916	0.9791	0.9342	0.8138	0.6029	0.4081	0.4704	0.7774	0.9599	0.9914	0.9965 (89)
MIT 2	17.8520	18.0820	18.5065	19.0795	19.5346	19.7597	19.7987	19.6539	19.0701	18.3693	17.8188	(90)
Living area fraction												
MIT	18.7161	18.9084	19.2646	19.7480	20.1463	20.3582	20.4087	20.4007	20.2484	19.7357	19.1464	18.6862 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7161	18.9084	19.2646	19.7480	20.1463	20.3582	20.4087	20.4007	20.2484	19.7357	19.1464	18.6862 (93)

8. Space heating requirement												
Utilisation	0.9942	0.9895	0.9759	0.9332	0.8305	0.6528	0.4793	0.5431	0.8096	0.9590	0.9894	0.9953 (94)
Useful gains	367.1310	414.3363	467.0603	514.6630	503.5910	384.4150	275.2380	284.6363	374.9300	382.1199	356.0276	349.6961 (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	1091.9246	1058.7516	962.6977	809.9737	629.4602	425.3538	281.3466	295.0395	455.7300	680.8359	901.1891	1088.0326 (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	1.0000 (97a)
Space heating kWh	539.2464	433.0471	368.7543	212.6381	93.6467	0.0000	0.0000	0.0000	222.2447	392.5163	549.3223 (98)	2811.4159 (99)
Space heating												
Space heating per m2									(98) / (4) =			51.0239 (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												3006.8619 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	539.2464	433.0471	368.7543	212.6381	93.6467	0.0000	0.0000	0.0000	0.0000	222.2447	392.5163	549.3223 (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)	576.7342	463.1520	394.3896	227.4204	100.1569	0.0000	0.0000	0.0000	0.0000	237.6948	419.8035	587.5105 (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	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Water heating	154.7047	136.0961	142.3156	126.7233	123.5667	109.5235	104.3410	115.6588	115.8194	131.4465	140.0641	150.6946 (64)
Efficiency of water heater	87.8733	87.6884	87.2425	86.1848	84.0861	79.8000	79.8000	79.8000	79.8000	86.2043	87.4174	79.8000 (216)
Fuel for water heating, kWh/month	176.0543	155.2041	163.1265	147.0367	146.9525	137.2475	130.7531	144.9358	145.1371	152.4826	160.2245	171.3198 (219)
Water heating fuel used												1830.4744 (219)
Annual totals kWh/year												
Space heating fuel - main system												3006.8619 (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)												253.1691 (232)
Total delivered energy for all uses												5165.5055 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
Energy kWh/year	3006.8619	Emission factor kg CO2/kWh	0.2160	Emissions kg CO2/year	649.4822 (261)							
Space heating - main system 1	3006.8619	0.2160	0.0000	0.0000	0.0000 (263)							
Space heating - secondary	0.0000	0.2160	0.0000	0.0000	0.0000 (264)							
Water heating (other fuel)	1830.4744	0.2160	0.0000	0.0000	395.3825 (265)							
Space and water heating					1044.8646 (265)							
Pumps and fans	75.0000	0.5190	0.0000	0.0000	38.9250 (267)							
Energy for lighting	253.1691	0.5190	0.0000	0.0000	131.3948 (268)							
Total CO2, kg/m2/year					1215.1846 (272)							
Emissions per m2 for space and water heating					18.9631 (272a)							
Fuel factor (electricity)					1.5500							
Emissions per m2 for lighting					2.3847 (272b)							
Emissions per m2 for pumps and fans					0.7064 (272c)							
Target Carbon Dioxide Emission Rate (TER) = (18.9631 * 1.55) + 2.3847 + 0.7064, rounded to 2 d.p.					32.4800 (273)							



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-C1-06 Mid MF				Issued on Date	06/02/2024
Assessment Reference	1B2P-C1-06 - Mid MF GREEN	Prop Type Ref	W Core			
Property	1B2P-C1-06 Mid MF, St Ann's Hospital, London, N15					
SAP Rating		84 B	DER	7.36	TER	26.08
Environmental		95 A	% DER<TER	71.78		
CO ₂ Emissions (t/year)		0.30	DFEE	40.09	TFEE	47.38
General Requirements Compliance		Pass	% DFEE<TFEE	15.39		
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 58 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 26.08 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 7.36 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)47.4 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)40.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor (no floor)			
Roof (no roof)			
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.56	
Maximum	1.5	OK
MVHR efficiency:	87%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	2.88 m ² , No overhang	
Windows facing West:	9.68 m ² , No overhang	
Air change rates:	4.00 ach	
Blinds/curtains:	None	

10 Key Features

Party wall U-value	0.00 W/m ² K
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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	58.2000 (1b)	x 2.6000 (2b)	= 151.3200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	58.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 151.3200 (5)

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 fires	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
Measured/design AP50 2.5000
Infiltration rate 0.1250 (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) = 0.0969 (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	0.1235	0.1211	0.1187	0.1066	0.1041	0.0920	0.0920	0.0896	0.0969	0.1041	0.1090	0.1138 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation:												73.9500 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2598	0.2513	0.2489	0.2368	0.2344	0.2223	0.2223	0.2199	0.2271	0.2344	0.2392	0.2441 (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
Glazing North (Uw = 0.80)			2.8800	0.7752	2.2326		(27)
Glazing E, S, W (Uw = 0.80)			9.6800	0.7752	7.5039		(27)
Corridor Door			2.1000	0.5000	1.0500		(26)
External Wall	31.3300	12.5600	18.7700	0.1500	2.8155	14.0000	262.7800 (29a)
Corridor	24.7000	2.1000	22.6000	0.1500	3.3900	316.4000	262.7800 (29a)
Lift / Stair Wall	18.0700		18.0700	0.2500	4.5175	9.0000	162.6300 (29a)
Total net area of external elements Aum(A, m2)			74.1000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.5094		(33)
Party Wall 1			11.3100	0.0000	0.0000	20.0000	226.2000 (32)
Party Floor 1			58.2000			40.0000	2328.0000 (32a)
Party Ceilings 1			58.2000			40.0000	2328.0000 (32b)
Timber Frame			104.7800			9.0000	943.0200 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32c) =		6567.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							112.8356 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							13.3847 (36)
Total fabric heat loss						(33) + (36) =	34.8941 (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
12.6719 12.5510 12.4301 11.8254 11.7044 11.0997 11.0997 10.9788 11.3416 11.7044 11.9463 12.1882 (38)
Heat transfer coeff 47.5661 47.4451 47.3242 46.7195 46.5986 45.9939 45.9939 45.8729 46.2357 46.5986 46.8404 47.0823 (39)
Average = Sum(39)m / 12 = 46.6893 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8173	0.8152	0.8131	0.8027	0.8007	0.7903	0.7903	0.7882	0.7944	0.8007	0.8048	0.8090 (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												1.9303 (42)
Average daily hot water use (litres/day)												80.0449 (43)
Daily hot water use												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy conte	88.0494	84.8476	81.6458	78.4440	75.2422	72.0404	72.0404	75.2422	78.4440	81.6458	84.8476	88.0494 (44)
Energy content (annual)	130.5717	114.2014	117.8456	102.7407	98.5821	85.0689	78.8288	90.4572	91.5376	106.6782	116.4476	126.4546 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1259.4175 (45)
Water storage loss:												
Store volume												3.0000 (47)
b) If manufacturer declared loss factor is not known :												0.0212 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)												3.4200 (52)
Volume factor from Table 2a												1.0000 (53)
Temperature factor from Table 2b												0.2173 (55)
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage												
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	6.7353 (57)
Total heat required for water heating calculated for each month	160.5724	141.2961	147.8433	131.7707	128.5798	114.0989	108.8265	120.4549	120.5676	136.6759	145.4777	156.4523 (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	160.5724	141.2961	147.8433	131.7707	128.5798	114.0989	108.8265	120.4549	120.5676	136.6759	145.4777	156.4523 (64)
Heat gains from water heating, kWh/month	67.4142	59.6477	63.1818	57.3853	56.7767	51.5094	50.2087	54.0752	53.6603	59.4687	61.9429	66.0443 (65)
Total per year (kWh/year) = Sum(64)m =												1612.6162 (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	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155 (66)
Lighting gains (calculated in Appendix L, equation L19 or L9a), also see Table 5	15.0285	13.3482	10.8555	8.2183	6.1433	5.1864	5.6041	7.2844	9.7771	12.4143	14.4893	15.4662 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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 (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)	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124 (71)
Water heating gains (Table 5)	90.6105	88.7615	84.9218	79.7018	76.3128	71.5409	67.4849	72.6817	74.5281	79.9310	86.0317	88.7692 (72)
Total internal gains	325.9792	324.1972	313.4616	296.2306	278.9338	262.0838	251.0159	256.1457	264.8881	282.3019	302.3105	317.1260 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	q Specific data or Table 6b	FP Specific data or Table 6c	Access factor Table 6d	Gains W
North	2.8800	10.6334	0.5000	0.8000	0.7700	8.4890 (74)
West	9.6800	19.6403	0.4200	0.8000	0.7700	44.2685 (80)

Solar gains	52.7576	102.8216	170.1824	252.2757	314.5557	324.7983	308.0455	260.6949	199.0121	122.0679	65.6700	43.4812 (83)
Total gains	378.7368	427.0188	483.6440	548.5063	593.4894	586.8821	559.0614	516.8406	463.9001	404.3698	367.9804	360.6071 (84)

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, nil,m (see Table 9a)	0.9557	0.9557	0.9557	0.9557	0.9557	0.9557	0.9557	0.9557	0.9557	0.9557	0.9557	0.9557 (85)
tau	38.3504	38.4481	38.5464	39.0453	39.1466	39.6613	39.6613	39.7658	39.4538	39.1466	38.9445	38.7444
alpha	3.5567	3.5632	3.5698	3.6030	3.6441	3.6441	3.6441	3.6511	3.6303	3.6198	3.5963	3.5830
util living area	0.9611	0.9403	0.8939	0.7944	0.6475	0.4805	0.3562	0.3990	0.6207	0.8478	0.9398	0.9665 (86)
MIT	19.6267	19.8428	20.1886	20.5843	20.8424	20.9601	20.9897	20.9845	20.9000	20.5447	20.0214	19.5838 (87)
Th 2	20.2384	20.2402	20.2420	20.2510	20.2528	20.2618	20.2618	20.2636	20.2582	20.2528	20.2492	20.2456 (88)
util rest of house	0.9557	0.9322	0.8799	0.7694	0.6092	0.4306	0.2986	0.3384	0.5688	0.8227	0.9303	0.9618 (89)
MIT 2	18.3867	18.6978	19.1899	19.7420	20.0788	20.2255	20.2547	20.2524	20.1598	19.7020	18.9647	18.3299 (90)
Living area fraction	18.9812	19.2467	19.6686	20.1458	20.4448	20.5777	20.6070	20.6034	20.5146	20.1060	19.4713	18.9310 (92)
MIT	18.9812	19.2467	19.6686	20.1458	20.4448	20.5777	20.6070	20.6034	20.5146	20.1060	19.4713	18.9310 (93)
Temperature adjustment												0.0000
adjusted MIT	18.9812	19.2467	19.6686	20.1458	20.4448	20.5777	20.6070	20.6034	20.5146	20.1060	19.4713	18.9310 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9447	0.9197	0.8679	0.7656	0.6193	0.4523	0.3258	0.3666	0.5873	0.8173	0.9186	0.9515 (94)
Useful gains	357.7776	392.7182	419.7788	419.9371	367.5735	265.4371	182.1209	189.4830	272.4588	330.4772	338.0318	343.1160 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	16.4000	14.1000	7.1000	4.2000 (96)
Heat loss rate W	698.3247	680.6816	623.1943	525.3989	407.4962	274.9372	184.2992	192.8026	296.5852	442.9655	579.4767	693.5671 (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												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	253.3670	193.5114	151.3411	75.9325	29.7025	0.0000	0.0000	0.0000	0.0000	83.6913	173.8403	260.7356 (98)
Space heating per m2										(98) / (4) =		20.9887 (99)

Sc. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1222.1217 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1219.0664 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	64.1614 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)

Water heating	
Annual water heating requirement	1612.6162 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1608.5847 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	84.6624 (310b)
Electricity used for heat distribution	29.7647 (313)
Annual totals kWh/year	

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7000)	
mechanical ventilation fans (SFP = 0.7000)	129.2273 (330a)
Total electricity for the above, kWh/year	129.2273 (331)
Electricity for lighting (calculated in Appendix L)	265.4077 (332)

Energy saving/generation technologies (Appendices M, N and Q)	
FV Unit 0 (0.80 * 0.84 * 951 * 1.00) =	-638.8140 (333)
Total delivered energy for all uses	2732.2958 (338)

12b. Carbon dioxide emissions - Community heating scheme

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump		320.0000 (367a)
Space heating from Heat pump	0.5190	458.6097 (367)
Efficiency of heat source Boilers		95.0000 (367b)
Space heating from Boilers	0.5190	81.3048 (368)
Electrical energy for heat distribution	0.5190	15.4479 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)		555.3623 (373)
Space and water heating		555.3623 (376)
Pumps and fans	0.5190	67.0690 (378)
Energy for lighting	0.5190	137.7466 (379)
Energy saving/generation technologies		-331.5444 (380)
FV Unit		-638.8140
Total CO2, kg/year	0.5190	428.6334 (383)
Dwelling Carbon Dioxide Emission Rate (DER)		7.3600 (384)

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

DER		7.3600 ZC1
Total Floor Area	TFA	58.2000
Assumed number of occupants	N	1.9303
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		17.1446 ZC2
CO2 emissions from cooking, equation (L16)		2.8407 ZC3
Total CO2 emissions		27.3453 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		27.3453 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)	58.2000	2.6000 (2b)	151.3200 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	151.3200 (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	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)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1322 (8)
Pressure test	Yes	
Measured/design AFS0		5.0000
Infiltration rate		0.3822 (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) =	0.2962 (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	0.3776	0.3702	0.3628	0.3258	0.3184	0.2814	0.2814	0.2740	0.2962	0.3184	0.3332	0.3480 (22b)
	0.5713	0.5685	0.5658	0.5531	0.5507	0.5396	0.5396	0.5375	0.5439	0.5507	0.5555	0.5606 (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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.40)			12.4400	1.3258	16.4924		(27)
External Wall	31.3300	12.4400	18.8900	0.1800	3.4002		(29a)
Corridor	24.7000	2.1000	22.6000	0.1800	4.0680		(29a)
Lift / Stair Wall	18.0700		18.0700	0.1800	3.2526		(29a)
Total net area of external elements Aum(A, m2)			74.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.3132		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)		5.9030 (36)
Total fabric heat loss	(33) + (36) =	35.2162 (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	28.5284	28.3901	28.2546	27.6180	27.4989	26.9445	26.9445	26.8418	27.1581	27.4989	27.7399	27.9917 (38)
Average = Sum(39)m / 12 =	63.7446	63.6063	63.4708	62.8342	62.7152	62.1607	62.1607	62.0581	62.3743	62.7152	62.9561	63.2080 (39)
												62.8337 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0953	1.0929	1.0906	1.0796	1.0776	1.0681	1.0681	1.0663	1.0717	1.0776	1.0817	1.0860 (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												1.9303 (42)
Average daily hot water use (litres/day)												80.0449 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	88.0494	84.8476	81.6458	78.4440	75.2422	72.0404	72.0404	75.2422	78.4440	81.6458	84.8476	88.0494 (44)
Energy content (annual)	130.5747	114.2014	117.8456	102.7407	98.5821	85.0689	78.8288	90.4572	91.5376	106.6782	116.4476	126.4546 (45)
Energy content (monthly)												
Distribution loss (46)m = 0.15 x (45)m												1259.4175 (45)
	19.5862	17.1302	17.6768	15.4111	14.7873	12.7603	11.8243	13.5686	13.7306	16.0017	17.4671	18.9682 (46)
Water storage loss:												
Store volume												3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.2602 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.1405 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	158.1923	139.1464	145.4633	129.4675	126.1998	111.7957	106.4465	118.0749	118.2644	134.2959	143.1744	154.0723 (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	158.1923	139.1464	145.4633	129.4675	126.1998	111.7957	106.4465	118.0749	118.2644	134.2959	143.1744	154.0723 (64)
Heat gains from water heating, kWh/month	65.5102	57.9280	61.2778	55.5427	54.8727	49.6668	48.3047	52.1712	51.8177	57.5646	60.1003	64.1403 (65)
Total per year (kWh/year) =	Sum(64)m = 1584.5934 (64)											

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155	96.5155 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.0360	13.3549	10.8609	8.2224	6.1463	5.1890	5.6069	7.2881	9.7820	12.4205	14.4966	15.4539 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	168.3855	170.1329	165.7297	156.3558	144.5230	133.4019	125.9723	124.2250	128.6281	138.0020	149.8348	160.9559 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516	32.6516 (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)	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124	-77.2124 (71)
Water heating gains (Table 5)	88.0514	86.2023	82.3627	77.1426	73.7536	68.9817	64.9257	70.1225	71.9690	77.3718	83.4726	86.2101 (72)
Total internal gains	326.4276	324.6447	313.9079	296.6756	279.3777	262.5273	251.4595	256.5902	265.3338	282.7490	302.7586	317.5746 (73)

