

Technical Note – London Plan Review

Project	J2680 – Finchley Road				
Reference	London Plan Review				
Scope	This is a technical note to provide information on how changes to London Plan requirements would impact the proposed design of Finchley Road development				
Date	30/01/2023	Job number	J2680	Author	AE

Introduction

This technical note has been written in order to compare the granted scheme with impacts of legislative updates to provide information on the impacts of changes to Building Regulations and the London Plan would have on the performance and proposed design for the development of J2680 – Finchley Road. As part of this study, the relevant points referencing energy and sustainability of London Plan 2015, which was in effect at time of planning submission for the project, have been reviewed against London Plan 2021. The main differences and resulting impacts on the proposed design have been outlined below.

It should be noted that the development submitted for planning in 2015 and was designed in line with design and technologies strongly recommended by local and Greater London Authority planning policy. At the time of design, CHP technology was heavily pushed for and therefore implemented on the project. Due to significant reductions in the carbon factor of grid electricity, the benefits of CHP have decreased in current planning policy. With construction of the development having commenced prior to the date of Building Regulations Part L 2021 coming into effect, Part L 2013 applies to the project. Alternatives to CHP, such as recently recommended technologies like heat pumps have been considered but due to constraints in roof and external space this technology has been deemed not viable. Similarly, with the project currently in construction and materials and components already ordered, there is no scope to change the design of the façade and thermal fabric to meet the changes in targets of the London Plan in terms of energy hierarchy and overheating.

The development already has planning permission and as part of a further update it was demonstrated that the updates to design led to a more energy and carbon efficient building performance than had been previously accepted by the authority in the original 2015 submission. Please refer to energy statement issued August 2022 for further information.

The following schedule specifically identifies where the London Plan 2021 would require an enhancement to the granted scheme. Although it can be seen that in many instances the granted scheme performs well.

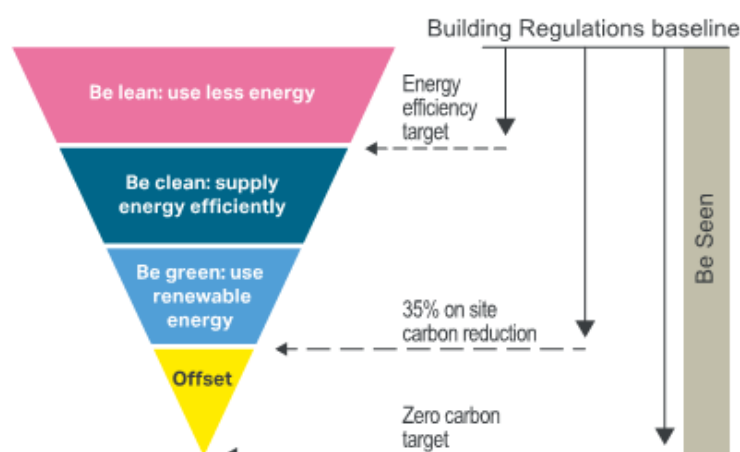
London Plan 2015 Policy	London Plan 2021 Equivalent Policy	Change	Design Implications
Policy 5.1 Climate Change Mitigation	Policy SI 2 Minimising Greenhouse Gas Emissions	'Be Seen' step added to energy hierarchy	Provide full energy monitoring system. Each residential unit will have a heat meter on its HIU which will meter heating and hot and cold water consumption. Monitoring equipment will be fitted on community plant. There will also be electric consumption meters to measure lighting and in-use general power consumption. All this data will be centrally collected.

Policy 5.2 Minimising Carbon Dioxide Emissions	Policy SI 2 Minimising Greenhouse Gas Emissions	In addition to 35% improvement over Part L, a 10% and 15% improvement needs to be demonstrated at 'Be Lean' stage for Residential and Commercial portions respectively. Note the scheme has never achieved 35% improvement.	For the granted scheme to comply with the new LP 2021 further improvement required via fabric performance upgrades to meet 'Be Lean' stage targets. Current scheme achieves 26% overall improvement. With the project currently in construction and materials and components already ordered, it will not be possible further improve fabric, alter the design of the façade, or change heating strategy. The development already has planning permission and improvement over Part L 2013 has increased in relation to this value, as demonstrated in August 2022 updated Energy Statement. Further capacity to PV generation will be provided via increase in efficiency of panels. (Please see attached)

Policy 5.6 Decentralised Energy in Development Proposals	Policy SI 3 Energy Infrastructure	CHP systems further down the heating hierarchy	Use extra low NO_x emitting plant (see below). At time of design and planning submission when London Plan 2015 was in effect, CHP was strongly pushed for in major developments. This was reflected by its position in the heating hierarchy. Alternatives technologies such as heat pumps have been considered but deemed not viable due to insufficient roof and external space for required plant.
Policy 7.14 Improving Air Quality	Policy SI 1 Improving Air Quality	Major proposals need to be submitted with an Air Quality Assessment. Air Quality Assessment previously submitted.	Use extra low NO_x emitting plant (see below). CHP technology is less likely to meet London Plan 2021 requirements. Alternatives technologies such as heat pumps have been considered but deemed not viable due to insufficient roof and external space for required plant. The development already has planning permission

Policy 5.9 Overheating and Cooling	Policy SI 4 Managing Heat Risk	Residential portion requires TM59 assessment and commercial portion will require TM52 assessment	Full TM59 and TM52 assessment required for the development. This was not required in previous planning policies. As demonstrated in August 2022 updated Energy Statement, an overheating assessment in line with policy at the time was carried out. Measures taken at each step of cooling hierarchy has been demonstrated. At this stage of construction, additional upgrades to shading or glazing is not feasible. It will also not be possible to provide mechanical cooling to rooms at risk due to lack of external or roof space to house condensers.

If reviewing against the London Plan 2021, a development needs to demonstrate how design principles have followed the energy hierarchy. This was also the case for London Plan 2015, however since then a fourth step 'Be Seen' has been added which requires to demonstrate how energy performance will be monitored, verified and reported. While metering and monitoring components are proposed, these were specified at a time before London Plan 2021 came into effect. The chosen monitoring equipment may therefore not meet all outlined criteria.



Under London Plan 2015, it was required to demonstrate an overall 35% carbon emissions reductions in comparison to Part L 2013. Under London Plan 2021, the development would need to be tested against Part L 2021. Under Part L 2021 the fabric performance and system efficiencies of the notional building is better, meaning the improvements over Part L demonstrated previously will be much smaller as the notional building tested against will have a lower energy and carbon consumption. Improvements to fabric would likely be required in order to meet fabric energy efficiency criteria for the residential portion of the development. The carbon factor of electricity has significantly decreased since 2015, meaning a CHP system is a much less viable system. The development would also under Part L 2021 need to demonstrate compliance to primary energy targets. This relates to how energy is delivered to the development. Using a CHP will make compliance against this criterion challenging. With construction having commenced prior to June 15th 2021, compliance needs to be demonstrated against Part L 2013 and is achieved.

In addition to overall 35% improvement over Part L, a 10% for residential portion and 15% improvement for commercial areas needs to be demonstrated at 'Be Lean' stage. This was not a requirement under London Plan 2015 and does not need to be achieved.

As stipulated by London Plan 2021, a carbon offset needs to be paid to meet the zero carbon target. This has already been paid.

As previously mentioned, the significant decrease in the carbon factor of electricity due to the greening of the national grid has made CHP systems less attractive for new developments. This is reflected in Policy SI 3 of London Plan 2021, where a CHP community heating system has dropped down the steps of systems to be considered in the heating hierarchy. Low-emission CHPs are permissible 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. Low-emission CHP refers to technologies with low NO_x emissions. It is not expected that gas engine CHPs will fit this category. However, the energy strategy was chosen at a time when CHP was heavily recommended and it is not possible to switch to air source heat pumps due to lack of external space to house the required plant.

The CHP system will need to meet the requirements for Policy Improving Air Quality. London Plan 2021 still states that a development should be as a minimum 'Air Quality Neutral', not contributing to an increase in onsite emissions. Under London Plan 2021, it is now required as part of this policy to submit an Air Quality Assessment. This has already been carried out.

While London Plan 2015 states that the development should seek to limit the risk of overheating, a standard to adhere to is not mentioned. As demonstrated in August 2022 updated Energy Statement, the cooling hierarchy has been followed to reduce the need for mechanical cooling via passive measures. Under London Plan 2021, the commercial portion would need to meet CIBSE TM52 criteria while the residential portion would need to meet the requirements set out in CIBSE TM59. Provision has been made for mechanical cooling in the commercial unit to ensure a comfortable internal temperature during summer heatwaves. Due to the location of the site, with air and noise pollution, there is risk that apartment windows need to remain closed which can negatively impact the residential portion's ability to effectively regulate internal temperatures via passive measures alone. With construction already in progress and materials and components already purchased, there is no scope to change the specification of glazing or alter massing of building. The addition of mechanical cooling has been explored but deemed not viable due to insufficient external or roof space for necessary plant.

Energy & Sustainability Statement

J2680 Finchley Road

Ref: J2680-B-RP-0001
Revision: 01
Status: S4

Webb Yates Engineers Ltd
48-50 Scrutton Street
London. EC2A 4HH
020 3696 1550
london@webbyates.com
www.webbyates.com

Registered in England & Wales No: 5393930

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REVISION HISTORY

Revision	Status	Date	Author	Reviewer	Approver
00	S4	15.08.2022	AE	ES	PD
01	S4	01.02.2023	AE	PD	PD

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I. EXECUTIVE SUMMARY

This report reviews the proposed energy strategy and performance for the mixed residential and commercial development for 317 Finchley Road, London NW3 6EP. Upon updated specification for the proposed thermal fabric and glazing, along with more accurate data for the CHP system efficiencies, the performance of the development has been modelled to ensure it performs to the same level or better than what was demonstrated in the RIBA Stage 4 Design Stage Energy and Sustainability Assessment J2680-Doc-01 rev 02, issued on 17.04.2018.

The project consists of 22 residential units, split between 3 towers, along with a shell & core commercial unit.

The guidance and policies used in formulating this report are listed below and the resulting findings are in line with the energy statement produced at the initial design RIBA Stage 4;

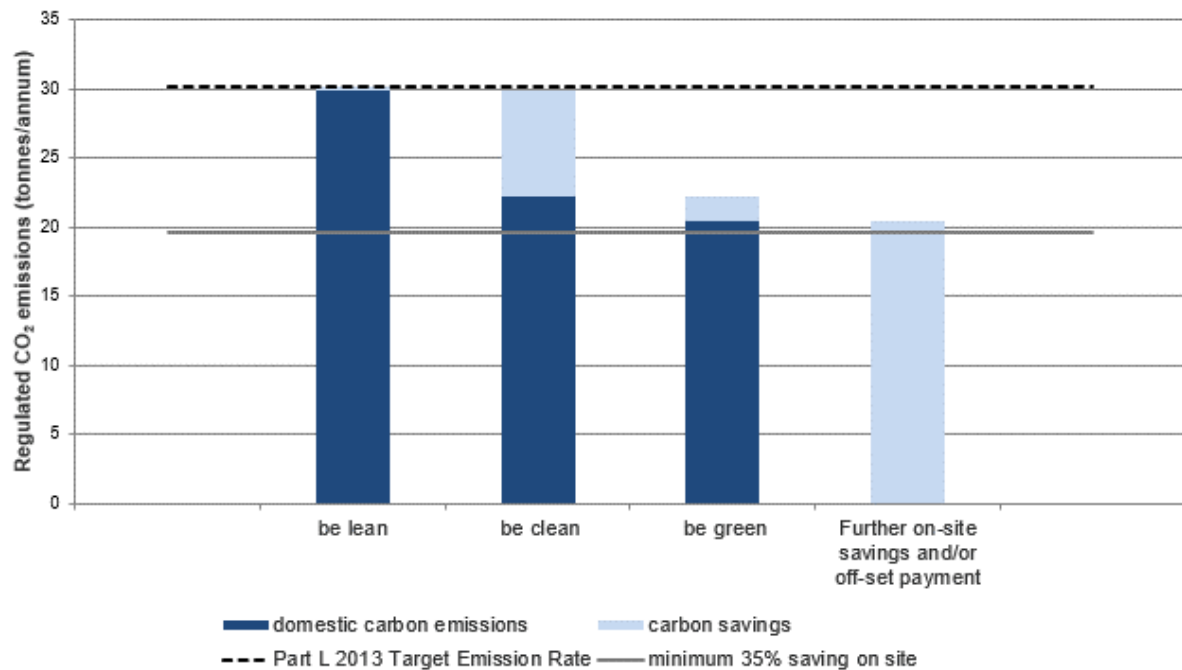
- Camden Local Plan 2015;
- London Plan 2015;
- Building Regulations Part L1A and L2A

It is worth noting that the project was submitted for planning in 2016 and therefore does not need to comply with the most recent regulations.

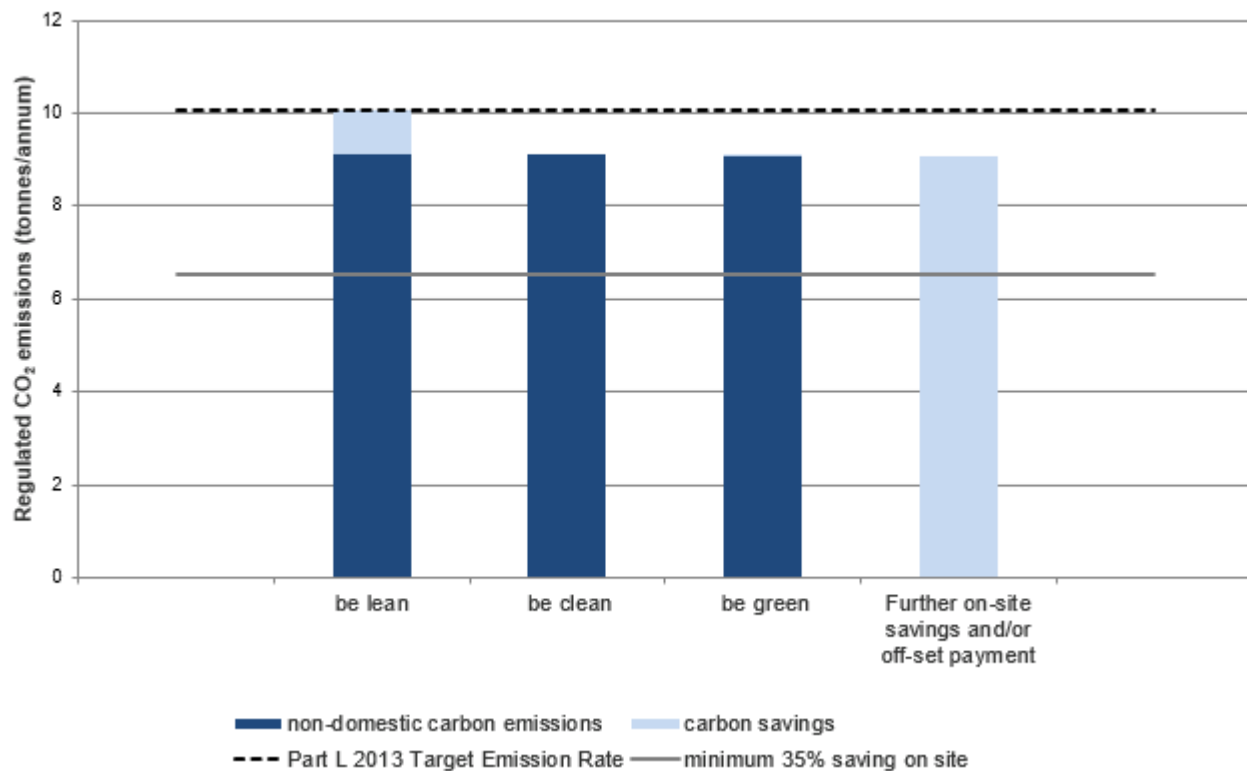
The energy strategy proposed meets the Building Regulations Part L1A and L2A requirements for the proposed new flats and retail units. The development achieves a site-wide improvement over Part L of 26% using SAP2012 carbon factors. This is an improvement over the performance at RIBA Stage 4 Design Stage Energy and Sustainability Assessment J2680-Doc-01 rev 02, issued on 17.04.2018, where an improvement over Part L of 24% was demonstrated. It is assumed that any carbon offset payments as part of planning permission have already been made. This should be confirmed with the relevant authorities.

	Total regulated emissions (Tonnes CO2 / year)	CO2 savings (Tonnes CO2 / year)	Percentage savings (%)
Part L 2013 baseline	40.2		
Be lean	39.0	1.2	3%
Be clean	31.4	7.6	19%
Be green	29.6	1.8	5%
Total Savings	-	10.6	26%
	-	CO2 savings off-set (Tonnes CO2)	-
Off-set	-	887.7	-

Domestic SAP 2012 Carbon Emissions



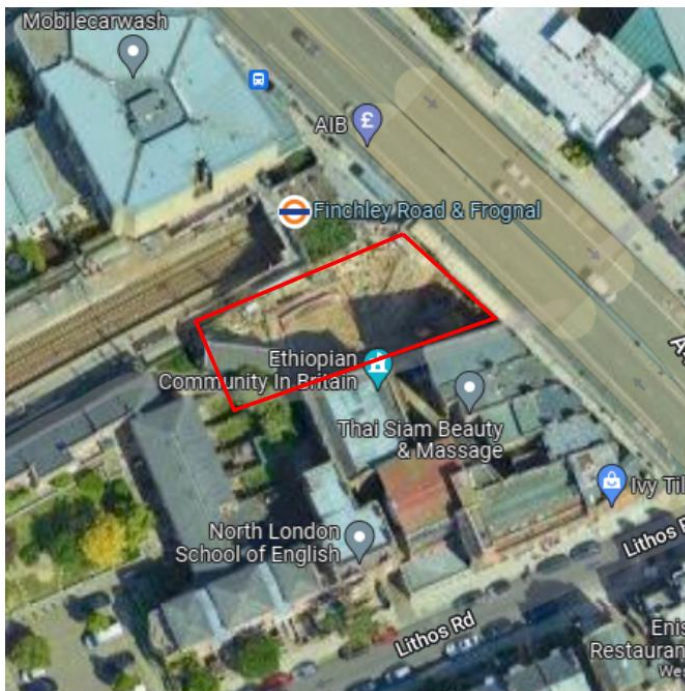
Non-domestic SAP 2012 Carbon Emissions



2. INTRODUCTION

The proposed development at 317 Finchley Road is to be located on the site of the former public house, adjacent to Finchley Road & Frognal Overground station within the London Borough of Camden. The Local Planning Authority for the area is the London Borough of Camden.

The redevelopment scheme will comprise of the construction of a new Building accommodating a new retail unit and approximately 22 residential units; along with ancillary cycle storage, landscape works and other associated works.



3. PLANNING POLICY BACKGROUND

The main planning documents which constitute the statutory development plan for Camden and form the basis on which decisions will be made for the proposed development are:

- Building Regulations Part L1A and L2A;
- Camden Local Plan 2015;
- London Plan 2015;
- CIBSE Technical Manuals and Guide;

The main planning documents which constitute the statutory development plan and form the basis on which decisions will be made for the proposed development are outlined below.

3.1. Building Regulation Compliance

Building Regulations apply to all developments, and are in place to ensure buildings meet health, safety, welfare, convenience and sustainability standards; they focus on the technical aspects of designing and constructing a building.

The proposed development of Finchley Road will be fully compliant with all revisions of the Building Regulations relevant to MEPH design. The most relevant document for the existing residential block is the **Part L Approved Document: Part L1A: Conservation of fuel and power in new dwellings** and **Part L Approved Document: Part L2A: Conservation of fuel and power in new buildings other than dwellings**

New thermal fabric for the dwellings should achieve the following minimum targets.

