BP FINCHLEY ROAD

ENERGY STATEMENT

ISSUE AND REVISION RECORD

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EXECUTIVE SUMMARY

This report has been produced by WME to support the planning application for the proposed development at 104a Finchley Road, Camden. The project proposal is for the demolition the existing buildings on the site, and the erection of a six-storey building comprising ground floor commercial space (Class E) and flexible commercial/educational space (Class E/F1), and 31 x residential apartments above.

The planning application is subject to London Borough of Camden Council and as such there are expectations for the scheme to meet or exceed the requirements of the Camden London Plan 2017. Whilst the proposals are not referrable to the GLA, the current London Plan (2021) will be referred to and used for compliance guidance. This is summarised as using the London Plan Hierarchy to reduce operational energy by 15% (against SAP 2012 methodology) using energy saving measures, and a further 20% reducing using onsite carbon reduction, (i.e. through the use of renewables). These figures can be exceeded. Any difference between the stated target and zero carbon target will be factored into a Carbon offsetting fund, as part of the London Plan for Zero Carbon development.

In addition, the carbon intensity of the electrical infrastructure has changed, and the London Plan recognises this, whilst the SAP 2012 calculation methodology does not, therefore an adjustment has been made to de-carbonise the electrical conversion factors inline. Ultimately the development will have to comply with the new Part L SAP process 10.2 and has been designed with this compliance in mind.

The building form has created an efficient balance of dwellings around a core, providing some single and some double aspect apartments. The building fabric has addressed reducing energy consumption by either meeting or dropping below the 'notional' building against which the model is compared. The improvements have included the adoption of triple glazing, dropping the U-value form 1.4 to 0.9.

All apartments will be provided with a MVHR for continuous supply and extract ventilation with heat recovery located in the utility cupboards. This method will allow each apartment to meet the continuous ventilation requirements of the Building Regulations Approved Document F, whilst delivering the thermal efficiency required to comply with the Building Regulations Approved Document L1A and maintain the acoustic integrity of the façade.

As per Approved Document part F, there is a requirement for purge ventilation. This is to allow for the removal of pollutants, such as the smell of burnt toast and paint fumes. This is a short-term means of gaining a higher rate of ventilation. This requirement will be met by openable windows and balcony doors (where applicable) to each habitable space. This will also have the benefit of allowing the occupants to open a window to enhance ventilation during suitable periods of their choosing.

Utilising low energy lighting solutions (i.e. LED) throughout the building, both in the dwellings, in the commercial spaces and in the community areas. This is both to help reduce energy consumption and also operational costs, based on whole life costs.

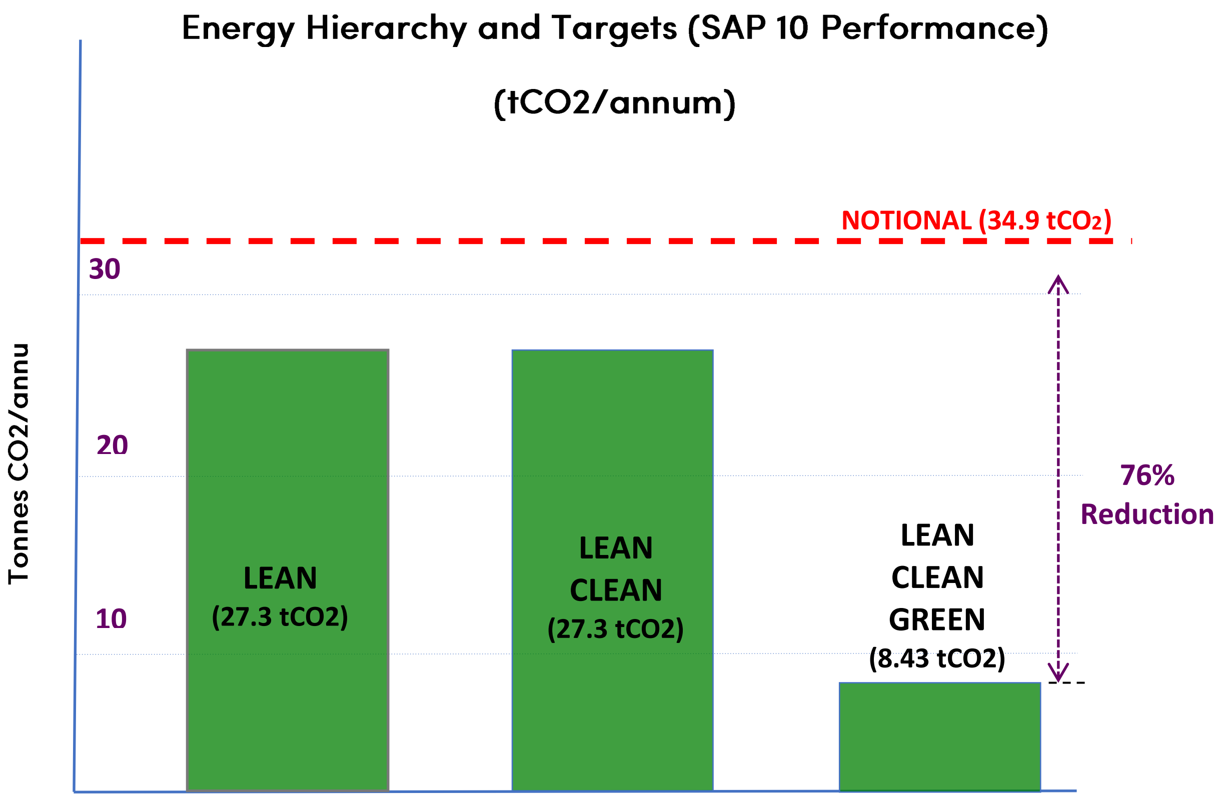
Heating to the building will be provided by a low temperature hot water (LTHW) system. The LTHW will be generated on the roof via 4 no. Air Source Heat Pumps (ASHP) which will connect to central buffer vessel / thermal store. The LTHW will deliver heat to the apartments via heat interface units located in the utility cupboard, which will generate the apartment heating and hot water.

A study has been done on the utilisation of PV, this includes roof mounted PV and also building integrated PV. The building integrated PV solution did not sit well with the balcony recesses and could not be co-ordinated into a single element on the suitable elevations. Instead, it would require a specific size and would break the rhythm of the fenestration. It was also proving to be cost prohibitive, on small scale areas, with inverters and cabling to each dwelling. For this reason, it has been dismissed. However the roof will be used for solar PV. It is exposed and free from overshadowing. The roof space also accommodates a biodiverse roof as well as a blue roof for rainwater attenuation. A 40-panel system has been recommended by PV specialists, equating to circa 78sqm and accounting for approximately 2% carbon savings.

Whilst the PV coverage might seem light given the available roof space, it is considered the optimum solution which will be structurally feasible considering the combination with the biodiverse roof and the blue roof for water attenuation.

All calculations are to be revisited and updated at the next stage of the design, in line with the release of the new FSAP Building Regulations 2022 software.

A summary of the current carbon savings in line with the Lean, Clean and Green hierarchy are presented in the table below and graph below.



	CO2 emissions (tonnes per annum)	
	Regulated	Unregulated
Notional	34.9	24.01
Be Lean	27.3	24.01
After Clean	27.3	24.01
After Green	8.43	24.01

	Regulated CO2 emissions (tonnes per annum)	
	Regulated	% savings
Savings from Lean	7.55	21.64
Savings from Clean	0	0
Savings from Green	18.91	54.20
Cumulative Savings	26.45	75.83

The calculation below, outlines our approach to calculating the Financial Contributions required.

SAP 10 Performance
Carbon Target (tCO2/annum) = 0
Carbon Emissions (tCO2/annum) = 8.43
Financial Contributions = £95/year/ tCO2 over target
Time Scale = 30 years
Total Financial Contributions = £24,026 (nearest £)

The above figures should be considered as approximate only, at this current stage. They will be updated throughout the different stages of design, in line with the refined design and more detailed energy calculation updates.

INTRODUCTION

This report has been produced by WME to support the planning application for the proposed development at 104A Finchley Road.

The proposed works involve the demolition of the existing buildings on the site, and the erection of a six-storey building comprising ground floor commercial space (Class E) and flexible commercial/educational space (Class E/F1), and 31 x residential apartments above.

The proposals for 104A Finchley Road are in accordance with Camden Council Policy, the Greater London Plan and all relevant Building Regulations.

PLANNING POLICY

National Planning Policy Framework
The National Planning Policy Framework sets out the Government's planning policies for England and details how these are expected to be applied. It sets out a structure for delivering sustainable development with particular relevance for energy and carbon issues.

Building Regulations

Significant changes to building regulations came into effect on 15 June 2022. It should be noted that energy modelling had been initiated before the latest software was released.

The changes to the Building Regulations are aimed at improving the energy efficiency of buildings to help the country move towards its targets for Net Zero by 2050. Essentially, what this means is Government wants to reduce our current carbon emissions and with construction being a major contributor, it must play its part. Even more changes will be coming in 2025 (Future Home Standards) to make buildings more energy efficient, but these measures are a stop-gap until then.

The new Building Regulations comprise five new Approved Documents, including uplifts to Part L (fuel and power) and Part F (ventilation), as well as new Part O (overheating) and Part S (Electric Charging).

In the shift towards a Future Buildings Standard, the government has introduced a range of changes to the Building Regulations, including a mandatory 30 per cent cut in carbon for all new homes and a 27 per cent cut for other buildings, including offices and shops.

However, the most current Building Regulations in relation to Conservation of Power and Fuel are Approved documents Part L2013.

There are 4 parts to the Approved Document L:

- Part L1A – Conservation of Fuel and Power (New Dwellings)
- Part L1B – Conservation of Fuel and Power (Existing Dwellings)
- Part L2A – Conservation of Fuel and Power (New buildings other than new dwellings)
- Part L1B – Conservation of Fuel and Power (Existing building other than existing dwellings)

The proposed development will be compliant with Building Regulations Part L1A (Residential) and Part L2A (Non-residential).

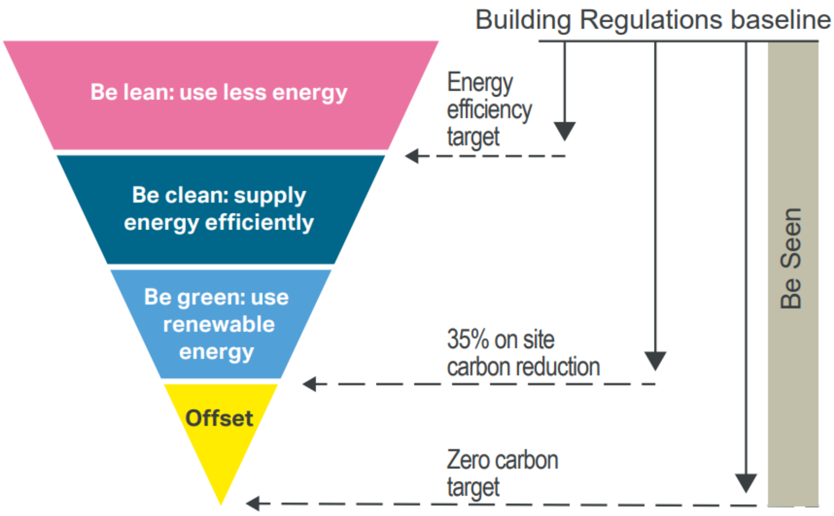
The London Plan
The London Plan 2021 is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the mayor's vision for Good Growth.

The Plan is part of the statutory development plan for London, meaning that the policies in the Plan should inform decisions on planning applications across the capital. Borough's Local Plans must be in 'general conformity' with the London Plan, ensuring that the planning system for London operates in a joined-up way and reflects the overall strategy for how London can develop sustainably, which the London Plan sets out.

Policy SI 2 Minimising greenhouse gas emissions of the New London Plan 2021 contains an energy hierarchy to help major developments meet net zero carbon.

This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

- Be lean: use less energy and manage demand during operation
- Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly
- Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site
- Be seen: monitor, verify and report on energy performance.



Source: Greater London Authority

B Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

C A minimum on-site reduction of at least 35 per cent beyond Building Regulations152 is required for major development.
Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures.

Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

1) through a cash in lieu contribution to the borough's carbon offset fund, or
2) off-site provided that an alternative proposal is identified, and delivery is certain.

D Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually

E Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.

F Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

Policy SI 3 Energy infrastructure

A Boroughs and developers should engage at an early stage with relevant energy companies and bodies to establish the future energy and infrastructure requirements arising from large-scale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development.

B Energy masterplans should be developed for large-scale development locations (such as those outlined in Part A and other opportunities) which establish the most effective energy supply options. Energy masterplans should identify:

1) major heat loads (including anchor heat loads, with particular reference to sites such as universities, hospitals and social housing)
2) heat loads from existing buildings that can be connected to future phases of a heat network
3) major heat supply plant including opportunities to utilise heat from energy from waste plants
4) secondary heat sources, including both environmental and waste heat
5) opportunities for low and ambient temperature heat networks
6) possible land for energy centres and/or energy storage
7) possible heating and cooling network routes
8) opportunities for futureproofing utility infrastructure networks to minimise the impact from road works
9) infrastructure and land requirements for electricity and gas supplies
10) implementation options for delivering feasible projects, considering issues of procurement, funding and risk, and the role of the public sector
11) opportunities to maximise renewable electricity generation and incorporate demand-side response measures.