6. Solar gains												
[Jan]		Area m2	Solar flux Table 6a W/m2	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W				
North		2.8500	10.6334	0.6300		0.7000	0.7700	9.2617 (74)				
West		9.9500	19.6403	0.6300		0.7000	0.7700	57.5622 (80)				
Solar gains	66.8239	130.3035	215.5185	318.7665	396.5325	406.9706	388.0739	329.0821	251.8383	154.6630	83.1988	55.0574 (83)
Total gains	393.2515	454.9482	529.4264	615.4421	675.9102	671.4978	639.5334	585.6723	517.1722	437.4320	385.9574	372.6319 (84)

7. Mean internal temperature (heating season)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature during heating periods in the living area from Table 9, Thl (C)	63.4041	63.5419	63.6776	64.3527	64.4448	65.0196	65.0196	65.1272	64.7970	64.4448	64.1982	63.9424
Utilisation factor for gains for living area, nil,m (see Table 9a)	5.2269	5.2361	5.2452	5.2882	5.2963	5.3346	5.3346	5.3418	5.3198	5.2963	5.2799	5.2628
tau	0.9965	0.9920	0.9759	0.9153	0.7733	0.5771	0.4250	0.4820	0.7557	0.9568	0.9925	0.9974 (86)
alpha	19.9036	20.0661	20.3415	20.6780	20.9010	20.9831	20.9972	20.9948	20.9352	20.6178	20.1961	19.8730 (87)
util living area	20.0047	20.0066	20.0085	20.0175	20.0192	20.0270	20.0270	20.0285	20.0240	20.0192	20.0158	20.0122 (88)
util rest of house	0.9954	0.9894	0.9679	0.8891	0.7163	0.4959	0.3325	0.3830	0.6757	0.9378	0.9896	0.9965 (89)
MIT	18.5493	18.7868	19.1843	19.6551	19.9292	20.0166	20.0260	20.0264	19.9760	19.5868	18.9839	18.5102 (90)
Living area fraction	19.1985	19.4001	19.7390	20.1455	20.3951	20.4800	20.4906	20.4906	20.4358	20.0811	19.5650	19.1635 (92)
MIT	19.1985	19.4001	19.7390	20.1455	20.3951	20.4800	20.4916	20.4906	20.4358	20.0811	19.5650	19.1635 (93)
Temperature adjustment												0.0000
adjusted MIT	19.1985	19.4001	19.7390	20.1455	20.3951	20.4800	20.4916	20.4906	20.4358	20.0811	19.5650	19.1635 (93)

8. Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9941	0.9873	0.9653	0.8929	0.7393	0.5344	0.3769	0.4306	0.7114	0.9392	0.9879	0.9955 (94)
Useful gains	390.9457	449.1798	511.0357	549.5502	499.7204	358.8652	241.0623	252.1458	367.9089	410.8333	381.2756	370.9489 (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	949.7015	922.2951	840.2922	706.6000	545.3124	365.5021	241.9053	253.8576	395.1916	594.6703	784.7463	945.8134 (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	415.7143	317.9334	244.9669	113.0759	33.9205	0.0000	0.0000	0.0000	0.0000	136.7278	290.4990	427.6992 (98)
Space heating												1980.5369 (98)
Space heating per m2										(98) / (4) =		34.0298 (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											2118.2213 (211)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	415.7143	317.9334	244.9669	113.0759	33.9205	0.0000	0.0000	0.0000	0.0000	136.7278	290.4990	427.6992 (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)	444.6143	340.0357	261.9966	120.9368	36.2786	0.0000	0.0000	0.0000	0.0000	146.2330	310.6941	457.4322 (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	158.1923	139.1464	145.4633	129.4675	126.1998	111.7957	106.4465	118.0749	118.2644	134.2959	143.1744	154.0723 (64)
Efficiency of water heater (217)m	87.2744	86.9508	86.1941	84.4552	81.8501	79.8000	79.8000	79.8000	79.8000	84.8617	86.6636	87.3965 (217)
Fuel for water heating, kWh/month	181.2586	160.0290	168.7626	153.2971	154.1841	140.0948	133.3916	147.9635	148.2010	158.2527	165.2070	176.2910 (219)
Water heating fuel used												1886.9331 (219)
Annual totals kWh/year												176.2910 (219)
Space heating fuel - main system												2118.2213 (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)												265.5411 (232)
Total delivered energy for all uses												4345.6954 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP	
Energy kWh/year	2118.2213
Emission factor kg CO2/kWh	0.2160
Emissions kg CO2/year	457.5358 (261)
Space heating - main system 1	0.0000
Space heating - secondary	0.0000
Water heating (other fuel)	1886.9331
Space and water heating	865.1133 (265)
Pumps and fans	75.0000
Energy for lighting	265.5411
Total CO2, kg/m2/year	0.5190
Emissions per m2 for space and water heating	14.8645 (272a)
Fuel factor (electricity)	1.5500
Emissions per m2 for lighting	2.3680 (272b)
Emissions per m2 for pumps and fans	0.6688 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.8645 * 1.55) + 2.3680 + 0.6688, rounded to 2 d.p.	26.0800 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	1B2P-D3-01 Mid MF				Issued on Date	06/02/2024
Assessment Reference	1B2P-D3-01 Mid MF GREEN	Prop Type Ref	E			
Property	1B2P-D3-01 Mid MF, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	6.49	TER	26.35	
Environmental	96 A	% DER<TER	75.37			
CO ₂ Emissions (t/year)	0.23	DFEE	38.75	TFEE	45.88	
General Requirements Compliance	Pass	% DFEE<TFEE	15.53			
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 53 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 26.35 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 6.49 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 45.9 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 38.8 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls:	Charging system linked to use of community heating, programmer and at least two room statsOK
-------------------------	--

Hot water controls:	No cylinder thermostat
---------------------	------------------------

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:	0.52
Maximum	1.5 OK
MVHR efficiency:	92%
Minimum:	70% OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	2.06 m ² , No overhang	
Windows facing East:	9.81 m ² , No overhang	
Windows facing South:	2.06 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	210.6217	151.5909	109.7979	49.1888	16.9485	0.0000	0.0000	0.0000	0.0000	57.1188	138.2058	219.0816 (98)
Space heating per m2										(98) / (4) =		18.1094 (99)

Sc. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	952.5540 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	950.1726 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	50.0091 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)

Water heating	
Annual water heating requirement	1551.5039 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1547.6252 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	81.4540 (310b)
Electricity used for heat distribution	26.2926 (313)
Annual totals kWh/year	

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)	
mechanical ventilation fans (SFP = 0.6500)	108.4507 (330a)
Total electricity for the above, kWh/year	108.4507 (331)
Electricity for lighting (calculated in Appendix L)	242.4331 (332)

Energy saving/generation technologies (Appendices M, N and Q)	
PV Unit 0 (0.80 * 0.84 * 951 * 1.00) =	-638.8140 (333)
Total delivered energy for all uses	2341.3306 (338)

12b. Carbon dioxide emissions - Community heating scheme

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump		320.0000 (367a)
Space heating from Heat pump	0.5190	405.1116 (367)
Efficiency of heat source Boilers		95.0000 (367b)
Space heating from Boilers	0.5190	71.8203 (368)
Electrical energy for heat distribution	0.5190	13.6459 (372)
Total CO2 associated with community systems (negative value allowed since DER <= TFER)		490.5778 (373)
Space and water heating		490.5778 (376)
Pumps and fans	0.5190	56.2859 (378)
Energy for lighting	0.5190	125.8228 (379)
Energy saving/generation technologies		-331.5444 (380)
PV Unit		341.1420 (383)
Total CO2, kg/year		6.4900 (384)
Dwelling Carbon Dioxide Emission Rate (DER)		

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

DER		6.4900 ZC1
Total Floor Area	TFA	52.6000
Assumed number of occupants	N	1.7668
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		17.3472 ZC2
CO2 emissions from cooking, equation (L16)		3.0685 ZC3
Total CO2 emissions		26.9057 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		26.9057 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)	52.6000	2.6000 (2b)	136.7600 (1b) - (3b)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 136.7600 (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	Air changes per hour							
Pressure test				20.0000 / (5) =	0.1462 (8)							
Measured/design AP50					Yes							
Infiltration rate					5.0000							
Number of sides sheltered					0.3962 (18)							
					3 (19)							
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.7750 (20)							
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3071 (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												
	0.3915	0.3839	0.3762	0.3378	0.3301	0.2917	0.2917	0.2841	0.3071	0.3301	0.3455	0.3608 (22b)
Effective ac	0.5767	0.5737	0.5708	0.5571	0.5545	0.5426	0.5426	0.5403	0.5472	0.5545	0.5597	0.5651 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			11.0400	1.3258	14.6164		(27)					
External Wall	38.4800	11.0400	27.4400	0.1800	4.9392		(29a)					
Corridor	28.9900	2.1000	26.8900	0.1800	4.8402		(29a)					
Total net area of external elements Aum(A, m2)			67.4700				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.5158		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.4030 (36)					
Total fabric heat loss						(33) + (36) =	31.9188 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 26.0247	Feb 25.8904	Mar 25.7587	Apr 25.1402	May 25.0245	Jun 24.4859	Jul 24.4859	Aug 24.3861	Sep 24.6934	Oct 25.0245	Nov 25.2586	Dec 25.5033 (38)
Heat transfer coeff	57.9435	57.8091	57.6775	57.0590	56.9433	56.4047	56.4047	56.3049	56.6121	56.9433	57.1774	57.4221 (39)
Average = Sum(39)m / 12 =												57.0585 (39)
HLP	Jan 1.1016	Feb 1.0990	Mar 1.0965	Apr 1.0848	May 1.0826	Jun 1.0723	Jul 1.0723	Aug 1.0704	Sep 1.0763	Oct 1.0826	Nov 1.0870	Dec 1.0917 (40)
HLP (average)												1.0848 (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												1.7668 (42)	
Average daily hot water use (litres/day)													76.1608 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	83.7768	80.7304	77.6840	74.6375	71.5911	68.5447	68.5447	71.5911	74.6375	77.6840	80.7304	83.7768 (44)	
Energy content	124.2386	108.6599	112.1273	97.7553	93.7985	80.9410	75.0037	86.0679	87.0958	101.5017	110.7971	120.3185 (45)	
Energy content (annual)												Total = Sum(45)m = 1198.3053 (45)	
Distribution loss (46)m = 0.15 x (45)m													
	18.6358	16.2990	16.8191	14.6633	14.0698	12.1411	11.2506	12.9102	13.0644	15.2253	16.6196	18.0478 (46)	
Water storage loss:													
Store volume													3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													0.2602 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.1405 (55)
Total storage loss													



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	151.8563	133.6049	139.7449	124.4821	121.4162	107.6678	102.6214	113.6855	113.8226	129.1194	137.5239	147.9361 (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	151.8563	133.6049	139.7449	124.4821	121.4162	107.6678	102.6214	113.6855	113.8226	129.1194	137.5239	147.9361 (64)
Heat gains from water heating, kWh/month	63.4035	56.0854	59.3765	53.8851	53.2821	48.2943	47.0329	50.7117	50.3408	55.8435	58.2215	62.1000 (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	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384	88.3384 (66)
Lighting gains (calculated in Appendix L, equation L10 or L9a), also see Table 5	13.7657	12.2266	9.9433	7.5278	5.6271	4.7506	5.1332	6.6723	8.9556	11.3712	13.2719	14.1483 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	153.9815	155.5794	151.5529	142.8809	132.1603	121.9804	115.1964	113.5985	117.6251	126.1970	137.0176	147.1875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338	31.8338 (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)	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707	-70.6707 (71)
Water heating gains (Table 5)	85.2197	83.4604	79.8071	74.8404	71.6158	67.0754	63.2162	68.1609	69.9177	75.0584	80.8631	83.4678 (72)
Total internal gains	305.4685	303.7680	293.8048	277.8505	261.9047	246.3180	236.0474	240.9333	248.9999	265.1282	283.6542	297.3051 (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		1.6300	10.6334	0.6300	0.7000	0.7700	5.2970 (74)					
East		7.7800	19.6403	0.6300	0.7000	0.7700	46.6980 (76)					
South		1.6300	46.7521	0.6300	0.7000	0.7700	23.2895 (78)					
Solar gains	75.2846	139.6164	216.2302	301.9543	363.3396	370.1779	353.0686	306.8745	246.4066	161.5859	92.3675	62.9423 (83)
Total gains	380.7531	443.3843	510.0350	579.8048	625.2442	616.4959	589.1160	547.8078	495.4065	426.7141	376.0217	360.2475 (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	63.0404	63.1869	63.3311	64.0175	64.1476	64.7602	64.7602	64.8749	64.5229	64.1476	63.8850	63.6128
alpha	5.2027	5.2125	5.2221	5.2678	5.2765	5.3173	5.3173	5.3250	5.3015	5.2765	5.2590	5.2409
util living area	0.9953	0.9889	0.9691	0.9040	0.7636	0.5710	0.4188	0.4681	0.7275	0.9432	0.9896	0.9964 (86)
MIT	19.9395	20.1129	20.3833	20.6996	20.9058	20.9837	20.9974	20.9954	20.9454	20.6570	20.2366	19.9069 (87)
Th 2	19.9995	20.0016	20.0037	20.0133	20.0151	20.0235	20.0235	20.0251	20.0203	20.0151	20.0114	20.0076 (88)
util rest of house	0.9937	0.9854	0.9592	0.8756	0.7059	0.4901	0.3272	0.3714	0.9454	0.9196	0.9857	0.9952 (89)
MIT 2	18.5977	18.8505	19.2389	19.6786	19.9301	20.0135	20.0226	20.0233	19.9807	19.6346	19.0390	18.5561 (90)
Living area fraction	19.2724	19.4853	19.8143	20.1920	20.4207	20.5014	20.5128	20.5121	20.4658	20.1487	19.6412	19.2353 (92)
adjusted MIT	19.2724	19.4853	19.8143	20.1920	20.4207	20.5014	20.5128	20.5121	20.4658	20.1487	19.6412	19.2353 (93)
Temperature adjustment												0.0000
adjusted MIT	19.2724	19.4853	19.8143	20.1920	20.4207	20.5014	20.5128	20.5121	20.4658	20.1487	19.6412	19.2353 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9922	0.9831	0.9570	0.8813	0.7308	0.5304	0.3734	0.4202	0.6850	0.9233	0.9838	0.9940 (94)
Useful gains	377.7812	435.8712	498.1029	510.8690	456.8524	326.9465	219.9501	230.1628	339.3742	394.0016	369.9149	358.0869 (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	867.5549	843.1613	767.9364	644.3107	496.5864	332.8656	220.6974	231.5314	360.3798	543.7351	717.0730	863.3592 (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	364.3842	273.6989	208.1961	96.0060	29.4877	0.0000	0.0000	0.0000	0.0000	111.4017	249.9538	375.9226 (98)
Space heating												1709.0510 (99)
Space heating per m2										(98) / (4) =		33.4915 (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												1827.8620 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	364.3842	273.6989	208.1961	96.0060	29.4877	0.0000	0.0000	0.0000	0.0000	111.4017	249.9538	375.9226 (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)	389.7157	292.7261	222.6696	102.6802	31.5376	0.0000	0.0000	0.0000	0.0000	119.1462	267.3303	402.0562 (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	151.8563	133.6049	139.7449	124.4821	121.4162	107.6678	102.6214	113.6855	113.8226	129.1194	137.5239	147.9361 (64)
Efficiency of water heater	87.0659	86.6872	85.8753	84.1312	81.6873	79.8000	79.8000	79.8000	79.8000	84.4231	86.3888	79.8000 (216)
Annual totals kWh/year	174.4153	154.1229	162.7300	147.9619	148.6354	134.9220	128.5982	142.4631	142.6348	152.9432	159.1918	169.6550 (219)
Water heating fuel used												1818.2737 (219)
Space heating fuel - main system												1827.8620 (211)
Space heating fuel - secondary												0.0000 (215)
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												243.1073 (232)
Electricity for lighting (calculated in Appendix L)												3964.2430 (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	1827.8620	394.8182 (261)
Space heating - secondary	0.0000	0.0000 (263)
Water heating (other fuel)	1818.2737	392.7471 (264)
Space and water heating		787.5653 (265)
Pumps and fans	75.0000	38.9250 (267)
Energy for lighting	243.1073	126.1127 (268)
Total CO2, kg/m2/year		952.6630 (272)
Emissions per m2 for space and water heating		14.9727 (272a)
Fuel factor (electricity)		1.5500
Emissions per m2 for lighting		2.3987 (272b)
Emissions per m2 for pumps and fans		0.7400 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.9727 * 1.55) + 2.3987 + 0.7400, rounded to 2 d.p.		26.3500 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D2-01 Mid MF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D2-01 Mid MF GREEN	Prop Type Ref	W / E			
Property	2B4P-D2-01 Mid MF, St Ann's Hospital, London, N15					
SAP Rating	86 B	DER	5.95	TER	20.17	
Environmental	96 A	% DER<TER	70.50			
CO ₂ Emissions (t/year)	0.38	DFEE	30.05	TFEE	35.63	
General Requirements Compliance	Pass	% DFEE<TFEE	15.67			
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 86 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 20.17 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 5.95 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE) 35.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 30.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor (no floor)			
Roof (no roof)			
Openings	0.76 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.52	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	2.14 m ² , No overhang	
Windows facing East:	6.68 m ² , No overhang	
Windows facing West:	6.22 m ² , No overhang	
Air change rates:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m ² K
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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	86.1000 (1b)	x 2.6000 (2b)	= 223.8600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	223.8600 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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	0.0000 (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) =	0.0000 / (5) =	0.0000 (8)
Pressure test		2.5000
Measured/design AP50		0.1250 (18)
Infiltration rate		2 (19)
Number of sides sheltered		