Table 2 Limiting fabric parameters	
Roof	0.20 W/(m ² ·K)
Wall	0.30 W/(m ² ·K)
Floor	0.25 W/(m ² ·K)
Party wall	0.20 W/(m ² ·K)
Swimming pool basin ¹	0.25 W/(m ² ·K)
Windows, roof windows, glazed roof-lights ² , curtain walling and pedestrian doors	2.00 W/(m ² ·K)
Air permeability	10.0 m ³ /(h·m ²) at 50 Pa

The following minimum fabric performance applies for the commercial units.

Table 3 Limiting fabric parameters	
Roof	0.25 W/(m ² ·K)
Wall	0.35 W/(m ² ·K)
Floor	0.25 W/(m ² ·K)
Swimming pool basin ¹	0.25 W/(m ² ·K)
Windows, roof windows, roof-lights ² , curtain walling and pedestrian doors ^{3,4}	2.2 W/(m ² ·K)
Vehicle access and similar large doors	1.5 W/(m ² ·K)
High-usage entrance doors	3.5 W/(m ² ·K)
Roof ventilators (inc. smoke vents)	3.5 W/(m ² ·K)
Air permeability	10.0 m ³ /(h·m ²) at 50 Pa

The new development will need to comply with paragraph L1 of Schedule 1. Compliance at the design stage is demonstrated by calculating and comparing the CO₂ emissions rate for the proposed development, known as the Building Emissions Rate (BER), and an equivalent notional building of the same geometry but with a set of benchmark performance characteristics as specified in the 2010 NCM modelling guide, known as the Target Emissions Rate (TER). NCM methodologies using SAP software were employed to demonstrate compliance with these regulations for the residential portion. For the non-domestic portion of the development, NCM methodologies using TAS software has been used.

3.2. London Borough of Camden Planning Policy

Camden Council encourages new developments to be energy and resource efficient. The Camden Council Local Plan, adopted in 2015, requires new developments to minimise use of energy and other non-renewable resources, as well as to facilitate an increase in the use of low and zero carbon technologies to help reduce carbon dioxide (CO₂) emissions and air pollutants harmful to health.

London Borough of Camden' Local Development Framework Core Strategy sets out recommendations for the following spatial policies:

Core Strategy Policy 13 – Tackling climate change through promoting higher environmental standards

Reducing the Effects of and Adapting to Climate Change

The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:

- a) Ensuring patterns of land use that minimise the need to travel by car and help support local energy networks.
- b) Promoting the efficient use of land and buildings.
- c) Minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:
 - ensuring developments use less energy
 - making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks;
 - generating renewable energy on-site
- d) Ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

Local Energy Generation

The Council will promote local energy generation and networks by:

- a) Working with our partners and developers to implement local energy networks in the parts of Camden most likely to support them, i.e. in the vicinity of:
 - Housing estates with community heating or the potential for community heating and other uses with large heating loads;
 - The growth areas of King's Cross, Euston; Tottenham Court Road; West Hampstead Interchange and Holborn;
 - Schools to be redeveloped as part of Building Schools for the Future programme;
 - Existing or approved combined heat and power/local energy networks; and other locations where land ownership would facilitate their implementation.
- b) Protecting existing local energy networks where possible (e.g. at Gower Street and Bloomsbury) and safeguarding potential network routes (e.g. Euston Road).

Water and Surface Water Flooding

We will make Camden a water efficient borough and minimise the potential for surface water flooding by:

- a) Protecting our existing drinking water and foul water infrastructure, including Barrow Hill Reservoir, Hampstead Heath Reservoir, Highgate Reservoir and Kidderpore Reservoir.
- b) Making sure development incorporates efficient water and foul water infrastructure.
- c) requiring development to avoid harm to the water environment, water quality or drainage systems and prevents or mitigates local surface water and down- stream flooding, especially in areas up-hill from, and in, areas known to be at risk from surface water flooding such as South and West Hampstead, Gospel Oak and King's Cross (see Map 5).

Waste

New development in Camden must support the objectives of sustainable waste management. This includes:

- Aiming for at least 10% of the total value of materials used to be derived from recycled and reused sources.
- Major developments are anticipated to be able to achieve 15-20% of the total value of materials used to be derived from recycled and reused sources.

Development Policy 22 – Promoting sustainable design and construction

The Council will require development to incorporate sustainable design and construction measures. Schemes must:

- a) Demonstrate how sustainable development principles, including the relevant measures set out in paragraph 22.5 below, have been incorporated into the design and proposed implementation;

and

- b) Incorporate green or brown roofs and green walls wherever suitable.

The Council will promote and measure sustainable design and construction by expecting non-domestic developments of 500m² of floor space or above to achieve “very good” in BREEAM assessments and “excellent” from 2016 and encouraging zero carbon from 2019.

The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:

- a) Summer shading and planting;
- b) Limiting run-off;
- c) Reducing water consumption;
- d) Reducing air pollution; and
- e) Not locating vulnerable uses in basements in flood-prone areas.

Development Policy 23 – Water

The Council will require developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding by:

- a) Incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site;
- b) Limiting the amount and rate of run-off and waste water entering the combined storm water and sewer network through the methods outlined in part a) and other sustainable urban drainage methods to reduce the risk of flooding;
- c) Reducing the pressure placed on the combined storm water and sewer network from foul water and surface water run-off and ensuring developments in the areas identified by the north London strategic flood risk assessment and shown on map 2 as being at risk of surface water flooding are designed to cope with the potential flooding;
- d) Ensuring that developments are assessed for upstream and downstream groundwater flood risks in areas where historic underground streams are known to have been present;
- e) Encouraging the provision of attractive and efficient water features.

3.3. **London Plan 2015**

Policy 5.2 Minimising Carbon Dioxide Emissions stipulate that major developments should be net zero-carbon with a minimum onsite reduction of 35% beyond Building Regulations. New developments will be required to connect to or demonstrate a potential connection to a decentralised energy system unless it is demonstrated that this is not feasible or viable.

All major developments need to demonstrate how London Plan 2015 carbon reduction targets are met.

It does so by demonstrating sustainable energy practices in line with the London Plan Energy Hierarchy (Policy 5.2), by requiring new developments to:

- Use less energy (Be Lean)
- Supply energy efficiently (Be Clean)
- Use renewable energy (Be Green)

Year	Improvement on 2013 Building Regulations
2013-2016	35% CO ₂ Emissions Reduction
2016-2036	Zero Carbon

4. ENVIRONMENTAL DESIGN STRATEGY

It is proposed to use a number of energy efficiency measures to reduce the energy demand of the development in line with the energy hierarchy of Be Lean, Be Clean, Be Green.

4.1. Be Lean

The first step of the London Plan energy hierarchy is to reduce energy use through both passive and active lean design measures. A number of sustainable design and construction methods have been incorporated into the design of the building which comply with the requirement to reduce energy demand. These include:

High Performance Building Envelope

Element	Building Regulation Part L1A & L2A	Average U-Value [W/m ² K]
	Limit U-Value [W/m ² K]	Design
External Wall	Residential - 0.3 Commercial – 0.35	Residential - 0.20 Commercial – 0.20
Floor	Residential - 0.25 Commercial – 0.25	Residential - 0.13 Commercial – 0.13
Roof	Residential - 0.20 Commercial – 0.25	Residential - 0.12 Commercial – 0.12
Glazing	Residential – 2.00 Commercial – 2.20	Residential – 1.10 g-value 0.46 Commercial – 1.10 g-value 0.46

Enhanced Air Tightness and Good Detailing

For new construction elements good detailing shall be achieved in order to avoid the creation of thermal bridges in the fabric and meeting points of elements such as between walls and floors and ceilings. The development will target a maximum air permeability of 3 m³/m²/hr at 50Pa.

Limit Overheating

Systems have been designed to minimise internal heat gains by creating as short as possible service runs and the use of low energy lighting. The façade will be designed in such a way as to maximise solar gains in colder winter months while limiting them in summer months.

Daylight

The maximisation of daylight is one of the most important environmental factors for buildings. Artificial lighting contributes up to 25% of the energy costs of a typical building, despite operation largely within daylight hours. Anecdotal evidence also suggests that the provision of good levels of natural light can contribute to enhanced health and well-being. The design shall maximise daylight while limiting solar gains during summer months.

Ventilation

For the newly constructed flats, it is proposed to have individual mechanically ventilated heat recovery units (MVHR). Heat recovery will use exhaust air to heat up incoming air and therefore reduce heating loads. The units will use a summer bypass mode in high temperature periods in order to help maintain a cooler and more comfortable indoor environment.

Heating

It is proposed to heat the new flats via underfloor heating fed by a community heating system supplied by CHP. A condensing boiler will provide top-up in periods of high heating demands, allowing for the CHP to run at a higher efficiency throughout the year and provide greater energy savings overall.

Efficient Systems

Use of efficient systems and equipment with suitable time and temperature controls which have been appropriately commissioned such that the systems can be operated efficiently.

Minimization of lengths and diameters of 'dead legs'. Efficient components i.e. fans, pumps, refrigeration equipment have been appropriately sized to have no more capacity for demand and standby than is required for the task to operate at their optimum levels.

Insulation of pipework, ductwork and hot water systems have been selected to be in line with the future highest standards.

Minimising Water Usage

The design shall incorporate water saving strategies, such as low flush toilets, and non-concussive spray taps. Water consumption will be monitored. Other features shall include mains leak detection and sanitary shut-off.

Energy Efficient Lighting and Appliances

Provision of the required lighting levels whilst minimizing energy consumption by appropriate specification of light fittings and effective control of lighting systems by:

- Specifying 100% of the fixed internal light fittings as dedicated energy efficient fixtures.
- Having suitable energy consumption metering.
- Ensuring systems have been appropriately commissioned.
- Using lighting systems which are efficient and make use of daylight where possible/practical.
- Provision of low output or energy efficient external lighting.
- Avoiding the use of external lighting when communal spaces are unoccupied or during the day by means PIR, daylight sensors and time controls.

A lighting efficacy of average 90 lumens per circuit watt has been used as the design standard. This will be achieved including LED lighting sources throughout.

4.2. Be Clean

New Community heat network / Connection to Existing Low Carbon Heating Infrastructure

The next phase of the London Plan is to provide the heating, cooling and power as efficiently as possible. The following technologies will be considered for further analysis for both buildings.

Gas Fired Boilers

High efficiency condensing boilers and incorporating underfloor heating is proposed; this allows a lower flow temperature and therefore the boiler will be condensing for a larger amount of its operating time ensuring efficiency. The boiler controls will incorporate external temperature compensation allowing fast response to external temperature change, which saves energy by reducing the need for sudden demands of duty from the boiler.

CHP & Decentralized Energy Networks

The Energy Hierarchy encourages the use of a CHP system to reduce CO₂ emissions further. The feasibility of connecting into a Decentralized Energy Network (DEN) or providing the Shared Heating Network (SHN) has been assessed and with reference to the London Heat Map and has been excluded under a previous assessment

The principle behind combined heat and power (cogeneration) is to recover the waste heat generated by the combustion of a fuel in an electricity generation system. This heat is often rejected to the environment, thereby wasting a significant portion of the energy available in the fuel that can otherwise be used for space heating. This cogeneration of electricity and heat greatly increases the overall efficiency of the system, anywhere from 25-55% to 60-90% depending on the equipment used, and the application.

A small scale thermal lead CHP system incorporating back up boilers is proposed for this development.

Distribution

The heating system will be designed to be as efficient as possible, with an inverter driven pump to adjust the pumping power required dependent on the heating demand.

The end-users will be supplied with regular information to control and operate the system e.g. at point of occupancy and maintenance visits.

The performance of the heat pump system will need to be monitored postconstruction to ensure it is achieving the expected performance approved during planning as will be specified in the Mechanical Specifications.

4.3. **Be Green**

The final reductions in energy consumption and related carbon emissions should be through the use of on-site renewable energy sources in the bid to reach the required carbon reductions.

The proposed building features a large expanse of south east facing existing roof on to which a photovoltaic (PV) array has been investigated as an option to provide energy for the building and an investment for the school.

Photovoltaic Panels are a renewable technology which will decrease the amount of electricity used in the building, particularly during the summer months when the solar irradiance is at its peak. Panels would be integrated, located on the pitched roof, south facing and angled at 30° from the horizontal. Such panels would not directly offset any energy used by the heating systems but would reduce carbon emissions from the other electrical uses within the building.

	Estimated Annual Energy generation Required (kWh)
Photovoltaic Array	3,023

This requires a 4.0 kWp system of 15 PV panels, south oriented placed with a tilt of 12°.

The energy assessment results (see section 9) show that the carbon savings measures described above give a reduction of 26% compared to Building Regulations Part L – exceeding previously reported results but not achieving the minimum on-site reduction of at least 35% to meet the zero-carbon target for the development.

5. LOW AND ZERO CARBON TECHNOLOGIES

The following section provides a feasibility analysis of Low or Zero Carbon (LZC) technologies for use at Finchley Road. There are various options when it comes to LZC technology, but a combination of project constraints rules the majority of these out.

The constraints are:

- Capital expenditure
- Return on Investment
- Carbon savings potential
- Clean energy output potential
- Spatial requirements
- Operation and maintenance requirements
- Planning requirements

Out of the technologies considered the following were discounted immediately for this site:

- Hydroelectric: there are no suitable water courses or hydroelectric plants near the site.
- Hydrogen: generation and storage are still in the experimental stage at this scale and no systems are currently commercially available.
- Biomass: planning energy and carbon targets rule out the use of biomass boilers or alternatives (including biomass CHP). It is also considered not a viable solution due to issues with emissions and transport.
- Biomass CHP: as above.
- Wind Turbines: wind turbine technology is not suitable for high density areas and those within close proximity to residential properties.

The feasibility study therefore reviewed the use of the following technologies to offset CO₂ emissions:

- Air Source Heat Pumps
- Photovoltaics
- Solar Thermal Panels
- Open/Closed Loop Ground Source Heat Pumps

The following types of green/renewable energy technologies have been selected in order to maximise on-site renewable energy generation:

- Photovoltaics

5.1. Feasibility of Selected Technologies

Solar Photovoltaic (PV) Panels and Detailed information

Photovoltaic (PV) Panels are a renewable technology which will decrease the amount of electricity from the grid used in the building, particularly during the summer months when the solar irradiance is at its peak. Panels can be integrated within the building roof or stand alone; most efficient when south facing and angled at 30° from the horizontal. Such panels would reduce carbon emissions from the electrical uses within the building.

With space available on the top roof, this technology has been deemed suitable to help reduce onsite electric consumption.

5.2. Feasibility study of the discarded technologies

Air Source Heat Pump and Detailed information

An air to water heat pump uses the air as a heat sink and transfers the heat in the external space into the heating system. The temperature of the Low Temperature Hot Water (LTHW) providing the heating also affects the COP of the units, with the ideal flow and return temperatures being 45°C/35°C.

On the basis of economic and technical application ASHP are not considered appropriate for the project on the basis that the COP value fluctuates with external ambient temperature and the system efficiencies cannot be confirmed.

Ground Source Heating and Cooling Systems

A Ground Source Heat Pump (GSHP) is a system that extracts heat from the ground, upgrades it to a higher temperature and releases it where required for use for space and water heating. Most systems are 'closed loop' and comprise of plastic piping buried in the ground and connected to a heat pump. A water or water-antifreeze mixture is passed around the looped pipe where it absorbs heat from the ground. The fluid flows into an electrically powered heat pump, comprising a compressor and a pair of heat exchangers before discharging back to the underground loop. Pipes can either be buried in trenches, usually in a slinky arrangement to reduce the amount of surface area that is required, or in a borehole, in a vertical loop system. Vertical loop systems require less surface space but are considerably more expensive.

Although their efficiency and potential for significant carbon reductions are attractive, the capital expenditure and on-going maintenance would add unnecessary costs and complications to the construction process. Extensive ground works would be required on a site with very limited space. Therefore GSHPs are deemed not feasible based on the site constraints.

Feasibility of Solar Thermal Systems

Similarly to PV panels, solar thermal panels can either be integrated into the sloped roof structure. Either flat plate or evacuated tube type panels could be used. The solar thermal panels will be used to heat water which can be used for the domestic hot water supply to the dwellings.

It has identified that it would be more efficient for this kind of development to use solar photovoltaics to help reduce electric consumption onsite.

6. COOLING HIERARCHY

The development has been designed in line with the cooling hierarchy outlined in Policy 5.9 Overheating and Cooling in the London Plan. The following measures have been taken at each stage of the hierarchy in order to reduce the demand for cooling.

Minimising Internal Heat Gains

Stage one of the Cooling Hierarchy is to minimise internal heat generation through energy efficient design.

Heat distribution infrastructure will be designed to minimise pipe lengths. This will be achieved at coordination stage, ensuring pipework is well insulated and that pipe configurations minimise heat loss. Good daylighting and high efficiency light fittings with occupancy control will also help to reduce excess heat gains from artificial lighting. Low energy lighting has been specified with occupancy controls to be provided for the luminaires.

Reducing Heat Entering the Building

The design of the façade will help to limit solar gains in the summer.

Passive Ventilation

Large openable windows in the flats will allow sufficient natural cross ventilation during occupied hours, and when acoustic requirements allow, to prevent overheating.

Mechanical Ventilation

The MVHRs of the new flats will employ a summer bypass mode in order to maintain a comfortable internal environment.

Active Cooling

It is currently proposed to not provide active cooling for the residential portion. Provision has been made for the shell & core commercial unit to have mechanical cooling. This has been modelled as a variable refrigerant flow (VRF) system in the energy model.

7. ENERGY ASSESSMENT

An energy assessment has been carried out to demonstrate how the targets for regulated CO₂ emissions reduction over and above 2013 Building Regulations will be met using the energy hierarchy outlined in Policy 5.2 Minimising carbon dioxide emissions in the London Plan 2015.

As part of planning policy, the following criteria apply:

- An on-site reduction of at least 35% should be achieved to meet the zero-carbon target
- A cash-in-lieu contribution is required to offset the remaining carbon shortfall

For the purpose of the energy assessment SAP2012 carbon factors in line with Part L have been used, and energy demand has been calculated using the approved SAP software.

Energy use has been converted to carbon emissions using the GLA Carbon Emission Reporting Spreadsheet (version 1.1) for the purpose of the energy assessment. The unregulated energy demands of the development have been estimated based on CIBSE Guide F.

SAP software was used to output a Target Emissions Rate (TER) based on the notional building and a Dwelling Emissions Rate (DER) for the residential portion of the development for each stage of the energy hierarchy outlined below:

- Lean – energy efficiency measures. Compared against a notional building with community gas boiler system for hot water and heat generation
- Clean – Community CHP system
- Green – Community CHP technology providing heating and hot water and PV generation

To assess performance against the London Plan energy target of 35% improvement over Part L, two separate models of the residential and commercial portion were created.

See Appendix A for full SAP results and Appendix B for BRUKL reports.