C Development Plans should:

1) identify the need for, and suitable sites for, any necessary energy infrastructure requirements including energy centres, energy storage and upgrades to existing infrastructure
2) identify existing heating and cooling networks, identify proposed locations for future heating and cooling networks and identify opportunities for expanding and inter-connecting existing networks as well as establishing new networks.

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

a) connect to local existing or planned heat networks
b) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
c) use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
d) use ultra-low NOx gas boilers

2) CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements in Part B of Policy SI 1 Improving air quality

3) where a heat network is planned but not yet in existence the development should be designed to allow for the cost-effective connection at a later date.

E Heat networks should achieve good practice design and specification standards for primary, secondary and tertiary systems comparable to those set out in the CIBSE/ADE Code of Practice CP1 or equivalent

Policy SI 4 Managing heat risk

A Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2) minimise internal heat generation through energy efficient design
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) provide active cooling systems.

Camden Local Plan 2017

Policy CC1 Climate change mitigation

We will:

a. promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
b. require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
c. ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
d. support and encourage sensitive energy efficiency improvements to existing buildings;
e. require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and
f. expect all developments to optimise resource efficiency.

For decentralised energy networks, we will promote decentralised energy by:
g. working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;

h. protecting existing decentralised energy networks (e.g. at Gower Street, Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and

Policy CC2 Adapting to climate change

All development should adopt appropriate climate change adaptation measures such as:

a) the protection of existing green spaces and promoting new appropriate green infrastructure;
b) not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;
c) incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and
d) Measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy.

Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement.

Sustainable design and construction measures

The Council will promote and measure sustainable design and construction by:

e) ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation;
f) encourage new build residential development to use the Home Quality Mark and Passivhaus design standards;
g) encouraging conversions and extensions of 500 sqm of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and
h) expecting non-domestic developments of 500 sqm of floorspace or above to achieve "excellent" in BREEAM assessments and encouraging zero carbon in new development from 2019.

Policy CC3 Water and flooding

We will require development to:

a) incorporate water efficiency measures;
b) avoid harm to the water environment and improve water quality;
c) consider the impact of development in areas at risk of flooding (including drainage);
d) incorporate flood resilient measures in areas prone to flooding;
e) utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and
f) not locate vulnerable development in flood-prone areas.

Where an assessment of flood risk is required, developments should consider surface water flooding in detail and groundwater flooding where applicable. The

Council will protect the borough's existing drinking water and foul water infrastructure, including the reservoirs at Barrow Hill, Hampstead Heath, Highgate and Kidderpore.

Policy CC4 Air Quality

The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan. Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution.

Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

Camden Planning Guidance I Energy efficiency and adaptation

The Council has prepared this Camden Planning Guidance (CPG) on Energy and resources to support the policies in the Camden Local Plan 2017. This guidance is therefore consistent with the Local Plan and forms a Supplementary Planning Document (SPD) which is an additional "material consideration" in planning decisions.

SUMMARY OF TARGETS

- Net zero carbon
- Minimum onsite reduction of 35% below Part L 2013
- Residential – at least a 10% improvement on 2013 Building Regulations from energy efficiency measures alone
- Non-residential – at least a 15% improvement on 2013 Building Regulations from energy efficiency measures alone
  *SAP 10 Carbon factor should be used

ENERGY STRATEGY

The Environmental Engineering strategy has been developed to provide a quality built environment, focusing on the comfort of the occupants as well as the Whole Life Cost (WLC) considerations of life cycle analysis, value for money, benefits to the environment, and their social impact.

The thermal performance of the building fabric will exceed the current Building Regulations Approval Document Part L2 (2013) and provides an air tightness improvement from 10 to 3 m3/hr/m2 of building fabric. Thermal bridging details will be in line with enhanced construction details (ECD) and offer the same level of performance.

A low energy lighting strategy has been adapted, using light emitting diode (LED) technology and low energy fluorescent fittings. Presence detection control within circulation areas will also contribute to energy savings.

The building form has created an efficient balance of dwellings around a core, providing some single and some double aspect apartments. The building fabric has addressed reducing energy consumption by either meeting or dropping below the 'notional' building against which the model is compared. The improvements have included the adoption of triple glazing, dropping the U-value form 1.4 to 0.9.

The Apartments are mechanically ventilated with MVHRs which provide background ventilation in compliance with Part F. For overheating, the windows and glazing doors are openable to provide a means of addition ventilation to cool internal spaces. On more extreme hot weather days, or at night time when it is expected that windows and doors will be closed, the MVHRs can provide mechanical cooling through the use of a refrigerant based cooling module.

Lighting is to utilize low energy lighting solutions (i.e. LED) throughout the building, both in the dwellings, in the commercial spaces and in the community areas. This is both to help reduce energy consumption and also operational costs, based on whole life costs.

Heating to the building will be provided by a low temperature hot water (LTHW) system. The LTHW will be generated on the roof via 4 no. Air Source Heat Pumps (ASHP) which will connect to central buffer vessel / thermal store. The LTHW will deliver heat to the apartments via heat interface units located in the utility cupboard, which will generate the apartment heating and hot water.

A 40-panel system has been recommended by PV specialists, equating to circa 78sqm and accounting for approximately 2% carbon savings.

METHODOLOGY

The calculation methodology for presenting carbon emission reduction draws on the approach set out by Policy SI 2 Minimising greenhouse gas emissions and the GLA Energy Assessment Guidance document.

It is a hierarchical approach with four sequential steps.

- Establish baseline (Part L compliance)
- Evaluate energy efficiency measures ('Lean')
- Evaluate heating and cooling systems ('Clean')
- Evaluate renewable energy technologies ('Green')

This energy statement has been developed using the FSAP Stroma software and the latest IES software. FSAP stroma software has been used for the residential element, while IES software used for the non-residential elements at the lower ground level. The non-residential spaces are Shell & Core only, and that has been modelled accordingly.

A sample of 8 dwelling types have been modelled. It is felt that these 8 dwelling types accurately reflect the 31 dwellings.

Dwelling Type	No.
1 Bed GF	2
2 Bed GF	2
3 Bed GF	1
1 Bed MF	5
2 Bed MF	13
3 Bed MF	3
1 Bed TF	3
2 Bed TF	2
Total	31

It should be noted that the current FSAP Beta 10 software was not available at the time of calculating. Energy Calculations for the domestic units have been undertaken using the FSAP Stroma 2012 software and the results calculated using SAP 10 carbon emission factors and the GLA Carbon reporting tool. The client is fully committed to updating the calculations in line with new building regulations once the software has been fully updated.

A notional building is developed within the modelling process; this has the same size, shape and zoning arrangements as the actual building. The insulation levels and HVAC efficiencies in the notional building are identical to the Part L reference building.

The GLA ask for the baseline to assume that the heating is provided by gas boilers and that any active cooling is provided by electrically powered equipment.

Emissions for the development must establish:

- Building CO2 Emissions Rate (BER) calculated through the Part L 2013 of the Building Regulations methodology based on the National Calculation Methodology (NCM)
- The related BER is multiplied by its floor area to give the related carbon dioxide emissions additional emissions associated with non Building Regulation elements established by using individual end use figures from CIBSE guide baselines (e.g. CIBSE Guide F) or evidence established through previous development work

It should be noted that the Notional emissions rate will change when the main heating system is changed.

This table gives a summary of the Notional, Lean, Clean and Green parameters for the residential.

Parameters	Notional	Lean	Clean	Green
Exposed Walls	U = 0.18 W/m2.K	0.15 W/m2.K	0.15 W/m2.K	0.15 W/m2.K
Roof	U = 0.13 W/m2.K	0.15 W/m2.K	0.15 W/m2.K	Upper roof: 0.10 W/m2.K Lower roof: 0.12 W/m2.k
Floor	U = 0.13 W/m2.K	0.10 W/m2	0.10 W/m2	0.10 W/m2
Windows	U = 1.4 W/m2.K G value = 0.63 FF = 0.7	U = 0.9 W/m2.K G value = 0.35 FF = 0.8	U = 0.9 W/m2.K G value = 0.35 FF = 0.8	U = 0.9 W/m2.K G value = 0.35 FF = 0.8
Party Elements	0.0 W/m2.K	0.0 W/m2.K	0.0 W/m2.K	0.0W/m2.K
Air permeability	5 m3/h/m2	3 m3/h/m2	3 m3/h/m2	3m3/h/m2
Thermal Bridging	0.15	< 0.15 Enhanced Construction details	< 0.15 Enhanced Construction details	< 0.15 Enhanced Construction details
Thermal Mass	Medium (250)	Light - Medium (<250)	Light - Medium (<250)	Light - Medium (<250)
Lighting	100% low energy lighting	100% low energy lighting	100% low energy lighting	100% low energy lighting
Ventilation	Natural with extract fans	MVHR K+1 = 0.5 sfp K+2 = 0.53 sfp 90% efficient	MVHR K+1 = 0.5 sfp K+2 = 0.53 sfp 90% efficient	MVHR K+1 = 0.5 sfp K+2 = 0.53 sfp 90% efficient
Heating	91% efficient Gas boiler	91% efficient Gas boiler	91% efficient Gas boiler	Community Heating via ASHP COP = 400%
Cooling	None	Via MVHR cooling module	Via MVHR cooling module	Via MVHR cooling module
Hot Water System	Gas Boiler	Gas Boiler	Gas Boiler	Main heating system
Renewable Technologies	None	None	None	None

BE LEAN: PASSIVE MEASURES

Building Fabric
The thermal performance of the building fabric will exceed the current 2013 Building Regulations Approval Document Part L1A (Domestic) and Part L2A (Non-domestic).

The limiting U values, Notional U values and proposed target U values are detailed in the table adjacent.

Element	Notional Building U-values (W/m2.K)	Target U-Values (W/m
Walls	0.18	0.15
Roof	0.13	Upper roof: 0.10 W/m2.K Lower roof: 0.12 W/m2.k
Floor	0.13	0.10
Party elements	0.00	0.00
Windows	1.4 G value = 0.63	0.9 G value = 0.35 Frame Factor = 0.80
Glazed doors	1.4	0.9
Air tightness	5 m3/(m2.h) (@ 50 Pa)	3 m3/(m2.h) (@ 50 Pa)
Thermal Bridging	Y = 0.15	Y <0.15 Enhanced Construction Details
Thermal Mass	Medium (250)	Light – Medium (Max 250)

Air Permeability
The primary improvements need to be made to the air tightness of the property and the thermal bridging. This will require additional effort in the detailing of typical junctions and interfaces, and addition policing and care taken on site.

Glazing

The notional building against which the design is compared, assumes approx. an area of glazing that is approximately 20% of the floor area. So for a typical 20sqm room, the glazing associated with the apartment would be around 4sqm.

Of the glazing provision approximately 5% of the floor area will need to be openable in order to provide 4 air changes per hour required for purge (rapid) ventilation.

Triple glazing with solar control has been proposed to help prevent overheating in line with Building Regulations Part O, as well as helping meet acoustic standards.

Day lighting and low energy lighting
A low energy lighting strategy has been adapted, using light emitting diode (LED) technology and low energy fluorescent fittings.
Presence detection control will contribute to energy reduction throughout the communal areas.

Mechanical Ventilation with Heat Recovery (MVHR)

All apartments will be provided with a MVHR for continuous supply and extract ventilation with heat recovery located in the utility cupboards. This method will allow each apartment to meet the continuous ventilation requirements of the Building Regulations Approved Document F, whilst delivering the thermal efficiency required to comply with the Building Regulations Approved Document L1A and maintain the acoustic integrity of the façade.

As per Approved Document part F, there is a requirement for purge ventilation. This is to allow for the removal of pollutants, such as the smell of burnt toast and paint fumes. This is a short-term means of gaining a higher rate of ventilation. This requirement will be met by openable windows and balcony doors (where applicable) to each habitable space. This will also have the benefit of allowing the occupants to open a window to enhance ventilation during suitable periods of their choosing.

London Plan Energy Efficiency Targets:

Residential –23% improvement on 2013 Building Regulations from energy efficiency measures alone – (Target = 10%)

Non-residential –11% improvement on 2013 Building from energy efficiency measures alone – (Target = 15%)

The non-residential space is shell and core only. However, it is anticipated that the 15% target could be achieved by specification of LED lighting and further lighting controls. This would be the responsibility of the future tenant.

COOLING AND OVERHEATING

In line with the Mayor's cooling hierarchy the proposed development minimises internal heat generation though energy efficient design, for e.g. triple glazing with solar control glazing, dual aspect cross ventilation where possible, the use of LED lighting with daylight linking and presence detection will be extensive.

Further to the overheating study, a natural ventilation approach has been taken to mitigating the risk of overheating. Recognising that extreme hot weather periods are becoming more frequent and that it will be undesirable to have windows open at night, the MVHRs will be able to provide mechanical cooling through the use of a refrigerant based cooling module.

The primary means of adopting natural ventilation as a means of mitigating risk of overheating has resulted in a generous provision of openable windows. The ventilation is assisted by mechanical ventilation with heat recovery (MVHR) to both ventilate the WC's, shower rooms, utility areas and kitchen areas, plus provide some useful reduction in energy consumption, recovering waste heat. On extreme hot weather days where it might not be desirable to have windows open, the MVHRs cooling module can provide mechanical cooling.