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1063 (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	0.9250	1.1250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation:												78.2000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2445	0.2418	0.2392	0.2259	0.2232	0.2099	0.2099	0.2073	0.2153	0.2232	0.2285	0.2338 (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
Glazing North (Uw = 0.80)			2.1400	0.7752	1.6589	10.0000	(27)
Glazing E, S, W (Uw = 0.80)			12.9000	0.7752	10.0000		(27)
Corridor Door			2.1000	0.5000	1.0500		(26)
External Wall	36.2700	15.0400	21.2300	0.1500	3.1845	14.0000	297.2200 (29a)
Corridor	4.7100	2.1000	2.6100	0.1500	0.3915	36.9400 (29a)	
Core Wall	7.5700		7.5700	0.2500	1.8925	9.0000	68.1300 (29a)
Total net area of external elements Aum(A, m ²)			48.5500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	18.1774			(33)
Party Wall 1			55.6400	0.0000	0.0000	20.0000	1112.8000 (32)
Party Floor 1			73.4000			40.0000	2936.0000 (32a)
Corridor			73.4000			40.0000	2936.0000 (32b)
Timber Frame			123.2400			9.0000	1109.1600 (32c)
Heat capacity Cm = Sum(A x k)							8495.8500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							98.6742 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							13.5038 (36)
Total fabric heat loss							(33) + (36) = 31.6812 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	18.0598	17.8636	17.6674	16.6862	16.4900	15.5089	15.5089	15.3127	15.9013	16.4900	16.8825	17.2749 (38)
Heat transfer coeff	49.7410	49.5448	49.3486	48.3674	48.1712	47.1901	47.1901	46.9938	47.5825	48.1712	48.5636	48.9561 (39)
Average = Sum(39)m / 12 =												48.3184 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.5777	0.5754	0.5732	0.5618	0.5595	0.5481	0.5481	0.5458	0.5526	0.5595	0.5640	0.5686 (40)
HLP (average)												0.5612 (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												2.5685 (42)
Average daily hot water use (litres/day)												95.2016 (43)
Jan												
Feb												
Mar												
Apr												
May												
Jun												
Jul												
Aug												
Sep												
Oct												
Nov												
Dec												



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	89.4895	89.2976	97.1057	100.9137	104.7218 (44)
Energy content (annual)	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974 (45)
Distribution loss (46)m = 0.15 x (45)m											
Water storage loss:	23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	19.0317	20.7746 (46)
Store volume											3.0000 (47)
b) If manufacturer declared loss factor is not known :											0.0212 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)											3.4200 (52)
Volume factor from Table 2a											1.0000 (53)
Temperature factor from Table 2b											0.2173 (55)
Enter (49) or (54) in (55)											
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180 (56)
If cylinder contains dedicated solar storage											
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120 (57)
Total heat required for water heating calculated for each month	185.2971	162.9205	170.1578	151.2250	147.2467	130.2070	123.7530	137.5833	137.9005	156.8758	167.5274 (58)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (62)
Output from w/h	185.2971	162.9205	170.1578	151.2250	147.2467	130.2070	123.7530	137.5833	137.9005	156.8758	167.5274 (59)
Heat gains from water heating, kWh/month	75.6352	66.8378	70.6014	63.8538	62.9834	56.8654	55.1718	59.7704	59.4235	66.1851	69.2744 (60)
Total per year (kWh/year) = Sum(64)m =											1851.0910 (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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245 (66)
Lighting gains (calculated in Appendix L, equation L19 or L19a), also see Table 5	21.2040	18.8332	15.3162	11.5954	8.6677	7.3176	7.9069	10.2777	13.7947	17.5156	20.4433	21.7933 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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 (70)
Pumps, fans	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396 (71)
Losses e.g. evaporation (negative values) (Table 5)	101.6602	99.4611	94.8943	88.6859	84.6552	78.9797	74.1556	80.3365	82.5326	88.9585	96.2144	99.4703 (72)
Total internal gains	416.1087	413.9432	399.8002	376.9715	353.7298	331.4003	316.9417	323.0888	334.8612	357.9074	384.3743	404.2841 (73)

6. Solar gains

[Jan]	Area m2	Solar Flux Table 6a W/m2	q Specific data or Table 6b	FP Specific data or Table 6c	Access factor Table 6d	Gains W
North	2.1400	2.1400	0.8000	0.7700		6.3078 (74)
East	6.6800	19.6403	0.4200	0.8000	0.7700	30.5490 (76)
West	6.2200	19.6403	0.4200	0.8000	0.7700	28.4453 (80)
Solar gains	65.3020	127.4598	210.3396	310.0873	384.0230	395.1924
Total gains	481.4107	541.4030	610.3398	687.0588	737.7528	726.5927
			692.3073	642.6158	580.5321	509.1948
					465.7146	458.0566 (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	4.1649	4.1722	4.1828	4.2528	4.2661	4.3340	4.3340	4.3479	4.3065	4.2661	4.2397	4.2137	
alpha	4.1630	4.1755	4.1881	4.2528	4.2661	4.3340	4.3340	4.3479	4.3065	4.2661	4.2397	4.2137	
util living area	0.9538	0.9264	0.8656	0.7397	0.5766	0.4102	0.2988	0.3344	0.5434	0.8035	0.9250	0.9605 (86)	
MIT	20.0289	20.2251	20.5094	20.7973	20.9405	20.9895	20.9979	20.9967	20.9660	20.7579	20.3576	19.9961 (87)	
Th 2	20.4501	20.4522	20.4542	20.4645	20.4666	20.4769	20.4769	20.4790	20.4728	20.4666	20.4625	20.4583 (88)	
util rest of house	0.9488	0.9188	0.8526	0.7186	0.5485	0.3780	0.2637	0.2972	0.5066	0.7812	0.9161	0.9562 (89)	
MIT 2	19.1232	19.4055	19.8088	20.2114	20.3985	20.4667	20.4753	20.4763	20.4375	20.1675	19.6062	19.0822 (90)	
Living area fraction									fLA = living area / (			0.3589 (91)	
MIT	19.4482	19.6996	20.0602	20.4217	20.5930	20.6543	20.6629	20.6630	20.6271	20.3794	19.8759	19.4102 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.4482	19.6996	20.0602	20.4217	20.5930	20.6543	20.6629	20.6630	20.6271	20.3794	19.8759	19.4102 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9379	0.9069	0.8425	0.7168	0.5553	0.3890	0.2762	0.3104	0.5175	0.7773	0.9050	0.9460 (94)
Useful gains	451.5249	490.9442	514.2022	492.1515	409.6442	282.6471	191.1953	199.4670	300.4443	395.8138	421.4485	433.3419 (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	753.4876	733.2454	669.1787	557.2735	428.3869	285.7025	191.7269	200.3370	310.5777	471.0839	620.4432	744.6325 (97)
Month fraction	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)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating kWh	224.6587	162.7923	115.3025	46.6431	13.9445	0.0000	0.0000	0.0000	0.0000	56.0009	143.2761	231.6002 (98)
Space heating												994.2184 (98)
Space heating per m2										(98) / (4) =		11.5473 (99)

8c. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	994.2184 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	991.7329 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	52.1965 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	1851.0910 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1846.4632 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	97.1823 (310b)
Electricity used for heat distribution	29.8757 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6500)	
mechanical ventilation fans (SFP = 0.6500)	177.5210 (330a)
Total electricity for the above, kWh/year	177.5210 (331)
Electricity for lighting (calculated in Appendix L)	374.4696 (332)
Energy saving/generation technologies (Appendices M, N and Q)	
FV Unit 0 (0.80 * 0.84 * 951 * 1.00) =	-638.8140 (333)
Total delivered energy for all uses	2900.7515 (338)

12b. Carbon dioxide emissions - Community heating scheme

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump		320.0000 (367a)
Space heating from Heat pump	0.5190	460.3199 (367)
Efficiency of heat source Boilers		95.0000 (367b)
Space heating from Boilers	0.5190	81.6080 (368)
Electrical energy for heat distribution	0.5190	15.5055 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)		557.4334 (373)
Space and water heating		557.4334 (376)
Pumps and fans	0.5190	92.1334 (378)
Energy for lighting	0.5190	194.3497 (379)
Energy saving/generation technologies		
FV Unit	-638.8140	-331.5444 (380)
Total CO2, kg/year		512.3721 (383)
Dwelling Carbon Dioxide Emission Rate (DER)		5.9500 (384)

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

DER		5.9500 ZC1
Total Floor Area	TFA	86.1000
Assumed number of occupants	N	2.5685
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		15.9478 ZC2
CO2 emissions from cooking, equation (L16)		2.0981 ZC3
Total CO2 emissions		23.9959 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		23.9959 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)	86.1000	2.6000 (2b)	223.8600 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	223.8600 (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				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) =												
Pressure test					Air changes per hour							
Measured/design AP50					30.0000 / (5) =	0.1340 (8)						
Infiltration rate					Yes	5.0000						
Number of sides sheltered						0.3840 (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) =	0.3264 (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	0.4162	0.4080	0.3999	0.3591	0.3509	0.3101	0.3101	0.3019	0.3264	0.3509	0.3672	0.3835 (22b)
	0.5866	0.5832	0.5799	0.5645	0.5616	0.5481	0.5481	0.5456	0.5533	0.5616	0.5674	0.5735 (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					
TER Opaque door			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			15.0400	1.3258	19.9394		(27)					
External Wall	36.2700	15.0400	21.2300	0.1800	3.8214		(29a)					
Corridor	4.7100	2.1000	2.6100	0.1800	0.4698		(29a)					
Core Wall	7.5700		7.5700	0.1800	1.3626		(29a)					
Total net area of external elements A _{um} (A, m ²)			48.5500				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.6932		(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)							4.3308 (36)					
Total fabric heat loss						(33) + (36) =	32.0240 (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	43.3344	43.0860	42.8425	41.6987	41.4847	40.4886	40.4886	40.3041	40.8723	41.4847	41.9176	42.3702 (38)
Average = Sum(39)m / 12 =	75.3584	75.1100	74.8665	73.7227	73.5087	72.5126	72.5126	72.3281	72.8963	73.5087	73.9416	74.3942 (39)
												73.7217 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8752	0.8724	0.8695	0.8562	0.8538	0.8422	0.8422	0.8400	0.8466	0.8538	0.8588	0.8640 (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												2.5685 (42)
Average daily hot water use (litres/day)												95.2016 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218 (44)
Distribution loss (46)m = 0.15 x (45)m	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974	150.3992 (45)
Water storage loss:												
Store volume	23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	19.0317	20.7746	22.5599 (46)
a) If manufacturer declared loss factor is known (kWh/day):												
Temperature factor from Table 2b												
Enter (49) or (54) in (55)												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9398	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553	(56)
If cylinder contains dedicated solar storage	4.3553	3.9398	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553	(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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168	(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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168	(64)
Heat gains from water heating, kWh/month	73.7312	65.1181	68.6974	62.0113	61.0794	55.0228	53.2678	57.8664	57.5809	64.2811	67.4318	72.1019	(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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.2040	18.8332	15.3162	11.5954	8.6677	7.3176	7.9069	10.2777	13.7947	17.5156	20.4433	21.7933	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	(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)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	(71)
Water heating gains (Table 5)	99.1011	96.9019	92.3352	86.1267	82.0960	76.4205	71.5965	77.7774	79.9734	86.3993	93.6553	96.9111	(72)
Total internal gains	416.5495	414.3841	400.2411	377.4123	354.1707	331.8412	317.3825	323.5297	335.3020	358.3482	384.8151	404.7249	(73)

6. Solar gains													
[Jan]	Area m2	Solar flux Table 6a	Specific data g W/m2	Specific data FF or Table 6c	Access factor Table 6d	Gains W							
North	2.1400	10.6334	0.6300	0.7000	0.7700	6.9544	(74)						
East	6.6800	19.6403	0.6300	0.7000	0.7700	40.7000	(76)						
West	6.2200	19.6403	0.6300	0.7000	0.7700	37.3344	(80)						
Solar gains	84.3843	164.7595	272.0317	400.0801	494.7225	508.7259	483.3646	411.9986	317.2712	195.5513	105.1251	69.4721	(83)
Total gains	500.9338	579.1436	672.2727	777.4925	848.8932	840.5671	800.7471	735.5283	652.5733	553.8996	489.9402	474.1970	(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	79.3431	79.6055	79.8644	81.1034	81.3395	82.4569	82.4569	82.6673	82.0229	81.3395	80.8633	80.3714	
alpha	6.2895	6.3070	6.3243	6.4069	6.4226	6.4971	6.4971	6.5112	6.4682	6.4226	6.3909	6.3581	
util living area	0.9982	0.9950	0.9810	0.9167	0.7565	0.5468	0.3978	0.4509	0.7325	0.9617	0.9954	0.9987	(86)
MIT	20.1291	20.2727	20.5103	20.7933	20.9522	20.9949	20.9994	20.9988	20.9712	20.7327	20.3779	20.1068	(87)
Th 2	20.1886	20.1911	20.1935	20.2049	20.2070	20.2169	20.2169	20.2188	20.2131	20.2070	20.2027	20.1982	(88)
util rest of house	0.9976	0.9934	0.9750	0.8931	0.7063	0.4823	0.3274	0.3751	0.6634	0.9457	0.9936	0.9983	(89)
MIT 2	19.0154	19.2265	19.5710	19.9701	20.1634	20.2137	20.2167	20.2183	20.1916	19.8990	19.3895	18.9901	(90)
Living area fraction									fLA = Living area / (4) =			0.3589	(91)
MIT	19.4151	19.6020	19.9081	20.2656	20.4465	20.4940	20.4976	20.4984	20.4714	20.1982	19.7442	19.3908	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4151	19.6020	19.9081	20.2656	20.4465	20.4940	20.4976	20.4984	20.4714	20.1982	19.7442	19.3908	(93)

8. Space heating requirement													
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	499.3292	574.4001	653.6949	695.9249	612.9499	424.7829	282.4155	295.9513	448.3366	523.7328	486.1569	473.0945	(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	1139.0464	1104.2645	1003.8167	837.9001	642.9450	427.3928	282.6262	296.4284	464.4483	705.5551	934.9318	1130.1111	(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	(98)
Space heating kWh	475.9496	356.0689	260.4906	102.2222	22.3163	0.0000	0.0000	0.0000	0.0000	135.2758	323.1180	488.8203	(98)
Space heating												2164.2616	(98)
Space heating per m2										(98) / (4) =		25.1366	(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													2314.7183 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
475.9496	356.0689	260.4906	102.2222	22.3163	0.0000	0.0000	0.0000	0.0000	0.0000	135.2758	323.1180	488.8203	(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)	509.0370	380.8223	278.5995	109.3285	23.8677	0.0000	0.0000	0.0000	0.0000	144.6800	345.5807	522.8025	(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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168	(64)
Water heating requirement	87.2520	86.8764	85.9834	83.8344	81.0796	79.8000	79.8000	79.8000	79.8000	84.4619	86.5726	87.3729	(216)
Efficiency of water heater	209.6422	185.0569	195.1281	177.6380	178.6721	160.2804	152.0965	169.4277	169.9214	182.9178	190.8505	203.7447	(219)
Fuel for water heating, kWh/month	209.6422	185.0569	195.1281	177.6380	178.6721	160.2804	152.0965	169.4277	169.9214	182.9178	190.8505	203.7447	(219)
Water heating fuel used	209.6422	185.0569	195.1281	177.6380	178.6721	160.2804	152.0965	169.4277	169.9214	182.9178	190.8505	203.7447	(219)
Annual totals kWh/year												2175.3762	(219)
Space heating fuel - main system												2314.7183	(211)
Space heating fuel - secondary												0.0000	(215)
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												374.4696	(232)
Electricity for lighting (calculated in Appendix L)												4939.5642	(238)
Total delivered energy for all uses													

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP													
Energy kWh/year	2314.7183												
Emission factor kg CO2/kWh	0.2160												
Emissions kg CO2/year	499.9792	(261)											
Space heating - main system 1	0.2160												
Space heating - secondary	0.0000												
Water heating (other fuel)	0.2160												
Space and water heating	0.2160												
Pumps and fans	75.0000												
Energy for lighting	374.4696												
Total CO2, kg/m2/year													
Emissions per m2 for space and water heating													11.2643 (272a)
Fuel factor (electricity)													1.5500
Emissions per m2 for lighting													2.2573 (272b)
Emissions per m2 for pumps and fans													0.4521 (272c)
Target Carbon Dioxide Emission Rate (TER) = (11.2643 * 1.55) + 2.2573 + 0.4521, rounded to 2 d.p.													20.1700 (273)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End EF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D3-01 End EF GREEN	Prop Type Ref	N / E			
Property	2B4P-D3-01 End EF, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	8.17	TER	27.44	
Environmental	94 A	% DER<TER	70.23			
CO ₂ Emissions (t/year)	0.46	DFEE	42.04	TFEE	56.98	
General Requirements Compliance	Pass	% DFEE<TFEE	26.22			
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 74 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 27.44 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 8.17 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 57.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 42.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof (no roof)	-	-	-
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and TRVsOK