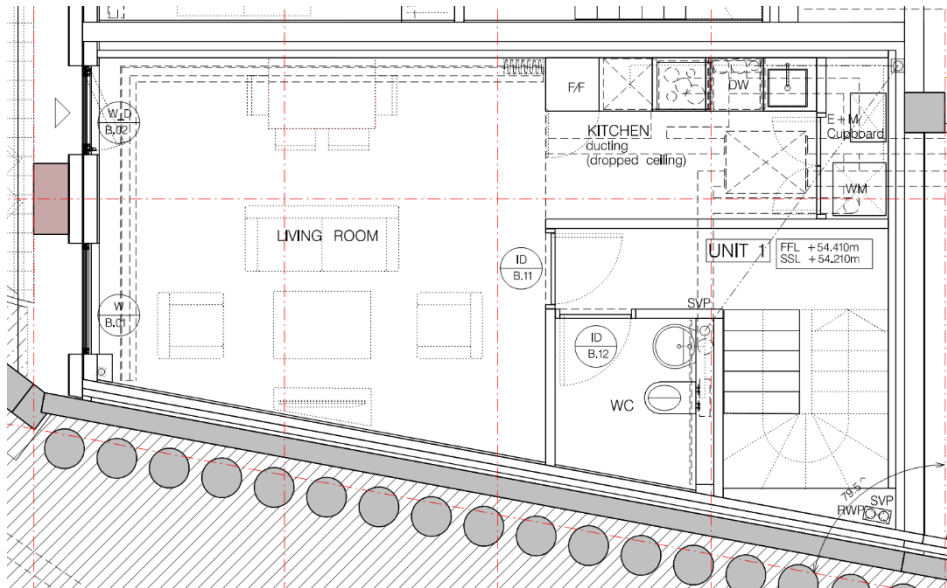
7.1. **Residential Model**

The SAP model for the new build flats were tested in accordance with the energy hierarchy set by the London and Local Plan. For each scenario, all apartment types varying in things such as area of external envelope, internal area and orientation within the development have been tested to provide a detailed assessment of onsite energy consumption.

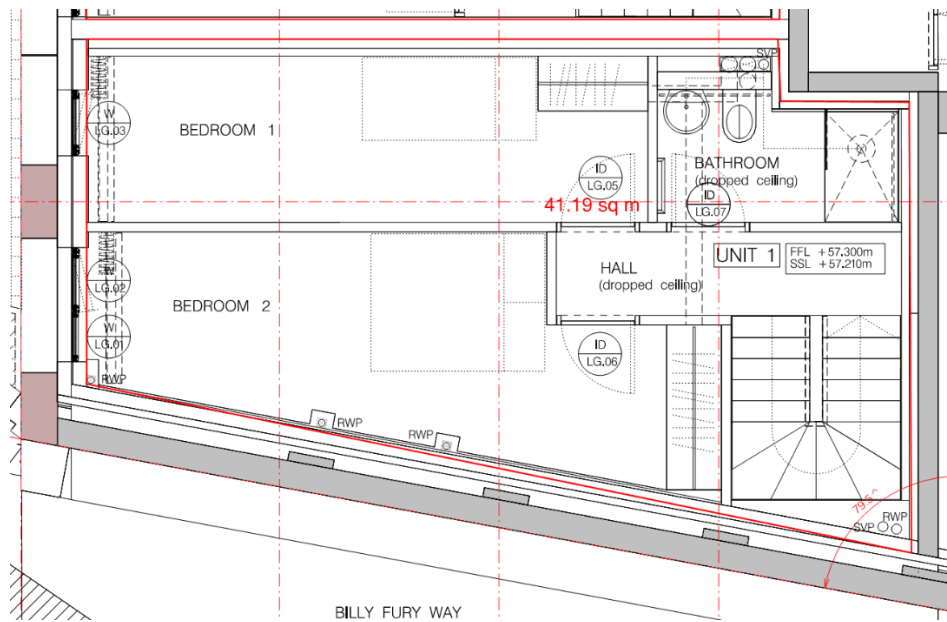
New Development

For the new residential blocks, 3 apartment types has been identified and tested.

Apartment Type	Area (m²)	Number of Units
Basement Flat	85.9	2
Mid-Floor Flat	74.6	17
Top Floor Flat	110.4	3

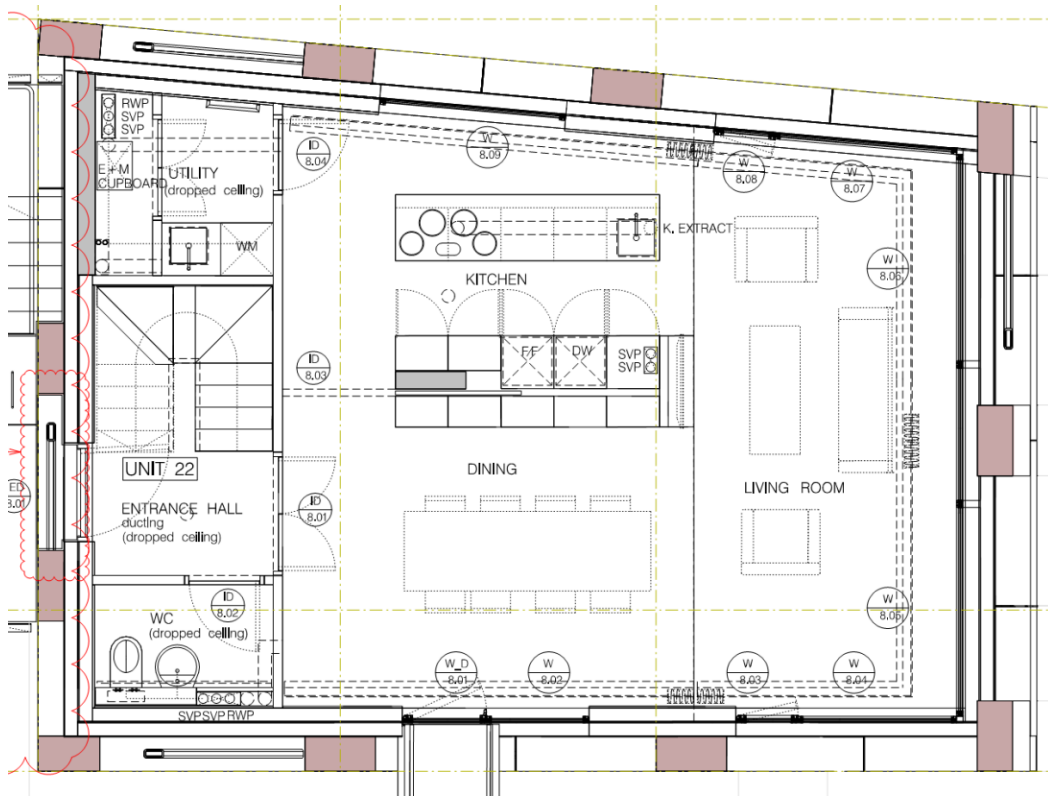


Basement Flat Basement Level
2-bed Flat Layout

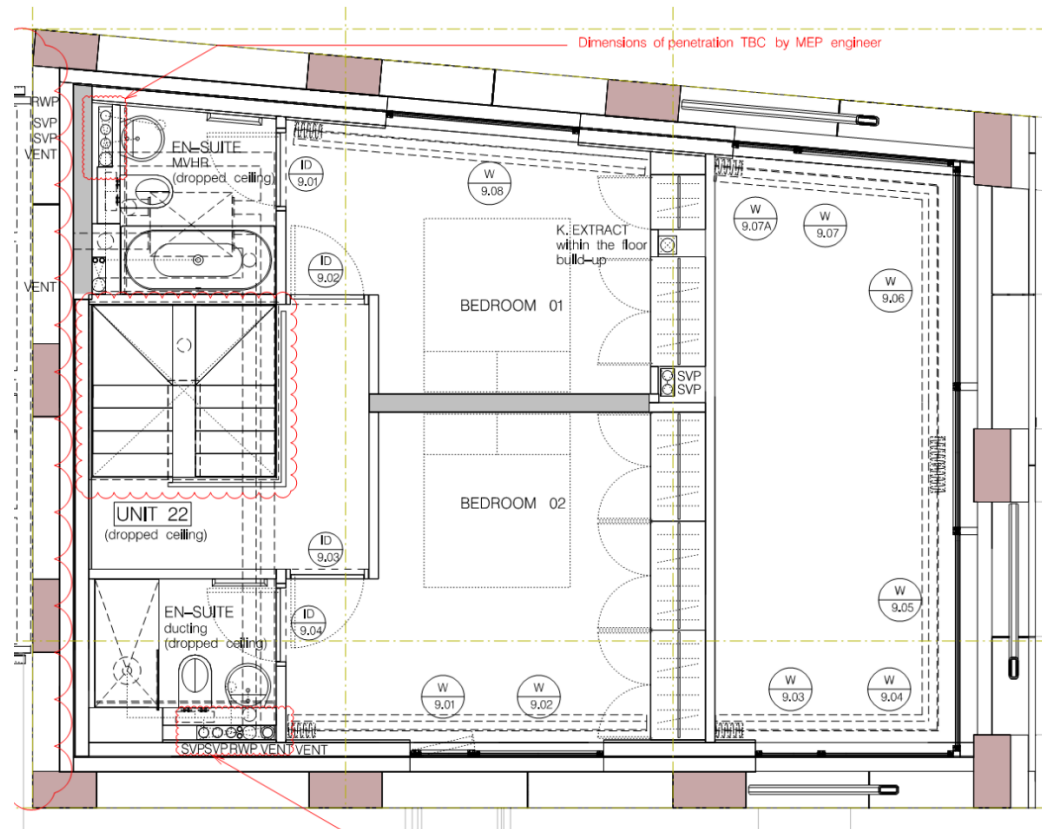


Basement Flat Lower Ground Floor Level
2-bed Flat Layout

23



Top Floor Flat 8th Floor Level
2-bed Flat Layout



Top Floor Flat 9th Floor Level
2-bed Flat Layout

The following fabric U-values have been assigned based on information from the Architect.

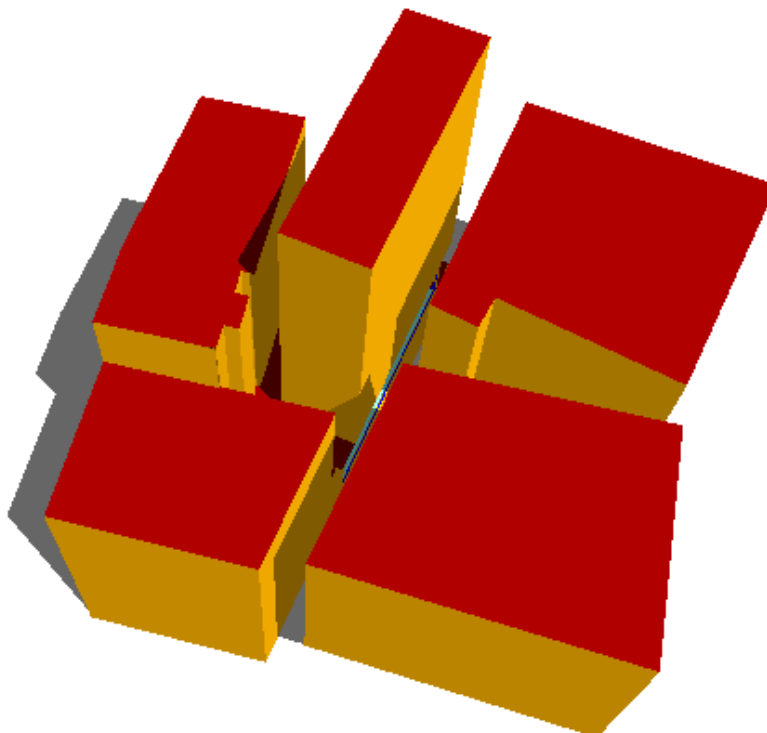
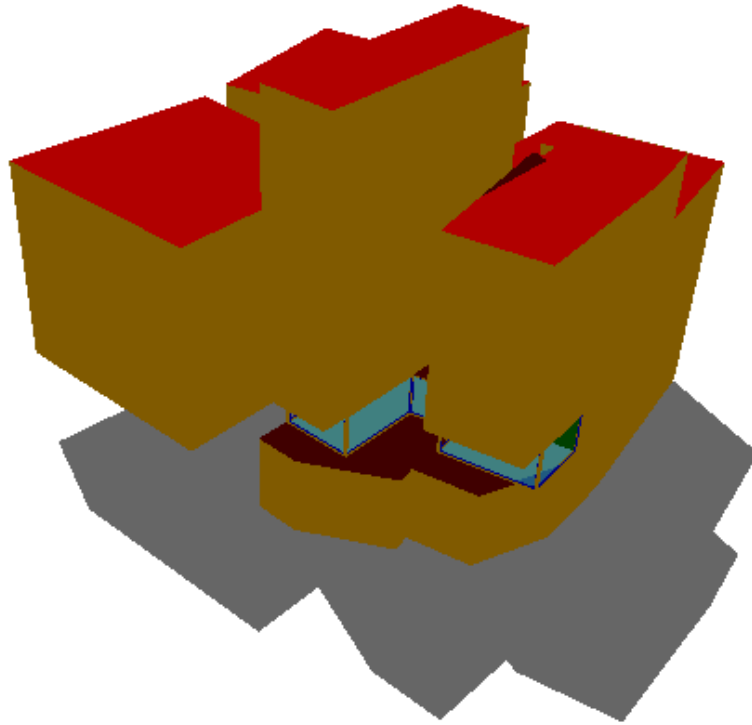
Building Element	U-value (W/m ² K)
External Wall	0.20
Roof	0.12
Floor	0.13

Glazing	U-value (W/m ² K)	G-value	LT-value
Double Glazed Windows	1.10	0.46	0.66

For the Lean stage, a communal heating system provides heating and hot water via a gas boiler, with individual MVHRs providing ventilation. For the Clean stage, heating and hot water is via communal CHP system and condensing boiler. For Green stage PVs have been added. The lighting has been assumed to have a luminous efficacy of roughly 90W/lm.

7.2. **Non-Residential Model**

A dynamic thermal model of the commercial portion of the development has been created using TAS thermal modelling software. The model takes into account things such as weather data, orientation of the building and overshadowing effects from surrounding architecture. Interfaces to residential portion have been modelled as adiabatic, meaning no heat transfer occurs.



The following fabric U-values have been assigned based on information from the Architect.

Building Element	U-value (W/m ² K)
External Wall	0.20
Roof	0.12
Floor	0.13

Glazing	U-value (W/m ² K)	G-value	LT-value
Double Glazed Windows	1.10	0.46	0.66

For the Lean stage, heating is provided via a VRF system supplied a gas boiler with hot water supplied via direct electric heaters. The VRF system can provide cooling in summer months. For the Green stage, heating and hot water is via an electric air source heat pump (ASHP) system. The lighting has been assumed to have a luminous efficacy of roughly 95W/lm.

It is worth noting that the commercial unit is designed as a shell & core and it will be up to future tenants how the space will be serviced. Suitable systems have been assumed for modelling purposes in order to estimate energy consumption and carbon emissions.

7.3. Unregulated Energy

The unregulated energy uses have been estimated by the methods and average values described in CIBSE Guide F and TM54: Evaluating operational energy performance of buildings at the design stage. The table below shows the electrical equipment that is used in the residential development. The number of items of equipment has been estimated based on the number of occupants per flat as shown in the Architect's area schedules.

The power consumption of the equipment has been taken from the CIBSE Guide F 2012, paragraph 12.2. The installed capacity (nameplate rating) does not give an accurate estimate of energy use, so the 'average power consumption' as well as 'sleep mode' consumption have been used for the calculation.

The usage hours of the electrical equipment depend on the operating hours. The number of hours per day takes into account the intermittent usage and the variation of the operation from hour to hour and day to day. Instead of use a diversity factor multiplied by the power consumption, is going to be used an estimated number of hours. Overnight and weekend energy use can contribute significantly to small power energy and has been included. The equation below explains the calculation of the energy consumption.

Annual energy consumption (kWh) =

Number of equipment × {[average power consumption during operation × annual hours of operation] + [sleep mode consumption × (8760 - hours of operation)]}

EQUIPMENT	QUANTITY INSTALLED	AVERAGE POWER DEMAND	SLEEP- MODE POWER DEMAND	HOURS OF OPERATION/DAY	TOTAL HOURS/YEAR	ENERGY CONSUMPTION
		(W)	(W)	hours/day	hours/year	(kWh)
laptops	44	40	4	5	1300	2,317.84
screens	22	60	10	3	780	1,109.40
multifunction devices	22	135	60	2	728	2,644.08
miscellaneous	22	15		8	2912	960.96
microwave	22	800		0.5	182	3,203.20
fridge	22	130	20	24	8760	25,053.60
cooking equipment	22	850		2	730	13,651.00
					TOT (kWh)	48,940.08
					SAP10 CO2 emissions	11.40
					SAP2012 CO2	25.40

The unregulated loads for the commercial unit have been extracted from the BRUKL report equating to 2.57 tonnes of CO₂ per annum.

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	0.44	0.94
Cooling	10.82	9.14
Auxiliary	6.59	5.34
Lighting	21.51	28.7
Hot water	0.84	0.98
Equipment*	11.55	11.55
TOTAL**	40.21	45.11

* 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.

7.4. Results

Domestic

Results show that the proposed design leads to a 32% improvement in energy consumption and associated carbon emissions to Part L. While the top floor flats do not meet Part L requirements at Lean stage, the residential portion meets requirements overall.

Full SAP calculations can be found in the Appendix.

Dwelling Type	Target Emission Rate (kgCO ₂ /m ²)	Lean Dwelling Emission Rate (kgCO ₂ /m ²)	Clean Dwelling Emission Rate (kgCO ₂ /m ²)	Green Dwelling Emission Rate (kgCO ₂ /m ²)
Basement Flat	14.87	13.92	13.84	12.28
Mid-Floor Flat	17.25	16.20	12.79	11.89
Top Floor Flat	17.25	19.56	17.31	15.98

	Regulated domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.3	1%
Be clean: savings from heat network	7.6	25%
Be green: savings from renewable energy	1.8	6%
Cumulative on site savings	9.7	32%
Annual savings from off-set payment	20.5	-
	(Tonnes CO₂)	
Cumulative savings for off-set payment	615	-
Cash in-lieu contribution (£)	58,415	

Non-Domestic

The proposed passive and active design measures along with renewable technologies for the commercial portion results in an overall improvement over Part L of 10%. Little improvement is observed at Green stage via the ASHP system. This can be explained by the fact that a retail unit will be cooling dominated rather than heating and no PVs are supplying the space.

Full BRUKL reports can be found in the Appendix.

Lean

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.85	2.8
Cooling	9.03	9.14
Auxiliary	6.59	5.34
Lighting	22.05	28.7
Hot water	0.84	0.98
Equipment*	11.55	11.55
TOTAL **	40.36	46.97

* 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 & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	129.53	133.45
Primary energy* [kWh/m ²]	120.5	133.76
Total emissions [kg/m ²]	20.4	22.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

Green

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	0.44	0.94
Cooling	10.82	9.14
Auxiliary	6.59	5.34
Lighting	21.51	28.7
Hot water	0.84	0.98
Equipment*	11.55	11.55
TOTAL**	40.21	45.11

* 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 & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	152.6	133.45
Primary energy* [kWh/m ²]	123.43	133.17
Total emissions [kg/m ²]	20.9	22.6

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	1.0	10%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Total Cumulative Savings	1.0	10%
Annual savings from off-set payment	9.1	-
	(Tonnes CO₂)	
Cumulative savings for off-set payment	273	-
Cash in-lieu contribution (£)	25,918	

Sitewide

The proposed passive and active design measures along with renewable technologies results in an overall improvement over Part L of 26%. This is an improvement over previously reported at the 2018 RIBA Stage 4 design improvement over Part L of 24%.

	Total regulated emissions (Tonnes CO2 / year)	CO2 savings (Tonnes CO2 / year)	Percentage savings (%)
Part L 2013 baseline	40.2		
Be lean	39.0	1.2	3%
Be clean	31.4	7.6	19%
Be green	29.6	1.8	5%
Total Savings	-	10.6	26%
	-	CO2 savings off-set (Tonnes CO2)	-
Off-set	-	887.7	-

8. SUSTAINABILITY

The Sustainable Design and Construction SPD provides additional information to support the implementation of the Mayor's London Plan. The SPD does not set new policies, however it can be taken into account as a further material consideration. It is applicable to all development types, with specific information on different building types where applicable.

This section addresses issues which are relevant to the proposed development.

8.1. Reducing the Effects of and Adapting to Climate Change

This section respond to the Camden Core Strategy policy I3 and Camden Development Policies DP22 and DP23.