For further details on cooling and overheating please refer to the overheating risk assessment.

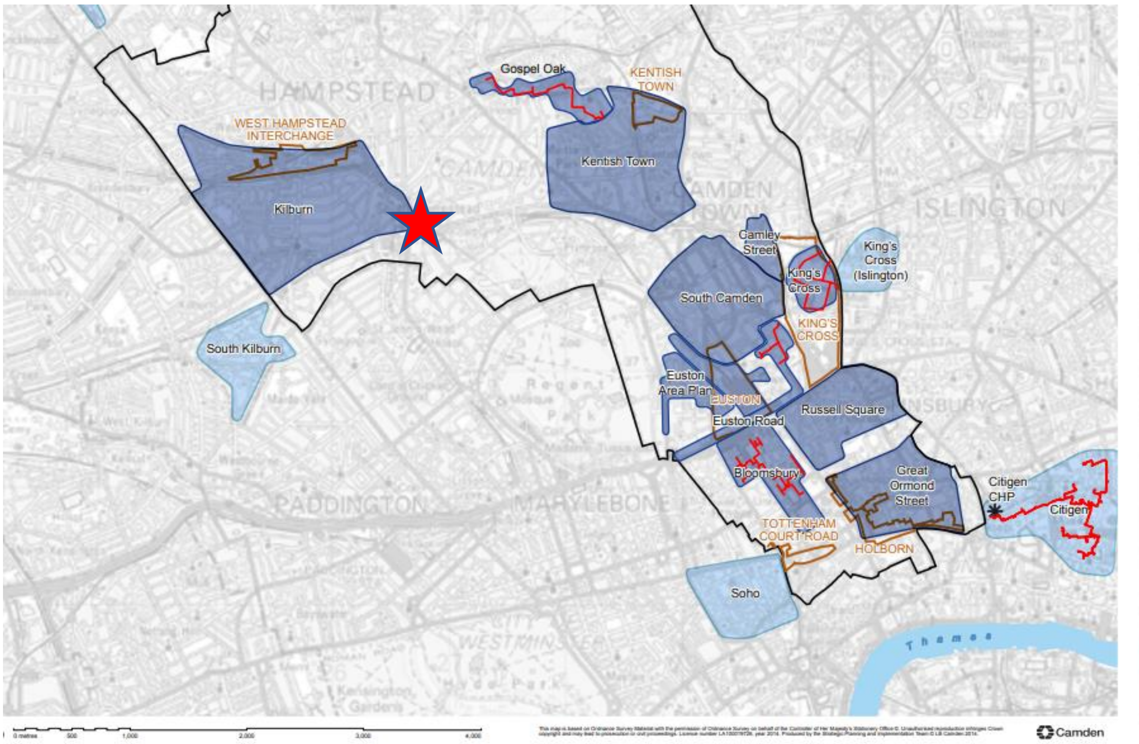
BE CLEAN: LONDON HEAT MAP

The second step of the London Plan's energy hierarchy is Be Clean and endeavours to exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.

Policy SI 3 Energy infrastructure goes further and requires all major developments to assess the feasibility of connecting to an existing decentralised energy network, and where this is not possible establishing a new network

District Heating networks combine heat demands from different buildings resulting in a more even demand profile, with CHP capacity being shared between heat customers who require heat at different times of the day. This means larger and more efficient plant can run for longer operating hours and generate shorter economic paybacks.

The London Heat Map below shows that there are no potential networks or existing district heating networks close to the site.



There is no opportunity to connect to an existing nearby or planned heating network currently. The close proximity of the underground makes the potential future connection to a district heating network very unlikely.

BE GREEN: RENEWABLE ENERGY

The utilisation of the Lean and Clean approach allows the project to minimise the reliance on the fossil fuelled energy infrastructure. Once the energy use has been minimised, the CO2 emissions can be reduced further through de-carbonised supplies and onsite 'renewable energy' solutions – 'Being Green'.

A LZC technology Appraisal was undertaken and is contained within the Appendix.

In summary, it being an urban site, wind turbines are unlikely to be effective due to poor wind speed. The use of biofuels is prohibitive as London is subject to strict air quality measures. Fuel cells are not technically appropriate as the development will not generate high enough annual energy demand to make the technology feasible, and there is no source of waste heat for absorption chillers to make practical sense. Combined Heat & Power was ruled out as has significant air quality issues and requires large plant area. PV panels are considered viable and at the time of procurement, we will determine if the market can meet the threshold to meet them economically viable under the new carbon conversion factors

A green approach of incorporating Low and Zero Carbon Technology has then been adopted via an Air Source Heat Pump system combined with PV panels at roof level.

Air Source Heat Pumps

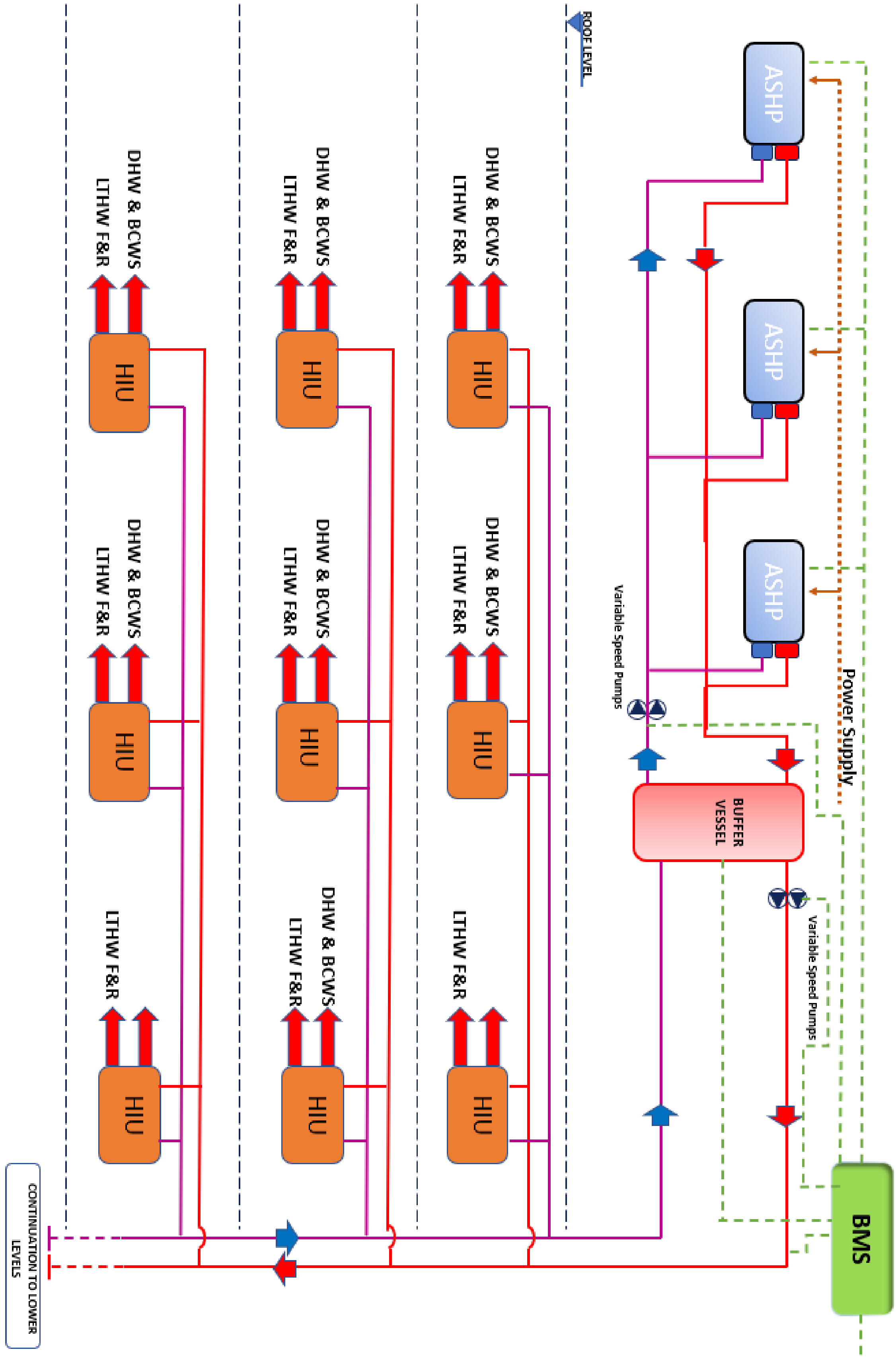
ASHPs absorb heat from the surrounding air and upgrade it to 'useful' heat to provide to the space.

While ASHP do consume electrical energy, the useful energy output is several times the input. This is dependent on the coefficient of performance (CoP) of the unit and the operating conditions.

Key to this city centre location, air source heat pumps are favourable for good, localised air quality. 4no. air source heat pumps will be located at roof level and run from 'clean' electricity, with no associated flue or localised NOx emissions.

Heating to the building will be provided by a low temperature hot water (LTHW) system. The LTHW will be generated on the roof via 4 no. Air Source Heat Pumps (ASHP) which will connect to central buffer vessel / thermal store.

A variable speed demand led LTHW secondary circuit will distribute along the roof to the pipework riser, where it will drop within and branch off at each level. The LTHW pipework will distribute along the common corridor ceiling to each heat interface unit (HIU) located within the apartment utility cupboard. Isolation valves and a flushing bypass will be located within the corridor on the final branch into each apartment. An access panel will be required for access to the valves.


ASHP
ASHP
ASHP
Power Supply
ROOF LEVEL
Variable Speed Pumps
BUFFER VESSEL
Variable Speed Pumps
BMS
DHW & BCWS
LTHW F&R
HIU
CONTINUATION TO LOWER LEVELS

A 'loose fit' approach has intentionally been adopted for the MEP services, rather than fixing systems and available space to specific manufacturers. This is to enable competitive tendering for MEP solutions, but it is also to safe guard the building for changes in technology over the coming years, as part of the adaptability and flexibility approach.

The system has been based around a Modutherm system as an industry market leader, however other manufacture plant have also been considered and may be adopted at a later stage of design. For this reason there is the need for flexibility in the seasonal efficiencies selected.

ASHP Specification Summary:

An estimate of the heating and/or cooling energy (MWh/annum) the heat pumps would provide to the development and the percentage of contribution to the site's heat loads.	170kW
Details of how the Seasonal Coefficient of Performance (SCOP) and Seasonal Energy Efficiency ratio (SEER) has been calculated for the energy modelling.	Heating COP – 4.0 kW/ kW SCOP – 3.99/156.6%
The expected heat source temperature and the heat distribution system temperature with an explanation of how the difference will be minimised to ensure the system runs efficiently.	Primary LTHW - 55 / 30 (Ave Return) Deg C Apartment Secondary Circuit – 45 / 35 Deg C
Whether any additional technology is required for top up or during peak loads (e.g. hot water supply) and how this has been incorporated into the energy modelling assumptions.	3000 Litre Thermal Store

Modelling Inputs for ASHP:
SCOP (Heating) = 4.00
NOTE: Whilst manufacturers quote a COP of up to 450%, our calculations are based on 400% which is considered a more accurate reflection of the equipment in action.

Refer to the appendix for manufacturers data sheet on the Modutherm ASHP selected.

Photovoltaic Cells

A study has been done on the utilisation of PV, this includes roof mounted PV and also building integrated PV.

The building integrated PV solution did not sit well with the balcony recesses and could not be co-ordinated into a single element on the suitable elevations. Instead, it would require a specific size and would break the rhythm of the fenestration. It was also proving to be cost prohibitive, on small scale areas, with inverters and cabling to each dwelling. For this reason, it has been dismissed.

The roof can be used for solar PV. It is exposed and free from overshadowing. The roof is being used as a biodiverse roof, and also as a blue roof for rainwater attenuation. The PV would need to sit on top of this. The 40-panel system has been suggested over full roof coverage due to weight concerns with the integration of blue and green roof options.

Any PV would feed into the building electrical distribution, serving the apartments only via the distribution panel at basement level.

The contribution to Carbon reduction by PV has been significantly reduced, following the decarbonisation of the national grid. For every kWh generated the CO2 reductions are now more than half what they were. At the same time the cost increase in energy has seen the £/kWh of electrical energy double. This has meant the financial incentive for payback on PV is twice as quick, but the carbon reduction is half as good than this time last year.

The layout has been configured to leave appropriate access and maintenance space along the perimeter edge of the roof and between the panels themselves. With the panels integrated fully into the proposed green roof system.

The infrastructure will be put in place to support the PV and green-blue roof integration. The 40 panel system will cover a roof area of 78.12sqm and produce a peak output of 16.2kWp.

The energy strategy is barely impacted by the increase or decrease of the PV panels in terms of the target emissions rate. Adding 78sqm to the roof gives approx. 2% CO_2 reduction across the building.

At the time of procurement of the PV panels for the roof, it will be appraised as to the best value obtainable and their Whole Life cost, in terms of type and efficiency. Compared against Carbon Offsetting, the PVs are currently not best value. As the energy strategy exceeds the mandatory reductions sought by the GLA for carbon reductions, it is proposed to have the PV cells as part of the industrial unit fit-out options, rather than as the shell and core works.