Hot water controls: No cylinder stat

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:	0.55	
Maximum	1.5	OK
MVHR efficiency:	92%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	9.86 m ² , No overhang	
Windows facing East:	8.63 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
Exposed floor U-value	0.12 W/m ² K
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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 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
Glazing North (Uw = 0.80)			9.8600	0.7752	7.6404		(27)
Glazing E, S, W (Uw = 0.80)			8.6300	0.7752	6.6889		(27)
Corridor Door			2.1000	0.5000	1.0500		(26)
Exposed Floor			74.1000	0.1200	8.8920		(28b)
External Wall	48.1000	18.4900	29.6100	0.1500	4.4415	14.0000	414.5400 (29a)
Corridor	4.2900	2.1000	2.1900	0.1500	0.3285	14.0000	30.6600 (29a)
Core Wall	5.3300		5.3300	0.2500	1.3325	9.0000	47.9700 (29a)
Total net area of external elements Aum(A, m ²)			131.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		30.3778		(33a)
Party Wall 1			41.0800	0.0000	0.0000	20.0000	821.6000 (32)
Party Ceilings 1			74.1000			40.0000	2964.0000 (32b)
Timber Frame			139.6200			9.0000	1256.5800 (32c)
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		5535.3500 (34)
Thermal mass parameter (THP = Cm / TPA) in kJ/m ² K							74.7011 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							17.0969 (36)
Total fabric heat loss						(33) + (36) =	47.4727 (37)

[illegible]

Energy conte	98.7895	95.1971	91.6048	88.0124	84.2401	80.8277	80.8277	84.2401	88.0124	91.6048	95.1971	98.7895	(44)
Energy content	146.5019	128.1315	132.2022	115.2768	112.7607	95.5444	88.4442	101.4910	102.7032	119.6906	130.6517	141.8793	(45)
Energy content (annual)										Total = Sum(45)=		1413.0389	(46)
Distribution loss	$(46) = 0.15 \times (45)m$												
	9751	101287	109330	172009	165910	134168	132666	152237	154055	179536	194978	212819	(46)

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
(66m)	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707 (66)
Lighting gains (calculated in Appendix L, equation L10 or L14a), also see Table 5	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249	18.4249 (66)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071 (68)
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 (69)
Losses e.g. evaporation (negative values) (Table 5)	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566 (71)
Water heating gains (Table 5)	97.7285	95.6540	91.3455	85.4923	81.6868	76.3528	71.7821	77.6128	79.6485	85.7464	92.5913	95.6627 (72)
Total internal gains	380.9458	378.9585	366.1873	345.5922	324.7227	304.5458	291.3883	297.1343	307.6666	328.6468	352.3788	370.2731 (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
North	9.8600	10.6334	0.5000	0.8000	0.7700	29.0631 (74)
East	8.6300	19.6403	0.4200	0.8000	0.7700	39.4667 (76)

Solar gains	68.5298	132.7463	221.5238	337.0299	431.4697	451.2538	425.5866	352.1807	261.3488	157.7249	85.0634	56.6839 (83)
Total gains	449.4756	511.7020	587.7112	682.6221	756.1924	755.7996	716.9749	649.3152	569.0154	486.1916	437.4422	426.9570 (84)

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

	<u>Utilisation factor for gains for living area, nil/m², see Table 9a)</u>											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	24.4003	24.4659	24.5318	24.8668	24.9349	25.2811	25.2811	25.3515	25.1414	24.9349	24.7991	24.6647
alpha	2.6267	2.6311	2.6355	2.6578	2.6623	2.6854	2.6854	2.6901	2.6761	2.6623	2.6533	2.6443
util. living area	0.9357	0.9202	0.8591	0.7590	0.6206	0.4690	0.3562	0.4032	0.6125	0.8184	0.9111	0.9426 (86)
MIF	18.9527	19.2286	19.6883	20.2489	20.6595	20.8857	20.9394	20.9436	20.7591	20.2045	19.4891	18.9014 (87)
Tau rest of house	20.2099	20.2118	20.2138	20.2236	20.2255	20.2354	20.2354	20.2373	20.2314	20.2255	20.2289	20.2177 (88)
useful area	0.9291	0.9011	0.8450	0.7358	0.8588	0.4212	0.2992	0.3435	0.5651	0.7349	0.9006	0.9366 (89)
MIF 2 living area fraction	17.4334	17.8305	18.4874	19.2771	19.8295	20.1224	20.2037	20.1907	19.9679	19.2982	18.2172	17.3642 (90)
MIF 2 living area / floor area	17.9521	18.3079	18.8974	19.6089	20.1129	20.3823	20.4619	20.4478	20.2426	19.5655	18.6515	17.8890 (92)
adjusted MIF	17.9521	18.3079	18.8974	19.6089	20.1129	20.3823	20.4619	20.4478	20.2426	19.5655	18.6515	17.8890 (93)

[illegible]

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	337.7159	265.8465	220.8976	125.1179	59.3725	0.0000	0.0000	0.0000	0.0000	132.1313	240.4092	344.9010 (98)
Space heating per m2										(98) / (4) =		1726.3356 (99)
												23.2981 (99)

8c. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1726.3918 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1722.0759 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	90.4356 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)

Water heating	
Annual water heating requirement	1766.2375 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1761.8219 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	92.7275 (310b)
Electricity used for heat distribution	36.6726 (313)
Annual totals kWh/year	

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6875)	
mechanical ventilation fans (SFP = 0.6875)	161.5936 (330a)
Total electricity for the above, kWh/year	161.5936 (331)
Electricity for lighting (calculated in Appendix L)	325.3892 (332)

Energy saving/generation technologies (Appendices M, N and Q)	
FV Unit 0 (0.80 * 0.84 * 951 * 1.00) =	-638.8140 (333)
Total delivered energy for all uses	3515.4297 (338)

12b. Carbon dioxide emissions - Community heating scheme

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump		320.0000 (367a)
Space heating from Heat pump	1088.7181	565.0447 (367)
Efficiency of heat source Boilers		95.0000 (367b)
Space heating from Boilers	193.0137	100.1741 (368)
Electrical energy for heat distribution	36.6726	19.0331 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)		684.2519 (373)
Space and water heating		684.2519 (376)
Pumps and fans	161.5936	83.8671 (378)
Energy for lighting	325.3892	168.8770 (379)

Energy saving/generation technologies		-331.5444 (380)
FV Unit		605.4515 (383)
Total CO2, kg/year	0.5190	8.1700 (384)
Dwelling Carbon Dioxide Emission Rate (DER)		

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

DER		8.1700 ZC1
Total Floor Area	TFA	74.1000
Assumed number of occupants	N	2.3414
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.5275 ZC2
CO2 emissions from cooking, equation (L16)		2.3643 ZC3
Total CO2 emissions		27.0618 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		27.0618 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)	74.1000	2.6000 (2b)	192.6600 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	192.6600 (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							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) =							Air changes per hour					
Pressure test							30.0000 / (5) =	0.1557 (8)				
Measured/design AP50								5.0000				
Infiltration rate								0.4057 (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) =		0.3449 (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	0.4397	0.4311	0.4225	0.3793	0.3707	0.3276	0.3276	0.3190	0.3449	0.3707	0.3880	0.4052 (22b)
Effective ac	0.5967	0.5929	0.5892	0.5720	0.5687	0.5537	0.5537	0.5509	0.5595	0.5687	0.5753	0.5821 (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					2.1000		1.0000		2.1000					(26)
TER Opening Type (Uw = 1.40)					16.4300		1.3258		21.7822					(27)
Exposed Floor					74.1000		0.1300		9.6330					(28b)
External Wall		48.1000		16.4300	31.6700		0.1800		5.7006					(29a)
Corridor		4.2900		2.1000	2.1900		0.1800		0.3942					(29a)
Core Wall		5.3300			5.3300		0.1800		0.9594					(29a)
Total net area of external elements Aum(A, m2)					131.8200									(31)
Fabric heat loss, W/K = Sum (A x U)							(26)... (30) + (32) =		40.5694					(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K														250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														12.0415 (36)
Total fabric heat loss												(33) + (36) =		52.6109 (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	37.9347	37.6960	37.4621	36.3634	36.1578	35.2008	35.2008	35.0236	35.5694	36.1578	36.5737	37.0084	(38)	
Average	90.5456	90.3069	90.0730	88.9743	88.7687	87.8117	87.8117	87.6345	88.1803	88.7687	89.1846	89.6193	(39)	
Average = Sum(39)m / 12 =												88.9733	(39)	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.2219	1.2187	1.2156	1.2007	1.1980	1.1850	1.1850	1.1827	1.1900	1.1980	1.2036	1.2094	(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												2.3414 (42)
Average daily hot water use (litres/day)												89.8086 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.8793 (45)
Energy content	Total = Sum(45)m =											1413.0389 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Store volume												3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.2602 (48)
Temperature factor from Table 2b												0.5400 (49)

HODKINSON

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End MF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D3-01 End MF GREEN	Prop Type Ref	N / E			
Property	2B4P-D3-01 End MF, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	6.84	TER	23.27	
Environmental	95 A	% DER<TER	70.61			
CO ₂ Emissions (t/year)	0.37	DFEE	33.87	TFEE	43.23	
General Requirements Compliance	Pass	% DFEE<TFEE	21.65			
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 74 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 (c)
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 23.27 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 6.84 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 43.2 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 33.9 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.68
Maximum	1.5
MVHR efficiency:	87%OK
Minimum:	70%OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing North:	9.86 m ² , No overhang	
Windows facing East:	8.63 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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

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					
Glazing North (Uw = 0.80)			9.8600	0.7752	7.6434		(27)					
Glazing E, S, W (Uw = 0.80)			8.6300	0.7752	6.6899		(27a)					
Corridor Door			2.1000	0.3800	1.0500		(26)					
External Wall	48.1000	18.4900	29.6100	0.1500	4.4415	14.0000	414.5400 (29a)					
Corridor	4.2900	2.1000	2.1900	0.1500	0.3285	14.0000	30.9600 (29a)					
Core Wall	5.3300		5.3300	0.2500	1.3325	9.0000	47.9700 (29a)					
Total net area of external elements Aum(A, m ²)			57.7200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	21.4858			(32)					
Party Wall 1			41.0800	0.0000	0.0000	20.0000	821.6000 (33)					
Party Floor 1			74.1000			40.0000	2964.0000 (32a)					
Party Ceilings 1			74.1000			40.0000	2964.0000 (32b)					
Timber Frame			139.6200			9.0000	1256.5800 (32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8499.3500 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							114.7011 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.7342 (36)					
Total fabric heat loss						(33) + (36) =	34.2200 (37)					
Ventilation heat loss calculated monthly (HMP = 0.33 x 253m ³ x 5)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38m) 16.8938	16.7249	16.5561	15.7117	15.5428	14.6984	14.6984	14.5295	15.0361	15.5428	15.8805	16.2183 (38)	
Heat transfer coeff												
51.1138	50.9449	50.7760	49.9317	49.7628	48.9184	48.9184	48.7495	49.2561	49.7628	50.1005	50.4383 (39)	
Average = Sum(38m) / 12 =											49.8894 (39)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP 0.6898	0.6875	0.6852	0.6738	0.6716	0.6602	0.6602	0.6579	0.6647	0.6716	0.6761	0.6807 (40)	
HLP (average)											0.6733 (40)	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

[illegible]

HODKINSON

Energy conte	146.5019	128.1315	122.2202	115.7278	110.6070	95.4454	89.4442	101.4910	102.7032	119.6906	130.6517	141.8793	45)
Volume conte (annual)										Total = Sum(43) =	1413.3089	(45)	
Distribution loss (46)m = 0.15 x (45)m													
	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2813	(46)
Water storage loss:													
Store volume													
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													
Volume factor from Table 2a													
Temperature factor from Table 2b													
Enter (49) or (54) in (53)													
Total storage loss													
	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353	(56)
If cylinder contains dedicated solar storage													
	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353	(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 require for water heating calculated for month													
	176.4996	155.2262	162.2179	144.3028	140.6047	124.4755	118.4419	131.4887	131.7332	149.6883	159.6817	171.8770	(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 =					
Output from w/h													
	176.4996	155.2262	162.2179	144.3028	140.6047	124.4755	118.4419	131.4887	131.7332	149.6883	159.6817	171.8770	(64)
								Total per year (KWh/year) = Sum(64)m =					
Heat gains from water heating, KWh/month													
	72.7100	64.2795	67.9614	61.5522	60.7750	54.9596	53.4059	57.7439	57.3728	63.7953	66.6657	71.1730	(65)

[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
North		9.8600	10.6334	0.5000	0.8000	0.7700	29.0631 (74)
East		8.6300	19.6403	0.4200	0.8000	0.7700	39.4667 (76)
Solar gains		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231	754.8732	755.8986	755.8986
		68.5298	132.7463	221.5238	431.0299	431.4697	451.2538
		448.8756	631.7020	687.0231			

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, n1/n (see Table 9A)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	40.4897	40.4897	40.4897	40.4897	40.4897	40.4897	40.4897	40.4897	40.4897	40.4897	40.4897	40.4897
alpha	0.0793	0.0895	0.0998	0.1522	0.1629	0.2175	0.2175	0.2287	0.1954	0.1629	0.1416	0.1206
util living area	0.9640	0.9399	0.8827	0.7538	0.5786	0.4083	0.2989	0.3428	0.5676	0.8306	0.9403	0.9697 (86)
MIT	19.9092	20.1188	20.4347	20.7661	20.9340	20.9882	20.9975	20.9957	20.8557	20.7029	20.2564	19.8714 (87)
Th 2	20.3499	20.3519	20.3539	20.3640	20.3660	20.3762	20.3762	20.3762	20.3721	20.3660	20.3579 (88)	20.3579 (88)
util rest of house	0.9592	0.9323	0.8688	0.7293	0.5453	0.3701	0.2570	0.2974	0.5230	0.8061	0.9315	0.9656 (89)
MIT 2	18.6703	19.1720	19.6196	20.0787	20.2936	20.3654	20.3744	20.3750	20.3489	20.0661	19.8802	19.4318 (90)
Living area fraction									fLA = Living area / (4) =			0.3414 (91)
MIT	19.2250	19.4953	19.8979	20.3134	20.5122	20.5780	20.5872	20.5869	20.5426	20.2440	19.6794	19.1802 (92)
adjusted MIT	19.2250	19.4953	19.8979	20.3134	20.5122	20.5780	20.5872	20.5869	20.5426	20.2440	19.6794	19.1802 (93)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9491	0.9205	0.8579	0.7272	0.5531	0.3826	0.2712	0.3127	0.5353	0.8010	0.9204	0.9563 (94)
Heat loss gains	426.5794	471.0187	504.2010	496.4217	418.2401	289.1431	194.4592	203.0595	304.6130	389.4563	402.6216	408.7873 (94)
Useful heat test	11.3000	4.9200	5.4100	11.7000	14.2400	14.6000	16.4000	16.4000	10.0000	10.0000	10.0000	4.2000 (96)
Month factor	762.8753	743.5457	680.2926	569.8910	438.5214	292.4347	195.0458	204.1100	317.3392	479.9123	630.2339	755.7670 (97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.9300	0.9300	1.0000	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	250.2041	183.1442	131.0122	52.8979	15.0893	0.0000	0.0000	0.0000	0.0000	67.2993	163.8809	258.3895 (98)
Space heating per m2										(98) / (4) =		15.1406 (99)

Sc. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1121.9172 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1119.1129 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	58.9007 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)

Water heating	
Annual water heating requirement	1766.2375 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1761.8219 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	92.7275 (310b)
Electricity used for heat distribution	30.3256 (313)
Annual totals kWh/year	

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8500)	
mechanical ventilation fans (SFP = 0.8500)	199.7884 (330a)
Total electricity for the above, kWh/year	199.7884 (331)
Electricity for lighting (calculated in Appendix L)	325.3892 (332)

Energy saving/generation technologies (Appendices M, N and Q)	
FV Unit 0 (0.80 * 0.84 * 951 * 1.00) =	-638.8140 (333)
Total delivered energy for all uses	2918.9262 (338)

12b. Carbon dioxide emissions - Community heating scheme

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump		320.0000 (367a)
Space heating from Heat pump	0.5190	467.2515 (367)
Efficiency of heat source Boilers		95.0000 (367b)
Space heating from Boilers	0.5190	82.8368 (368)
Electrical energy for heat distribution	0.5190	15.7390 (372)
Total CO2 associated with community systems (negative value allowed since DFEE < TFEE)		565.8274 (373)
Space and water heating		565.8274 (376)
Pumps and fans	0.5190	103.6902 (378)
Energy for lighting	0.5190	168.9770 (379)
Energy saving/generation technologies		-331.5444 (380)
FV Unit		506.8501 (383)
Total CO2, kg/year		6.8400 (384)
Dwelling Carbon Dioxide Emission Rate (DER)		

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

Total Floor Area	TFA	74.1000	6.8400 ZC1
Assumed number of occupants	N	2.3414	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		16.5275	ZC2
CO2 emissions from cooking, equation (L16)		2.3643	ZC3
Total CO2 emissions		25.7318	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		25.7318	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)	74.1000	2.6000 (2b)	192.6600 (1b) - (3b)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 192.6600 (5)