8.2. Minimising the Need to Travel by Car

The proposed development is located in a highly sustainable location and will not have a detrimental impact on the local public transport network and will have no impact on the local highway network. A full detail of the transport assessment can be found in the Transport Statement included in the planning application.

The proposed development will not include car parking spaces. An internal bike store will be located at the lower ground of the development. Additionally the proposed development is adequately located, according to the TfL Planning Information Database, the site has a PTAI (Public Transport Accessibility Index) of 35.2, which translates into a PTAL (Public Transport Accessibility Levels) of 6a.

The design team has also provided a Residential and Commercial Travel Plans to ensure that the need to travel by car is minimised.

8.3. Re-use Land and Buildings

The site is currently occupied by a former public house, the building will be demolished. 100% of the proposed development will be constructed on previously developed land. The proposed development has been design to ensure that the scheme will benefit from internal daylight, Windows have been positioned to allow sufficient daylight to enter the rooms. Please refer to the daylighting report. Solar gains will be utilised on facades and shading strategies will be incorporated into the building design if overheating is an issue.

8.4. Minimising Carbon Emissions

An energy assessment has been carried out for this development. Further details are provided in the Energy Statement. The energy efficiency measures include:

Enhancements of the building fabric will be used in order to exceed Building Regulation Part L1/2A.

The proposed development will be designed to high performance with good air tightness. The air tightness level will be achieved by ensuring that sensitive areas are accounted for in the design and construction phases to make certain that a tightly sealed building is constructed and all punctures through the seal are air- tight. The Design Team must ensure that all opening both major and minor, such as services, be accounted for and assessed to reduce air leakage.

All lighting will be dedicated low energy fittings. Lighting systems to a number of spaces may include LED technology where viable and subject to the performance of each product being able to deliver to the performance requirements of the space served.

To reduce carbon emissions and atmospheric pollution by encouraging local energy generation from renewable sources to supply a significant proportion of the energy demand.

A feasibility study has been carried out in the energy statement to establish the most appropriate local low or zero carbon energy source for the development. In line with the site strategy this will be a connection to an energy centre (including a combine heat and power unit for the residential units) and the installation of an air source heat pump system for the commercial unit.

All major mechanical and electrical plant will be kept in dedicated plant rooms/spaces with easy access for maintenance.

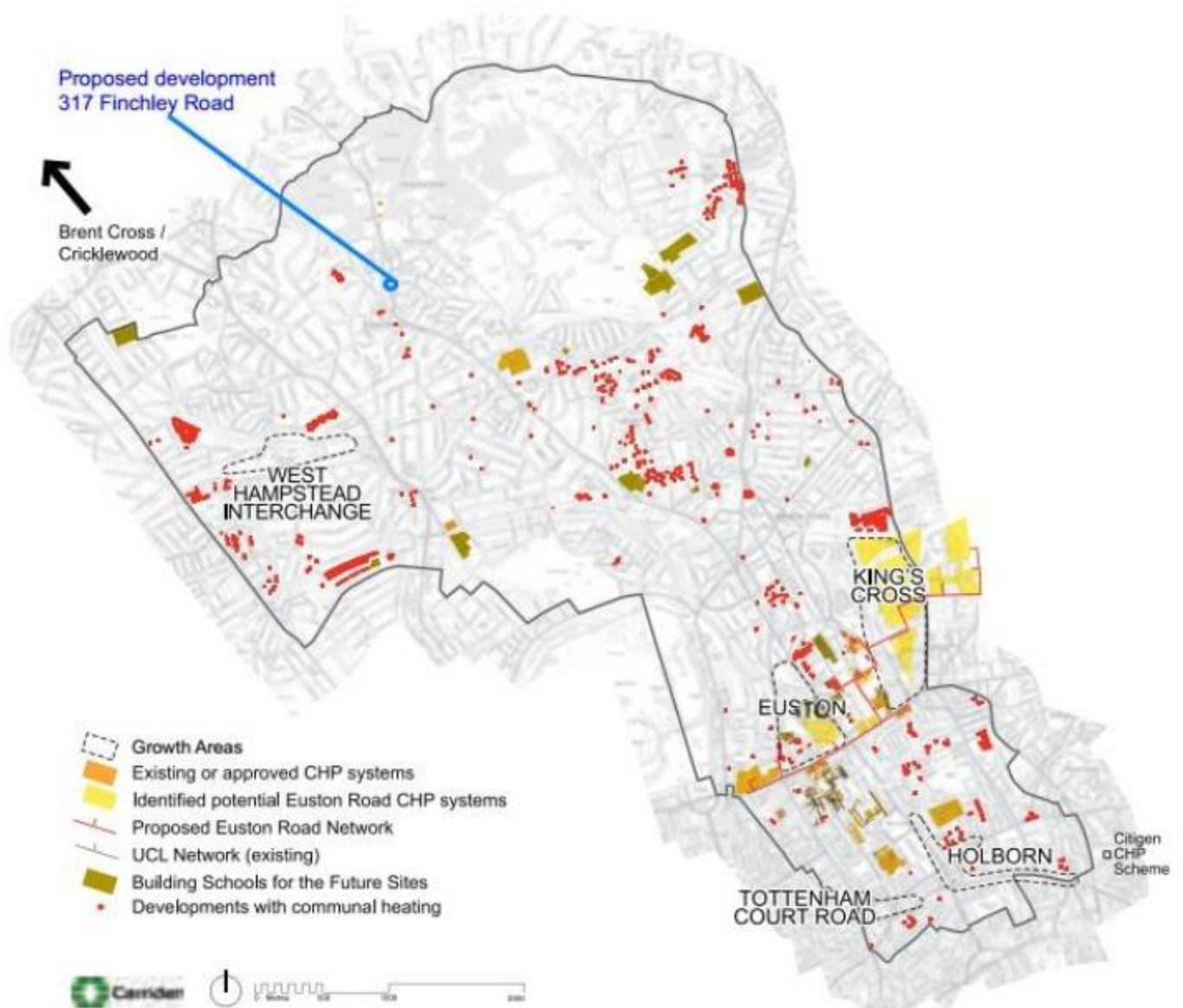
The proposed development will be design to ensure that all timber specified will be sourced responsibly such as FSC or similar. All insulation materials will have a Global Warming Potential of less than five. The use of new aggregates will be minimised on-site, on-site demolition waste will be used as aggregate where possible.

The proposed building has been designed to ensure that the effect of climate change are mitigated, this includes the use of Green roof and landscape area, to mitigate the heat island effect. The materials of the building will be defined to ensure that the thermal mass will mitigate any overheating risk due to variation of temperatures as a result of climate change.

8.5. Local Energy Generation

The Combined heat and power Network Map from the Camden Core Strategy Section 3 – Tackling Climate Change and improving and protecting Camden's environment and quality of life did not identify the proposed development as located in a zone of opportunity to connect to an existing or proposed district heating network. Therefore to follow the London plan energy hierarchy the proposed development has been designed to include an energy centre with a combined heat and power unit.

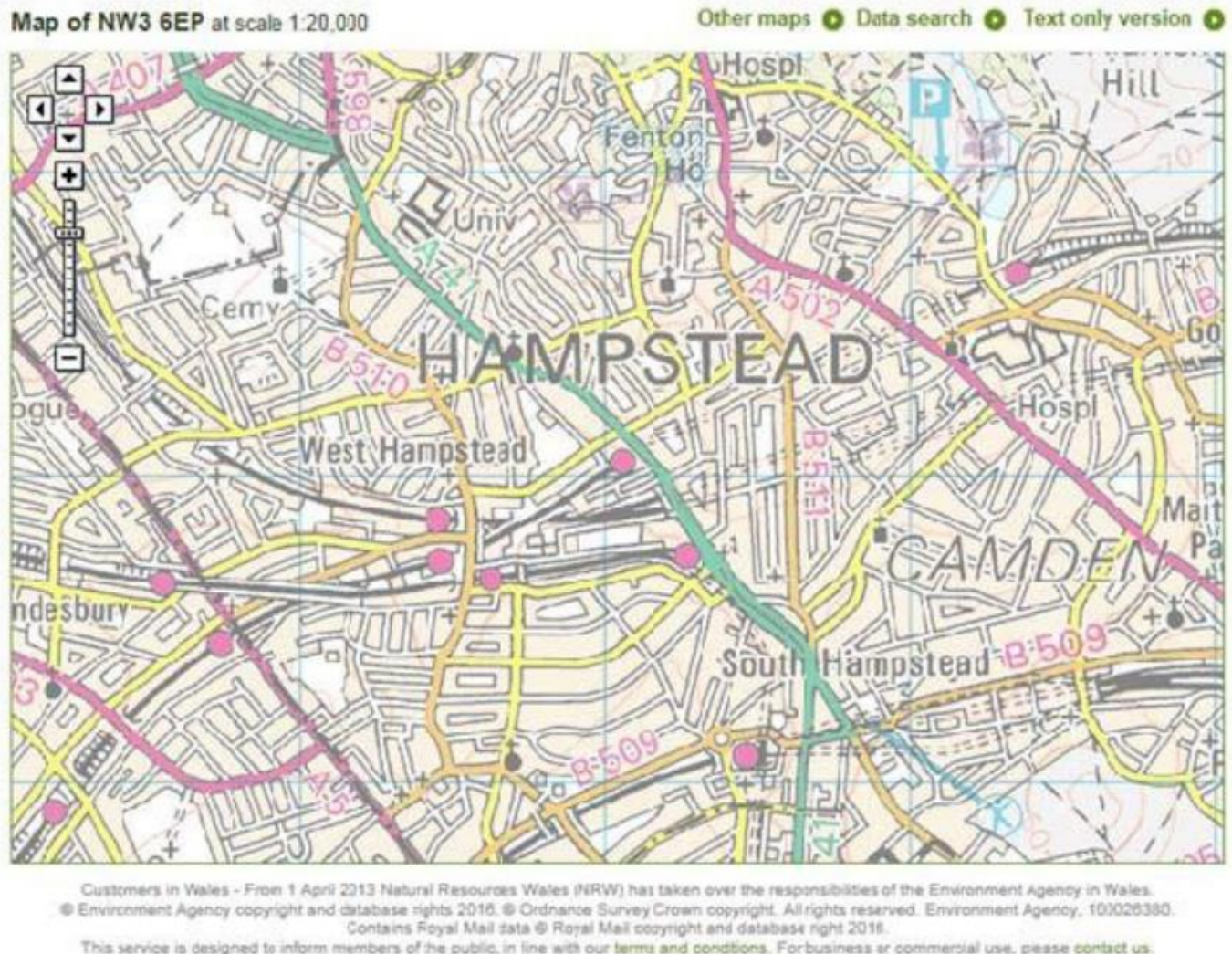
Map 4: Combined Heat and Power Network



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8.6. Water and Surface Water Flooding

The proposed development has been identified by the Environmental Agency within a Zone of low flood risk (Zone I).



Sufficient drainage will be incorporated to ensure water does not collect during wet weather. Sustainable Drainage Systems (Suds) will be incorporated where possible. The proposed development will reduce surface water run-off due to the integration of green spaces and green roofs. The green roof will be design to reduce the heat island effect and to act as roof garden. The details of the planting on the green roof is detailed in the landscape proposal.

8.7. External Water Consumption

The proposed development will mitigate the volume of water used for landscaping by the use of selected species that require minimum watering as per the landscape design. There will be a net increase in green space on the site due to the inclusion of semi-private and private gardens, as well as green roofs. Where new trees will be provided these will be selected as part of the Hard and Soft.

Landscaping please refer to Landscape Plans submitted under separate cover by the Landscape Architects.

8.8. Surface Water Run-Off

The proposed development will mitigate the volume of surface water run-off. Sufficient drainage will be incorporated to ensure water does not collect during wet weather. The proposed development will reduce surface water run-off due to the integration of green spaces and green roofs. All at grade surfaces will be considered permeable.

8.9. Internal Water Usage

The proposed development will be designed to meet the requirements of Building Regulation Part G 2015. The following flow rate and capacity for the sanitaryware will be used as a guidance.

- 6/3litre dual flush WCs.
- Taps with a flow rate of no more than 4litres per minute.
- Baths with an average capacity of no more than 140litres to overflow.
- Showers with a flow rate of no more than 9litres per minute.
- Washing machines will have a consumption figure of no more than 17.16 litres per kilogram of dry load.
- Dishwashers will have a consumption figure of no more than 4.5 litres per place setting.
- Waste disposal units will not be supplied.
- Water softeners will not be supplied.

The above will result in a calculated daily consumption of less than 110litres per person, per day.

Additionally all water systems in the building will be designed in compliance with the measures outlined in the Health and Safety Executive's 'Legionnaires Disease, The Control of Legionella Bacteria in Water Systems'. Approved Code of Practice and Guidance, 200054 and, where relevant, other Industry/Best Practice Guidance.

8.10. Construction Waste Management

To promote resource efficiency via the effective management and reduction of construction waste. The proposed development will implement a Site Waste Management Plan.

Demolition waste will be minimised, reused and recycled, where practicable. The specification will include a Site Waste Management Plan (SWMP).

The proposed development will include a compliant Site Waste Management Plan (SWMP) that contains:

- a) Target benchmarks for resource efficiency, i.e. m³ of waste per 100m² or tonnes of waste per 100m² set in accordance with best practice.
- b) Procedures and commitments to minimize non-hazardous construction waste at Design Stage. Specify waste minimisation actions relating to at least three waste groups and support them by appropriate monitoring of waste.
- c) Procedures for minimising hazardous waste
- d) Monitoring, measuring and reporting of hazardous and non-hazardous site waste production according to the defined waste groups (according to the waste streams generated by the scope of the works).

8.11. Diverting Waste from Landfill

The proposed development will include a compliant Site Waste Management Plan (SWMP) including procedures and commitments to sort and divert waste from landfill for at least 10% of the total value of the material used, through either:

- a) Re-use on-site (in situ or for new applications).
- b) Re-use on other sites.
- c) Salvage/reclaim for re-use.
- d) Return to the supplier via a 'take-back' scheme.
- e) Recovery and recycling using an approved Waste Management Contractor.
- f) Compost according to the defined waste groups (in line with the waste streams generated by the scope of the works).

The proposed development will ensure that at least 85% by weight or by volume of non-hazardous construction waste generated by the project has been diverted from landfill.

8.12. Operational Waste

To recognise and encourage the provision of dedicated storage facilities for a building's operational-related recyclable waste streams, so that this waste is diverted from landfill or incineration.

There is to be dedicated space for the segregation and storage of operational recyclable waste.

Individual recycling facilities will be provided to each dwelling.

A waste and recycling scheme will be established in line with the requirements set out by the Local Authorities.

8.13. Air Quality

Potential construction phase air quality impacts have been assessed as a result of fugitive dust emissions from demolition, earthworks, construction and track out activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Potential impacts during the operational phase of the development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken to determine the potential for trips generated by the development to affect local air quality. This indicated that impacts were not anticipated to be significant.

Dispersion modelling was undertaken in order to quantify pollutant concentrations at the site and assess the potential for future site users to be exposed to poor air quality. The results indicated high pollutant concentrations at the ground, first and second floor of the development. In order to reduce future exposure of residents to poor air quality, suitable mitigation for inclusion within the development was identified. This included a mechanical ventilation system to supply clean air to specified areas. Mitigation measures are detailed in the air quality report.

9. CONCLUSION

In line with the Local and London Plan, Planning Policy and conditions, and previously submitted energy and sustainability statement, this updated report outlines the Environmental Design Strategy for both portions of the development and demonstrates the energy efficiency and renewable energy measures applied and changes to fabric properties are able to achieve the required onsite carbon reductions in line with the RIBA Stage 4 report, issued in 2018. It is worth mentioning that the development submitted for planning in 2016 and therefore does not need to comply with most recent planning policy.

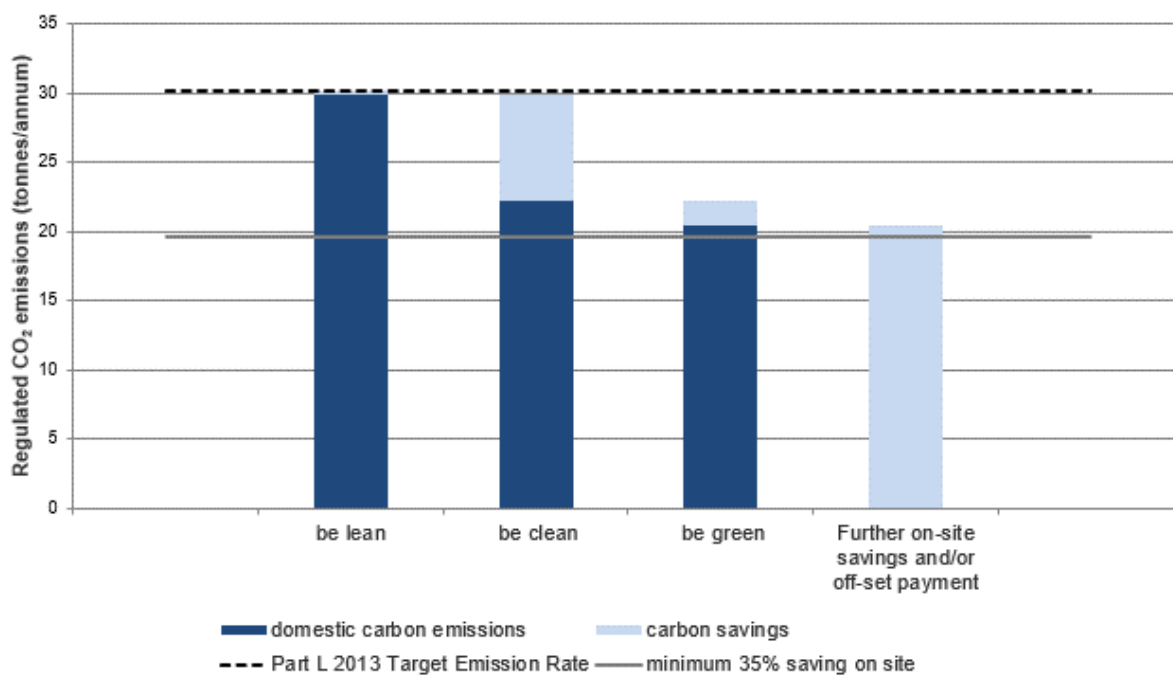
The proposed development achieves a 26% improvement over Part L. Although not meeting the target of 35% improvement, this is better than the reported 24% at the 2018 RIBA Stage 4. A sitewide improvement of 3% at Lean stage, in line with Part L where proposed design performs better than notional. The achieved performance result in an annual carbon saving of 10.6 tonnes CO₂. To achieve zero carbon, a cash in lieu payment would be required. It is assumed that any carbon offset payments as part of planning permission have already been made. This should be confirmed with the relevant authorities.