BE SEEN: MONITORING

To truly achieve net zero-carbon buildings we need to have a better understanding of their actual operational energy performance. Although Part L calculations and Energy Performance Certificates (EPCs) give an indication of the theoretical performance of buildings, it is well established that there is a ‘performance gap’ between design theory and measured reality.

To address this gap the London Plan Policy SI 2 ‘Minimising greenhouse gas emissions’ introduces a fourth stage to the energy hierarchy; the ‘be seen’ stage, which requires monitoring and reporting of the actual operational energy performance of major developments for at least five years via the Mayor’s ‘be seen’ monitoring portal.

Both Air Source Heat pumps and PV panels will be metered by a remote monitoring platform with daily readings for a period of 3 years after installation and when the equipment is turned on.

The ‘be seen’ policy establishes post-construction monitoring as good practice, enabling developers and building owners to better understand their buildings and identify methods for improving energy performance from the project inception stage and throughout the building’s lifetime.

Performance Indicator group	Description for BP Finchley Road, Camden
Contextual Data	104a Finchley Road, Camden NW3 5EY Residential = 2,842 sqm Commercial & School = 659 sqm
Building Energy Use	Grid electricity consumption (kWh) =147,447 (regulated + approximated unregulated)
Renewable Energy	Energy generation (kWh) = 15,390
Carbon Emissions	Tonnes CO2/m2 for residential= 6.02 Tonnes CO2/m2 for non-residential= 2.41 Tonnes CO2/m2 for Whole development = 8.43 Carbon shortfall (tonnes CO2) = 8.43 Estimated carbon offset amount (£) = 24,026

BUILDING COMPLIANCE RESULTS

The calculation methodology for presenting carbon emission reduction draws on the approach set out by Policy SI 2 Minimising Carbon Dioxide Emissions of the London Plan and is amplified in the Camden Planning Guidance.

It is a hierarchical approach with four sequential steps.

- Establish baseline (Part L compliance)
- Evaluate energy efficiency measures ('lean')
- Evaluate heating and cooling systems ('clean')
- Evaluate renewable energy technologies ('green')

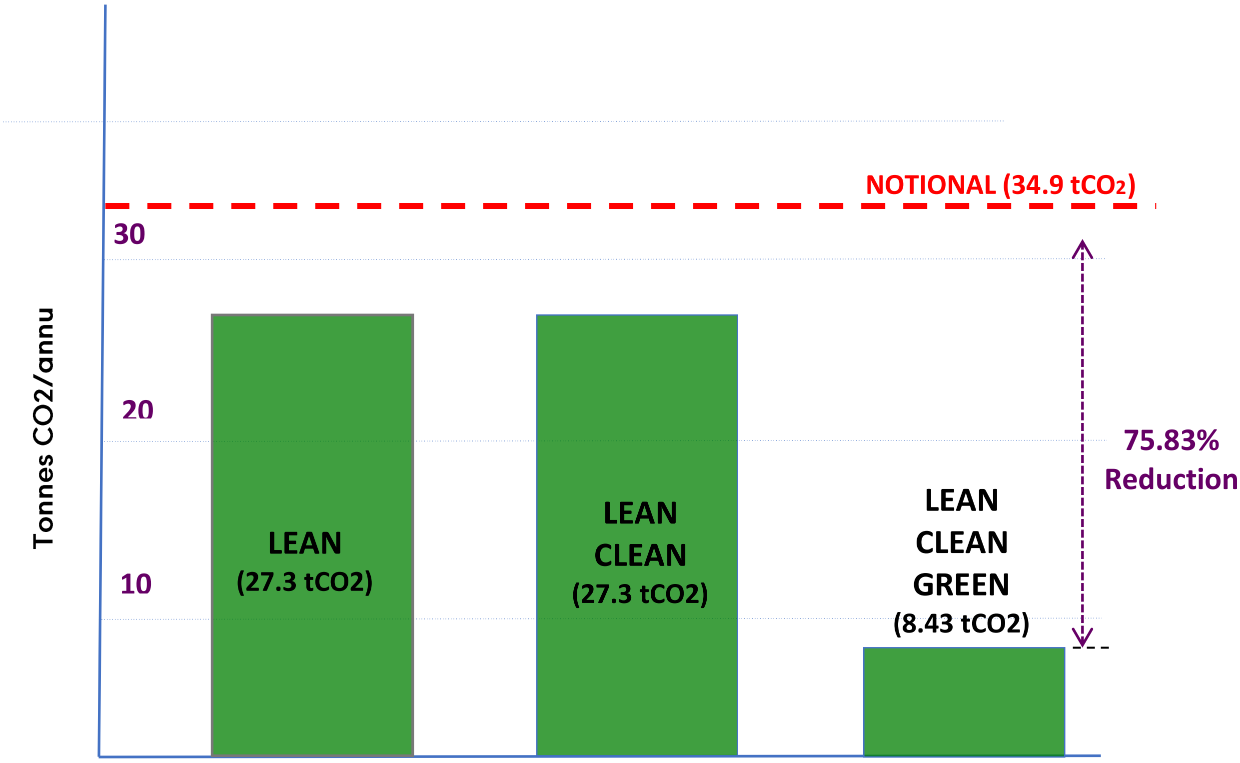
SAP (Standard Assessment Procedure) is the approved methodology for calculating energy performance in domestic buildings. The latest SAP software is yet not available, so energy calculations for the dwellings have been undertaken in the SAP2012 Software. The results have been input into the GLA Carbon Emissions energy reporting tool to convert with SAP 10 carbon factors.

Full modelling report is contained within the Appendix.

A summary of our current proposals to reduce carbon for the development, in line with the calculation methodology outlined in the GLA Preparing Energy Assessments guidance is;

- Improved U values, air permeability = 3m3/m2.h, energy efficient lighting & controls – LEAN
- Enhanced Construction details - LEAN
- Mechanical Ventilation with Heat Recovery - LEAN
- High performing ASHP to provide heating and domestic hot water – GREEN
- 78sqm of PV panels – GREEN

SAP 10 PERFORMANCE SUMMARY



	CO2 emissions (tonnes per annum)	
	Regulated	Unregulated
Notional	34.9	24.1
Be Lean	27.3	24.1
After Clean	27.3	24.1
After Green	8.43	24.1

	Regulated CO2 emissions (tonnes per annum)	
	Regulated	% savings
Savings from Lean	7.55	21.64
Savings from Clean	0	0
Savings from Green	18.91	54.20
Cumulative Savings	26.45	75.83

CARBON OFFSETTING

The contribution payable will be linked to the amount of carbon dioxide emitted beyond the target level, as per the equation below;

CO_2 emitted from the development (tonnes) per year MINUS CO_2 target emissions (tonnes) per year x £95 x 30years

Following the Lean, Clean and Green measures detailed previously, it is felt that every measure possible, within the limitations of this site (restricted roof space), have been investigated to further reduce carbon emissions in line with our target of Zero Carbon.

The calculation below, outlines our approach to calculating the Financial Contributions required. Following the calculation method above;

SAP 10 Performance
Carbon Target (tCO_2/annum) = 0
Carbon Emissions (tCO_2/annum) = 8.43
Financial Contributions = £95/year/ tCO_2 over target
Time Scale = 30 years
Total Financial Contributions = £24,026 (nearest £)

The above figures should be considered as approximate only, at this current stage. They will be updated throughout the different stages of design, in line with the refined design and more detailed energy calculation updates.

APPENDIX

1. Overheating Report
2. LZCT Appraisal
3. ASHP Product Data Sheet
4. SBEM Compliance Sheets
5. SAP compliance Sheets

APPENDIX – 1. OVERHEATING RISK ASSESMENT

BP FINCHLEY ROAD

OVERHEATING RISK ASSESSMENT

ISSUE AND REVISION RECORD

Revision	Date	Originator	Checked	Approved	Description
00	25/04/22	FH	JALW	JALW	Issued for Review

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Scope and exclusions

Build Energy has been commissioned by WME Global to carry out an overheating risk assessment on the proposed new build residential development at PFS Site, 104a Finchley Road, London, NW3 5EY.

This report assesses compliance with CIBSE TM59:2017 design methodology for the assessment of overheating risk in homes.

The study focuses on assessing the risk of overheating in highly occupied areas. For domestic spaces, this refers to the living rooms, dining rooms, and bedrooms.

The study is based on dynamic simulation modelling (DSM), which estimates the indoor climate of the buildings based on a range of factors including:

- Weather and climate predictions
- Solar heat gain through building façade
- Heat loss through building thermal envelope
- Heat gain caused by the internal gain analysis of each building
- Building Heating, Ventilation and Air-conditioning

All results and strategies are directly affected by the inputs listed in this document; any deviation from these is certain to output different results.

All results are based on the output from computer modelling software which is based on climatic conditions and patterns of use bound not to be identical to the real-life situation. Therefore, these results should be read
as those following the overheating mitigation risk calculation methodology, but not as guaranteed real-life observations.

Dynamic simulation model

Description of development
The assessment involves the erection of a 6-storey new build residential development on the PFS Site, 104a Finchley Road, London, NW3 5EY.

Software
The building has been modelled using IES Virtual Environment dynamic simulation modelling software,
version 2022.1.0.0, with analytic capabilities compliant with CIBSE AM11.

External geometry
Figure 1 displays the external geometry used for this assessment.

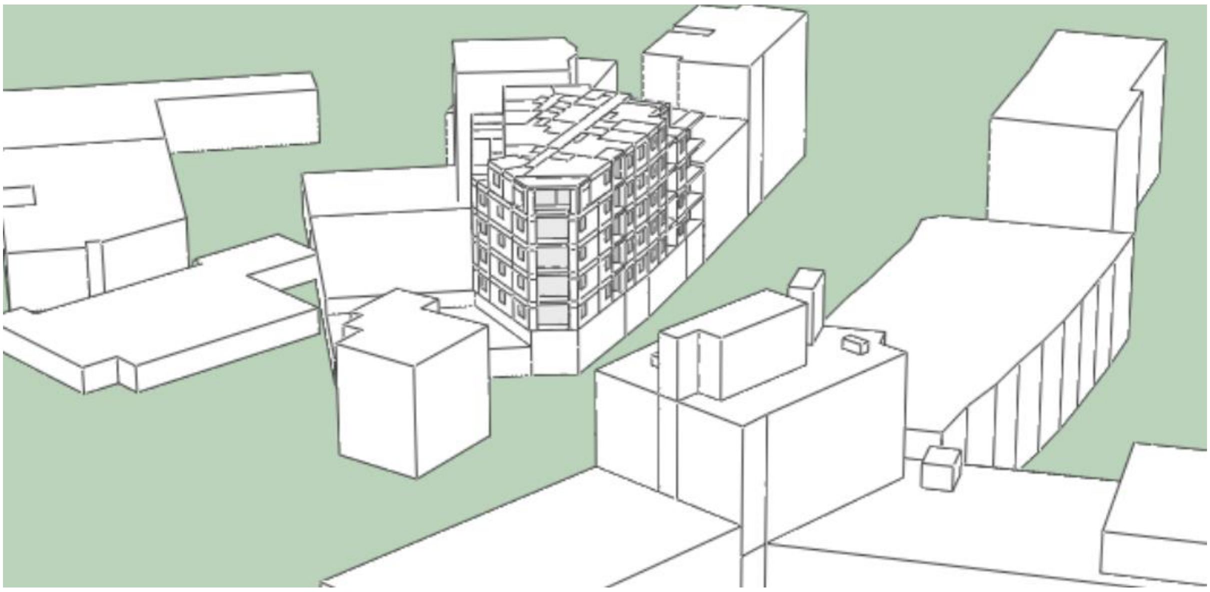


Figure 1 – Three-dimensional external geometry

Please not that all flats have been examined.

Classification of overheating

CIBSE TM59
CIBSE TM59 is the standard method for assessing the risk of overheating in domestic properties.

TM59 criteria for homes that are predominantly naturally ventilated
a) For living rooms, kitchens, and bedrooms: the number of hours during which the ΔT of internal operative temperature vs adaptive temperature is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 percent of occupied hours (this is the same as CIBSE TM52 Criterion 1: Hours of exceedance).
b) For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26°C will be recorded as a failure).
TM59 criteria for homes that are predominantly mechanically ventilated
For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e all occupied rooms should not exceed an operative temperature of 26°C for more than 35 of the annual occupied hours (CIBSE Guide A(2015a)).

This assessment fit in the predominately naturally ventilated criteria and therefore the relevant criteria have been used to establish compliance.

No corridors have been examined since there is no communal heating or cooling.

Specification for Model

The following information has been used to produce the building model.

Drawings

Model geometry has been taken from the drawings created by TP Bennet and received by Build Energy on the 14/06/2022.

Weather data

As per TM59 guidance, London_DSY01_2020_High_50 has been used in order to examine the risk of overheating. As per paragraph 3.2 within CIBSE TM59 assessment, all developments are required to pass using the DSY01 file for the 2020s, high emissions, 50% percentile scenario. Other files including the more extreme DSY02 and DSY03 as well as future files 2050s and 2080s can be used but a pass is not mandatory and therefore these have not been examined.