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 * 20 =	0.0000 (6b)				
Number of intermittent fans	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)				
									Air changes per hour			
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =							30.0000 / (5) =		0.1557 (8)			
Pressure test							Yes					
Measured/design AP50							5.0000					
Infiltration rate							0.4057 (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) =		0.3449 (21)			
Wind speed	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	0.4397	0.4311	0.4225	0.3793	0.3707	0.3276	0.3276	0.3190	0.3449	0.3707	0.3880	0.4052 (22b)
	0.5967	0.5929	0.5892	0.5720	0.5687	0.5537	0.5537	0.5509	0.5595	0.5687	0.5753	0.5821 (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 x K					
TER Opaque door			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			16.4300	1.3258	21.7822		(27)					
External Wall	48.1000	16.4300	31.6700	0.1800	5.7006		(29a)					
Corridor	4.2900	2.1000	2.1900	0.1800	0.3942		(29a)					
Core Wall	5.3300		5.3300	0.1800	0.9594		(29a)					
Total net area of external elements Aum(A, m2)			57.7200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	30.9364		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.9010 (36)					
Total fabric heat loss						(33) + (36) =	36.8374 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 37,9347	Feb 37,6960	Mar 37,4621	Apr 36,3634	May 36,1578	Jun 35,2008	Jul 35,2008	Aug 35,0236	Sep 35,5694	Oct 36,1578	Nov 36,5737	Dec 37,0084 (38)
Heat transfer coeff	74.7721	74.5334	74.2995	73.2008	72.9952	72.0382	72.0382	71.8610	72.4068	72.9952	73.4111	73.8458 (39)
Average = Sum(39)m / 12 =												73.1998 (39)
HLP	Jan 1.0091	Feb 1.0058	Mar 1.0027	Apr 0.9879	May 0.9851	Jun 0.9722	Jul 0.9722	Aug 0.9698	Sep 0.9772	Oct 0.9851	Nov 0.9907	Dec 0.9966 (40)
HLP (average)												0.9879 (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												2.3414 (42)
Average daily hot water use (litres/day)												89.8086 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy conte	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.8793 (45)
Energy content (annual)												Total = Sum(45)m = 1413.0389 (45)
Distribution loss (46)m = 0.15 x (45)m												
	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Water storage loss:												
Store volume												
a) If manufacturer declared loss factor is known (kWh/day):												
Temperature factor from Table 2b												
Enter (49) or (54) in (55)												
												0.2602 (48)
												0.5400 (49)
												0.1405 (55)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	174.1196	153.0765	159.8379	141.9996	138.2247	122.1722	116.0619	129.1087	129.4299	147.3083	157.3785	169.4969 (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	174.1196	153.0765	159.8379	141.9996	138.2247	122.1722	116.0619	129.1087	129.4299	147.3083	157.3785	169.4969 (64)
Heat gains from water heating, kWh/month	70.8060	62.5597	66.0574	59.7096	58.8710	53.1170	51.5018	55.8399	55.5302	61.8913	64.8231	69.2690 (65)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.4271	16.3668	13.3104	10.0768	1.5325	6.3593	6.8714	8.9318	11.9882	15.2218	17.7660	18.9393 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.6711	208.8157	203.4114	191.9063	177.3831	163.7333	154.6144	152.4698	157.8741	169.3793	183.9025	197.5523 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071 (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)	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566 (71)
Water heating gains (Table 5)	95.1694	93.0948	88.7868	82.9300	79.1276	73.7737	69.2229	75.0536	77.1253	83.1872	90.0321	93.1035 (72)
Total internal gains	381.3889	379.3986	366.6298	346.0344	325.1645	304.9875	291.8300	297.5764	308.1089	328.9095	352.8219	370.7163 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
North	8.7700	10.6334	0.6300	0.7000	0.7000	0.7700	28.4999 (74)					
East	7.6600	19.6403	0.6300	0.7000	0.7000	0.7700	45.9778 (76)					
Solar gains	74.4777	144.4070	240.6710	364.6846	465.0045	485.3972	458.1706	380.4293	283.5460	171.5573	92.4872	61.5688 (83)
Total gains	455.8666	323.8056	607.3009	710.7189	790.1690	790.3847	750.0005	678.0058	591.6548	500.4667	445.3090	432.2851 (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	68.8203	69.0406	69.2380	70.2975	70.4955	71.4320	71.4320	71.6081	71.0683	70.4955	70.0962	69.6835
alpha	5.5880	5.6027	5.6172	5.6865	5.6997	5.7621	5.7621	5.7739	5.7379	5.6997	5.6731	5.6456
util living area	0.9977	0.9946	0.9822	0.9267	0.7793	0.5721	0.4209	0.4836	0.7712	0.9662	0.9949	0.9983 (86)
MIT	19.9673	20.1162	20.3737	20.7034	20.9176	20.9884	20.9983	20.9965	20.9433	20.6399	20.2463	19.9451 (87)
Th 2	20.0758	20.0785	20.0811	20.0935	20.0958	20.1066	20.1066	20.1086	20.1024	20.0958	20.0911	20.0862 (88)
util rest of house	0.9970	0.9928	0.9762	0.9038	0.7256	0.4971	0.3364	0.3920	0.6966	0.9510	0.9929	0.9977 (89)
MIT 2	18.6943	18.9131	19.2871	19.7548	20.0202	20.0994	20.1060	20.1072	20.0594	19.6801	19.1131	18.6695 (90)
Living area fraction	19.1289	19.3239	19.6581	20.0787	20.3266	20.4029	20.4106	20.4108	20.3612	20.0078	19.5000	19.1051 (92)
MIT	19.1289	19.3239	19.6581	20.0787	20.3266	20.4029	20.4106	20.4108	20.3612	20.0078	19.5000	19.1051 (93)
Temperature adjustment												0.0000
adjusted MIT	19.1289	19.3239	19.6581	20.0787	20.3266	20.4029	20.4106	20.4108	20.3612	20.0078	19.5000	19.1051 (93)

8. Space heating requirement												
Utilisation	0.9959	0.9908	0.9727	0.9034	0.7401	0.5225	0.3653	0.4233	0.7196	0.9492	0.9911	0.9969 (94)
Useful gains	453.9913	518.9822	590.7305	642.0320	584.8272	412.9482	275.9804	287.0304	425.7653	475.0529	441.3371	430.9406 (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	1108.7908	1075.0610	977.6424	818.2883	629.6991	418.0327	274.5125	288.2205	453.3517	686.7264	910.2986	1100.6763 (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	487.1708	373.6850	287.8625	126.9045	33.3847	0.0000	0.0000	0.0000	0.0000	157.4851	337.6523	498.2834 (98)
Space heating												2302.4283 (98)
Space heating per m2									(98) / (4) =			31.0719 (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												2462.4902 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	487.1708	373.6850	287.8625	126.9045	33.3847	0.0000	0.0000	0.0000	0.0000	157.4851	337.6523	498.2834 (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)	521.0383	399.6631	307.8744	135.7268	35.7056	0.0000	0.0000	0.0000	0.0000	168.4333	361.1254	532.9234 (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	174.1196	153.0765	159.8379	141.9996	138.2247	122.1722	116.0619	129.1087	129.4299	147.3083	157.3785	169.4969 (64)
Water heating												79.8000 (216)
Efficiency of water heater	87.4139	87.1059	86.3656	84.5158	81.6787	79.8000	79.8000	79.8000	79.8000	84.9922	86.7999	87.5213 (217)
Fuel for water heating, kWh/month	199.1899	175.7361	185.0713	168.0155	169.2298	153.0980	145.4410	161.7904	162.1929	173.3199	181.3118	193.6636 (219)
Water heating fuel used												2068.0601 (219)
Annual totals kWh/year												
Space heating fuel - main system												2462.4902 (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)												325.4292 (232)
Total delivered energy for all uses												4930.9795 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP												
Energy kWh/year	2462.4902	Emission factor kg CO2/kWh	0.2160	Emissions kg CO2/year	531.8979 (261)							
Space heating - main system 1	0.0000	0.0000	0.0000	0.0000 (263)								
Space heating - secondary	0.0000	0.2160	0.0000	446.7010 (264)								
Water heating (other Fuel)	2068.0601	0.2160	0.0000	978.5989 (265)								
Space and water heating				38.9250 (267)								
Pumps and fans	75.0000	0.5190	0.5190	168.8977 (268)								
Energy for lighting	325.4292	0.5190	0.5190	168.8977 (268)								
Total CO2, kg/m2/year				1186.4216 (272)								
Emissions per m2 for space and water heating				13.2065 (272a)								
Fuel factor (electricity)				1.5500								
Emissions per m2 for lighting				2.2793 (272b)								
Emissions per m2 for pumps and fans				0.5253 (272c)								
Target Carbon Dioxide Emission Rate (TER) = (13.2065 * 1.55) + 2.2793 + 0.5253, rounded to 2 d.p.				23.2700 (273)								

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	2B4P-D3-01 End TF				Issued on Date	06/02/2024
Assessment Reference	2B4P-D3-01 End TF GREEN	Prop Type Ref	N / E			
Property	2B4P-D3-01 End TF, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	8.86	TER	28.81	
Environmental	94 A	% DER<TER	69.24			
CO ₂ Emissions (t/year)	0.46	DFEE	45.05	TFEE	61.53	
General Requirements Compliance	Pass	% DFEE<TFEE	26.79			
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 74 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 28.81 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 8.86 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)61.5 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.0 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.25 (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	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls:

No cylinder thermostat

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:	0.68	
Maximum	1.5	OK
MVHR efficiency:	87%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
Based on:		
Overheating:	Average	
Windows facing North:	9.86 m ² , No overhang	
Windows facing East:	8.63 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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	74.1000 (1b)	x 2.6000 (2b)	= 192.6600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.6600 (5)

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 flameless gas fires	0	0	0	0	= 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =

Pressure test	0.0000 / (5) =	0.0000 (8)
Measured/design AP50		2.5000
Infiltration rate		0.1250 (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) = 0.1063 (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	0.1355	0.1328	0.1302	0.1169	0.1142	0.1009	0.1009	0.0983	0.1063	0.1142	0.1195	0.1248 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation:												73.9500 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2657	0.2631	0.2604	0.2471	0.2445	0.2312	0.2312	0.2285	0.2365	0.2445	0.2498	0.2551 (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
Glazing North (Uw = 0.80)			9.8600	0.7752	7.6434		(27)
Glazing E, S, W (Uw = 0.80)			8.6300	0.7752	6.6899		(27)
Corridor Door			2.1000	0.5000	1.0500		(26)
External Wall	48.1000	18.4900	29.6100	0.1500	4.4415	14.0000	414.5400 (29a)
Corridor	4.2900	2.1000	2.1900	0.1500	0.3285	30.6600	(29a)
Core Wall	5.3300		5.3300	0.2500	1.3325	9.0000	47.9700 (29a)
Main Roof	74.1000		74.1000	0.1000	7.4100	100.0000	(30)
Total net area of external elements Sum(A, m2)			131.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	28.8958	(33)
Party Wall 1			41.0800	0.0000	0.0000	20.0000	821.6000 (32)
Party Floor 1			74.1000			40.0000	2964.0000 (32a)
Timber Frame			139.6200			9.0000	1256.5800 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss (33) + (36) = 49.4492 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	16.8938	16.7249	16.5561	15.7117	15.5428	14.6984	14.6984	14.5295	15.0361	15.5428	15.8905	16.2183 (38)
Heat transfer coeff	66.3431	66.1742	66.0053	65.1609	64.9920	64.1476	64.1476	63.9788	64.4854	64.9920	65.3298	65.6675 (39)
Average = Sum(39)m / 12 =												65.1187 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8953	0.8930	0.8908	0.8794	0.8771	0.8657	0.8657	0.8634	0.8702	0.8771	0.8816	0.8862 (40)
HLP (average)												0.8788 (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												2.3414 (42)
Average daily hot water use (litres/day)												89.8086 (43)
Jan												
Feb												
Mar												
Apr												
May												
Jun												
Jul												
Aug												
Sep												
Oct												
Nov												
Dec												

Daily hot water use



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy cont	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.4517	141.8793 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Store volume												3.0000 (47)
b) If manufacturer declared loss factor is not known :												0.0212 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)												3.4200 (52)
Volume factor from Table 2a												1.0000 (53)
Temperature factor from Table 2b												0.2173 (55)
Enter (49) or (54) in (55)												
Total storage loss	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (56)
If cylinder contains dedicated solar storage	6.7353	6.0835	6.7353	6.5180	6.7353	6.5180	6.7353	6.7353	6.5180	6.7353	6.5180	6.7353 (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	176.4996	155.2262	162.2179	144.3028	140.6047	124.4755	118.4419	131.4887	131.7332	149.6883	159.6817	171.8770 (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	176.4996	155.2262	162.2179	144.3028	140.6047	124.4755	118.4419	131.4887	131.7332	149.6883	159.6817	171.8770 (64)
Heat gains from water heating, kWh/month	72.7100	64.2795	67.9614	61.5522	60.7750	54.9596	53.4059	57.7439	57.3728	63.7953	66.6657	71.1730 (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	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707	117.0707 (66)
Lighting gains (calculated in Appendix L, equation L18 or L19a), also see Table 5	18.4249	16.3648	13.3088	10.0756	7.5316	6.3585	6.8706	8.9307	11.9867	15.2199	17.7639	18.9370 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071	34.7071 (69)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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 (70)
Pumps, fans	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566	-93.6566 (71)
Losses e.g. evaporation (negative values) (Table 5)	97.7285	95.6540	91.3459	85.4892	81.6668	76.3328	71.7821	77.6128	79.6485	85.7464	92.5913	95.6627 (72)
Water heating gains (Table 5)	380.9458	378.9558	366.1873	345.5923	324.7227	304.5458	291.3883	297.1345	307.6666	328.4668	352.3788	370.2731 (73)
Total internal gains												

6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	q Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North		9.8600	10.6334	0.5000	0.8000	0.7700	29.0631 (74)
East		8.6300	19.6403	0.4200	0.8000	0.7700	39.4667 (76)
Solar gains	68.5298	132.7463	221.5238	337.0299	431.4697	451.2538	425.5866
Total gains	449.4756	911.7020	987.7112	682.6221	756.1924	755.7996	716.9749
							649.3152
							569.0154
							486.1916
							437.4422
							426.9570 (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	54.2021	54.3404	54.4794	55.1854	55.3288	56.0571	56.0571	56.2051	55.7635	55.3288	55.0427	54.7596
alpha	4.6135	4.6227	4.6320	4.6790	4.6886	4.7371	4.7371	4.7470	4.7176	4.6886	4.6695	4.6506
util living area	0.9907	0.9822	0.9569	0.8776	0.7214	0.5290	0.3908	0.4474	0.7112	0.9293	0.9826	0.9926 (86)
MIT	19.8262	20.0025	20.3001	20.6632	20.8952	20.9808	20.9963	20.9932	20.9282	20.6011	20.1499	19.7937 (87)
Th 2	20.1715	20.1734	20.1754	20.1851	20.1870	20.1968	20.1968	20.1987	20.1929	20.1870	20.1831	20.1792 (88)
util rest of house	0.9886	0.9783	0.9475	0.8531	0.6755	0.4676	0.3208	0.3721	0.6482	0.9092	0.9781	0.9909 (89)
MIT 2	18.5925	18.8492	19.2772	19.7865	20.0807	20.1821	20.1949	20.1950	20.1300	19.7152	19.0718	18.5507 (90)
Living area fraction	19.0137	19.2430	19.6264	20.0859	20.3588	20.4548	20.4685	20.4675	20.4025	20.0177	19.4399	18.9753 (92)
MIT	19.0137	19.2430	19.6264	20.0859	20.3588	20.4548	20.4685	20.4675	20.4025	20.0177	19.4399	18.9753 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0137	19.2430	19.6264	20.0859	20.3588	20.4548	20.4685	20.4675	20.4025	20.0177	19.4399	18.9753 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9847	0.9727	0.9400	0.8498	0.6856	0.4876	0.3446	0.3976	0.6654	0.9043	0.9728	0.9876 (94)
Useful gains	442.6131	497.7075	552.4271	580.0904	518.4822	368.5641	247.0869	258.1910	378.6199	439.6618	425.5514	421.6504 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
	976.1540	949.1342	866.4142	728.8804	562.7535	375.5710	248.1136	260.2338	406.4194	612.0723	806.1641	970.2437 (97)
Month factor	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												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating	396.9544	303.3588	233.6064	107.1288	32.9378	0.0000	0.0000	0.0000	0.0000	128.2736	274.0411	408.1534 (98)
Space heating per m2										(98) / (4) =		1884.4543 (98)
												25.4312 (99)

8c. Space cooling requirement
Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1884.4543 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1879.7432 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	98.9339 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)

Water heating	
Annual water heating requirement	1766.2375 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1761.8219 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	92.7275 (310b)
Electricity used for heat distribution	38.3323 (313)
Annual totals kWh/year	

Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8500)	
mechanical ventilation fans (SFP = 0.8500)	199.7884 (330a)
Total electricity for the above, kWh/year	199.7884 (331)
Electricity for lighting (calculated in Appendix L)	325.3892 (332)

Energy saving/generation technologies (Appendices M, N and Q)	
FV Unit 0 (0.80 * 0.84 * 951 * 1.00) =	-638.8140 (333)
Total delivered energy for all uses	3719.5901 (338)

12b. Carbon dioxide emissions - Community heating scheme

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump		320.0000 (367a)
Space heating from Heat pump	0.5190	590.6163 (367)
Efficiency of heat source Boilers		95.0000 (367b)
Space heating from Boilers	0.5190	104.7076 (368)
Electrical energy for heat distribution	0.5190	19.8944 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)		715.2184 (373)
Space and water heating		715.2184 (376)
Pumps and fans	0.5190	103.6902 (378)
Energy for lighting	0.5190	168.8770 (379)