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2013 baseline	40.2		
Be lean	39.0	1.2	3%
Be clean	31.4	7.6	19%
Be green	29.6	1.8	5%
Total Savings	-	10.6	26%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	887.7	-

Domestic

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	30.2	25.4
After energy demand reduction (be lean)	29.9	25.4
After heat network connection (be clean)	22.3	25.4
After renewable energy (be green)	20.5	25.4

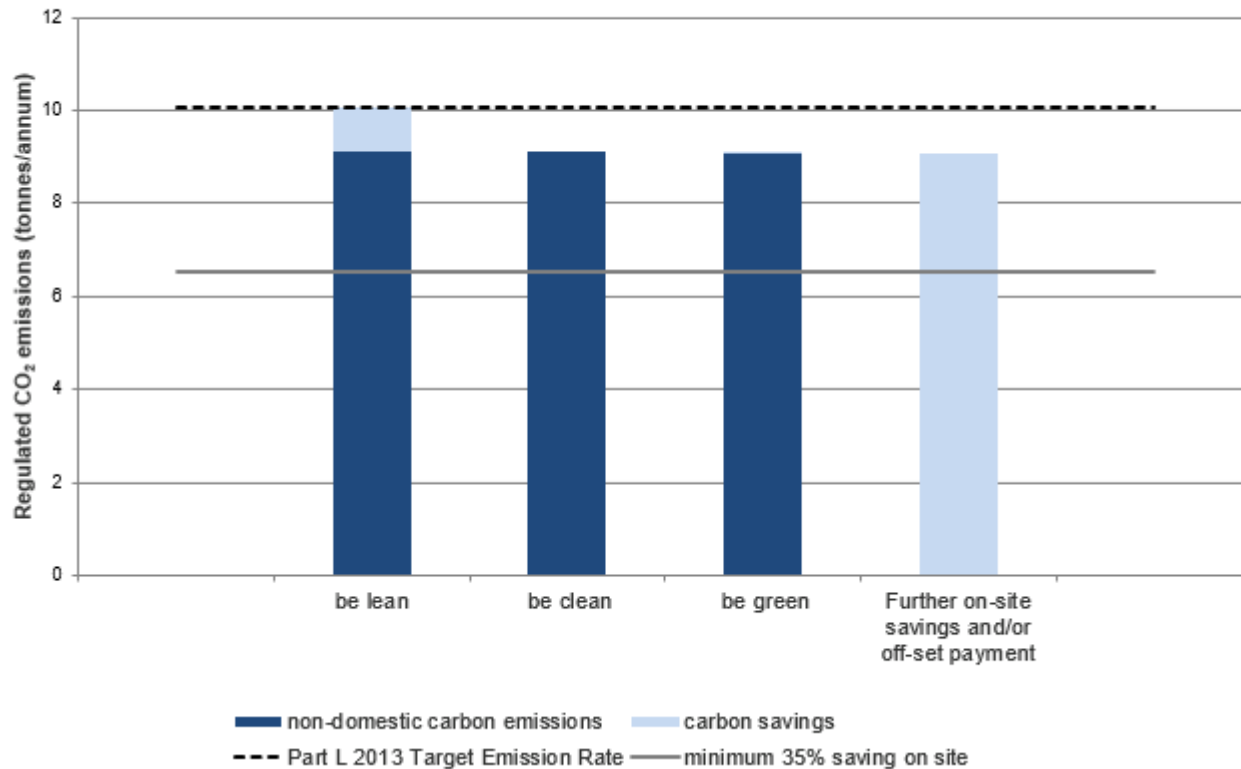
Domestic SAP 2012 Carbon Emissions



Non-Domestic

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	10.1	2.6
After energy demand reduction (be lean)	9.1	2.6
After heat network connection (be clean)	9.1	2.6
After renewable energy (be green)	9.1	2.6

Non-domestic SAP 2012 Carbon Emissions



APPENDIX A – SAP CALCULATIONS



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
 Region: Thames
 Postcode: NW3 6EP
 UPRN: 0000000000
 RRN: (not assigned)
 Date of assessment: 16 June 2022
 Tenure: Owner-occupied
 Date of certificate: 15 August 2022
 Assessment type: New dwelling as designed
 Transaction type: New dwelling
 Year completed: 2018
 Related Party Disclosure: No related party
 PCDF revision number: 503

Property description

Dwelling type: Flat
 Detachment: Semi-detached
 Number of dwellings above: 5
 Number of dwellings below: 0

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	55.32	2.50	138.30	Yes
2	30.55	2.50	76.38	-

Living area: 100.00 %
 Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	West	9.44	1.00

Overshading: More than average

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value
1	basementfloor	55.32	-	55.32	0.13	30
1 from below	basementfloor	55.32	-	55.32	-	30

ceiling	partyceiling	30.55	-	30.55	-	30
party	party wall	119.03	-	119.03	-	30
ext wall	wall	60.06	9.44	50.62	0.20	30

Thermal bridges:

User-defined (individual ϕ -values)

Junction	Length	ϕ -value	Source of data
Exposed floor (normal)	8.00	0.320	default detail

Thermal mass

Calculated from κ values (see exposed elements table)

Ventilation

Pressure test:	Yes (design value)
Ventilation:	Balanced with heat recovery (MVHR) (Appendix Q datasheet)
Brand/Model:	Nuaire
Approved installation scheme?	Yes
Duct type:	Rigid
SEF:	0.59
Wet rooms:	Kitchen + 3
Duct insulation:	Not insulated
Efficiency (%):	89
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	0
Number of passive stacks:	0
Number of sides sheltered:	4
q50:	3.00

Main heating system

Boiler system with radiators or underfloor	
Fraction of primary space heating provided: 1	
Main fuel:	Mains gas
Manufacturer's data	
Manufacturer's description:	1
Open flue fanned flue	
Manufacturer's efficiency:	89.5% (SEDBUK 2009) modulating burner control
Open flue fanned flue	
Radiators	
Central heating pump in heated space	
Central heating pump installed 2013 or later	
Design temperature: >45°C	

Main heating controls

Time and temperature zone control by suitable arrangement of plumbing and electrical services
Delayed start thermostat
Boiler interlock

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system
Cylinder volume: 150l
Manufacturer's loss factor: 1.394kWh/day
Cylinder in heated space
Water separately timed
Primary pipework: Fully insulated

Solar panel:	No

Other information

Yes
Conservatory:

Electricity tariff:
No conservatory

Water use <= 125 litres/person/day
Standard tariff

Photovoltaics:

None

Terrain type:
Wind turbine?

Dense urban
No

Special feature (App. Q)
Total fixed lighting outlets:
Low energy fixed lighting outlets:

No
35
35 (= 100% of total outlets)

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2
Regulations: Approved Document L1A, 2013 Edition, England
SAP 2012 = B 85 | EI 2012 = B 89 | DFEE = 28.31 | TFEE = 34.57 | DER = 13.92 | TER = 14.87
Heat demand kWh: space 397 water space 2375
Weather data for: postcode NW3
PCDF revision number: 503 (31 July 2022)
External Definitions revision number: 5.0 (11 June 2014)
Applicable recommendations: None

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

LEAN_Finchley Basement Reduced Window Areas

Dwelling type: Semi-detached Flat Ground-floor
Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation not possible.
Region: Thames
Front of dwelling faces: Unknown or unspecified
Overshading: More than average
Overhangs: see below
Thermal mass parameter: 108.6 (calculated from construction elements)
Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
Ventilation rate during hot weather: 4 (Windows fully open)

Summer ventilation heat loss coefficient: 283.37 (P1)
Transmission heat loss coefficient: 27.34 (37)
Summer heat loss coefficient: 310.71 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
West	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
West	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	341	321	283	(P3)
Internal gains:	500	482	490	
Total summer gains:	842	803	773	(P5)
Solar gain/loss ratio:	2.71	2.59	2.49	(P6)
Threshold temperature:	19.95	21.73	21.53	
Likelihood of high internal temperature	Not significant	Slight	Slight	(P7)

Assessment of likelihood of high internal temperature: Slight



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Ground-floor flat , total floor area 86m²

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

1 TER and DER

Fuel for main heating: Mains gas

Fuel factor: 1.000 (mains gas)

Target Carbon Dioxide Emission Rate (TER): 14.87kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 13.92kg/m²

Result: OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 34.6kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 28.3kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.20 (max 0.30)	0.20 (max 0.70)	OK
Party wall	0.00 (max 0.20)	0.00 (no max)	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.10 (max 2.00)	1.10 (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: 10.00

OK

4 Heating efficiency

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

Efficiency: 89.5% (SEDBUK 2009)
Minimum: 88%
OK

Secondary heating
No secondary system specified

5 Cylinder insulation

Hot water storage:
Manufacturer's declared loss factor: 1.39kWh/day
Permitted by DBSCG: 1.89kWh/day - OK

Primary pipework insulated: Yes - OK

Solar hot water cylinder: No solar water heating

6 Controls

Space heating controls : Time and temperature zone control by suitable arrangement of plumbing and electrical services OK

Hot water controls:
Cylinderstat: No
Water separately timed: Yes

Boiler interlock: Yes

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.59 W/(l/s)
Maximum: 1.5 W/(l/s)
Efficiency: 89% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Slight - OK
Based on:
Overshading: More than average
Air change rate: 4
Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

Opening U-value: 1.10W/m²K
Party wall U-value: 0.00W/m²K
Thermal bridging γ -value is 0.001W/m²K
Design air permeability is 3.00m³/h.m²

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SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.13	0.13	0.13	0.12	0.11	0.10	0.10	0.10	0.11	0.11	0.12	0.12	(22b)
Effective ach	0.32	0.32	0.32	0.30	0.30	0.29	0.29	0.29	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-		-		9.44	1.05		9.95	-		-		
1	55.32		0.00		55.32	0.13		7.1916	30		1659.6	(26-33)	
ext wall	60.06		9.44		50.62	0.20		10.124	30		1518.6	(26-33)	
party	119.03		0.00		119.03	-		-	30		3570.9	(26-33)	
ceiling	30.55		0.00		30.55	-		-	30		916.5	(26-33)	
TMP											108.60	(35)	
Thermal bridges								0.08				(36)	
Total fabric heat loss										27.34		(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	50.18	49.99	49.81	48.88	48.69	47.76	47.76	47.58	48.13	48.69	49.06	49.44	(39)
HLP	0.58	0.58	0.58	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.57	0.58	(40)
HLP (average)												0.57	(40)

4. Water heating energy requirements

Assumed occupancy:												2.56	(42)
Average daily water use (litres/day)												95.12	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	104.63	100.82	97.02	93.21	89.41	85.60	85.60	89.41	93.21	97.02	100.82	104.63	(44)
Energy content	155.16	135.70	140.03	122.08	117.14	101.09	93.67	107.49	108.77	126.76	138.37	150.26	(45)
Distribution loss	23.27	20.36	21.01	18.31	17.57	15.16	14.05	16.12	16.32	19.01	20.76	22.54	(46)
Store volume	150.00												(50)
Store loss factor (kWh/litre/day)													(51)
Volume factor													(52)
Temperature factor	0.70												(53)
Energy lost from store in kWh/day	0.98												(55)
Storage loss	30.34	27.40	30.34	29.36	30.34	29.36	30.34	30.34	29.36	30.34	29.36	30.34	(57)
Storage loss (solar store)	30.34	27.40	30.34	29.36	30.34	29.36	30.34	30.34	29.36	30.34	29.36	30.34	(58)
Primary loss	54.86	49.55	54.86	53.09	54.86	22.51	23.26	23.26	22.51	54.86	53.09	54.86	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(64)
Total water output												2,375.29	(64)
Heat gains (kWh)	119.75	106.68	114.72	106.55	107.11	75.11	74.02	78.62	77.66	110.30	111.97	118.12	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	(66)
Lighting	22.07	19.61	15.94	12.07	9.02	7.62	8.23	10.70	14.36	18.23	21.28	22.69	(67)
Appliances	231.27	233.67	227.62	214.75	198.50	183.22	173.02	170.62	176.66	189.54	205.79	221.06	(68)
Cooking	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	(71)
Water heating	160.95	158.75	154.19	147.99	143.96	104.31	99.50	105.67	107.86	148.26	155.51	158.76	(72)
Total internal	478.77	476.50	462.23	439.28	415.95	359.63	345.22	351.46	363.36	420.50	447.05	466.98	(73)
Solar gains	53.19	104.06	171.37	249.93	306.30	313.55	298.51	256.42	199.31	123.47	66.33	43.74	(83)
Total gains	531.96	580.56	633.60	689.21	722.25	673.18	643.73	607.88	562.67	543.97	513.37	510.73	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.95	0.92	0.87	0.75	0.60	0.45	0.33	0.36	0.57	0.79	0.91	0.95	(86)
Util elsewhere	0.94	0.91	0.85	0.73	0.57	0.41	0.29	0.32	0.53	0.77	0.90	0.95	(89)
Living area fraction												1.00	(91)
Util overall	0.94	0.91	0.85	0.74	0.59	0.44	0.31	0.35	0.55	0.77	0.90	0.94	(94)
Space heating kWh	217.05	159.11	114.46	47.77	14.78	0.00	0.00	0.00	0.00	51.10	134.59	223.12	(98)
Total space heating requirement kWh												961.96	(98)
Space heating requirement per m ²												11.20	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												90.5	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	217.05	159.11	114.46	47.77	14.78	0.00	0.00	0.00	0.00	51.10	134.59	223.12	(98)

Space heating (main system 1)	239.83	175.81	126.47	52.78	16.33	0.00	0.00	0.00	0.00	56.46	148.71	246.54	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(64)
Efficiency of water heater (%)	84.54	84.05	83.11	81.63	80.45	79.80	79.80	79.80	79.80	81.68	83.54	84.67	(217)
Water heating fuel	284.30	253.00	271.00	250.57	251.51	191.67	184.55	201.86	201.31	259.51	264.32	278.09	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	1,062.94	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,891.68	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	193.15	(231)
Electricity for lighting	389.82	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	4,612.59	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	1,062.94	0.216	229.59	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	2,891.68	0.216	624.60	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	193.15	0.519	100.246926	(267)
Energy for lighting	389.82	0.519	202.32	(268)
Photovoltaics	0.00	0.529	0.00	
Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00		0.00	(269)
Total kg/year			1,195.69	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			13.92	(273)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
q50	5		
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.41	0.41	0.36	0.36	0.31	0.31	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)		A*U (W/K)		κ (kJ/m ² K)		A*κ (kJ/K)		
Door	-		-	0.00				0.00		-		-		(26)
Windows	-		-	9.44		1.33		12.52		-		-		(27)
Ground floor	-		-	0.00		0.13		0.00		-		-		(28a)
Walls	60.06		9.44	50.62		0.18		9.11		-		-		(29a)
Roof	-		-	0.00		0.13		0.00		-		-		(30)
Total area of external elements				60.06										(31)
Fabric heat loss								21.63						(33)
TMP												250.00		(35)
Thermal bridges						2.56								(36)
Total fabric heat loss								24.19						(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Ventilation heat loss	41.74	41.50	41.26	40.13	39.91	38.93	38.93	38.75	39.31	39.91	40.34	40.79	(38)	
Heat transfer	65.93	65.68	65.44	64.31	64.10	63.12	63.12	62.93	63.50	64.10	64.53	64.98	(39)	
HLP	0.77	0.76	0.76	0.75	0.75	0.74	0.74	0.73	0.74	0.75	0.75	0.76	(40)	

4. Water heating energy requirements

Assumed occupancy:												2.56	(42)
Average daily water use (litres/day)												95.12	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	104.63	100.82	97.02	93.21	89.41	85.60	85.60	89.41	93.21	97.02	100.82	104.63	(44)
Energy content	155.16	135.70	140.03	122.08	117.14	101.09	93.67	107.49	108.77	126.76	138.37	150.26	(45)
Distribution loss	23.27	20.36	21.01	18.31	17.57	15.16	14.05	16.12	16.32	19.01	20.76	22.54	(46)
Store volume												150.00	(50)
Store loss factor (kWh/litre/day)												0.02	(51)
Volume factor												0.93	(52)
Temperature factor												0.54	(53)
Energy lost from store in kWh/day												1.44	(55)
Storage loss	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	201.75	177.79	186.63	167.18	163.74	146.18	140.27	154.08	153.86	173.36	183.46	196.86	(64)
Total water output												2,443.28	(64)
Heat gains (kWh)	88.87	78.79	83.84	76.67	76.23	69.68	68.42	73.02	72.24	79.42	82.08	87.24	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	(66)
Lighting	24.40	21.67	17.62	13.34	9.97	8.42	9.10	11.82	15.87	20.15	23.52	25.07	(67)
Appliances	231.27	233.67	227.62	214.75	198.50	183.22	173.02	170.62	176.66	189.54	205.79	221.06	(68)
Cooking	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	(71)
Water heating	119.44	117.25	112.68	106.48	102.45	96.78	91.96	98.14	100.33	106.75	114.00	117.26	(72)
Total internal	439.59	437.06	422.40	399.05	375.40	352.90	338.55	345.05	357.34	380.92	407.78	427.87	(73)
Solar gains	39.74	77.73	128.02	186.70	228.81	234.23	223.00	191.55	148.89	92.24	49.55	32.68	(83)
Total gains	479.32	514.79	550.42	585.75	604.21	587.13	561.55	536.61	506.23	473.15	457.33	460.54	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												1.00	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	427.40	337.85	277.83	143.58	49.40	0.00	0.00	0.00	0.00	142.79	293.98	434.09	(98)
Total space heating requirement kWh												2,106.92	(98)
Space heating requirement per m ²												24.54	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												93.5	(206)
Efficiency of main system 2 (%)												0.0	(207)
Efficiency of secondary system (%)												100	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	427.40	337.85	277.83	143.58	49.40	0.00	0.00	0.00	0.00	142.79	293.98	434.09	(98)

Space heating (main system 1)	457.12	361.34	297.14	153.56	52.83	0.00	0.00	0.00	0.00	152.71	314.42	464.27	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	201.75	177.79	186.63	167.18	163.74	146.18	140.27	154.08	153.86	173.36	183.46	196.86	(64)
Efficiency of water heater (%)	86.77	86.50	85.87	84.41	82.05	79.80	79.80	79.80	79.80	84.30	86.07	86.87	(217)
Water heating fuel	232.52	205.53	217.33	198.05	199.56	183.18	175.77	193.09	192.81	205.64	213.17	226.62	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	2,253.39	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,443.28	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	0.00	(231)
Electricity for lighting	430.85	(232)
Total delivered energy for all uses	5,127.51	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	2,253.39	0.216	486.73	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,443.28	0.216	527.75	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	430.85	0.519	223.61	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,277.01	(272)
Emissions per m ² for space and water heating			11.81	(272a)
Emissions per m ² for lighting			2.60	(272b)
Emissions per m ² for pumps and fans			0.45	(272c)
Target Carbon Dioxide Emission Rate (TER)			14.87	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.20	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.20	0.22	0.23	0.24	(22b)
Effective ach	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.53	0.53	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	65.13	65.04	64.95	64.53	64.45	64.08	64.08	64.01	64.22	64.45	64.61	64.78	(39)
HLP	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	(40)
HLP (average)												0.75	(40)

4. Water heating energy requirements

SAP 2012 worksheet
 Calculation of Target Fabric Energy Efficiency
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	593.30	467.06	478.30	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.95	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	563.94	458.73	465.68	-	-	-	-	(102)
Gains W	-	-	-	-	-	732.24	701.06	667.47	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	121.18	180.29	150.14	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	30.29	45.07	37.53	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.14	(8)
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.41	0.41	0.36	0.36	0.31	0.31	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	9.44	1.33	12.52	-	-	(27)

SAP 2012 worksheet (Version 9.92, October 2013)
 Calculation of Heat Demand
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.12	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.10	0.11	(22b)
Effective ach	0.31	0.31	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	49.25	49.06	48.88	48.32	48.32	47.58	47.76	47.58	47.58	48.13	47.95	48.69	(39)
HLP	0.57	0.57	0.57	0.56	0.56	0.55	0.56	0.55	0.55	0.56	0.56	0.57	(40)
HLP (average)												0.56	(40)

4. Water heating energy requirements

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.13	0.13	0.13	0.12	0.11	0.10	0.10	0.10	0.11	0.11	0.12	0.12	(22b)
Effective ach	0.32	0.32	0.32	0.30	0.30	0.29	0.29	0.29	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	50.18	49.99	49.81	48.88	48.69	47.76	47.76	47.58	48.13	48.69	49.06	49.44	(39)
HLP	0.58	0.58	0.58	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.57	0.58	(40)
HLP (average)												0.57	(40)