The Design Summer Year 1 (DSY) is the third hottest summer in London sampled from 20 years of measurement. It is then projected to 2020 based on a high emission, 50th percentile climate change scenario. CIBSE recommends this dataset to simulate unusually hot (but not extreme) weather conditions closer to the 2021 than to 20 years ago. Figure 2 below display the external temperature for this specific location.

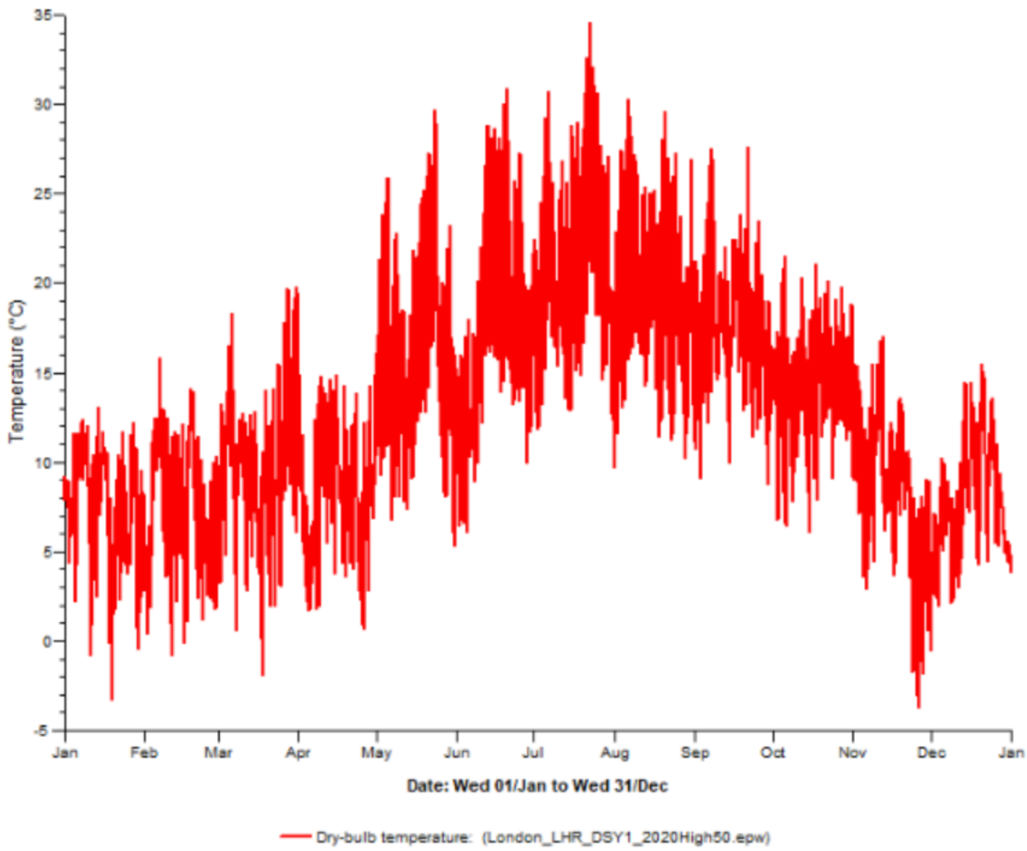


Figure 2 – DSY01 annual temperature

Construction properties

All construction U-values are based on information received by WME Global and TP Bennett.

U- values

Floor - 0.10 W/m2K
Lower Roof - 0.12 W/m2K
Upper Roof - 0.10 W/m2K
Wall - 0.15 W/m2K
Glazing – 0.9 (0.35 g value and 71%LT)

No blinds have been assumed in the calculation.

Natural surroundings have been included in the simulation. The building therefore benefit from solar shading.

Ventilation strategy

Ventilation to all spaces is provided by natural means via openable windows and glazing doors in all apartments along with MVHR with active cooling for the overheating function.

Natural ventilation to occupied rooms is provided by exposed openings adjusted for the urban location. As stipulated in TM59, windows start to open when the operative temperature in the room exceeds 23°C and when the room is occupied. Kitchen, Dining, & Living windows shut at 10pm and all windows remain sealed at night to overcome noise issues. Window opening conditions are presented below.

All windows will open from 08.00 to 23.00 with the profile of gt(ta,25,4) & ta>to - The formula indicates that the windows will start to open at 23°C and are fully open at 27°C and only when the internal temperature is greater than the external. Windows will be openable on a 90degree angle resulting in a >90% openable area.

Figures 3 and 4 display the window opening strategy as a direct output from the software.

MVHR with active cooling will be in operation on a 24hr basis with a tempered air intake at 16°C. Flow rates will vary across each room. Figures 5 and 6 below display the maximum flow rate achieved per room.

Opening attributes are based on Equivalent Orifice Area; please note this is different from the geometric Free Area. The Equivalent Orifice Area represents the actual sharp edge orifice area as a percentage of the gross physical opening drawn in the model through which air will pass at an identical flow rate, under an identical pressure difference, to the opening in question. This is calculated based on window dimensions, degree of sheltering, and wind speed, all of which are included in the simulation.

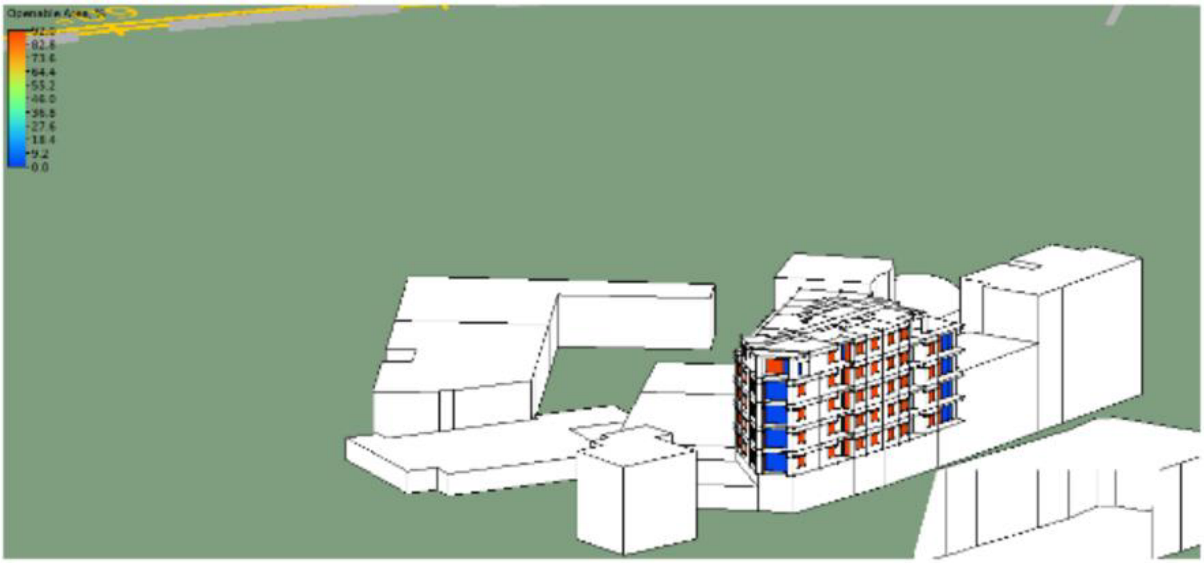


Figure 3 – Window opening %

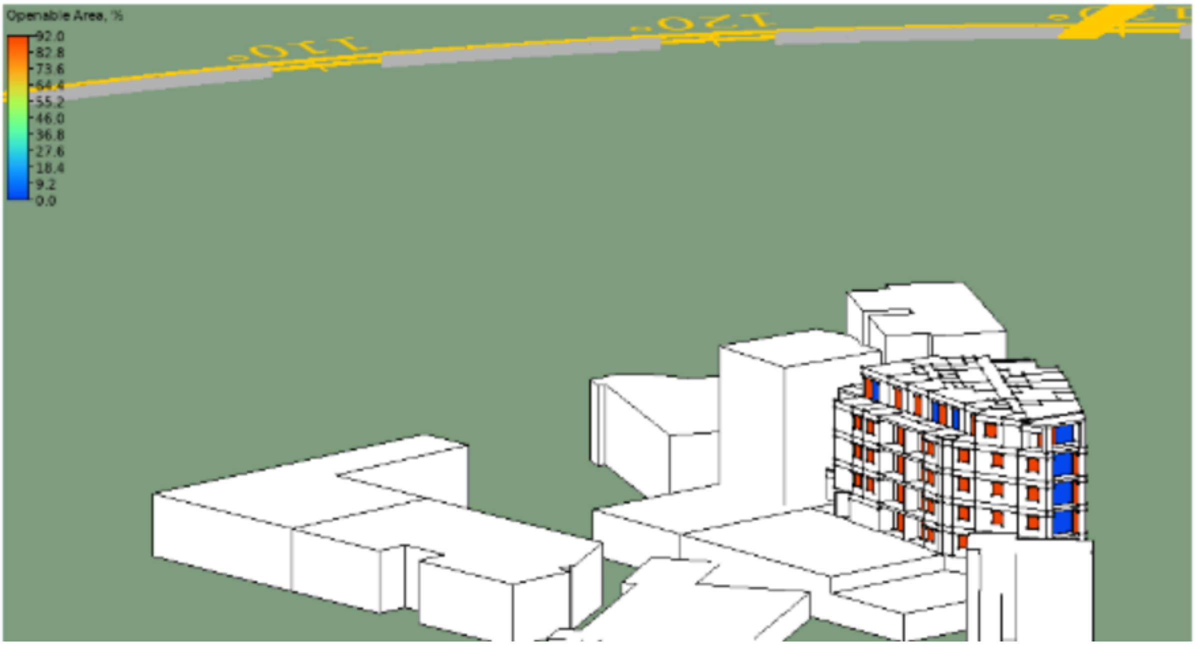


Figure 4 – Window opening %

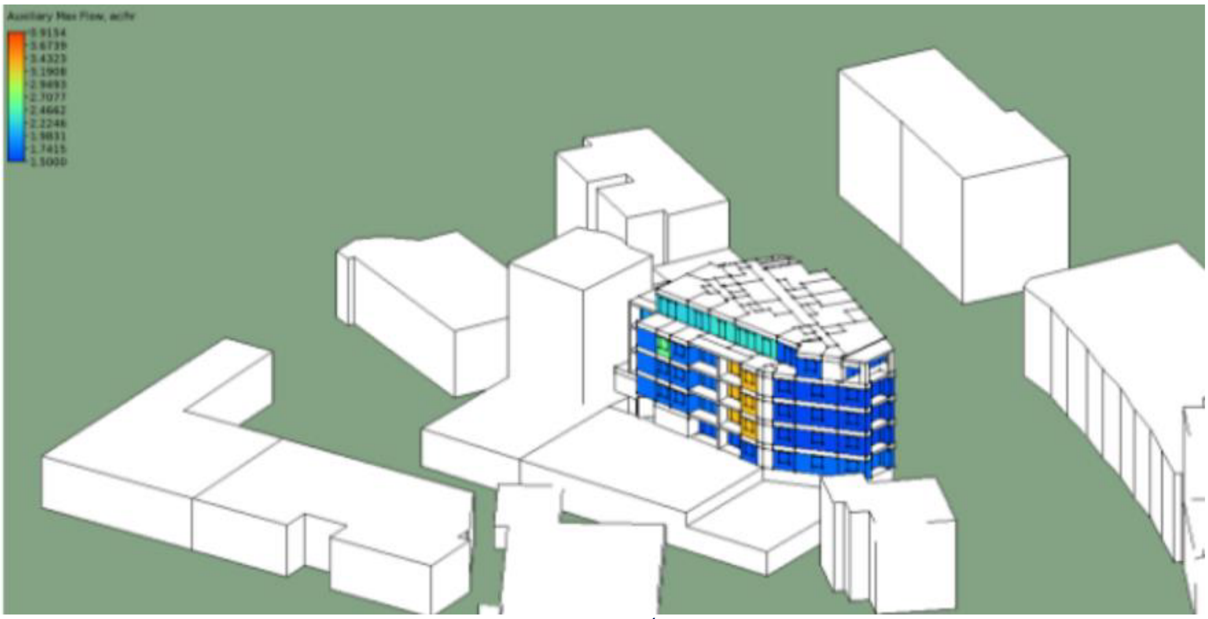


Figure 5 - MVHR maximum flow rate in ach/h

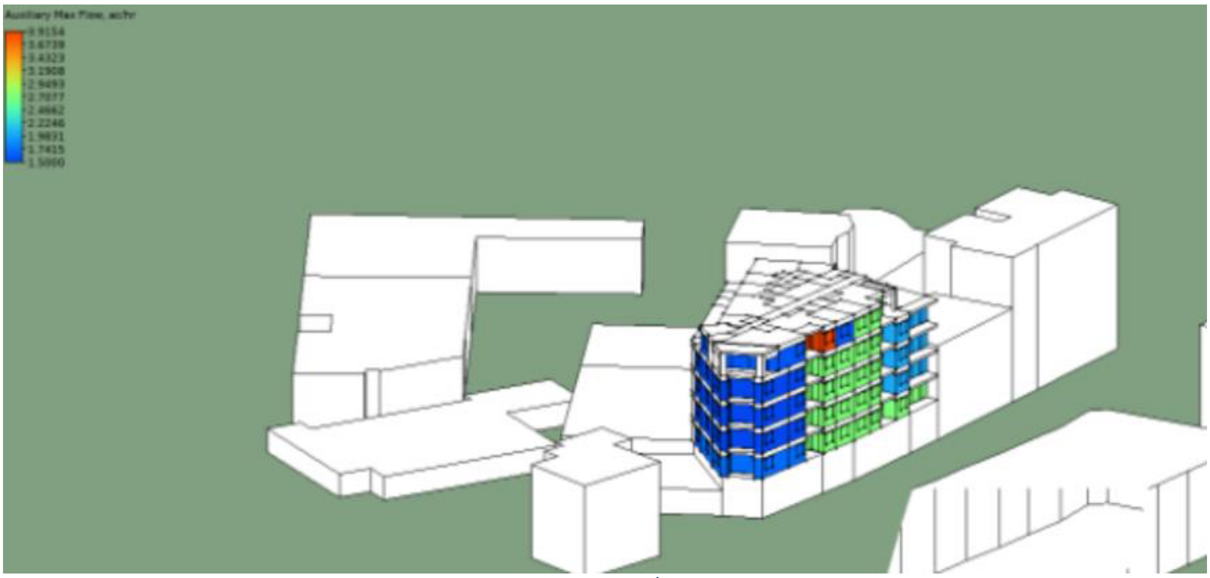


Figure 6 - MVHR maximum flow rate in ach/h

Internal gains and profiles of operation

Internal heat gains and operation schedules are entered per the CIBSE TM59 extract in Figure below.