Energy saving/generation technologies		-331.5444 (380)
FV Unit		-638.8140 (383)
Total CO2, kg/year	0.5190	656.2411 (384)
Dwelling Carbon Dioxide Emission Rate (DER)		8.8600 (384)

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

DER		8.8600 ZC1
Total Floor Area	TFA	74.1000
Assumed number of occupants	N	2.3414
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		16.5275 ZC2
CO2 emissions from cooking, equation (L16)		2.3643 ZC3
Total CO2 emissions		27.7518 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		27.7518 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)	74.1000	2.6000 (2b)	192.6600 (1b) - (3b)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	192.6600 (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							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) =							Air changes per hour					
Pressure test							30.0000 / (5) =		0.1557 (8)			
Measured/design AP50									5.0000			
Infiltration rate									0.4057 (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) =		0.3449 (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	0.4397	0.4311	0.4225	0.3793	0.3707	0.3276	0.3276	0.3190	0.3449	0.3707	0.3880	0.4052 (22b)
	0.5967	0.5929	0.5892	0.5720	0.5687	0.5537	0.5537	0.5509	0.5595	0.5687	0.5753	0.5821 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			16.4300	1.3258	21.7822		(27)					
External Wall	48.1000	16.4300	31.6700	0.1800	5.7006		(29a)					
Corridor	4.2900	2.1000	2.1900	0.1800	0.3942		(29a)					
Core Wall	5.3300		5.3300	0.1800	0.9594		(29a)					
Main Roof	74.1000		74.1000	0.1300	9.6330		(30)					
Total net area of external elements Aum(A, m2)			131.8200				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	40.5694		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						(33) + (36) =	17.2865 (36)					
Total fabric heat loss							57.8559 (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	37.9347	37.6960	37.4621	36.3634	36.1578	35.2008	35.2008	35.0236	35.5694	36.1578	36.5737	37.0084 (38)
Average = Sum(39)m / 12 =	95.7906	95.5519	95.3180	94.2193	94.0137	93.0567	93.0567	92.8795	93.4253	94.0137	94.4296	94.8643 (39)
												94.2183 (39)
HLP (average)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days in month	1.2927	1.2895	1.2863	1.2715	1.2687	1.2558	1.2558	1.2534	1.2608	1.2687	1.2744	1.2802 (40)
												1.2715 (40)
	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3414 (42)
Average daily hot water use (litres/day)												89.8086 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	98.7895	95.1971	91.6048	88.0124	84.4201	80.8277	80.8277	84.4201	88.0124	91.6048	95.1971	98.7895 (44)
Energy content (annual)	146.5019	128.1315	132.2202	115.2728	110.6070	95.4454	88.4442	101.4910	102.7032	119.6906	130.6517	141.7993 (45)
Distribution loss (46)m = 0.15 x (45)m												
										Total = Sum(45)m =	1413.3895	(45)
Water storage loss:												
	21.9753	19.2197	19.8330	17.2909	16.5910	14.3168	13.2666	15.2237	15.4055	17.9536	19.5978	21.2819 (46)
Store volume												
a) if manufacturer declared loss factor is known (kWh/day):												3.0000 (47)
Temperature factor from Table 2b												0.2602 (48)
												0.5400 (49)

8c. Space cooling requirement

Not applicable

HODKINSON

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	3706.2306	0.2160	800.5458 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2048.5873	0.2160	442.4949 (264)
Space and water heating Pumps and fans	75.0000	0.5190	1243.0407 (265)
Energy for lighting	325.4292	0.5190	38.9250 (267)
Total CO ₂ , kg/m ² /year			166.8977 (268)
Emissions per m ² for space and water heating Fuel factor (electricity)			1450.8634 (272)
Emissions per m ² for space and water heating Fuel factor (electricity)			16.7752 (272a)
Emissions per m ² for lighting			1.5500
Emissions per m ² for pump and fans			2.2793 (272b)
Emissions per m ² for pump and fans			0.5253 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.7752 / 1.55) + 2.2793 + 0.5253, rounded to 2 d.p.			28.8100 (272d)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	3B5P-D1-01 End MF				Issued on Date	06/02/2024
Assessment Reference	3B5P-D1-01 End MF GREEN	Prop Type Ref	S / E			
Property	3B5P-D1-01 End MF, St Ann's Hospital, London, N15					
SAP Rating	86 B	DER	6.34	TER	20.27	
Environmental	95 A	% DER<TER	68.73			
CO ₂ Emissions (t/year)	0.41	DFEE	29.63	TFEE	36.58	
General Requirements Compliance	Pass	% DFEE<TFEE	19.01			
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 86 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 (c)
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 20.27 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 6.34 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)36.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)29.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	0.77 (max. 2.00)	0.80 (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:	2.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Community heating scheme	-
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Nominal cylinder loss: 0.22 kWh/day	
Permitted by DBSOG 0.35	OK	
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK

Hot water controls: No cylinder thermostat

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:	0.68	
Maximum	1.5	OK
MVHR efficiency:	87%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based on:		
Overheating:	Average	
Windows facing East:	5.36 m ² , No overhang	
Windows facing South:	14.61 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
Door U-value	0.50 W/m ² K
Window U-value	0.80 W/m ² K
Window U-value	0.80 W/m ² K
Air permeability	2.5 m ³ /m ² h
Photovoltaic array	0.84 kW

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

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 k ² /m ² K	A x K kJ/K					
Glazing E, S, W (Uw = 0.80)			19.9700	0.7752	15.4806			(27)				
Corridor Door			2.1000	0.5000	1.0500			(26)				
External Wall	56.9400	19.9700	19.9700	0.5455	5.5455	14.0000	517.5800	(21a)				
Corridor	24.3100	2.1000	22.2100	0.1500	3.3315	14.0000	310.9400	(29a)				
Total net area of external elements Aum(A, m ²)			81.2500					(31)				
Fabric heat loss, W/K = Sum (A x U)			32.6300	... (30) + (32) =	25.4076			(33)				
Party Wall 1			32.6300	0.0000	0.0000	20.0000	652.6000	(32)				
Party Floor 1			86.1000			40.0000	3444.0000	(32a)				
Party Ceilings 1			86.1000			40.0000	3444.0000	(32b)				
Timber Frame			181.5300			9.0000	1633.7700	(32c)				
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		10002.8900	(34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							116.1776	(35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							13.8165	(36)				
Total fabric heat loss						(33) + (36) =	39.2241	(37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x 25m ³ x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	19.6297	19.4334	19.2372	18.2561	18.0598	17.0787	17.0787	16.8825	17.4712	18.0598	18.4523	18.8447
Heat transfer coeff												
Average = Sum(39)m / 12 =	58.6576	58.6576	58.4613	57.4802	57.2840	56.3028	56.3028	56.1066	56.6953	57.2840	57.6764	58.0689
	39	39	39	39	39	39	39	39	39	39	39	39
	57.4311	57.4311	57.4311	57.4311	57.4311	57.4311	57.4311	57.4311	57.4311	57.4311	57.4311	57.4311
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.6836	0.6813	0.6790	0.6676	0.6653	0.6539	0.6539	0.6516	0.6585	0.6653	0.6699	0.6744
HLP (average)												0.6670
Days in month	31	28	31	30	31	30	31	31	31	30	31	31
	31	28	31	30	31	30	31	31	31	30	31	31

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Space heating per m2 (98) / (4) = 12.1301 (99)

8c. Space cooling requirement

Not applicable

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Heat pump	0.9500 (303a)
Fraction of heat from community Boilers	0.0500 (303b)
Fraction of total space heat from community Heat pump	0.9500 (304a)
Fraction of total space heat from community Boilers	0.0500 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	1044.4056 (98)
Space heat from Heat pump = (98) x 0.95 x 1.00 x 1.05	1041.7846 (307a)
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.05	54.8313 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	1851.0910 (64)
Water heat from Heat pump = (64) x 0.95 x 1.00 x 1.05	1846.4632 (310a)
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.05	97.1823 (310b)
Electricity used for heat distribution	30.4027 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8500)	
mechanical ventilation fans (SFP = 0.8500)	232.1428 (330a)
Total electricity for the above, kWh/year	232.1428 (331)
Electricity for lighting (calculated in Appendix L)	364.8223 (332)
Energy saving/generation technologies (Appendices M, N and Q)	
PV Unit 0 (0.80 * 0.84 * 951 * 1.00) =	-638.8140 (333)
Total delivered energy for all uses	2998.4225 (338)

12b. Carbon dioxide emissions - Community heating scheme

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump		320.0000 (367a)
Space heating from Heat pump	0.5190	468.4393 (367)
Efficiency of heat source Boilers		95.0000 (367b)
Space heating from Boilers	0.5190	83.0474 (368)
Electrical energy for heat distribution	0.5190	15.7790 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)		567.2657 (373)
Space and water heating		567.2657 (376)
Pumps and fans	0.5190	120.4821 (378)
Energy for lighting	0.5190	189.3428 (379)
Energy saving/generation technologies		
PV Unit		-331.5444 (380)
Total CO2, kg/year	0.5190	545.5462 (383)
Dwelling Carbon Dioxide Emission Rate (DER)		6.3400 (384)

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

DER	6.3400 ZC1
Total Floor Area	86.1000
Assumed number of occupants	2.5685
CO2 emission factor in Table 12 for electricity displaced from grid	0.5190
CO2 emissions from appliances, equation (L14)	15.9478 ZC2
CO2 emissions from cooking, equation (L16)	2.0981 ZC3
Total CO2 emissions	24.3859 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	24.3859 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	2.6000 (2b)	223.8600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)		86.1000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 223.8600 (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							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) =							Air changes per hour				
Pressure test								30.0000 / (5) = 0.1340 (8)				
Measured/design AP50								Yes				
Infiltration rate								5.0000				
Number of sides sheltered								0.3840 (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) = 0.3264 (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	0.4162	0.4080	0.3999	0.3591	0.3509	0.3101	0.3101	0.3019	0.3264	0.3509	0.3672	0.3835 (22b)
	0.5866	0.5832	0.5799	0.5645	0.5616	0.5481	0.5481	0.5456	0.5533	0.5616	0.5674	0.5735 (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			2.1000	1.0000	2.1000		(26)					
TER Opening Type (Uw = 1.40)			19.4200	1.3258	25.7462		(27)					
External Wall	56.9400	19.4200	37.5200	0.1800	6.7536		(29a)					
Corridor	24.3100	2.1000	22.2100	0.1800	3.9978		(29a)					
Total net area of external elements Aum(A, m2)			81.2500				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.5976		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							1.2270 (36)					
Total fabric heat loss						(33) + (36) =	45.8246 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.3344	Feb 43.0860	Mar 42.8425	Apr 41.6987	May 41.4847	Jun 40.4886	Jul 40.4886	Aug 40.3041	Sep 40.8723	Oct 41.4847	Nov 41.9176	Dec 42.3702 (38)
Heat transfer coeff	89.1590	88.9106	88.6671	87.5233	87.3094	86.3132	86.3132	86.1287	86.6969	87.3094	87.7422	88.1948 (39)
Average = Sum(39)m / 12 =												87.5223 (39)
HLP	Jan 1.0355	Feb 1.0326	Mar 1.0298	Apr 1.0165	May 1.0140	Jun 1.0025	Jul 1.0025	Aug 1.0003	Sep 1.0069	Oct 1.0140	Nov 1.0191	Dec 1.0243 (40)
HLP (average)												1.0165 (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												2.5685 (42)
Average daily hot water use (litres/day)												95.2016 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	104.7218	100.9137	97.1057	93.2976	89.4895	85.6815	85.6815	89.4895	93.2976	97.1057	100.9137	104.7218 (44)
Energy content (annual)	155.2994	135.8258	140.1601	122.1950	117.2490	101.1770	93.7553	107.5856	108.8705	126.8781	138.4974	150.3992 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1497.8923 (45)
	23.2949	20.3739	21.0240	18.3292	17.5873	15.1765	14.0633	16.1378	16.3306	19.0317	20.7746	22.5599 (46)
Water storage loss:												
Store volume												3.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.2602 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.1405 (55)
Total storage loss												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (56)
If cylinder contains dedicated solar storage	4.3553	3.9338	4.3553	4.2148	4.3553	4.2148	4.3553	4.3553	4.2148	4.3553	4.2148	4.3553 (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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168 (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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168 (64)
Heat gains from water heating, kWh/month	73.7312	65.1181	68.6974	62.0113	61.0794	55.0228	53.2678	57.8664	57.5809	64.2811	67.4318	72.1019 (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	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245	128.4245 (66)
Lighting gains (calculated in Appendix L, equation L10 or L1a), also see Table 5	20.6543	18.3450	14.9192	11.2948	8.4430	7.1279	7.7020	10.0113	13.4371	17.0615	19.9133	21.2284 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.7171	234.1216	228.0623	215.1629	198.8797	183.5757	173.3517	170.9473	177.0065	189.9060	206.1892	221.4931 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424	35.8424 (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)	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396	-102.7396 (71)
Water heating gains (Table 5)	99.1011	96.9019	92.3352	86.1267	82.0960	76.4205	71.5965	77.7774	79.9734	86.3993	93.6553	96.9111 (72)
Total internal gains	415.9998	413.8958	399.8440	377.1117	353.9460	331.6515	317.1775	323.2632	334.9444	357.8942	384.2851	404.1599 (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
East	5.2100	19.6403	0.6300	0.7000	0.7700	31.2721 (76)
South	14.2100	46.7521	0.6300	0.7000	0.7700	203.0330 (78)
Solar gains	234.3051	393.6906	524.3124	625.6541	678.9288	664.4174
Total gains	650.3049	807.5865	1048.1564	1252.7058	1347.8576	1368.4504

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, nil,m (see Table 9a)	0.9939	0.9806	0.9481	0.8696	0.7306	0.5454	0.3936	0.4242	0.6437	0.9004	0.9840	0.9958 (86)
MIT	20.0613	20.2872	20.5434	20.7909	20.9359	20.9897	20.9986	20.9979	20.9749	20.7791	20.3672	20.0188 (87)
Th 2	20.0538	20.0562	20.0586	20.0696	20.0716	20.0813	20.0813	20.0831	20.0776	20.0716	20.0675	20.0631 (88)
util rest of house	0.9920	0.9749	0.9334	0.8365	0.6740	0.4711	0.3121	0.3407	0.5675	0.8668	0.9783	0.9944 (89)
MIT 2	18.8146	19.1416	19.5040	19.8423	20.0147	20.0750	20.0808	20.0822	20.0603	19.8375	19.2684	18.7598 (90)
Living area fraction	0.3310	0.3310	0.3310	0.3310	0.3310	0.3310	0.3310	0.3310	0.3310	0.3310	0.3310	0.3310 (91)
MIT	19.2273	19.5208	19.8480	20.1563	20.3196	20.3778	20.3846	20.3853	20.3630	20.1492	19.6321	19.1766 (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	19.2273	19.5208	19.8480	20.1563	20.3196	20.3778	20.3846	20.3853	20.3630	20.1492	19.6321	19.1766 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	643.6288	784.0222	859.1027	842.1584	712.4936	493.5389	326.1594	342.4537	529.4363	686.5349	647.2742	600.8697 (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	1330.9024	1299.9470	1183.5292	985.1857	752.5724	498.6997	326.6600	343.2519	542.9837	833.7330	1099.5967	1320.8547 (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	511.3316	346.7015	241.3733	102.9797	29.8186	0.0000	0.0000	0.0000	0.0000	109.5153	325.6722	535.6689 (98)
Space heating												2203.0611 (98)
Space heating per m2												25.3872 (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												2356.2151 (211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168 (64)
Space heating fuel (main heating system)	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)
Water heating requirement	546.8787	370.8037	258.1533	110.1387	31.8916	0.0000	0.0000	0.0000	0.0000	117.1287	348.3125	572.9079 (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	182.9171	160.7708	167.7778	148.9218	144.8667	127.9037	121.3730	135.2033	135.5973	154.4958	165.2241	178.0168 (64)
Efficiency of water heater	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)
Fuel for water heating, kWh/month	209.2588	185.1936	195.5832	177.5986	177.8734	160.2804	152.0965	169.4277	169.9214	184.1086	190.8074	203.2825 (219)
Water heating fuel used												2175.4320 (219)
Annual totals kWh/year												2356.2151 (211)
Space heating fuel - main system												0.0000 (215)
Space heating fuel - secondary												0.0000 (215)
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												364.7619 (232)
Electricity for lighting (calculated in Appendix L)												4971.4090 (238)
Total delivered energy for all uses												

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	2356.2151	0.2160	508.9425 (261)
Space heating - secondary	0.0000	0.2160	0.0000 (263)
Water heating (other fuel)	2175.4320	0.2160	469.8933 (264)
Space and water heating			978.8358 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	364.7619	0.5190	189.3114 (268)
Total CO2, kg/m2/year			1207.0722 (272)
Emissions per m2 for space and water heating			11.3686 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.1987 (272b)
Emissions per m2 for pumps and fans			0.4521 (272c)
Target Carbon Dioxide Emission Rate (TER) = (11.3686 * 1.55) + 2.1987 + 0.4521, rounded to 2 d.p.			20.2700 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	B End Terrace				Issued on Date	06/02/2024
Assessment Reference	B End Terrace GREEN	Prop Type Ref	E / W			
Property	B End Terrace, St Ann's Hospital, London, N15					
SAP Rating	84 B	DER	15.93	TER	26.41	
Environmental	85 B	% DER<TER	39.68			
CO ₂ Emissions (t/year)	1.66	DFEE	50.11	TFEE	62.71	
General Requirements Compliance	Pass	% DFEE<TFEE	20.09			
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