4. Water heating energy requirements

Assumed occupancy:												2.56	(42)
Average daily water use (litres/day)												95.12	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	104.63	100.82	97.02	93.21	89.41	85.60	85.60	89.41	93.21	97.02	100.82	104.63	(44)
Energy content	155.16	135.70	140.03	122.08	117.14	101.09	93.67	107.49	108.77	126.76	138.37	150.26	(45)
Distribution loss	23.27	20.36	21.01	18.31	17.57	15.16	14.05	16.12	16.32	19.01	20.76	22.54	(46)
Store volume	150.00												(50)
Store loss factor (kWh/litre/day)													(51)
Volume factor													(52)
Temperature factor	0.70												(53)
Energy lost from store in kWh/day	0.98												(55)
Storage loss	30.34	27.40	30.34	29.36	30.34	29.36	30.34	30.34	29.36	30.34	29.36	30.34	(57)
Storage loss (solar store)	30.34	27.40	30.34	29.36	30.34	29.36	30.34	30.34	29.36	30.34	29.36	30.34	(58)
Primary loss	54.86	49.55	54.86	53.09	54.86	22.51	23.26	23.26	22.51	54.86	53.09	54.86	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(64)
Total water output												2,375.29	(64)
Heat gains (kWh)	119.75	106.68	114.72	106.55	107.11	75.11	74.02	78.62	77.66	110.30	111.97	118.12	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	(66)
Lighting	53.15	47.20	38.39	29.06	21.73	18.34	19.82	25.76	34.57	43.90	51.24	54.62	(67)
Appliances	345.18	348.76	339.74	320.52	296.27	273.47	258.24	254.65	263.68	282.89	307.15	329.94	(68)
Cooking	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	(71)
Water heating	160.95	158.75	154.19	147.99	143.96	104.31	99.50	105.67	107.86	148.26	155.51	158.76	(72)
Total internal	666.53	661.97	639.57	604.82	569.20	503.38	484.80	493.33	513.37	582.30	621.14	650.58	(73)
Solar gains	69.08	135.14	222.55	324.58	397.79	407.20	387.68	333.01	258.84	160.35	86.14	56.81	(83)
Total gains	735.61	797.11	862.12	929.40	966.99	910.58	872.48	826.34	772.20	742.65	707.28	707.39	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.87	0.82	0.74	0.60	0.46	0.33	0.24	0.26	0.42	0.64	0.80	0.88	(86)
Util elsewhere	0.85	0.81	0.72	0.58	0.44	0.31	0.21	0.23	0.39	0.61	0.79	0.87	(89)
Living area fraction												1.00	(91)
Util overall	0.85	0.81	0.73	0.59	0.45	0.33	0.23	0.26	0.42	0.63	0.79	0.86	(94)
Space heating kWh	133.61	91.16	58.13	20.06	5.29	0.00	0.00	0.00	0.00	21.76	73.58	139.10	(98)
Total space heating requirement kWh												542.69	(98)
Space heating requirement per m ²												6.32	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												90.5	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	133.61	91.16	58.13	20.06	5.29	0.00	0.00	0.00	0.00	21.76	73.58	139.10	(98)

Space heating (main system 1)	147.63	100.72	64.23	22.17	5.85	0.00	0.00	0.00	0.00	24.04	81.31	153.70	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(64)
Efficiency of water heater (%)	83.32	82.74	81.78	80.65	80.04	79.80	79.80	79.80	79.80	80.69	82.23	83.46	(217)
Water heating fuel	288.47	257.03	275.39	253.60	252.79	191.67	184.55	201.86	201.31	262.69	268.54	282.10	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	599.66	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,920.00	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	193.15	(231)
Electricity for lighting	375.42	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	4,163.23	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	£ / kWh	£ / year	
Space heating - main system 1	599.66	3.48	20.87	(240)
Space heating - main system 2	0.00	-	0.00	(241)
Space heating - secondary system	0.00	-	0.00	(242)
Water heating	2,920.00	3.48	101.62	(247)
Space cooling	0.00	-	0.00	(248)
Pumps and fans	75.00	13.19	9.89	(249)
Mechanical ventilation	193.15	13.19	25.48	(249)
Energy for lighting	375.42	13.19	49.52	(250)
Additional standing charges			120	(251)
Photovoltaics	0.00	-	0.00	(252)
Micro wind turbines	0.00	-	0.00	(252)
Hydroelectric energy	0.00	-	0.00	(252)
mCHP	0.00	-	0.00	(252)
Total energy cost			327.37	(255)

11a. SAP Rating

Energy cost deflator	0.42	(256)
Energy cost factor (ECF)	1.05	(257)
SAP value	85.34	
SAP rating	85	(258)
SAP band	B	

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	599.66	0.216	129.53	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	2,920.00	0.216	630.72	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	193.15	0.519	100.246926	(267)

Energy for lighting	375.42	0.519	194.84	(268)
Photovoltaics	0.00	0.529	0.00	
Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00	0.529	0.00	(269)
Total kg/year			1,094.26	(272)
CO2 emissions per m²			12.74	(273)
EI value			88.80	(274)
EI rating			89	(274)
EI band			B	

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of EPC Costs, Emissions and Primary Energy
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley Basement Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.12	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.10	0.11	(22b)
Effective ach	0.31	0.31	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	49.25	49.06	48.88	48.32	48.32	47.58	47.76	47.58	47.58	48.13	47.95	48.69	(39)
HLP	0.57	0.57	0.57	0.56	0.56	0.55	0.56	0.55	0.55	0.56	0.56	0.57	(40)
HLP (average)												0.56	(40)

4. Water heating energy requirements

Assumed occupancy:												2.56	(42)
Average daily water use (litres/day)												95.12	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	104.63	100.82	97.02	93.21	89.41	85.60	85.60	89.41	93.21	97.02	100.82	104.63	(44)
Energy content	155.16	135.70	140.03	122.08	117.14	101.09	93.67	107.49	108.77	126.76	138.37	150.26	(45)
Distribution loss	23.27	20.36	21.01	18.31	17.57	15.16	14.05	16.12	16.32	19.01	20.76	22.54	(46)
Store volume	150.00												(50)
Store loss factor (kWh/litre/day)													(51)
Volume factor													(52)
Temperature factor	0.70												(53)
Energy lost from store in kWh/day	0.98												(55)
Storage loss	30.34	27.40	30.34	29.36	30.34	29.36	30.34	30.34	29.36	30.34	29.36	30.34	(57)
Storage loss (solar store)	30.34	27.40	30.34	29.36	30.34	29.36	30.34	30.34	29.36	30.34	29.36	30.34	(58)
Primary loss	54.86	49.55	54.86	53.09	54.86	22.51	23.26	23.26	22.51	54.86	53.09	54.86	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(64)
Total water output												2,375.29	(64)
Heat gains (kWh)	119.75	106.68	114.72	106.55	107.11	75.11	74.02	78.62	77.66	110.30	111.97	118.12	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	(66)
Lighting	53.15	47.20	38.39	29.06	21.73	18.34	19.82	25.76	34.57	43.90	51.24	54.62	(67)
Appliances	345.18	348.76	339.74	320.52	296.27	273.47	258.24	254.65	263.68	282.89	307.15	329.94	(68)
Cooking	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	(71)
Water heating	160.95	158.75	154.19	147.99	143.96	104.31	99.50	105.67	107.86	148.26	155.51	158.76	(72)
Total internal	666.53	661.97	639.57	604.82	569.20	503.38	484.80	493.33	513.37	582.30	621.14	650.58	(73)
Solar gains	75.93	133.28	219.86	329.94	392.57	428.63	407.20	359.41	280.40	172.62	97.76	61.30	(83)
Total gains	742.45	795.25	859.42	934.76	961.77	932.01	892.01	852.75	793.77	754.92	718.90	711.88	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.84	0.79	0.69	0.54	0.38	0.24	0.14	0.16	0.33	0.56	0.75	0.85	(86)
Util elsewhere	0.82	0.78	0.67	0.52	0.36	0.21	0.12	0.13	0.30	0.53	0.73	0.84	(89)
Living area fraction												1.00	(91)
Util overall	0.82	0.78	0.68	0.53	0.38	0.23	0.14	0.15	0.32	0.55	0.74	0.84	(94)
Space heating kWh	104.52	72.26	38.74	11.07	2.00	0.00	0.00	0.00	0.00	10.76	48.18	109.34	(98)
Total space heating requirement kWh												396.87	(98)
Space heating requirement per m ²												4.62	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												90.5	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	104.52	72.26	38.74	11.07	2.00	0.00	0.00	0.00	0.00	10.76	48.18	109.34	(98)

Space heating (main system 1)	115.49	79.85	42.80	12.23	2.21	0.00	0.00	0.00	0.00	11.89	53.24	120.82	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	240.35	212.65	225.23	204.53	202.34	152.96	147.27	161.09	160.64	211.96	220.82	235.46	(64)
Efficiency of water heater (%)	82.77	82.27	81.21	80.29	79.89	79.80	79.80	79.80	79.80	80.26	81.53	82.91	(217)
Water heating fuel	290.40	258.49	277.34	254.75	253.26	191.67	184.55	201.86	201.31	264.09	270.85	284.00	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	438.53	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,932.58	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	193.15	(231)
Electricity for lighting	375.42	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	4,014.68	(238)

10a. Fuel costs using PCDF prices (rev: 503)

	kWh/year	£/kWh	£/year	
Space heating - main system 1	438.53	3.63	15.92	(240)
Space heating - main system 2	0.00	-	0.00	(241)
Space heating - secondary system	0.00	-	0.00	(242)
Water heating	2,932.58	3.63	106.45	(247)
Space cooling	0.00	-	0.00	(248)
Pumps and fans	75.00	19.44	14.58	(249)
Mechanical ventilation	193.15	19.44	37.55	(249)
Energy for lighting	375.42	19.44	72.98	(250)
Additional standing charges			95	(251)
Photovoltaics	0.00	-	0.00	(252)
Micro wind turbines	0.00	-	0.00	(252)
Hydroelectric energy	0.00	-	0.00	(252)
mCHP	0.00	-	0.00	(252)
Total energy cost			342.48	(255)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	438.53	0.216	94.72	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	2,932.58	0.216	633.44	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	193.15	0.519	100.246926	(267)
Energy for lighting	375.42	0.519	194.84	(268)
Photovoltaics	0.00	0.529	0.00	
Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00	0.529	0.00	(269)
Total kg/year			1,062.17	(272)

13. Primary energy

	kWh/year	Primary factor	Primary energy kWh/year	
Space heating - main system 1	438.53	1.22	535.00	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	2,932.58	1.22	3,577.75	(264)
Space cooling	0.00	3.07	0	(266)
Pumps and fans	75.00	3.07	230.25	(267)
Mechanical ventilation	193.15	3.07	592.98278	(267)
Energy for lighting	375.42	3.07	1,152.54	(268)
Photovoltaics	0.00	3.07		(269)
Micro wind turbines	0.00	3.07		(269)
Hydroelectric energy	0.00	3.07		(269)
mCHP	0.00	3.07	0.00	(269)
Primary energy kWh/year			6,088.52	(272)
Primary energy kWh/m ² /year			70.90	(273)



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN of Finchley 3rd Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
 Region: Thames
 Postcode: NW3 6EP
 UPRN: 0000000000
 RRN: (not assigned)
 Date of assessment: 16 June 2022
 Tenure: Owner-occupied
 Date of certificate: 15 August 2022
 Assessment type: New dwelling as designed
 Transaction type: New dwelling
 Year completed: 2018
 Related Party Disclosure: No related party
 PCDF revision number: 503

Property description

Dwelling type: Flat
 Detachment: Semi-detached
 Number of dwellings above: 4
 Number of dwellings below: 2

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	74.60	2.57	191.72	-

Living area: 100.00 %
 Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	North	6.94	1.00
Finchley Window_updated 22.06.08	ext wall	East	6.65	1.00
Finchley Window_updated 22.06.08	ext wall	South	14.38	1.00

Overshading: Average or unknown

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value
ceiling	partyceiling	74.60	-	74.60	-	30

Floor	partyfloor	74.60	-	74.60	-	30
Floor from below	partyfloor	74.60	-	74.60	-	30
ext wall	wall	105.04	27.97	77.07	0.13	30

Thermal bridges:

Default (y = 0.15)

Thermal mass

TMP = 250kJ/m²K

Ventilation

Pressure test: Yes (design value)

Ventilation: Balanced with heat recovery (MVHR) (database revision 503, product index 500569)

Brand/Model: The Nuaire Group: Nuaire MRXBOXAB-ECO-LP2

Approved installation scheme? No

Duct type: Rigid

SFP: 0.61

Wet rooms: Kitchen + 2

Duct insulation: Insulated

Efficiency (%): 79

Number of chimneys: 0

Number of open flues: 0

Number of intermittent fans: 0

Number of passive stacks: 0

Number of sides sheltered: 2

q50: 3.00

Main heating system

Boiler system with radiators or underfloor

Fraction of primary space heating provided: 1

Main fuel: Mains gas

Manufacturer's data

Manufacturer's description: Notional Match

Open flue fanned flue

Manufacturer's efficiency: 89.5% (SEDBUK 2009) modulating burner control

Open flue fanned flue

Radiators

Central heating pump in heated space

Central heating pump installed 2013 or later

Design temperature: >45°C

Main heating controls

Time and temperature zone control by suitable arrangement of plumbing and electrical services

Delayed start thermostat

Boiler interlock

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system

Cylinder volume: 150l

Manufacturer's loss factor: 1.394kWh/day

Cylinder in heated space

Water separately timed

Primary pipework: Fully insulated

Cylinderstat

Solar panel: No

Other information

Yes	Electricity tariff:	Water use <= 125 litres/person/day
Conservatory:	Separated heated conservatory	Standard tariff
Photovoltaics:	None	
Terrain type:	Dense urban	
Wind turbine?	No	
Special feature (App. Q)	No	
Total fixed lighting outlets:	30	
Low energy fixed lighting outlets:	30 (= 100% of total outlets)	

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2
 Regulations: Approved Document L1A, 2013 Edition, England
 SAP 2012 = B 84 | EI 2012 = B 88 | DFEE = 41.59 | TFEE = 46.18 | DER = 16.20 | TER = 17.25
 Heat demand kWh: space 722 water space 1966
 Weather data for: postcode NW3
 PCDF revision number: 503 (31 July 2022)
 External Definitions revision number: 5.0 (11 June 2014)
 Applicable recommendations: None

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.



SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
 Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

LEAN of Finchley 3rd Reduced Window Areas

Dwelling type: Semi-detached Flat Mid-floor
 Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation possible.
 Region: Thames
 Front of dwelling faces: Unknown or unspecified
 Overshading: Average or unknown
 Overhangs: see below
 Thermal mass parameter: 250.0 (global variable applied)
 Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
 Ventilation rate during hot weather: 6 (Windows fully open)

Summer ventilation heat loss coefficient: 379.61 (P1)
 Transmission heat loss coefficient: 55.25 (37)
 Summer heat loss coefficient: 434.85 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
North	-	1.00	None
East	-	1.00	None
South	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
North	1.00	1.00	1.00	1.00	(P8)
East	1.00	1.00	1.00	1.00	(P8)
South	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	902	857	793	(P3)
Internal gains:	495	476	485	
Total summer gains:	1,396	1,333	1,278	(P5)
Solar gain/loss ratio:	3.21	3.07	2.94	(P6)
Threshold temperature:	19.46	21.22	20.99	
Likelihood of high internal temperature	Not significant	Slight	Slight	(P7)

Assessment of likelihood of high internal temperature: Slight

This SAP software supplied by Energy Design Tools is currently undergoing approval from the BRE and by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: LEAN of Finchley 3rd Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Mid-floor flat , total floor area 75m²

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

1 TER and DER

Fuel for main heating: Mains gas

Fuel factor: 1.000 (mains gas)

Target Carbon Dioxide Emission Rate (TER): 17.25kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 16.20kg/m²

Result: OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 46.2kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 41.6kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.13 (max 0.30)	0.13 (max 0.70)	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.10 (max 2.00)	1.10 (max 3.30)	OK

2a Thermal bridging

Default y-value of 0.15

Note: Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 3.00 (design value)

Maximum: 10.00

OK

4 Heating efficiency

Main heating system : Boiler system with radiators or underfloor- mains gas

Data from manufacturer

Notional Match

Efficiency: 89.5% (SEDBUK 2009)
Minimum: 88%
OK

Secondary heating
No secondary system specified

5 Cylinder insulation

Hot water storage:
Manufacturer's declared loss factor: 1.39kWh/day
Permitted by DBSCG: 1.89kWh/day - OK

Primary pipework insulated: Yes - OK

Solar hot water cylinder: No solar water heating

6 Controls

Space heating controls : Time and temperature zone control by suitable arrangement of plumbing and electrical services - OK

Hot water controls:
Cylinderstat: Yes
Water separately timed: Yes

Boiler interlock: Yes

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.61 W/(l/s)
Maximum: 1.5 W/(l/s)
Efficiency: 79% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Slight - OK
Based on:
Overshading: Average or unknown
Air change rate: 6
Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

External wall U-value: 0.13W/m²K
Opening U-value: 1.10W/m²K
Design air permeability is 3.00m³/h.m²

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	(22b)
Effective ach	0.33	0.32	0.32	0.30	0.30	0.29	0.29	0.28	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-		-		27.97	1.05		29.47		-		-	
Floor	74.60		0.00		74.60	-		-		30		2238	(26-33)
ext wall	105.04		27.97		77.07	0.13		10.0191		30		2312.1	(26-33)
ceiling	74.60		0.00		74.60	-		-		30		2238	(26-33)
TMP												250.00	(35)
Thermal bridges								15.76					(36)
Total fabric heat loss										55.25			(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	75.92	75.72	75.52	74.51	74.31	73.30	73.30	73.10	73.70	74.31	74.71	75.12	(39)
HLP	1.02	1.02	1.01	1.00	1.00	0.98	0.98	0.98	0.99	1.00	1.00	1.01	(40)
HLP (average)												1.00	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									150.00				(50)
Store loss factor (kWh/litre/day)													(51)
Volume factor													(52)
Temperature factor									0.54				(53)
Energy lost from store in kWh/day									0.75				(55)
Storage loss	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(57)
Storage loss (solar store)	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Total water output												1,965.81	(64)
Heat gains (kWh)	86.13	76.40	81.37	74.52	74.16	67.90	66.77	71.12	70.32	77.19	79.64	84.59	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	115.77	113.69	109.37	103.49	99.68	94.31	89.75	95.59	97.67	103.75	110.62	113.70	(72)
Total internal	403.37	401.37	388.55	367.85	346.88	326.61	313.39	319.15	329.73	350.63	374.65	392.64	(73)
Solar gains	251.53	429.66	591.86	741.28	838.45	836.22	804.59	731.36	643.41	475.86	301.47	215.13	(83)
Total gains	654.89	831.03	980.41	1,109.14	1,185.34	1,162.83	1,117.98	1,050.51	973.14	826.49	676.13	607.77	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.99	0.96	0.89	0.75	0.57	0.40	0.29	0.32	0.52	0.82	0.97	0.99	(86)
Util elsewhere	0.98	0.95	0.87	0.71	0.52	0.35	0.23	0.26	0.45	0.77	0.96	0.99	(89)
Living area fraction												1.00	(91)
Util overall	0.98	0.95	0.88	0.74	0.56	0.39	0.28	0.31	0.51	0.81	0.96	0.99	(94)
Space heating kWh	410.30	252.74	148.55	46.14	9.48	0.00	0.00	0.00	0.00	63.61	245.71	435.95	(98)
Total space heating requirement kWh												1,612.48	(98)
Space heating requirement per m ²												21.62	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												90.5	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	410.30	252.74	148.55	46.14	9.48	0.00	0.00	0.00	0.00	63.61	245.71	435.95	(98)
Space heating (main system 1)	453.37	279.27	164.14	50.99	10.47	0.00	0.00	0.00	0.00	70.28	271.50	481.72	(210)