Number of people	Description	Peak load (W) Sensible	Peak load (W) Latent	00–01	01–02	02–03	03–04	04–05	05–06	06–07	07–08	08–09	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	21–22	22–23	23–24
			Hour ending	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
1	Single bedroom occupancy	75	55	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
2	Double bedroom occupancy	150	110	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.7
2	Studio occupancy	150	110	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
1	1-bedroom living/kitchen occupancy	75	55	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1	1-bedroom living occupancy	75	55	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
1	1-bedroom kitchen occupancy	75	55	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
2	2-bedroom living/kitchen occupancy	150	110	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
2	2-bedroom living occupancy	150	110	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
2	2-bedroom kitchen occupancy	150	110	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
3	3-bedroom living/kitchen occupancy	225	165	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
3	3-bedroom living occupancy	225	165	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
3	3-bedroom kitchen occupancy	225	165	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
	Single bedroom equipment	80		0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.13
	Double bedroom equipment	80		0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.13
	Studio equipment	450		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	1	1	0.44	0.44	0.24	0.24
	Living/kitchen equipment	450		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	1	1	0.44	0.44	0.24	0.24
	Living equipment	150		0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1	1	1	1	0.4	0.4
	Kitchen equipment	300		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	1	1	0.17	0.17	0.17	0.17
	Lighting profile	2 (W/m2)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0

Figure 7 – TM59 internal gains and operational profiles

Results

This section details the results of the residential houses as tested against the weather files and thermal comfort criteria required by CIBSE TM59 Guidance.

Table 1 displays TM59 results confirming that all occupied rooms meet CIBSE TM59 thermal comfort criteria under DSY 1 2020. Only DSY01 is critical for compliance and the other weather files are excluded.

The TM59 criteria are below:

1. For living rooms, kitchens, and bedrooms: the number of hours during which the ΔT of internal operative temperature vs adaptive temperature is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 percent of occupied hours. (this is the same as CIBSE TM52 Criterion 1: Hours of exceedance).
2. For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26°C will be recorded as a failure).

Table 1 – CIBSE TM59 results (DSY01_2020_High50)

	Finchley Road		
Room description	Crit a	Crit b	Pass or Fail?
G.05 Bedroom1	0	0	✓
G.05 Bedroom2	0	0	✓
G.05 Bedroom3	0	4	✓
G.04 Bedroom1	0	0	✓
G.04 Bedroom2	0	4	✓
G.03 Bedroom	0	0	✓
G.02 Bedroom	0	0	✓
G.01 Bedroom	0	0	✓
01.04 Bedroom1	0	5	✓
01.05 Bedroom	0	0	✓
01.06 Bedroom2	0	8	✓
01.04 Bedroom2	0	1	✓
01.04 Bedroom3	0	7	✓
01.07 Bedroom1	0	0	✓
01.07 Bedroom2	0	0	✓
01.03 Bedroom	0	0	✓
01.02 Bedroom	0	0	✓
01.01 Bedroom1	0	0	✓
04.03 Bedroom1	0	8	✓
04.04 Bedroom	0	0	✓
04.05 Bedroom1	0	0	✓
04.05 Bedroom2	0	0	✓
04.02 Bedroom	0	0	✓
04.01 Bedroom	0	0	✓
01.06 Bedroom1	0	3	✓

01.06 Bedroom3	0	0	✓
04.03 Bedroom2	0	8	✓
01.01 Bedroom2	0	0	✓
02.04 Bedroom1	0	7	✓
02.05 Bedroom	0	0	✓
02.06 Bedroom2	0	7	✓
02.04 Bedroom2	0	4	✓
02.04 Bedroom3	0	8	✓
02.07 Bedroom1	0	0	✓
02.07 Bedroom2	0	0	✓
02.03 Bedroom	0	0	✓
02.02 Bedroom	0	0	✓
02.01 Bedroom1	0	0	✓
02.06 Bedroom1	0	7	✓
02.06 Bedroom3	0	3	✓
02.01 Bedroom2	0	0	✓
03.04 Bedroom1	0	8	✓
03.05 Bedroom	0	0	✓
03.06 Bedroom2	0	7	✓
03.04 Bedroom2	0	4	✓
03.04 Bedroom3	0	8	✓
03.07 Bedroom1	0	0	✓
03.07 Bedroom2	0	0	✓
03.03 Bedroom	0	0	✓
03.02 Bedroom	0	0	✓
03.01 Bedroom1	0	0	✓
03.06 Bedroom1	0	7	✓
03.06 Bedroom3	0	3	✓
03.01 Bedroom2	0	0	✓
G.05 KLD	0	N/A	✓
G.04 KLD	0.3	N/A	✓
G.01 KLD	0	N/A	✓
01.05 KLD	0	N/A	✓
01.04 KLD	0.4	N/A	✓
01.01 KLD	0	N/A	✓
04.05 KLD	0	N/A	✓
01.07 KLD	0	N/A	✓
G.02 KLD	0	N/A	✓
G.03 KLD	0	N/A	✓
01.03 KLD	0	N/A	✓
01.06 KLD	0	N/A	✓
04.04 KLD	0	N/A	✓
04.02 KLD	0	N/A	✓
04.01 KLD	0	N/A	✓

04.03 KLD	0	N/A	✓
02.05 KLD	0	N/A	✓
02.04 KLD	0.4	N/A	✓
02.01 KLD	0	N/A	✓
02.07 KLD	0	N/A	✓
02.03 KLD	0	N/A	✓
02.06 KLD	0	N/A	✓
03.05 KLD	0	N/A	✓
03.04 KLD	0.4	N/A	✓
03.01 KLD	0	N/A	✓
03.07 KLD	0	N/A	✓
03.03 KLD	0	N/A	✓
03.06 KLD	0	N/A	✓
01.02 KLD	0	N/A	✓
02.02 KLD	0	N/A	✓
03.02 KLD	0	N/A	✓

Conclusion

The results show that based on the information provided to Build Energy, with the current design, and in the occupied rooms selected for assessment, every occupied space can comply with the following criteria:

• CIBSE TM59 – Design Methodology for The Assessment of Overheating Risk in Homes

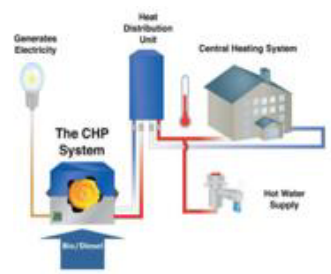
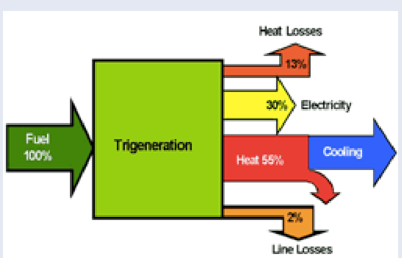
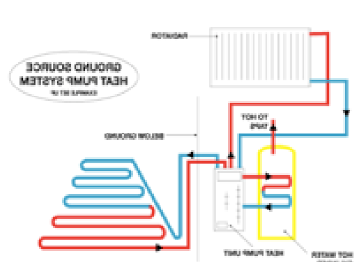
All occupied domestic spaces comply with TM59 under DSY 1 2020. This has been achieved by a predominately naturally ventilated scenario along with MVHR with cooling operation at 16°C.

Communal circulation spaces are not required to meet CIBSE TM59 and modelling has been excluded since no communal heat loss information is present.

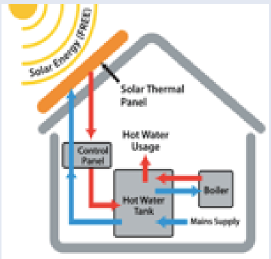
Any deviation from the assumptions will change the results.

APPENDIX – 2. LZCT APPRAISAL

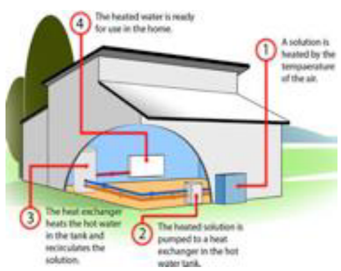
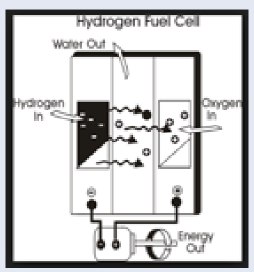
Renewables and LZCT Appraisal

Renewable Technology	Advantages	Disadvantages	Viable Option
Combined Heat and Power (CHP) 	• Heat and power generation – efficient way to generate heat • Tried and tested technology • Suitable for projects with high heating and hot water loads	• Modulating decreases performance • Higher Nox emissions than condensing boiler • No RHI tariff **DECIDING FACTOR:** - Significant impact on the local air quality, in an area where it is already a concern - Minimal plant space - Flues required - Affordability	N
Tri-generation 	• Waste heat drives absorption chiller in summer months Provides low carbon cooling (depending on source of waste heat) • Chillers are quiet	• Requires source of waste heat usually from industrial process • Large plant space required for absorption chiller • Large amount of heat rejection • Still requires conventional chillers for peak cooling load • No RHI payments	N
Ground Source Heat Pump 	• Can provide steady and consistent heating and cooling • RHI available	• Large area of land required • Run off electricity – high carbon factor • High capital cost • Costs associated with exploratory bore holes required **DECIDING FACTOR:** - Costs associated with boreholes	N
Biomass 	• Carbon neutral • Economic alternative to fossil fuels • RHIs available	• Large storage areas required with access for deliveries • Source of wood pellets • Slower start up time compared with fossil fuels • Reliability of fuel source **DECIDING FACTOR:** **- Not acceptable by Planning**	N

Renewables and LZCT Appraisal

Renewable Technology	Advantages	Disadvantages	Viable Option
Wind Turbine 	• Zero carbon technology • FITs available • Turbulent wind speed at urban sites • Recorded output typically lower than manufacturer's data • Area of natural beauty - Planning permission very unlikely	• Recorded output typically lower than manufacturer's data • Planning permission difficult • Noisy, especially with gearbox **DECIDING FACTOR:** - Not acceptable by Planning	N
Photovoltaics (PV) 	• Zero carbon technology (PV) • Tried and tested technology • Can be integrated/replace building fabric providing cost savings • Simple technology with no moving parts – minimal maintenance • FITs available	• Obstructions (shadowing etc.) effects productivity • Best results produced in direct sunlight mostly over summer, south facing – do we have a south facing roof? • Needs to be carefully integrated amongst rooflights and drainage requirements • Require large areas for significant production NOTE: limited roof space	Y
Home PV battery 	• Enhances PV technology and allows greater control, efficiency and reliability • Tried and tested technology • Simple technology with no moving parts – minimal maintenance • Waives the requirement for a G59 connection with the electricity grid	• Requires Space	Y
Solar thermal Panels 	• Tried and tested technology • Can be integrated into the building fabric • RHIs available	• Not compatible with CHP system • Pumps use electricity • Obstructions effect productivity **DECIDING FACTOR:** - More carbon savings from PV panels	Y