End-Terrace House, total floor area 121 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) 26.41 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 15.93 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)62.7 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)50.1 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.16 (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	0.11 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	0.85 (max. 2.00)	1.40 (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:	0.63	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Not significant	OK
Based on:		
Overshading:	Average	
Windows facing East:	8.18 m ² , No overhang	
Windows facing South:	5.40 m ² , No overhang	
Windows facing West:	13.93 m ² , No overhang	
Air change rate:	8.00 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
Window U-value	0.80 W/m ² K
Window U-value	0.80 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) (Version 9.92, January 2014)											
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014											
1. Overall dwelling dimensions											
Ground floor	Area (m2)	Storey height (m)	Volume (m3)								
First floor	46.5000 (1b)	x	2.5200 (2b)	=	117.1800 (1b) - (3b)						
Second floor	37.2500 (1c)	x	3.0500 (2c)	=	113.6125 (1c) - (3c)						
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.2500 (1d)	x	2.9000 (2d)	=	108.0250 (1d) - (3d)						
Dwelling volume					(4)						
					(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	338.8175 (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							0 * 10 =	0.0000 (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) =						0.0000 / (5) =	0.0000 (8)			
Pressure test								0.0000			
Measured/design AP50								0.1500 (18)			
Infiltration rate								1 (19)			
Number of sides sheltered								0.9250 (20)			
Shelter factor								0.1388 (21)			
Infiltration rate adjusted to include shelter factor								0.1388 (21)			
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561
Balanced mechanical ventilation with heat recovery								0.1630 (22b)			
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	0.2944	0.2909	0.2875	0.2701	0.2667	0.2493	0.2493	0.2458	0.2563	0.2667	0.2736
											0.2805 (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				
Glazing E, S, W (Uw = 0.80)			27.5100	0.7752	21.3256		(27)				
Door			2.3200	1.4000	3.2480		(28)				
Ground Floor			46.5000	0.1300	6.0450	75.0000	3487.5000 (28a)				
External Wall	153.6100	29.8300	123.7800	0.1600	19.8048	14.0000	1732.9200 (29a)				
Main Roof	37.2500		37.2500	0.1000	3.7250	100.0000	3725.0000 (30)				
GP Roof	9.2500		9.2500	0.1500	1.3875	100.0000	925.0000 (31)				
Total net area of external elements Aum(A, m2)			246.6100				(32)				
Fabric heat loss, W/K = Sum (A x U)					55.5359	20.0000	1293.4000 (32)				
Party Wall 1			64.6700	0.0000	0.0000	20.0000	1267.9200 (32c)				
Timber Frame			140.8800			9.0000	1267.9200 (32c)				
Internal Floor 1			37.2500			18.0000	670.5000 (32d)				
Internal Floor 2			37.2500			18.0000	670.5000 (32d)				
Internal Ceiling 1			37.2500			18.0000	670.5000 (32d)				
Internal Ceiling 2			37.2500			18.0000	670.5000 (32d)				
Heat capacity Cm = Sum(A x k)							15113.7400 (34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							124.9069 (35)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							33.2662 (36)				
Total fabric heat loss							88.8021 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							15113.7400 (34)				
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Heat transfer coeff	121.7196	121.3318	120.9439	119.0047	118.6169	116.6777	116.6777	116.2898	117.4534	118.6169	119.3926
Average = Sum(39)m / 12 =											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
HLP (average)	1.0059	1.0027	0.9995	0.9835	0.9803	0.9643	0.9643	0.9611	0.9707	0.9803	0.9867
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											2.8671 (42)



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Average daily hot water use (litres/day)												102.2935 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	112.5229	108.4312	104.3394	100.2477	96.1559	92.0642	92.0642	96.1559	100.2477	104.3394	108.4312	112.5229 (44)
Energy content	166.8682	145.9440	150.6011	131.2977	125.9833	108.7140	100.7395	115.6000	116.9807	136.3297	148.8145	161.6029 (45)
Energy content (annual)	Total = Sum(45)m =											1609.4758 (45)
Distribution loss (46)m = 0.15 x (45)m	24.2404 (46)											
Water storage loss:												
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 (56)											
If cylinder contains dedicated solar storage	20.0880 (56)											
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624 (57)	
Total heat required for water heating calculated for each month	210.2186	185.0992	193.9515	173.2497	169.3337	150.6660	144.0899	158.9504	158.9327	179.6801	190.7665	204.9353 (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	210.2186	185.0992	193.9515	173.2497	169.3337	150.6660	144.0899	158.9504	158.9327	179.6801	190.7665	204.9353 (64)
Heat gains from water heating, kWh/month	90.1640	79.8505	84.7552	77.2181	76.5698	69.7090	68.1762	73.1173	72.4577	80.0099	83.0424	88.4133 (65)
Total per year (kWh/year) = Sum(64)m =	2119.8918 (64)											
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	9.5247											
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	12.3806											
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	16.6173											
Pumps, fans	21.0994											
Losses e.g. evaporation (negative values) (Table 5)	24.6261											
Water heating gains (Table 5)	26.2524 (67)											
Total internal gains	286.5094	289.4824	281.9904	266.0047	245.9071	226.9844	214.3428	211.3698	218.8618	234.8115	254.9451	273.8678 (68)
Solar input	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000											
Water heating gains (Table 5)	0.0000											
Total internal gains	121.1882	118.8252	113.6913	107.2473	102.9163	96.8181	91.6347	98.2760	100.6357	107.5403	115.3367	118.8351 (72)
Solar input	499.2465	497.0007	480.3651	453.2624	425.2710	398.6237	381.5087	388.0328	402.1212	429.4576	460.9144	484.9618 (73)
6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
East	8.1800	19.6403	0.4200	0.8000	0.7700	37.4087 (76)						
South	5.4000	46.7521	0.4200	0.8000	0.7700	58.7851 (78)						
West	13.9300	19.6403	0.4200	0.8000	0.7700	63.7046 (80)						
Solar gains	159.8984	294.0740	448.3841	613.6892	726.6682	735.0182	703.2451	619.3089	506.9662	338.5468	195.7568	133.9464 (83)
Total gains	659.1449	791.0747	928.7492	1066.9515	1151.9393	1133.6420	1084.7538	1007.3418	909.0874	768.0044	656.6712	618.9082 (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, nli,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	34.4913	34.6015	34.7125	35.2781	35.3935	35.9817	35.9817	36.1017	35.7441	35.3935	35.1635	34.9365
alpha	3.2994	3.3068	3.3142	3.3519	3.3596	3.3988	3.3988	3.4068	3.3829	3.3596	3.3442	3.3291
util living area	0.9834	0.9694	0.9388	0.8699	0.7537	0.5940	0.4529	0.5003	0.7257	0.9121	0.9723	0.9864 (86)
Weekday	17.5731	17.9571	18.5455	19.2488	19.7503	20.0251	20.0943	20.0877	19.9091	19.2239	18.2812	17.5220
Weekend	19.7985	19.9693	20.2333	20.5527	20.7944	20.9355	20.9806	20.9728	20.8677	20.5336	20.1085	19.7279
24 / 16	9	8	9	8	9	9	9	9	9	8	9	9
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	20.0784	20.0810	20.0837	20.0971	20.0998	20.1132	20.1132	20.1159	20.1078	20.0998	20.0944	20.0891 (88)
util rest of house	0.9805	0.9642	0.9282	0.8474	0.7119	0.5284	0.3692	0.4149	0.6663	0.8918	0.9667	0.9840 (89)
Weekday	17.5731	17.9571	18.5455	19.2488	19.7503	20.0251	20.0943	20.0877	19.9091	19.2239	18.2812	17.5220
Weekend	17.5731	17.9571	18.5455	19.2488	19.7503	20.0251	20.0943	20.0877	19.9091	19.2239	18.2812	17.5220
MIT 2	20.0784	20.0810	20.0837	20.0971	20.0998	20.1132	20.1132	20.1159	20.1078	20.0998	20.0944	20.0891 (90)
Living area fraction	fLA = living area / (4) = 0.713 (91)											
MIT	20.3286	20.3305	20.3325	20.3422	20.3442	20.3540	20.3540	20.3559	20.3500	20.3442	20.3403	20.3364 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.3286	20.3305	20.3325	20.3422	20.3442	20.3540	20.3540	20.3559	20.3500	20.3442	20.3403	20.3364 (93)
8. Space heating requirement												

HODKINSON

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilization	0.9814	0.9657	0.9313	0.8839	0.8479	0.8470	0.8925	0.8835	0.8978	0.9683	0.9847	(94)
Useful gains	646.874	763.953	864.954	911.063	833.879	620.1011	425.820	442.1614	621.3771	689.5328	635.8785	609.4320 (95)
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate %	1950.934	1872.2137	1672.954	1361.6787	1025.3453	671.3588	438.034	460.0334	734.0886	1155.8239	1580.7900	1935.0795 (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	970.2698	744.7512	601.1503	324.4426	142.4509	0.0000	0.0000	0.0000	0.0000	346.9206	680.3377	889.2578 (98)
Space heating per m2												
										(98) / (4) =		39.6660 (99)

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

a) If manufacturer declared loss factor is known (kWh/day):	1.5003 (48)
Temperature factor from Table 2b	0.5400 (49)
Enter (49) or (54) in (55)	0.8102 (55)
Total storage loss	
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 (56)
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	
215.2459 189.6400 198.9788 178.1149 174.3610 155.5311 149.1172 163.9778 163.9778 184.7074 195.6317 209.9807 (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(62)m =	0.0000 (63)
Output from w/h	
215.2459 189.6400 198.9788 178.1149 174.3610 155.5311 149.1172 163.9778 163.9778 184.7074 195.6317 209.9807 (64)	
Total per year (kWh/year) = Sum(64)m =	2179.0842 (64)
Heat gains from water heating, kWh/month	
94.1858 83.4832 88.7770 81.1102 80.5916 73.6011 72.1980 77.1392 76.3498 84.0318 86.9345 92.4351 (65)	

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

Metabolic gains (Table 5), Watts	
(66)m	143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
25.5425 22.6866 18.4500 13.9678 10.4411 8.8148 9.5247 12.3806 16.6173 21.0994 24.6261 26.2524 (67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
286.5094 289.4824 281.9904 266.0407 245.9071 226.9844 214.3428 211.3698 218.8618 234.8115 254.9451 273.8678 (68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 (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)	
-114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 (71)	
Water heating gains (Table 5)	
126.5939 124.2309 119.3240 112.6531 108.3220 102.2238 97.0404 103.6817 106.0414 112.9460 120.7424 124.2408 (72)	
Total internal gains	907.6522 905.4064 888.7708 861.6681 833.6767 807.0294 789.9144 836.4385 869.3201 923.3675 (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
East	8.1800	19.6403	0.6300	0.7000	0.7700	49.0990 (76)
South	5.4000	46.7521	0.6300	0.7000	0.7700	177.1554 (78)
West	13.9300	19.6403	0.6300	0.7000	0.7700	83.6123 (80)
Solar gains	209.8667 385.9721 588.5042 805.4670 953.7520 964.7114 923.0092 812.8430 665.3931 444.3427 256.9309 175.8047 (83)					
Total gains	717.5189 891.3785 1077.2750 1267.1351 1387.4288 1371.7409 1312.9237 1209.2815 1075.9200 882.2060 726.2509 669.1721 (84)					

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, T _{hi} (°C)												21.0000 (85)
Utilisation factor for gains for living area, n _{li} m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	51.6655	51.7957	51.9241	52.5354	52.6514	53.1982	53.1982	53.3006	52.9862	52.6514	52.4173	52.1748
alpha	4.4444	4.4530	4.4616	4.5024	4.5101	4.5465	4.5465	4.5534	4.5324	4.5101	4.4945	4.4783
util living area	0.9980	0.9945	0.9830	0.9432	0.8450	0.6776	0.5151	0.5748	0.8261	0.9721	0.9956	0.9986 (86)
MIT	19.5007	19.7058	20.0336	20.4429	20.7652	20.9386	20.9859	20.9773	20.8451	20.3959	19.8678	19.4691 (87)
Th 2	19.8064	19.8091	19.8116	19.8237	19.8260	19.8366	19.8366	19.8366	19.8325	19.8260	19.8214	19.8166 (88)
util rest of house	0.9973	0.9926	0.9768	0.9220	0.7898	0.5774	0.3861	0.4418	0.7443	0.9577	0.9938	0.9980 (89)
MIT 2	17.8231	18.1238	18.6003	19.1856	19.6045	19.7979	19.8318	19.8299	19.7129	19.1340	18.3698	17.7837 (90)
Living area fraction									fLA = Living area / (4) =			0.2715 (91)
MIT	18.2785	18.5533	18.9894	19.5270	19.9195	20.1076	20.1452	20.1414	20.0203	19.4766	18.7765	18.2413 (92)
Temperature adjustment									0.0000			0.0000
adjusted MIT	18.2785	18.5533	18.9894	19.5270	19.9195	20.1076	20.1452	20.1414	20.0203	19.4766	18.7765	18.2413 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.9959	0.9895	0.9709	0.9154	0.7948	0.6024	0.4214	0.4781	0.7594	0.9519	0.9913	0.9970 (94)	
Useful gains	714.5948	882.0635	1045.8973	1159.8831	1102.7868	826.3108	553.2368	578.1180	817.0521	839.7721	719.9089	667.1517 (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												
2273.4451	2214.9615	2021.1396	1699.7303	1311.7709	869.9332	559.9663	589.8290	938.8592	1416.6352	1871.8048	2261.3575 (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	1159.7846	895.7075	725.5803	388.6901	155.4842	0.0000	0.0000	0.0000	0.0000	429.1861	829.3650	1186.0891 (98)
Space heating												5769.8868 (98)
Space heating per m ²										(98) / (4) =		47.6850 (99)

8c. Space cooling requirement



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)												93.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												6171.0019 (211)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	1159.7846	895.7075	725.5803	388.6901	155.4842	0.0000	0.0000	0.0000	0.0000	429.1861	829.3650	1186.0891 (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)	1240.4113	957.9759	776.0217	415.7113	166.2932	0.0000	0.0000	0.0000	0.0000	459.0226	887.0214	1268.5445 (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	215.2459	189.6400	198.9788	178.1149	174.3610	155.5311	149.1172	163.9778	163.9778	184.7074	195.6317	209.9807 (64)
Water heating requirement	215.2459	189.6400	198.9788	178.1149	174.3610	155.5311	149.1172	163.9778	163.9778	184.7074	195.6317	209.9807 (64)
Efficiency of water heater	88.6395	88.4283	87.9617	86.8409	84.5100	79.8000	79.8000	79.8000	79.8000	86.9905	88.2418	88.7109 (217)
Fuel for water heating, kWh/month	242.8330	214.4563	226.2108	205.1047	206.3200	194.9012	186.8637	205.4859	205.2604	212.3305	221.6997	236.7021 (219)
Water heating fuel - used	242.8330	214.4563	226.2108	205.1047	206.3200	194.9012	186.8637	205.4859	205.2604	212.3305	221.6997	236.7021 (219)
Annual totals kWh/year												2558.1683 (219)
Space heating fuel - main system												6171.0019 (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)												451.0888 (232)
Total delivered energy for all uses												9255.2591 (238)

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

Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
6171.0019	0.2160	1332.9364 (261)
0.0000	0.0000	0.0000 (263)
2558.1683	0.2160	552.5644 (264)
		1885.5008 (265)
75.0000	0.5190	38.9250 (267)
451.0888	0.5190	234.1151 (268)
		2158.5409 (272)
		15.5827 (272a)
		1.5500
		1.9348 (272b)
		0.3217 (272c)
		26.4100 (273)

Target Carbon Dioxide Emission Rate (TER) = (15.5827 * 1.55) + 1.9348 + 0.3217, rounded to 2 d.p.