Renewables and LZCT Appraisal

Renewable Technology	Advantages	Disadvantages	Viable Option
Air Source Heat Pump 	• RHI available • Minimum maintenance • No deliveries • Underfloor heating is ideal so not to take up floor space • Minimal spatial requirements	• Not a zero carbon technology as it uses some electricity to run the pump • Best matched to underfloor heating • Alternative means of heating water required for summer months • Aesthetics should be considered DECIDING FAACTOR: - No air quality issues	Y
Fuel Cell 	• More efficient cogeneration method than CHP • Research grants may be available	• Newly adopted technology – only two installations in UK • Suited to development with significant heat and electricity demand • Requires large plant space DECIDING FACTOR: - Heating and electricity demand too low	N
Wood burning Stove 	• Carbon neutral • Economic alternative to fossil fuels • Aesthetically pleasing centre point in a living space • Come in various sizes, colours and finishes • Give a warn and cosy atmosphere • RHIs available (only if back boiler)	• Flue/chimney required • Storage areas required • Slower start up time compared with fossil fuels DECIDING FACTOR: - Chimney required – Air Quality	N
Anaerobic Digester 	• It turns waste into a resource • You can use waste by-products to generate energy and reduce your waste disposal costs. • It can be used in combination with a combined heat and power plant to generate both electricity and heat.	• Works best on a larger scale • Requires Planning permission • Would need community buy in DECIDING FACTOR: - Not suited to small scale jobs.	N

APPENDIX – 3. ASHP PRODUCT DATA SHEET

Technical data / scope of supply

Performance data	Values in brackets: (1 Compressor)		**LWP450AR3**
Heating capacity | COP	for A7/W35 acc. to DIN EN 14511-x: 2018	kW | COP	47.8 (31.03) | 3.57 (4.58)
	for A7/W45 acc. to DIN EN 14511-x: 2018	kW | COP	— (39.56) | — (3.42)
	for A2/W35 acc. to DIN EN 14511-x: 2018	kW | COP	45.5 (27.17) | 3.50 (3.83)
	for A10/W35 acc. to DIN EN 14511-x: 2018	kW | COP	— (33.38) | — (4.68)
	for A-7/W35 acc. to DIN EN 14511-x: 2018	kW | COP	38.92 (23.5) | 2.95 (2.79)
	for A-15/W65 acc. to DIN EN 14511-x: 2018	kW | COP	— | —
	for A-7/W55 acc. to DIN EN 14511-x: 2018	kW | COP	36.09 (—) | 2.09 (—)
Cooling capacity | EER	for A35/W18	kW | EER	55.0(32.4) I 2.5 (3.05)
	for A35/W7	kW | EER	— (24.7) | — (2.56)
Operating limits			
Heating circuit return min. | Heating circuit flow max. Heating	within heat source min. I max.	°C	20 | 60
Heating circuit return min. | Heating circuit flow max. Cooling	within heat source min. I max.	°C	10 (7) | 35
Heat source heating	min. I max.	°C	-22 | 35
Heat source cooling	min. I max.	°C	10 | 40
Additional operating points		…	A-10/W65
Sound			
Sound power level inside	min. | Night | max.	dB(A)	— | — | —
Sound power level outside 1)	min. | Night | max.	dB(A)	63 | 63 | 72.4
Sound power level acc. to DIN EN 12102-1:2017	inside | outside	dB(A)	— | 63
Tonality | Low-frequency		dB(A) | • yes – no	— | — | —
Heat source			
Air flow rate at maximum external pressing | Maximum external pressure		m³/h | Pa	15000 (9000) | —
Heating circuit			
Flow rate (pipe dimensioning) I Min. volume buffer tank in series I Min. volume separation buffer tank		l/h | l | l	5500 | — | —
Free pressing | Pressure loss | Flow rate		bar | bar | l/h	1.048 | 0.033 | 5500
Max. allowable operating pressure		bar	6
Circulation pump control range	min. I max.	l/h	—
Hot gas use			
Flow rate (pipe dimensioning)		l/h	2000
Free pressing | Pressure loss | Flow rate		bar | bar | l/h	— | 0.952 (0.045) | 2000
General unit data			
Total weight		kg	680
Weight of individual components		kg | kg | kg	— | — | —
Refrigerant type | Refrigerant capacity		… | kg	R410a | 23.0
Electrics			
Voltage code | all-pole fuse protection for heat pump *)**)		… | A	3~/PE/400V/50Hz | C50
Voltage code | all-pole fuse protection for heat pump *) + electric heating element **)		… | A	—
Voltage code | Control voltage fuse protection **)		… | A	1~N/PE/230V/50Hz | B16
Voltage code | Electric heating element fuse protection **)		… | A	—
WP*): effect. Power consumption A7/W35 DIN EN 14511-x: 2018 I Electric consumption I cosφ		kW | A | …	13.7(7.0) | 27.2(13.9) | 0.73(0.73)
WP*): Max. machine current I Max. power consumption within the operating limits		A | kW	45.3 | —
Starting current: direct | with soft starter		A | A	< 142 | 85
Degree of protection		IP	14B
Electric heating element output	3 | 2 | 1 phase	kW | kW | kW	— | — | —
Circulation pump power consumption, heating circuit	min. I max.	W	— | 310
Other unit information			
Safety valve heating circuit | Response pressure	included in scope of supply: • yes – no | bar		— | —
Buffer tank | Volume	included in scope of supply: • yes – no | l		— | —
Heating circuit expansion vessel | Volume | Prepressure	incl. in scope of supply: • yes – no | l | bar		— | — I —
Overflow valve | Changeover valve heating - domestic hot water	integrated: • yes – no		— | —
Heating circuit vibration decoupling	incl. in scope of supply or integrated: • yes – no		—
Controller I Heat quantity recording I Extension board	incl. in scope of supply or integrated: • yes – no		• | • | •

*) compressor only, **) note local regulations 1) Indoor and outdoor installation.

The performance data and the operating limits apply to clean heat exchangers I Index: h

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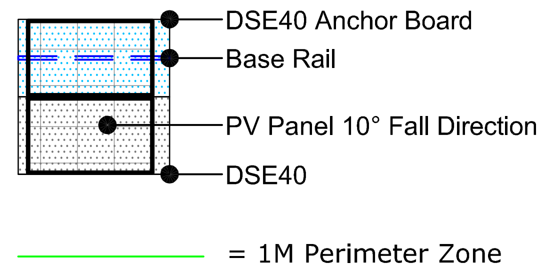
APPENDIX – 4. BAUDER PV LAYOUT



Bauder Bio Solar G2 - JA Solar module

Key:

Bauder Bio Solar G2 - JA Solar module

Design Information	
Short Mounting Rails:	0
Long Mounting Rails:	21
Type of Optimizer:	N/A
Area of PV Panels:	78.12m2
General Information	
Total power DC:	16.20 kWp
BAUDER System type:	Bauder Bio Solar G2
Module type:	JAM54S30 - 405/MR (405wp)
Module amount:	40 Units
Azimuth:	6 & 34 Degrees SE

All Dimensions, positions of Rooflights and Outlets/SVP's/mansafe systems are to be checked on site for clashes BEFORE the PV design is ordered.

Rev	Date	Description	Drawn By

BAUDER

UK OFFICE
Bauder Limited
70 Landseer Road, Ipswich,
Suffolk IP3 0DH,
England.
Tel: +44 (0)1473 257671
Fax: +44 (0)1473 230761
Email: technical@bauder.co.uk
bauder.co.uk

IRELAND OFFICE
Bauder Limited
O'Duffy Centre, Cross Lane,
Carrickmacross, Co. Monaghan,
Ireland.
Tel: +353 (0)42 9692 333
Fax: +353 (0)42 9692 839
Email: technical@bauder.ie
bauder.ie

Contractor to be responsible for checking this scheme against architects drawings/site requirements and to advise Bauder immediately of any discrepancies. Orders placed against this drawing reference assume approval of this scheme. Any materials required over and above the quantities given, will be charged accordingly.

Contract Name:
104a Finchley Road
London
NW3 5EY

Bauder Bio Solar G2 PV Layout Plan

Contract No:	B221995
Drawing No:	B221995PV - 20220706
Designed to Drawing No:	
Scale:	N.T.S
Drawn By:	D.Mitchell
Date:	06.07.22

Roof Area Name:	Roof Height:	Membrane Type:	No. Panels:	No. Mounts:	No. Weld Sleeves:	Inverter Type 1:	Inverter Type 2:
Main Roof Area	15.00m (TBC)	BTGRS	40	41	N/A	SOL-15.0-3PH-5G-DC x1	-
-	-	-	-	-	-	-	-

Required Ballast In Kg/m²:

= 180

APPENDIX – 5. SAP COMPLIANCE SHEETS (LEAN & GREEN)

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:46:52

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.44m²

Site Reference : BP Finchley Road **Plot Reference:** G02 BP Finchley Rd

Address : G02 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	28.64 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	10.67 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	47.1 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	34.8 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof	(no roof)		
Openings	0.95 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	6.65m²	
Windows facing: South East	3.04m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Floors U-value	0.1 W/m²K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:46:51

Project Information:

Assessed By: Robyn Berry (STRO036659)

Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 92.67m²

Site Reference : BP Finchley Road

Plot Reference: G04 BP Finchley Rd

Address : G04 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)		
Fuel factor: 1.55 (electricity (c))		
Target Carbon Dioxide Emission Rate (TER)	23.5 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	8.82 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	46.4 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	34.3 kWh/m²	
		OK

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	0.10 (max. 0.25)	0.10 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	0.93 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	3.58m²	
Windows facing: West	7.18m²	
Windows facing: North	3.1m²	
Windows facing: South	3.1m²	
Windows facing: North West	3.38m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Thermal bridging	0.025 W/m²K
Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Floors U-value	0.1 W/m²K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:46:51

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 99.23m²

Site Reference : BP Finchley Road **Plot Reference:** G05 BP Finchley Rd

Address : G05 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	26.52 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.53 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	56.8 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	40.4 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof	(no roof)		
Openings	0.93 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	14.76m²	
Windows facing: North West	1.67m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Thermal bridging	0.032 W/m²K
Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Floors U-value	0.1 W/m²K
Community heating, heat from electric heat pump	

Enforcement bodies must refer to and verify separate SAP Specification Document before using this reporting for compliance

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:46:51

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.6m²

Site Reference : BP Finchley Road **Plot Reference:** 103 BP Finchley Rd

Address : 103 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	24.96 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.91 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	34.9 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	29.5 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	0.95 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: South West	$6.65m^2$
Windows facing: South East	$3.04m^2$
Ventilation rate:	2.00
Blinds/curtains:	Light-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Air permeablility	$3.0\ m^3/m^2h$
Windows U-value	$0.9\ W/m^2K$
Party Walls U-value	$0\ W/m^2K$
Community heating, heat from electric heat pump	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:46:50

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 62.73m²

Site Reference : BP Finchley Road **Plot Reference:** 205 BP Finchley Rd

Address : 205 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	24.58 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.57 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	39.4 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	31.2 kWh/m²	
		OK

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	0.96 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	7.61m²	
Windows facing: North West	1.67m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:46:50

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 89.7m²

Site Reference : BP Finchley Road **Plot Reference:** 306 BP Finchley Rd

Address : 306 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)		
Fuel factor: 1.55 (electricity (c))		
Target Carbon Dioxide Emission Rate (TER)	23.22 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	8.90 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	43.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	33.2 kWh/m²	
		OK

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	0.12 (max. 0.20)	0.12 (max. 0.35)	OK
Openings	0.94 (max. 2.00)	1.20 (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:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	10.44m²	
Windows facing: East	1.53m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Roofs U-value	0.12 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:46:50

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.38m²

Site Reference : BP Finchley Road **Plot Reference:** 401 BP Finchley Rd

Address : 401 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	29.16 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.18 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	48.1 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	38.3 kWh/m²	
		OK

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	0.97 (max. 2.00)	1.20 (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:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	4.58m²	
Windows facing: South East	2.94m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Roofs U-value	0.1 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:46:50

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 72.1m²

Site Reference : BP Finchley Road **Plot Reference:** 405 BP Finchley Rd

Address : 405 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	27.5 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	10.43 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.2 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	41.2 kWh/m²	
		OK

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	0.12 (max. 0.20)	0.12 (max. 0.35)	OK
Openings	0.94 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: North	6.58m²
Windows facing: East	6.28m²
Ventilation rate:	2.00
Blinds/curtains:	None

10 Key features

Thermal bridging	0.037 W/m²K
Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Roofs U-value	0.12 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16

Printed on 02 August 2022 at 11:44:59

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.44m²

Site Reference : BP Finchley Road **Plot Reference:** G02 BP Finchley Rd

Address : G02 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	28.64 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	7.53 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	47.1 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	34.8 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof	(no roof)		
Openings	0.95 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	6.65m²	
Windows facing: South East	3.04m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Floors U-value	0.1 W/m²K
Community heating, heat from electric heat pump	
Photovoltaic array	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:44:59

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 92.67m²

Site Reference : BP Finchley Road **Plot Reference:** G04 BP Finchley Rd

Address : G04 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	23.5 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	5.74 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	46.4 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	34.3 kWh/m²	
		OK

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	0.10 (max. 0.25)	0.10 (max. 0.70)	**OK**
Roof	(no roof)		
Openings	0.93 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	3.58m²	
Windows facing: West	7.18m²	
Windows facing: North	3.1m²	
Windows facing: South	3.1m²	
Windows facing: North West	3.38m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Thermal bridging	0.025 W/m²K
Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Floors U-value	0.1 W/m²K
Community heating, heat from electric heat pump	
Photovoltaic array	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:44:58