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	B Mid Terrace				Issued on Date	06/02/2024
Assessment Reference	B Mid Terrace GREEN	Prop Type Ref	E / W			
Property	B Mid Terrace, St Ann's Hospital, London, N15					
SAP Rating	85 B	DER	14.77	TER	24.17	
Environmental	87 B	% DER<TER	38.89			
CO ₂ Emissions (t/year)	1.53	DFEE	43.57	TFEE	54.29	
General Requirements Compliance	Pass	% DFEE<TFEE	19.75			
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)



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 119 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) 24.17 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 14.77 kgCO₂/m²OK

1b TFEE and DFEE
Target Fabric Energy Efficiency (TFEE)54.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)43.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.16 (max. 0.30)	0.16 (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	0.11 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	0.86 (max. 2.00)	1.40 (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 ERH0006BV3 + 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:	0.63	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Not significant	OK
Based on:		
Overshading:	Average	
Windows facing East:	8.18 m ² , No overhang	
Windows facing West:	13.93 m ² , No overhang	
Air change rate:	8.00 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	
Window U-value	0.80 W/m ² K	
Window U-value	0.80 W/m ² K	
Air permeability	3.0 m ³ /m ² h	

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	2.8610 (42)

8. Space heating requirement

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9861	0.9745	0.9440	0.8637	0.7201	0.5301	0.3778	0.4264	0.6861	0.9119	0.9755	0.9886	(94)
Useful gains	590.0032	675.0827	759.0613	800.0743	724.2033	526.3423	357.9232	372.6113	534.7206	604.0976	570.8503	559.7508	(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	1586.8859	1522.6239	1361.1914	1107.5545	836.3191	549.9901	362.5433	380.0308	600.9801	941.3487	1284.5730	1574.5825	(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	741.6807	569.5477	447.9848	221.3857	83.4141	0.0000	0.0000	0.0000	0.0000	250.9148	513.8804	755.0348	(98)
Space heating												3583.8431	(98)
Space heating per m2										(98) / (4) =		30.0154	(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 %)													344.8757	(206)
Efficiency of secondary/supplementary heating system, %													100.0000	(208)
Space heating requirement													1039.1696	(211)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	741.6807	569.5477	447.9848	221.3857	83.4141	0.0000	0.0000	0.0000	0.0000	250.9148	513.8804	755.0348	(98)	
Space heating efficiency (main heating system 1)	344.8757	344.8757	344.8757	344.8757	344.8757	0.0000	0.0000	0.0000	0.0000	344.8757	344.8757	344.8757	(210)	
Space heating fuel (main heating system)	215.0574	165.1458	129.8975	64.1929	24.1867	0.0000	0.0000	0.0000	0.0000	72.7552	149.0045	218.9296	(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	209.9811	184.8915	193.7372	173.0628	169.1544	150.5113	143.9465	158.7859	158.7662	179.4861	190.5547	204.7233	(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	156.8721	138.1282	144.7366	129.2913	126.3714	112.4435	107.5391	118.6253	118.6106	134.0899	142.3591	152.9441	(217)	
Water heating fuel used												1582.0111	(219)	
Annual totals kWh/year												1039.1696	(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 = 0.7875)														
mechanical ventilation fans (SFP = 0.7875)													321.1643	(230a)
Total electricity for the above, kWh/year													321.1643	(231)
Electricity for lighting (calculated in Appendix L)													455.3930	(232)
Total delivered energy for all uses													3397.7380	(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	1039.1696	0.5190	539.3290 (261)
Space heating - secondary	0.0000	0.5190	0.0000 (263)
Water heating (other fuel)	1582.0111	0.5190	821.0638 (264)
Space and water heating			1360.3928 (265)
Pumps and fans	321.1643	0.5190	166.6843 (267)
Energy for lighting	455.3930	0.5190	236.3490 (268)
Total CO2, kg/year			1763.4260 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			14.7700 (273)

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

DER		14.7700	EC1
Total Floor Area	TFA	119.4000	
Assumed number of occupants	N	2.8610	
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190	
CO2 emissions from appliances, equation (L14)		14.1162	EC2
CO2 emissions from cooking, equation (L16)		1.5717	EC3
Total CO2 emissions		30.4579	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		30.4579	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	46.0000 (1b)	x	2.5200 (2b)	=	115.9200 (1b) - (3b)							
First floor	36.7000 (1c)	x	3.0500 (2c)	=	111.9350 (1c) - (3c)							
Second floor	36.7000 (1d)	x	2.9000 (2d)	=	106.4300 (1d) - (3d)							
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	119.4000											
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	334.2850 (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 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								40.0000 / (5) =					0.1197 (8)
Measured/design Aps0								Yes					5.0000
Infiltration rate													0.3697 (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) =					0.3142 (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	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													
0.4006	0.3928	0.3849	0.3456	0.3378	0.2985	0.2985	0.2906	0.3142	0.3378	0.3535	0.3692 (22b)		
Effective ac	0.5802	0.5771	0.5741	0.5597	0.5570	0.5446	0.5446	0.5422	0.5494	0.5570	0.5625	0.5682 (25)	

3. Heat losses and heat loss parameters

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			2.3200	1.0000	2.3200		(26)						
TER Opening Type (Uw = 1.40)			22.1100	1.3258	29.3125		(27)						
Ground Floor			46.0000	0.1300	5.9800		(28a)						
External Wall	87.2400	24.4300	62.8100	0.1800	11.3058		(29a)						
Main Roof	36.7000		36.7000	0.1300	4.7710		(30)						
GF Roof	9.3000		9.3000	0.1300	1.2090		(31)						
Total net area of external elements Aum(A, m2)			179.2400				(31)						
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	54.8983		(33)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							17.7813 (36)						
Total fabric heat loss						(33) + (36) =	72.6796 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 64.0094	Feb 63.6657	Mar 63.3287	Apr 61.7461	May 61.4500	Jun 60.0716	Jul 60.0716	Aug 59.8164	Sep 60.6026	Oct 61.4500	Nov 62.0490	Dec 62.6753	(38)
Heat transfer coeff	136.6890	136.3453	136.0083	134.4257	134.1296	132.7512	132.7512	132.4960	132.2822	134.1296	134.7286	135.3549	(39)
Average = Sum(39)m / 12 =													(39)
	Jan 1.1448	Feb 1.1419	Mar 1.1391	Apr 1.1258	May 1.1234	Jun 1.1118	Jul 1.1118	Aug 1.1097	Sep 1.1163	Oct 1.1234	Nov 1.1284	Dec 1.1336	(40)
HLP (average)													1.1258 (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												2.8610	(42)
Average daily hot water use (litres/day)												102.1479	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	112.3627	108.2768	104.1909	100.1050	96.0191	91.9332	91.9332	96.0191	100.1050	104.1909	108.2768	112.3627	(44)
Energy content	166.6307	145.7363	150.3868	131.1108	125.8040	108.5593	100.5961	115.4355	116.8142	136.1357	148.6027	161.3729	(45)
Energy content (annual)													(45)
Distribution loss (46)m = 0.15 x (45)m													(46)
	24.9946	21.8604	22.5580	19.6666	18.8706	16.2839	15.0894	17.3153	17.5221	20.4203	22.2904	24.2059	(46)
Water storage loss:													
Store volume													170.0000 (47)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

a) If manufacturer declared loss factor is known (kWh/day):	1.5003 (48)
Temperature factor from Table 2b	0.5400 (49)
Enter (49) or (54) in (55)	0.8102 (55)
Total storage loss	25.1153 22.6848 25.1153 24.3051 25.1153 24.3051 25.1153 25.1153 24.3051 25.1153 24.3051 25.1153 (56)
If cylinder contains dedicated solar storage	25.1153 22.6848 25.1153 24.3051 25.1153 24.3051 25.1153 25.1153 24.3051 25.1153 24.3051 25.1153 (57)
Primary loss	23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 (59)
Total heat required for water heating calculated for each month	215.0084 189.4323 198.7645 177.9280 174.1817 155.3764 148.9738 163.8132 163.6313 184.5134 195.4199 209.7506 (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	215.0084 189.4323 198.7645 177.9280 174.1817 155.3764 148.9738 163.8132 163.6313 184.5134 195.4199 209.7506 (64)
Heat gains from water heating, kWh/month	94.1069 83.4141 88.7058 81.0481 80.5320 73.5497 72.1504 77.0845 76.2944 83.9673 86.8641 92.3587 (65)

5. Internal gains (see Table 5 and 5a)	
Metabolic gains (Table 5), Watts	
(66)m	143.0483 143.0483 143.0483 143.0483 143.0483 143.0483 143.0483 143.0483 143.0483 143.0483 143.0483 143.0483 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	25.7862 22.9031 18.6261 14.1011 10.5408 8.8990 9.6156 12.4988 16.7758 21.3007 24.8611 26.5029 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	284.4300 287.3815 279.9438 264.1099 244.1224 225.3370 212.7872 209.8357 217.2734 233.1073 253.0948 271.8802 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3048 37.3048 37.3048 37.3048 37.3048 37.3048 37.3048 37.3048 37.3048 37.3048 37.3048 37.3048 (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)	-114.4386 -114.4386 -114.4386 -114.4386 -114.4386 -114.4386 -114.4386 -114.4386 -114.4386 -114.4386 -114.4386 -114.4386 (71)
Water heating gains (Table 5)	126.4877 124.1281 119.2282 112.5667 108.2419 102.1523 96.9763 103.6082 105.9645 112.8592 120.6446 124.1380 (72)
Total internal gains	905.6185 903.3272 886.7126 859.6923 831.8196 805.3028 788.2937 794.8571 808.9282 836.1818 867.5150 891.4356 (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
East	8.1800	19.6403	0.6300	0.7000	0.7700	49.0990 (76)
West	13.9300	19.6403	0.6300	0.7000	0.7700	83.6123 (80)

Solar gains	132.7113	259.6114	427.5431	623.5461	764.1791	782.2733	744.7561	639.7345	497.2503	308.0509	165.4754	109.1353 (83)
Total gains	638.3298	762.9387	914.2556	1083.2384	1195.9987	1187.5761	1133.0497	1034.5916	906.1785	744.2326	632.9904	600.5709 (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, nil,m (see Table 9a)	
tau	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
alpha	60.6608 60.8138 60.9644 61.6821 61.8183 62.4602 62.4602 62.5805 62.2114 61.8183 61.5435 61.2587
util living area	5.0441 5.0543 5.0643 5.1121 5.1212 5.1640 5.1640 5.1720 5.1474 5.1212 5.1029 5.0839
MIT	0.9988 0.9969 0.9890 0.9544 0.8537 0.6740 0.5072 0.5728 0.8434 0.9809 0.9974 0.9992 (86)
MIT 2	19.7048 19.8699 20.1583 20.5317 20.8211 20.9611 20.9926 20.9866 20.8771 20.4744 20.0197 19.6794 (87)
util rest of house	19.9644 19.9667 19.9690 19.9798 19.9818 19.9912 19.9912 19.9929 19.9876 19.9818 19.9777 19.9735 (88)
MIT 2	0.9984 0.9958 0.9849 0.9375 0.8042 0.5843 0.3953 0.4556 0.7717 0.9711 0.9963 0.9989 (89)
Living area fraction	18.2303 18.4732 18.8939 19.4315 19.8094 19.9659 19.9885 19.9875 19.8886 19.3617 18.7004 18.1996 (90)
MIT	18.6360 18.8574 19.2418 19.7342 20.0877 20.2397 20.2647 20.2624 20.1605 19.6678 19.0634 18.6068 (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
adjusted MIT	18.6360 18.8574 19.2418 19.7342 20.0877 20.2397 20.2647 20.2624 20.1605 19.6678 19.0634 18.6068 (93)

8. Space heating requirement	
Utilisation	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Useful gains	0.9976 0.9941 0.9811 0.9325 0.8100 0.6076 0.4262 0.4880 0.7857 0.9670 0.9948 0.9983 (94)
Ext temp.	636.8255 758.4161 896.9574 1010.1544 968.7802 721.5575 482.9531 504.8777 711.9715 719.6730 629.7179 599.5269 (95)
Heat loss rate W	4.3000 4.9000 6.5000 8.9000 11.7000 14.6000 16.6000 16.4000 14.1000 10.6000 7.1000 4.2000 (96)
Month fracti	1959.5694 1903.0315 1732.9845 1456.3942 1125.0399 748.6816 486.4993 511.7514 807.7616 1216.2659 1611.8118 1950.0265 (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 (97a)
Space heating	984.1214 769.1816 622.0042 321.2927 116.2572 0.0000 0.0000 0.0000 0.0000 369.4652 707.1076 1004.7717 (98)
Space heating per m2	(98) / (4) = 40.9900 (99)

8c. Space cooling requirement	
-------------------------------	--



FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)	93.5000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)
Space heating requirement	5234.4402 (211)

Space heating requirement	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Space heating efficiency (main heating system 1)	984.1214 769.1816 622.0042 321.2927 116.2572 0.0000 0.0000 0.0000 0.0000 369.4652 707.1076 1004.7717 (98)
Space heating fuel (main heating system)	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)
Water heating requirement	1052.5363 822.6541 665.2451 343.6285 124.3393 0.0000 0.0000 0.0000 0.0000 395.1499 756.2648 1074.6221 (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	215.0084 189.4323 198.7645 177.9280 174.1817 155.3764 148.9738 163.8132 163.6313 184.5134 195.4199 209.7506 (64)
Efficiency of water heater (217)m	88.3753 88.1639 87.6538 86.3723 83.7642 79.8000 79.8000 79.8000 79.8000 86.6311 87.9467 88.4517 (217)
Fuel for water heating, kWh/month	243.2902 214.8636 226.7609 206.0012 207.9428 194.7073 186.6940 205.2797 205.0518 212.9875 222.2027 237.1357 (219)
Water heating fuel used	237.1357 (219)
Annual totals kWh/year	2562.9073 (219)
Space heating fuel - main system	5234.4402 (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)	455.3930 (232)
Total delivered energy for all uses	8327.7404 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP	
Energy kWh/year	5234.4402
Emission factor kg CO2/kWh	0.2160
Emissions kg CO2/year	1130.6391 (261)
Space heating - main system 1	0.0000
Space heating - secondary	0.0000 (263)
Water heating (other fuel)	2562.9073
Space and water heating	0.2160
Pumps and fans	75.0000
Energy for lighting	455.3930
Total CO2, kg/m2/year	0.5190
Emissions per m2 for space and water heating	1959.5010 (272)
Fuel factor (electricity)	1.5500
Emissions per m2 for lighting	1.9795 (272b)
Emissions per m2 for pumps and fans	0.3260 (272c)
Target Carbon Dioxide Emission Rate (TER) = (14.1058 * 1.55) + 1.9795 + 0.3260, rounded to 2 d.p.	24.1700 (273)



Appendix E

Monitoring and Metering Plan

BE SEEN METERING & MONITORING PLAN

Introduction

The following technical note sets out the metering and monitoring plan for Phase 1A of the St Ann's development in the London Borough of Haringey. This metering and monitoring is required in order to report against the GLA 'Be Seen' requirements and has been prepared to partially discharge Condition 28 of the Decision Notice dated 10 July 2023 (reference HGY/2022/1833).

The London Plan (2021) introduces 'Be Seen' as the fourth step of the energy hierarchy in Policy SI 2: *Be Lean; Be Clean; Be Green; and Be Seen*. This is to monitor and report on actual operational energy performance and work towards bridging the 'performance gap' between design theory and actual energy use.

The process is outlined within the 'Be Seen' Energy Monitoring Guidance (2021). At the planning stage (within 8 weeks of consent), applicants are required to provide predicted energy performance data which will come from the planning stage Energy Statement and indicative Part L energy calculations. The planning stage Be Seen GLA spreadsheet has been completed by XCO2 on behalf of Hill Residential and was submitted to the GLA on 15 July 2022.

On commencement of RIBA Stage 6 and prior to handover, updated predicted energy performance data taken from the as-built Part L energy calculations should be provided to the GLA by the developer.

The building owner is then required to monitor and report energy performance data annually for at least five years. The reporting period starts as soon as the defects liability period is complete (usually estimated to be between 6-12 months). This means that the annual reporting of energy performance to the GLA could occur at any time during the year.

Metering and Monitoring Plan

The metering and monitoring plan (Table 1) sets out the data that needs to be collected in order to report on 'Be Seen' to the GLA, based on the 2021 energy monitoring guidance document, and the mandatory minimum level of metering that is required.

The metering covers the following reportable unit types applicable to the St Ann's development: Energy centre (supplying heat to Phase 1A); residential dwellings (monitored per apartment block and per block of houses (5 minimum)); non-residential communal corridors and landlord core areas (monitored per apartment block); and non-residential commercial uses (monitored per individual commercial unit with GIA above 250m²).

Table 1: Metering and monitoring plan

Reportable Unit	Performance Indicator Group	Performance Indicator Description	Required Meter(s)
Energy Centre & Heat Network	Plant parameters: Energy centre inputs	Grid electricity consumption (kWh)	Electricity meter for Phase 1A energy centre (total grid electricity consumption)
	Plant parameters: Efficiency & contribution of each heating generation plant	Energy input into each heating energy conversion plant (kWh for each energy carrier)	Electricity meter to each ASHP and electric boiler
		Energy output from each heating energy conversion plant (kWh for each energy carrier)	Heat output meter from each ASHP and electric boiler
	Plant parameters: Network efficiency data	Total district heating output from production centre (kWh)	Heat meter at Phase 1A energy centre output
		Total district heating supplied to apartment blocks (kWh)	Heat meter at each apartment block entry
		Total district heating supplied to customers (kWh)	Heat meter at each dwelling HIU
	Energy storage equipment	Net electricity flow to EVs (kWh)	Electricity meter for supply to all EV charge points
Residential: Dwellings	Building energy use	Grid electricity consumption (kWh)	Residential electricity meter for each apartment block (<i>in addition to the individual private dwelling utility meters, which are unlikely to be accessible</i>) <i>Houses will have individual private dwelling utility meters, with no opportunity for additional check meters</i>

Reportable Unit	Performance Indicator Group	Performance Indicator Description	Required Meter(s)
		District heating consumption (kWh)	Heat meter at each dwelling HIU for apartments <i>Not feasible for houses (individual ASHPs)</i>
Non-residential: Communal corridor and landlord areas	Building energy use	Grid electricity consumption (kWh)	Landlord electricity meter for each apartment block
	Renewable energy	Renewable electricity generation (gross) (kWh)	PV electricity generation meter for each apartment block
		Renewable electricity exported (kWh)	PV electricity export meter for each apartment block
		Renewable electricity used on-site (kWh)	N/A – calculate difference between electricity generated and exported
Non-residential: Commercial units	Building energy use	Grid electricity consumption (kWh)	Electricity meter for each commercial unit
	Energy storage equipment	Net electricity flow to EVs (kWh)	Electricity meter for supply to any EV charge points for commercial units