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 99.23m²

Site Reference : BP Finchley Road **Plot Reference:** G05 BP Finchley Rd

Address : G05 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	26.52 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	6.49 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	56.8 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	40.4 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	OK
Roof	(no roof)		
Openings	0.93 (max. 2.00)	1.20 (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:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	14.76m²	
Windows facing: North West	1.67m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Thermal bridging	0.032 W/m²K
Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Floors U-value	0.1 W/m²K
Community heating, heat from electric heat pump	
Photovoltaic array	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:44:58

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.6m²

Site Reference : BP Finchley Road **Plot Reference:** 103 BP Finchley Rd

Address : 103 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	24.96 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	6.84 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	34.9 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	29.5 kWh/m²	
		OK

2 Fabric U-values

Element	**Average**	**Highest**	
External wall	0.14 (max. 0.30)	0.15 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	0.95 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	$6.65m^2$	
Windows facing: South East	$3.04m^2$	
Ventilation rate:	2.00	
Blinds/curtains:	Light-coloured curtain or roller blind Closed 100% of daylight hours	

10 Key features

Air permeablility	$3.0 m^3/m^2h$
Windows U-value	$0.9 W/m^2K$
Party Walls U-value	$0 W/m^2K$
Community heating, heat from electric heat pump	
Photovoltaic array	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:44:58

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 62.73m²

Site Reference : BP Finchley Road **Plot Reference:** 205 BP Finchley Rd

Address : 205 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	24.58 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	6.57 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	39.4 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	31.2 kWh/m²	
		OK

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	0.96 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	7.61m²	
Windows facing: North West	1.67m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	
Photovoltaic array	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:44:57

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 89.7m²

Site Reference : BP Finchley Road **Plot Reference:** 306 BP Finchley Rd

Address : 306 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	23.22 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	5.88 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	43.0 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	33.2 kWh/m²	
		OK

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	0.12 (max. 0.20)	0.12 (max. 0.35)	OK
Openings	0.94 (max. 2.00)	1.20 (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:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	10.44m²	
Windows facing: East	1.53m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Roofs U-value	0.12 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	
Photovoltaic array	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:44:57

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 49.38m²

Site Reference : BP Finchley Road **Plot Reference:** 401 BP Finchley Rd

Address : 401 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)
Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	29.16 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	8.11 kg/m²	**OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	48.1 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	38.3 kWh/m²	
		OK

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	0.97 (max. 2.00)	1.20 (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: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	**OK**
Hot water controls:	No cylinder thermostat No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	4.58m²	
Windows facing: South East	2.94m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Roofs U-value	0.1 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	
Photovoltaic array	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.16
Printed on 02 August 2022 at 11:44:57

Project Information:

Assessed By: Robyn Berry (STRO036659) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 72.1m²

Site Reference : BP Finchley Road **Plot Reference:** 405 BP Finchley Rd

Address : 405 BP Finchley Rd, London, NW3 5EY

Client Details:

Name:

Address :

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 system: Electricity (c)		
Fuel factor: 1.55 (electricity (c))		
Target Carbon Dioxide Emission Rate (TER)	27.5 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	7.39 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.2 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	41.2 kWh/m²	
		OK

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	0.12 (max. 0.20)	0.12 (max. 0.35)	OK
Openings	0.94 (max. 2.00)	1.20 (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:	Community heating schemes - Heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and TRVs	OK
Hot water controls:	No cylinder thermostat	
	No cylinder	

Regulations Compliance Report

Results and inputs informed by developer declaration. Any deviation is certain to output different results.

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.3	
Maximum	1.5	**OK**
MVHR efficiency:	70%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	6.58m²	
Windows facing: East	6.28m²	
Ventilation rate:	2.00	
Blinds/curtains:	None	

10 Key features

Thermal bridging	0.037 W/m²K
Air permeablility	3.0 m³/m²h
Windows U-value	0.9 W/m²K
Roofs U-value	0.12 W/m²K
Party Walls U-value	0 W/m²K
Community heating, heat from electric heat pump	
Photovoltaic array	

APPENDIX – 6. BRUKL SHEETS (LEAN & GREEN)

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Finchey Road - BE LEAN

As designed

Date: Thu Jul 28 15:05:16 2022

Administrative information

Building Details

Address: London, N2

Certifier details

Name: Alexandros Grigoropoulos

Telephone number: 07837047051

Address: Unit A37 Aerodrome Studios, 2-8 Airfield Way, Christchurch, BH23 3TS

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.15

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.15

BRUKL compliance check version: v6.1.b.0

Foundation area [m^2]: 194.2

The CO_2 emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	1.91	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.87	
Target primary energy rate (TPER), $kWh/m^2.annum$	18.41	
Building primary energy rate (BPER), $kWh/m^2.annum$	30.16	
Do the building's emission and primary energy rates exceed the targets?	BER > TER	BPER > TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a-Limit}$	U_{a-Calc}	U_{i-Calc}	First surface with maximum value
Walls*	0.26	0.15	0.15	60000000:Surf[3]
Floors	0.18	0.11	0.11	60000000:Surf[6]
Pitched roofs	0.16	-	-	No Pitched roofs in building
Flat roofs	0.18	0.18	0.18	60000000:Surf[5]
Windows** and roof windows	1.6	0.9	0.9	60000000:Surf[0]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No Vehicle access doors in building
High usage entrance doors	3	-	-	No High usage entrance doors in building

$U_{a-Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]
U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- HVAC1. VRF and MVHR (RETAIL/SCHOOL)

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.81	5.5	0	-	0.8
Standard value	0.93*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

2- HVAC2. EH and NV (Communal corridors)

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	0	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

1- DHW1 (SCHOOL/DWELLINGS)

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	1	-
Standard value	1	N/A

2- DHW2

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	**System type in the Approved Documents**
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	**Zone**	**Standard**
Classroom	-	-	-	1.1	-	-	-	-	-	-	N/A
Classroom	-	-	-	1.1	-	-	-	-	-	-	N/A
Kitchen	-	-	-	1.1	-	-	-	-	-	-	N/A
WC	-	-	0.4	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
Unit 1	-	-	-	1.1	-	-	-	-	-	-	N/A
Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
School accomodation	-	-	-	1.1	-	-	-	-	-	-	N/A
School accomodation	-	-	-	1.1	-	-	-	-	-	-	N/A
WC	-	-	0.4	-	-	-	-	-	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Classroom	120	-	-
Plantroom	120	-	-
Classroom	120	-	-
LIFT	120	-	-
Kitchen	120	-	-
WC	120	-	-
Store	120	-	-
Store	120	-	-
Circulation	120	-	-
LIFT	120	-	-
Swithcroom	120	-	-
Circulation	120	-	-
Unit 1	120	120	1.25
Circulation	120	-	-
Store	120	-	-
Circulation	120	-	-
Substation	120	-	-
School accomodation	120	-	-
School accomodation	120	-	-
01.04 Corridor	120	-	-
01 Staircase	120	-	-
01 Corridor	120	-	-
04.05 Corridor	120	-	-
04 Staircase	120	-	-
WC	120	-	-
04 Corridor	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
01.04 Corridor	120	-	-
01 Staircase	120	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
01 Corridor	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
01.04 Corridor	120	-	-
01 Staircase	120	-	-
01 Corridor	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
04 Ceiling Void	120	-	-
04 Ceiling Void	120	-	-
04 Ceiling Void	120	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Classroom	NO (-88.6%)	NO
Classroom	NO (-55.4%)	NO
LIFT	N/A	N/A
Kitchen	N/A	N/A
WC	N/A	N/A
Circulation	N/A	N/A
LIFT	N/A	N/A
Circulation	N/A	N/A
Unit 1	NO (-48.6%)	NO
Circulation	N/A	N/A
Circulation	N/A	N/A
School accomodation	YES (+11.6%)	NO
School accomodation	YES (+9.8%)	NO
WC	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	1130.6	1130.6
External area [m^2]	1317.5	1317.5
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	252.83	359.49
Average U-value [W/m^2K]	0.19	0.27
Alpha value* [%]	25.03	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
24	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
1	**Offices and Workshop Businesses**
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
42	**Residential Spaces**
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
33	**Non-residential Institutions: Education**
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	1.26	2.02
Cooling	3.79	2.85
Auxiliary	4.14	1.41
Lighting	6.03	7.6
Hot water	5.63	4.78
Equipment*	45.49	45.49
TOTAL**	**20.86**	**18.66**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	5.65
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*5.65*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	59.76	54.36
Primary energy [kWh/m^2]	30.16	18.41
Total emissions [kg/m^2]	2.87	1.91

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	7.8	127.5	2.7	8.6	9.4	0.79	4.11	0.81	5.5
	Notional	12.4	143.6	3.8	8.6	2.1	0.91	4.63	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	0.6	0	0.2	0	0	1	0	1	0
	Notional	1.4	0	0.3	0	0	1.41	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Finchey Road - BE GREEN

As designed

Date: Thu Jul 28 14:54:50 2022

Administrative information

Building Details

Address: London, N2

Certifier details

Name: Alexandros Grigoropoulos

Telephone number: 07837047051

Address: Unit A37 Aerodrome Studios, 2-8 Airfield Way, Christchurch, BH23 3TS

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.15

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.15

BRUKL compliance check version: v6.1.b.0

Foundation area [m²]: 194.2

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	2.23	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.13	
Target primary energy rate (TPER), $kWh/m^2.annum$	24.41	
Building primary energy rate (BPER), $kWh/m^2.annum$	23.55	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a-Limit}$	U_{a-Calc}	U_{i-Calc}	First surface with maximum value
Walls*	0.26	0.15	0.15	60000000:Surf[3]
Floors	0.18	0.11	0.11	60000000:Surf[6]
Pitched roofs	0.16	-	-	No Pitched roofs in building
Flat roofs	0.18	0.18	0.18	60000000:Surf[5]
Windows** and roof windows	1.6	0.9	0.9	60000000:Surf[0]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No Vehicle access doors in building
High usage entrance doors	3	-	-	No High usage entrance doors in building

$U_{a-Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- HVAC1. VRF and MVHR (RETAIL/SCHOOL)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	5.5	0	-	0.8
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

2- HVAC2. EH and NV (Communal corridors)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

1- DHW1 (SCHOOL/DWELLINGS)

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	3.5	-
Standard value	2*	N/A

* Standard shown is for all types except absorption and gas engine heat pumps.

2- DHW2

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	**Zone**	**Standard**
Classroom	-	-	-	1.1	-	-	-	-	-	-	N/A
Classroom	-	-	-	1.1	-	-	-	-	-	-	N/A
Kitchen	-	-	-	1.1	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
WC	-	-	0.4	-	-	-	-	-	-	-	N/A
Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
Unit 1	-	-	-	1.1	-	-	-	-	-	-	N/A
Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
School accomodation	-	-	-	1.1	-	-	-	-	-	-	N/A
School accomodation	-	-	-	1.1	-	-	-	-	-	-	N/A
WC	-	-	0.4	-	-	-	-	-	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Classroom	120	-	-
Plantroom	120	-	-
Classroom	120	-	-
LIFT	120	-	-
Kitchen	120	-	-
WC	120	-	-
Store	120	-	-
Store	120	-	-
Circulation	120	-	-
LIFT	120	-	-
Swithcroom	120	-	-
Circulation	120	-	-
Unit 1	120	120	1.25
Circulation	120	-	-
Store	120	-	-
Circulation	120	-	-
Substation	120	-	-
School accomodation	120	-	-
School accomodation	120	-	-
01.04 Corridor	120	-	-
01 Staircase	120	-	-
01 Corridor	120	-	-
04.05 Corridor	120	-	-
04 Staircase	120	-	-
WC	120	-	-
04 Corridor	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
01.04 Corridor	120	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
01 Staircase	120	-	-
01 Corridor	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
01.04 Corridor	120	-	-
01 Staircase	120	-	-
01 Corridor	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
Ceiling Void	120	-	-
04 Ceiling Void	120	-	-
04 Ceiling Void	120	-	-
04 Ceiling Void	120	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Classroom	NO (-88.6%)	NO
Classroom	NO (-55.4%)	NO
LIFT	N/A	N/A
Kitchen	N/A	N/A
WC	N/A	N/A
Circulation	N/A	N/A
LIFT	N/A	N/A
Circulation	N/A	N/A
Unit 1	NO (-48.6%)	NO
Circulation	N/A	N/A
Circulation	N/A	N/A
School accomodation	YES (+11.6%)	NO
School accomodation	YES (+9.8%)	NO
WC	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	1130.6	1130.6
External area [m^2]	1317.5	1317.5
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	252.83	0
Average U-value [W/m^2K]	0.19	0
Alpha value* [%]	25.03	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
24	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
1	**Offices and Workshop Businesses**
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
42	**Residential Spaces**
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
33	**Non-residential Institutions: Education**
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	0.34	0.74
Cooling	3.79	2.85
Auxiliary	4.14	2.27
Lighting	6.03	7.6
Hot water	1.77	3.52
Equipment*	45.49	45.49
TOTAL**	**16.08**	**16.97**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0.37
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0.37*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	59.76	54.36
Primary energy [kWh/m^2]	23.56	24.41
Total emissions [kg/m^2]	2.13	2.23

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	7.8	127.5	0.6	8.6	9.4	3.43	4.11	3.5	5.5
	Notional	12.4	143.6	1.2	8.6	2.1	2.78	4.63	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	0.6	0	0.2	0	0	1	0	1	0
	Notional	1.4	0	0.3	0	0	1.41	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type