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Efficiency of water heater (%)	86.77	85.86	84.32	81.96	80.34	79.80	79.80	79.80	79.80	82.49	85.70	86.97	(217)
Water heating fuel	223.03	198.69	212.53	196.07	196.08	176.46	169.55	185.95	185.59	202.00	205.51	217.18	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	1,781.75	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,368.63	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	199.75	(231)
Electricity for lighting	327.14	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	4,752.27	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	1,781.75	0.216	384.86	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	2,368.63	0.216	511.62	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	199.75	0.519	103.670769	(267)
Energy for lighting	327.14	0.519	169.79	(268)
Photovoltaics	0.00	0.529	0.00	
Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00	0.529	0.00	(269)
Total kg/year			1,208.86	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			16.20	(273)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.16	(8)
q50	5		
Infiltration rate		0.41	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.35	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.35	0.37	0.39	0.41	(22b)
Effective ach	0.60	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)		A*U (W/K)		κ (kJ/m ² K)		A*κ (kJ/K)		
Door	-		-	0.00				0.00		-		-		(26)
Windows	-		-	18.65		1.33		24.73		-		-		(27)
Ground floor	-		-	0.00		0.13		0.00		-		-		(28a)
Walls	105.04		18.65	86.39		0.18		15.55		-		-		(29a)
Roof	-		-	0.00		0.13		0.00		-		-		(30)
Total area of external elements				105.04										(31)
Fabric heat loss								40.28						(33)
TMP												250.00		(35)
Thermal bridges						5.252								(36)
Total fabric heat loss								45.53						(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Ventilation heat loss	37.77	37.53	37.30	36.20	36.00	35.04	35.04	34.87	35.41	36.00	36.41	36.85	(38)	
Heat transfer	83.30	83.06	82.83	81.73	81.53	80.57	80.57	80.39	80.94	81.53	81.94	82.38	(39)	
HLP	1.12	1.11	1.11	1.10	1.09	1.08	1.08	1.08	1.08	1.09	1.10	1.10	(40)	

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)

Average daily water use (litres/day)												90.07	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										0.93			(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										1.44			(55)
Storage loss	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	193.52	170.59	179.20	160.70	157.52	140.82	135.30	148.38	148.09	166.63	176.12	188.89	(64)
Total water output												2,341.88	(64)
Heat gains (kWh)	86.13	76.40	81.37	74.51	74.16	67.90	66.77	71.12	70.32	77.19	79.64	84.59	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	115.77	113.69	109.36	103.49	99.68	94.31	89.74	95.59	97.67	103.75	110.61	113.69	(72)
Total internal	403.36	401.37	388.54	367.85	346.88	326.61	313.39	319.15	329.73	350.63	374.65	392.63	(73)
Solar gains	178.65	305.17	420.38	526.51	595.53	593.94	571.48	519.46	457.00	337.99	214.13	152.80	(83)
Total gains	582.02	706.54	808.93	894.36	942.41	920.55	884.87	838.61	786.73	688.62	588.78	545.44	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												1.00	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	541.94	388.89	290.23	136.22	45.79	0.00	0.00	0.00	0.00	150.19	362.52	561.02	(98)
Total space heating requirement kWh												2,476.80	(98)
Space heating requirement per m ²												33.20	(99)

9a. Energy requirements

Fraction of space heat from secondary													0	(201)
Fraction of space heat from main systems													1	(202)
Fraction of main heating from main system 2													0	(203)
Fraction of total heating from main system 1													1	(204)
Fraction of total heating from main system 2													0	(205)
Efficiency of main system 1 (%)													93.5	(206)
Efficiency of main system 2 (%)													0.0	(207)
Efficiency of secondary system (%)													100	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	541.94	388.89	290.23	136.22	45.79	0.00	0.00	0.00	0.00	150.19	362.52	561.02	(98)	
Space heating (main system 1)	579.62	415.92	310.41	145.69	48.97	0.00	0.00	0.00	0.00	160.63	387.72	600.02	(210)	

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	193.52	170.59	179.20	160.70	157.52	140.82	135.30	148.38	148.09	166.63	176.12	188.89	(64)
Efficiency of water heater (%)	87.42	86.95	86.09	84.38	81.98	79.80	79.80	79.80	79.80	84.54	86.70	87.54	(217)
Water heating fuel	221.38	196.20	208.15	190.46	192.14	176.46	169.55	185.94	185.58	197.11	203.14	215.76	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	2,648.98	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,341.88	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	0.00	(231)
Electricity for lighting	327.14	(232)
Total delivered energy for all uses	5,318.01	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	2,648.98	0.216	572.18	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,341.88	0.216	505.85	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	327.14	0.519	169.79	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,286.74	(272)
Emissions per m ² for space and water heating			14.45	(272a)
Emissions per m ² for lighting			2.28	(272b)
Emissions per m ² for pumps and fans			0.52	(272c)
Target Carbon Dioxide Emission Rate (TER)			17.25	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.16	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.26	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.33	0.33	0.32	0.29	0.28	0.25	0.25	0.24	0.26	0.28	0.29	0.31	(22b)
Effective ach	0.56	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.53	0.54	0.54	0.55	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A*U (W / K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47			-	-		
Floor	74.60		0.00	74.60		-	-			30	2238 (26-33)		
ext wall	105.04		27.97	77.07		0.13	10.0191			30	2312.1 (26-33)		
ceiling	74.60		0.00	74.60		-	-			30	2238 (26-33)		
TMP											250.00 (35)		
Thermal bridges							15.76				(36)		
Total fabric heat loss										55.25	(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	90.37	90.23	90.10	89.48	89.36	88.82	88.82	88.72	89.03	89.36	89.60	89.84	(39)
HLP	1.21	1.21	1.21	1.20	1.20	1.19	1.19	1.19	1.19	1.20	1.20	1.20	(40)
HLP (average)												1.20	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(46)
Storage loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Storage loss (solar store)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(58)
Primary loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	124.89	109.23	112.71	98.27	94.29	81.37	75.40	86.52	87.55	102.03	111.38	120.95	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	124.89	109.23	112.71	98.27	94.29	81.37	75.40	86.52	87.55	102.03	111.38	120.95	(64)
Total water output												1,204.58	(64)
Heat gains (kWh)	31.22	27.31	28.18	24.57	23.57	20.34	18.85	21.63	21.89	25.51	27.84	30.24	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	41.97	40.64	37.87	34.12	31.68	28.25	25.33	29.07	30.40	34.29	38.67	40.64	(72)
Total internal	326.56	325.32	314.05	295.48	275.88	257.55	245.98	249.63	259.46	278.16	299.71	316.58	(73)
Solar gains	251.53	429.66	591.86	741.28	838.45	836.22	804.59	731.36	643.41	475.86	301.47	215.13	(83)
Total gains	578.09	754.97	905.91	1,036.77	1,114.34	1,093.77	1,050.57	980.99	902.87	754.03	601.18	531.72	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.99	0.98	0.94	0.85	0.69	0.51	0.37	0.41	0.64	0.90	0.98	1.00	(86)
Util elsewhere	0.99	0.97	0.92	0.81	0.63	0.43	0.28	0.32	0.56	0.87	0.98	0.99	(89)
Living area fraction												1.00	(91)
Util overall	0.99	0.97	0.93	0.84	0.69	0.51	0.37	0.41	0.64	0.89	0.98	0.99	(94)
Space heating kWh	618.02	428.18	305.63	137.27	44.37	0.00	0.00	0.00	0.00	169.09	419.66	647.99	(98)
Total space heating requirement kWh												2,770.21	(98)
Space heating requirement per m ²												37.13	(99)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	834.88	657.25	674.24	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.96	0.98	0.98	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	803.92	645.93	657.87	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,365.85	1,313.57	1,233.66	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	404.59	496.72	428.38	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	101.15	124.18	107.10	-	-	-	-	(100)

Space cooling (June to August) 332.42 (107)

Space cooling per m² 4.46 (108)

8f. Dwelling Fabric Energy Efficiency (kWh/m²) 41.6 (109)

File name: LEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	757.36	596.22	610.99	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.95	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	718.88	582.43	591.61	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,082.67	1,041.10	985.99	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	261.93	341.25	293.42	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	65.48	85.31	73.36	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.16	(8)
Infiltration rate		0.41	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.35	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.35	0.37	0.39	0.41	(22b)
Effective ach	0.60	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	18.65	1.33	24.73	-	-	(27)
Ground floor	-	-	0.00	0.13	0.00	-	-	(28a)

SAP 2012 worksheet (Version 9.92, October 2013)
 Calculation of Heat Demand
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.12	0.13	0.12	0.14	(22b)
Effective ach	0.31	0.31	0.30	0.29	0.29	0.28	0.29	0.28	0.28	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-		-		27.97	1.05	29.47		-		-		
Floor	74.60		0.00		74.60	-	-		30		2238	(26-33)	
ext wall	105.04		27.97		77.07	0.13	10.0191		30		2312.1	(26-33)	
ceiling	74.60		0.00		74.60	-	-		30		2238	(26-33)	
TMP											250.00	(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	74.91	74.71	74.51	73.91	73.91	73.10	73.30	73.10	73.10	73.70	73.50	74.31	(39)
HLP	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.98	0.99	0.99	1.00	(40)
HLP (average)												0.99	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	(22b)
Effective ach	0.33	0.32	0.32	0.30	0.30	0.29	0.29	0.28	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47		-	-			
Floor	74.60		0.00	74.60		-	-		30	2238		(26-33)	
ext wall	105.04		27.97	77.07		0.13	10.0191		30	2312.1		(26-33)	
ceiling	74.60		0.00	74.60		-	-		30	2238		(26-33)	
TMP										250.00		(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	75.92	75.72	75.52	74.51	74.31	73.30	73.30	73.10	73.70	74.31	74.71	75.12	(39)
HLP	1.02	1.02	1.01	1.00	1.00	0.98	0.98	0.98	0.99	1.00	1.00	1.01	(40)
HLP (average)												1.00	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									150.00				(50)
Store loss factor (kWh/litre/day)													(51)
Volume factor													(52)
Temperature factor									0.54				(53)
Energy lost from store in kWh/day									0.75				(55)
Storage loss	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(57)
Storage loss (solar store)	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Total water output												1,965.81	(64)
Heat gains (kWh)	86.13	76.40	81.37	74.52	74.16	67.90	66.77	71.12	70.32	77.19	79.64	84.59	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	(66)
Lighting	46.31	41.13	33.45	25.33	18.93	15.98	17.27	22.45	30.13	38.25	44.65	47.60	(67)
Appliances	310.13	313.35	305.24	287.97	266.18	245.70	232.01	228.79	236.90	254.16	275.96	296.44	(68)
Cooking	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	115.77	113.69	109.37	103.49	99.68	94.31	89.75	95.59	97.67	103.75	110.62	113.70	(72)
Total internal	573.73	569.69	549.57	518.31	486.31	457.51	440.55	448.35	466.22	497.69	532.74	559.25	(73)
Solar gains	326.66	557.99	768.65	962.71	1,088.90	1,086.00	1,044.93	949.81	835.60	618.00	391.52	279.39	(83)
Total gains	900.38	1,127.68	1,318.23	1,481.02	1,575.21	1,543.51	1,485.47	1,398.16	1,301.81	1,115.69	924.26	838.65	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.95	0.88	0.76	0.59	0.44	0.30	0.22	0.24	0.39	0.66	0.89	0.96	(86)
Util elsewhere	0.94	0.86	0.72	0.55	0.39	0.26	0.17	0.19	0.34	0.61	0.87	0.95	(89)
Living area fraction												1.00	(91)
Util overall	0.94	0.87	0.75	0.59	0.43	0.30	0.21	0.23	0.38	0.65	0.88	0.96	(94)
Space heating kWh	273.11	138.89	64.01	14.86	2.50	0.00	0.00	0.00	0.00	22.14	137.39	301.07	(98)
Total space heating requirement kWh												953.97	(98)
Space heating requirement per m ²												12.79	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												90.5	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	273.11	138.89	64.01	14.86	2.50	0.00	0.00	0.00	0.00	22.14	137.39	301.07	(98)
Space heating (main system 1)	301.78	153.47	70.73	16.41	2.76	0.00	0.00	0.00	0.00	24.47	151.81	332.67	(210)

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Efficiency of water heater (%)	85.73	84.27	82.36	80.61	79.95	79.80	79.80	79.80	79.80	80.92	84.16	86.05	(217)
Water heating fuel	225.73	202.43	217.58	199.37	197.04	176.46	169.55	185.95	185.59	205.92	209.28	219.51	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	1,054.11	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,394.40	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	199.75	(231)
Electricity for lighting	327.14	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	4,050.41	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	£/kWh	£/year	
Space heating - main system 1	1,054.11	3.48	36.68	(240)
Space heating - main system 2	0.00	-	0.00	(241)
Space heating - secondary system	0.00	-	0.00	(242)
Water heating	2,394.40	3.48	83.33	(247)
Space cooling	0.00	-	0.00	(248)
Pumps and fans	75.00	13.19	9.89	(249)
Mechanical ventilation	199.75	13.19	26.35	(249)
Energy for lighting	327.14	13.19	43.15	(250)
Additional standing charges			120	(251)
Photovoltaics	0.00	-	0.00	(252)
Micro wind turbines	0.00	-	0.00	(252)
Hydroelectric energy	0.00	-	0.00	(252)
mCHP	0.00	-	0.00	(252)
Total energy cost			319.40	(255)

11a. SAP Rating

Energy cost deflator	0.42	(256)
Energy cost factor (ECF)	1.12	(257)
SAP value	84.35	
SAP rating	84	(258)
SAP band	B	

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	1,054.11	0.216	227.69	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	2,394.40	0.216	517.19	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	199.75	0.519	103.670769	(267)
Energy for lighting	327.14	0.519	169.79	(268)
Photovoltaics	0.00	0.529	0.00	

Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00	0.529	0.00	(269)
Total kg/year			1,057.26	(272)
CO2 emissions per m²			14.17	(273)
EI value			88.15	(274)
EI rating			88	(274)
EI band			B	

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
Calculation of EPC Costs, Emissions and Primary Energy
Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN of Finchley 3rd Reduced Window Areas
Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.12	0.13	0.12	0.14	(22b)
Effective ach	0.31	0.31	0.30	0.29	0.29	0.28	0.29	0.28	0.28	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47		-	-			
Floor	74.60		0.00	74.60		-	-		30	2238		(26-33)	
ext wall	105.04		27.97	77.07		0.13	10.0191		30	2312.1		(26-33)	
ceiling	74.60		0.00	74.60		-	-		30	2238		(26-33)	
TMP										250.00		(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	74.91	74.71	74.51	73.91	73.91	73.10	73.30	73.10	73.10	73.70	73.50	74.31	(39)
HLP	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.98	0.99	0.99	1.00	(40)
HLP (average)												0.99	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									150.00				(50)
Store loss factor (kWh/litre/day)													(51)
Volume factor													(52)
Temperature factor									0.54				(53)
Energy lost from store in kWh/day									0.75				(55)
Storage loss	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(57)
Storage loss (solar store)	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Total water output												1,965.81	(64)
Heat gains (kWh)	86.13	76.40	81.37	74.52	74.16	67.90	66.77	71.12	70.32	77.19	79.64	84.59	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	(66)
Lighting	46.31	41.13	33.45	25.33	18.93	15.98	17.27	22.45	30.13	38.25	44.65	47.60	(67)
Appliances	310.13	313.35	305.24	287.97	266.18	245.70	232.01	228.79	236.90	254.16	275.96	296.44	(68)
Cooking	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	115.77	113.69	109.37	103.49	99.68	94.31	89.75	95.59	97.67	103.75	110.62	113.70	(72)
Total internal	573.73	569.69	549.57	518.31	486.31	457.51	440.55	448.35	466.22	497.69	532.74	559.25	(73)
Solar gains	347.51	532.89	738.27	959.33	1,061.33	1,132.67	1,086.00	1,008.21	882.69	644.87	430.07	291.86	(83)
Total gains	921.23	1,102.57	1,287.85	1,477.64	1,547.64	1,590.18	1,526.54	1,456.56	1,348.91	1,142.55	962.81	851.11	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.93	0.86	0.72	0.53	0.37	0.22	0.13	0.15	0.30	0.57	0.84	0.95	(86)
Util elsewhere	0.92	0.84	0.68	0.49	0.32	0.17	0.09	0.10	0.25	0.52	0.81	0.94	(89)
Living area fraction												1.00	(91)
Util overall	0.92	0.85	0.71	0.52	0.36	0.21	0.12	0.14	0.29	0.57	0.83	0.94	(94)
Space heating kWh	216.02	116.13	43.33	7.49	0.81	0.00	0.00	0.00	0.00	9.26	85.51	243.25	(98)
Total space heating requirement kWh												721.80	(98)
Space heating requirement per m ²												9.68	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												90.5	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	216.02	116.13	43.33	7.49	0.81	0.00	0.00	0.00	0.00	9.26	85.51	243.25	(98)
Space heating (main system 1)	238.69	128.32	47.88	8.27	0.90	0.00	0.00	0.00	0.00	10.24	94.49	268.78	(210)

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Efficiency of water heater (%)	85.11	83.81	81.68	80.22	79.85	79.80	79.80	79.80	79.80	80.30	83.01	85.49	(217)
Water heating fuel	227.39	203.54	219.40	200.32	197.28	176.46	169.55	185.95	185.59	207.52	212.18	220.95	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	797.57	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,406.13	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	199.75	(231)
Electricity for lighting	327.14	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	3,805.59	(238)

10a. Fuel costs using PCDF prices (rev: 503)

	kWh/year	£/kWh	£/year	
Space heating - main system 1	797.57	3.63	28.95	(240)
Space heating - main system 2	0.00	-	0.00	(241)
Space heating - secondary system	0.00	-	0.00	(242)
Water heating	2,406.13	3.63	87.34	(247)
Space cooling	0.00	-	0.00	(248)
Pumps and fans	75.00	19.44	14.58	(249)
Mechanical ventilation	199.75	19.44	38.83	(249)
Energy for lighting	327.14	19.44	63.60	(250)
Additional standing charges			95	(251)
Photovoltaics	0.00	-	0.00	(252)
Micro wind turbines	0.00	-	0.00	(252)
Hydroelectric energy	0.00	-	0.00	(252)
mCHP	0.00	-	0.00	(252)
Total energy cost			328.30	(255)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	797.57	0.216	172.27	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	2,406.13	0.216	519.72	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	199.75	0.519	103.670769	(267)
Energy for lighting	327.14	0.519	169.79	(268)
Photovoltaics	0.00	0.529	0.00	
Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00	0.529	0.00	(269)
Total kg/year			1,004.38	(272)

13. Primary energy

	kWh/year	Primary factor	Primary energy kWh/year	
Space heating - main system 1	797.57	1.22	973.03	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	2,406.13	1.22	2,935.48	(264)
Space cooling	0.00	3.07	0	(266)
Pumps and fans	75.00	3.07	230.25	(267)
Mechanical ventilation	199.75	3.07	613.23557	(267)
Energy for lighting	327.14	3.07	1,004.32	(268)
Photovoltaics	0.00	3.07		(269)
Micro wind turbines	0.00	3.07		(269)
Hydroelectric energy	0.00	3.07		(269)
mCHP	0.00	3.07	0.00	(269)
Primary energy kWh/year			5,756.32	(272)
Primary energy kWh/m ² /year			77.16	(273)



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley top Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
Region: Thames
Postcode: NW3 6EP
UPRN: 0000000000
RRN: (not assigned)
Date of assessment: 16 June 2022
Tenure: Owner-occupied
Date of certificate: 15 August 2022
Assessment type: New dwelling as designed
Transaction type: New dwelling
Year completed: 2018
Related Party Disclosure: No related party
PCDF revision number: 503

Property description

Dwelling type: Flat
Detachment: Semi-detached
Number of dwellings above: 0
Number of dwellings below: 2

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	63.66	2.57	163.61	-
2	46.72	2.57	120.07	-

Living area: 67.58 %
Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	North	18.09	1.00
Finchley Window_updated 22.06.08	ext wall	East	25.82	1.00
Finchley Window_updated 22.06.08	ext wall	South	13.46	1.00

Overshading: Average or unknown

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value

Floor	partyfloor	63.66	-	63.66	-	30
Floor from below	partyfloor	63.66	-	63.66	-	30
ceiling	roof	66.96	-	66.96	0.12	30
ext wall	wall	195.39	57.37	138.02	0.20	30

Thermal bridges:

User-defined (individual ϕ -values)

Junction	Length	ϕ -value	Source of data
Exposed floor (normal)	8.00	0.320	default detail

Thermal mass

TMP = 250kJ/m²K

Ventilation

Pressure test:	Yes (design value)
Ventilation:	Balanced with heat recovery (MVHR) (Appendix Q datasheet)
Brand/Model:	Nuaire
Approved installation scheme?	Yes
Duct type:	Rigid
SFP:	0.59
Wet rooms:	Kitchen + 2
Duct insulation:	Not insulated
Efficiency (%):	89
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	0
Number of passive stacks:	0
Number of sides sheltered:	0
q50:	3.00

Main heating system

Boiler system with radiators or underfloor
Gas (incl LPG) boilers 1998 or later
Regular non-condensing with permanent pilot light
Fraction of primary space heating provided: 1
Main fuel: Mains gas
SAP tables
(105) Regular non-condensing with permanent pilot light
Open flue fanned flue
Radiators
Central heating pump in heated space
Central heating pump installed 2013 or later
Design temperature: >45°C

Main heating controls

Time and temperature zone control by suitable arrangement of plumbing and electrical services
Delayed start thermostat
Boiler interlock

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system
Cylinder volume: 150l
Manufacturer's loss factor: 1.394kWh/day
Cylinder in heated space
Water separately timed
Primary pipework: Fully insulated
Cylinderstat

Solar panel:

No

Other information

Water use <= 125 litres/person/day	Yes
Electricity tariff:	Standard tariff
Conservatory:	No conservatory
Photovoltaics:	None
Terrain type:	Dense urban
Wind turbine?	No
Special feature (App. Q)	No
Total fixed lighting outlets:	40
Low energy fixed lighting outlets:	40 (= 100% of total outlets)

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2
Regulations: Approved Document L1A, 2013 Edition, England
SAP 2012 = B 83 | EI 2012 = B 84 | DFEE = 49.10 | TFEE = 56.38 | DER = 19.56 | TER = 17.25
Heat demand kWh: space 1841 water space 2139
Weather data for: postcode NW3
PCDF revision number: 503 (31 July 2022)
External Definitions revision number: 5.0 (11 June 2014)
Applicable recommendations: None

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.



SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

LEAN_Finchley top Reduced Window Areas

Dwelling type: Semi-detached Flat Top-floor
Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation not possible.
Region: Thames
Front of dwelling faces: Unknown or unspecified
Overshading: Average or unknown
Overhangs: see below
Thermal mass parameter: 250.0 (global variable applied)
Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
Ventilation rate during hot weather: 4 (Windows fully open)

Summer ventilation heat loss coefficient: 374.45 (P1)
Transmission heat loss coefficient: 96.17 (37)
Summer heat loss coefficient: 470.62 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
North	-	1.00	None
East	-	1.00	None
South	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
North	1.00	1.00	1.00	1.00	(P8)
East	1.00	1.00	1.00	1.00	(P8)
South	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	1,848	1,743	1,551	(P3)
Internal gains:	467	450	458	
Total summer gains:	2,315	2,193	2,009	(P5)
Solar gain/loss ratio:	4.92	4.66	4.27	(P6)
Threshold temperature:	21.17	22.81	22.32	
Likelihood of high internal temperature	Slight	Medium	Medium	(P7)

Assessment of likelihood of high internal temperature: Medium

This SAP software supplied by Energy Design Tools is currently undergoing approval from the BRE and by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: LEAN_Finchley top Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Top-floor flat , total floor area 110m²

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

1 TER and DER

Fuel for main heating: Mains gas

Fuel factor: 1.000 (mains gas)

Target Carbon Dioxide Emission Rate (TER): 17.25kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 19.56kg/m²

Excess emissions: 2.31kg/m² (13.4%)

Result: Fail

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 56.4kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 49.1kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.20 (max 0.30)	0.20 (max 0.70)	OK
Floor	(no floor)		
Roof	0.12 (max 0.20)	0.12 (max 0.35)	OK
Openings	1.10 (max 2.00)	1.10 (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: 10.00

OK

4 Heating efficiency

Main heating system : Boiler system with radiators or underfloor

Gas (incl LPG) boilers 1998 or later

Regular non-condensing with permanent pilot light- mains gas

Efficiency: 70%
SAP default data : Fail

Secondary heating
No secondary system specified

5 Cylinder insulation

Hot water storage:
Manufacturer's declared loss factor: 1.39kWh/day
Permitted by DBSCG: 1.89kWh/day - OK

Primary pipework insulated: Yes - OK

Solar hot water cylinder: No solar water heating

6 Controls

Space heating controls : Time and temperature zone control by suitable arrangement of plumbing and electrical services - OK

Hot water controls:
Cylinderstat: Yes
Water separately timed: Yes

Boiler interlock: Yes

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.59 W/(l/s)
Maximum: 1.5 W/(l/s)
Efficiency: 89% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Medium - OK
Based on:
Overshading: Average or unknown
Air change rate: 4
Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

Roof U-value: 0.12W/m²K
Opening U-value: 1.10W/m²K
Thermal bridging γ -value is 0W/m²K
Design air permeability is 3.00m³/h.m²

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SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infiltr rate	0.19	0.19	0.18	0.17	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	(22b)
Effective ach	0.38	0.38	0.37	0.35	0.35	0.33	0.33	0.33	0.34	0.35	0.36	0.36	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45		-	-			
Floor	63.66		0.00	63.66		-	-		30	1909.8		(26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034		30	4140.51		(26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544		30	2008.86		(26-33)	
TMP										250.00		(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									96.17			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	131.72	131.36	131.01	129.26	128.91	127.15	127.15	126.80	127.85	128.91	129.61	130.31	(39)
HLP	1.19	1.19	1.19	1.17	1.17	1.15	1.15	1.15	1.16	1.17	1.17	1.18	(40)
HLP (average)												1.17	(40)

4. Water heating energy requirements

Assumed occupancy: 2.82 (42)

Average daily water use (litres/day)	101.11											(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume	150.00											(50)	
Store loss factor (kWh/litre/day)												(51)	
Volume factor												(52)	
Temperature factor	0.54											(53)	
Energy lost from store in kWh/day	0.75											(55)	
Storage loss	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(57)
Storage loss (solar store)	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(64)
Total water output												2,139.44	(64)
Heat gains (kWh)	92.12	81.63	86.77	79.23	78.68	71.80	70.39	75.27	74.52	82.08	84.98	90.39	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	(66)
Lighting	24.26	21.55	17.52	13.27	9.92	8.37	9.05	11.76	15.78	20.04	23.39	24.93	(67)
Appliances	272.10	274.92	267.81	252.66	233.54	215.57	203.56	200.74	207.85	223.00	242.12	260.09	(68)
Cooking	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	123.81	121.48	116.63	110.04	105.75	99.73	94.60	101.17	103.50	110.32	118.03	121.49	(72)
Total internal	488.43	486.21	470.22	444.22	417.47	391.93	375.47	381.92	395.39	421.62	451.79	474.77	(73)
Solar gains	381.22	685.76	1,024.58	1,397.15	1,669.15	1,699.64	1,621.16	1,413.90	1,154.06	782.18	463.50	321.66	(83)
Total gains	869.65	1,171.97	1,494.79	1,841.37	2,086.62	2,091.56	1,996.63	1,795.83	1,549.45	1,203.80	915.29	796.42	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.99	0.97	0.91	0.76	0.56	0.39	0.28	0.32	0.55	0.87	0.98	1.00	(86)
Util elsewhere	0.99	0.97	0.89	0.71	0.50	0.32	0.21	0.25	0.48	0.83	0.98	0.99	(89)
Living area fraction												0.68	(91)
Util overall	0.99	0.96	0.89	0.73	0.53	0.36	0.25	0.29	0.52	0.85	0.97	0.99	(94)
Space heating kWh	825.76	539.33	325.59	97.87	19.00	0.00	0.00	0.00	0.00	168.75	532.14	866.07	(98)
Total space heating requirement kWh												3,374.51	(98)
Space heating requirement per m ²												30.57	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												70.0	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	825.76	539.33	325.59	97.87	19.00	0.00	0.00	0.00	0.00	168.75	532.14	866.07	(98)
Space heating (main system 1)	1,179.66	770.47	465.13	139.82	27.14	0.00	0.00	0.00	0.00	241.07	760.21	1,237.24	(210)

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(64)
Efficiency of water heater (%)	67.70	67.13	65.88	63.24	60.87	60.00	60.00	60.00	60.00	64.44	67.04	67.83	(217)
Water heating fuel	312.45	277.59	296.67	276.51	281.13	254.24	243.61	268.09	267.86	281.43	286.69	304.20	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	4,820.73	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	3,350.47	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	255.24	(231)
Electricity for lighting	428.40	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	8,929.84	(238)

12a. Carbon dioxide emissions

	kWh / year	Emission factor	Emissions kg / year	
Space heating - main system 1	4,820.73	0.216	1,041.28	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	3,350.47	0.216	723.70	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	255.24	0.519	132.468522	(267)
Energy for lighting	428.40	0.519	222.34	(268)
Photovoltaics	0.00	0.529	0.00	
Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00	0.529	0.00	(269)
Total kg/year			2,158.71	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			19.56	(273)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	4	40	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
q50	5		
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)		A*U (W/K)		κ (kJ/m ² K)		A*κ (kJ/K)		
Door	-		-	0.00				0.00		-		-		(26)
Windows	-		-	27.60		1.33		36.58		-		-		(27)
Ground floor	-		-	0.00		0.13		0.00		-		-		(28a)
Walls	195.387		27.60	167.79		0.18		30.20		-		-		(29a)
Roof	-		-	66.96		0.13		8.71		-		-		(30)
Total area of external elements				262.35										(31)
Fabric heat loss								75.49						(33)
TMP												250.00		(35)
Thermal bridges						2.56								(36)
Total fabric heat loss								78.05						(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Ventilation heat loss	55.21	54.89	54.57	53.06	52.78	51.47	51.47	51.23	51.98	52.78	53.35	53.94	(38)	
Heat transfer	133.26	132.94	132.62	131.11	130.83	129.52	129.52	129.28	130.03	130.83	131.40	132.00	(39)	
HLP	1.21	1.20	1.20	1.19	1.19	1.17	1.17	1.17	1.18	1.19	1.19	1.20	(40)	

4. Water heating energy requirements

Assumed occupancy:												2.82	(42)
Average daily water use (litres/day)												101.11	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										0.93			(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										1.44			(55)
Storage loss	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	211.53	186.34	195.45	174.87	171.12	152.54	146.16	160.85	160.71	181.34	192.18	206.32	(64)
Total water output												2,519.68	(64)
Heat gains (kWh)	92.12	81.63	86.77	79.22	78.68	71.80	70.38	75.27	74.52	82.08	84.98	90.39	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	(66)
Lighting	24.26	21.55	17.52	13.27	9.92	8.37	9.05	11.76	15.78	20.04	23.39	24.93	(67)
Appliances	272.10	274.92	267.81	252.66	233.54	215.57	203.56	200.74	207.85	223.00	242.12	260.09	(68)
Cooking	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	123.81	121.48	116.63	110.03	105.75	99.72	94.60	101.16	103.50	110.32	118.03	121.49	(72)
Total internal	488.43	486.20	470.21	444.22	417.47	391.92	375.47	381.92	395.39	421.61	451.79	474.76	(73)
Solar gains	195.33	351.36	524.96	715.86	855.22	870.84	830.63	724.44	591.31	400.77	237.48	164.81	(83)
Total gains	683.75	837.57	995.18	1,160.07	1,272.69	1,262.77	1,206.10	1,106.36	986.69	822.38	689.27	639.57	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												0.68	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	971.54	741.45	591.25	303.57	111.93	0.00	0.00	0.00	0.00	347.31	690.45	996.08	(98)
Total space heating requirement kWh												4,753.59	(98)
Space heating requirement per m ²												43.07	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												93.5	(206)
Efficiency of main system 2 (%)												0.0	(207)
Efficiency of secondary system (%)												100	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	971.54	741.45	591.25	303.57	111.93	0.00	0.00	0.00	0.00	347.31	690.45	996.08	(98)

Space heating (main system 1)	1,039.08	792.99	632.35	324.68	119.71	0.00	0.00	0.00	0.00	371.46	738.45	1,065.33	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	211.53	186.34	195.45	174.87	171.12	152.54	146.16	160.85	160.71	181.34	192.18	206.32	(64)
Efficiency of water heater (%)	88.38	88.13	87.58	86.27	83.71	79.80	79.80	79.80	79.80	86.52	87.93	88.46	(217)
Water heating fuel	239.33	211.44	223.16	202.69	204.40	191.16	183.16	201.57	201.40	209.59	218.55	233.22	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	5,084.05	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,519.68	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	0.00	(231)
Electricity for lighting	428.40	(232)
Total delivered energy for all uses	8,032.13	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	5,084.05	0.216	1,098.16	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,519.68	0.216	544.25	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	428.40	0.519	222.34	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,903.67	(272)
Emissions per m ² for space and water heating			14.88	(272a)
Emissions per m ² for lighting			2.01	(272b)
Emissions per m ² for pumps and fans			0.35	(272c)
Target Carbon Dioxide Emission Rate (TER)			17.25	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	4	40	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.29	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.37	0.36	0.36	0.32	0.31	0.28	0.28	0.27	0.29	0.31	0.33	0.34	(22b)
Effective ach	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A *U (W /K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45			-	-		
Floor	63.66		0.00	63.66		-	-			30	1909.8 (26-33)		
ext wall	195.39		57.37	138.02		0.20	27.6034			30	4140.51 (26-33)		
ceiling	66.96		0.00	66.96		0.12	8.03544			30	2008.86 (26-33)		
TMP											250.00 (35)		
Thermal bridges							0.08				(36)		
Total fabric heat loss										96.17	(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	149.42	149.17	148.92	147.77	147.55	146.55	146.55	146.36	146.94	147.55	147.99	148.45	(39)
HLP	1.35	1.35	1.35	1.34	1.34	1.33	1.33	1.33	1.33	1.34	1.34	1.34	(40)
HLP (average)												1.34	(40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Average daily water use (litres/day)												101.11	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(46)
Storage loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Storage loss (solar store)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(58)
Primary loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	140.19	122.61	126.52	110.31	105.84	91.33	84.63	97.12	98.28	114.53	125.02	135.77	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	140.19	122.61	126.52	110.31	105.84	91.33	84.63	97.12	98.28	114.53	125.02	135.77	(64)
Total water output												1,352.17	(64)
Heat gains (kWh)	35.05	30.65	31.63	27.58	26.46	22.83	21.16	24.28	24.57	28.63	31.26	33.94	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	(66)
Lighting	24.26	21.55	17.52	13.27	9.92	8.37	9.05	11.76	15.78	20.04	23.39	24.93	(67)
Appliances	272.10	274.92	267.81	252.66	233.54	215.57	203.56	200.74	207.85	223.00	242.12	260.09	(68)
Cooking	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	47.11	45.61	42.52	38.30	35.57	31.71	28.44	32.63	34.12	38.49	43.41	45.62	(72)
Total internal	408.72	407.34	393.10	369.49	344.28	320.91	306.31	310.39	323.01	346.78	374.17	395.90	(73)
Solar gains	381.22	685.76	1,024.58	1,397.15	1,669.15	1,699.64	1,621.16	1,413.90	1,154.06	782.18	463.50	321.66	(83)
Total gains	789.94	1,093.10	1,417.68	1,766.64	2,013.43	2,020.55	1,927.47	1,724.29	1,477.07	1,128.96	837.67	717.56	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	1.00	0.98	0.94	0.82	0.64	0.46	0.33	0.39	0.64	0.92	0.99	1.00	(86)
Util elsewhere	0.99	0.98	0.92	0.78	0.57	0.38	0.24	0.29	0.55	0.88	0.98	1.00	(89)
Living area fraction												0.68	(91)
Util overall	0.99	0.98	0.93	0.80	0.61	0.43	0.30	0.36	0.61	0.90	0.98	1.00	(94)
Space heating kWh	1,078.76	753.21	516.44	203.06	54.59	0.00	0.00	0.00	0.00	304.60	743.76	1,125.02	(98)
Total space heating requirement kWh												4,779.44	(98)
Space heating requirement per m ²												43.30	(99)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	1,377.57	1,084.47	1,112.37	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.97	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	1,331.47	1,066.34	1,082.57	-	-	-	-	(102)
Gains W	-	-	-	-	-	2,472.04	2,360.81	2,125.31	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	821.21	963.08	775.80	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	205.30	240.77	193.95	-	-	-	-	(100)

Space cooling (June to August) 640.02 (107)

Space cooling per m² 5.80 (108)

8f. Dwelling Fabric Energy Efficiency (kWh/m²) 49.1 (109)

SAP 2012 worksheet
 Calculation of Target Fabric Energy Efficiency
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	1,217.53	958.48	982.55	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.91	0.95	0.93	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	1,103.35	911.12	912.11	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,503.32	1,436.81	1,319.45	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	287.98	391.12	303.06	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	72.00	97.78	75.76	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	4	40	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.14	(8)
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	27.60	1.33	36.58	-	-	(27)

SAP 2012 worksheet (Version 9.92, October 2013)
 Calculation of Heat Demand
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley top Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.17	0.17	0.17	0.15	0.15	0.14	0.14	0.14	0.14	0.15	0.15	0.16	(22b)
Effective ach	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.33	0.33	0.34	0.33	0.35	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A *U (W /K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45			-	-		
Floor	63.66		0.00	63.66		-	-			30	1909.8 (26-33)		
ext wall	195.39		57.37	138.02		0.20	27.6034			30	4140.51 (26-33)		
ceiling	66.96		0.00	66.96		0.12	8.03544			30	2008.86 (26-33)		
TMP											250.00 (35)		
Thermal bridges							0.08				(36)		
Total fabric heat loss										96.17	(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	129.96	129.61	129.26	128.21	128.21	126.80	127.15	126.80	126.80	127.85	127.50	128.91	(39)
HLP	1.18	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.15	1.16	1.16	1.17	(40)
HLP (average)												1.16	(40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Average daily water use (litres/day)												101.11	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)													(51)
Volume factor													(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										0.75			(55)
Storage loss	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(57)
Storage loss (solar store)	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(64)
Total water output												2,139.44	(64)
Water heating demand												2,139	(64)
Heat gains (kWh)	92.12	81.63	86.77	79.23	78.68	71.80	70.39	75.27	74.52	82.08	84.98	90.39	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	(66)
Lighting	60.65	53.86	43.81	33.16	24.79	20.93	22.61	29.39	39.45	50.09	58.47	62.33	(67)
Appliances	406.12	410.33	399.72	377.11	348.57	321.75	303.83	299.61	310.23	332.83	361.37	388.19	(68)
Cooking	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	123.81	121.48	116.63	110.04	105.75	99.73	94.60	101.17	103.50	110.32	118.03	121.49	(72)
Total internal	704.64	699.74	674.21	634.37	593.18	556.47	535.11	544.23	567.24	607.31	651.93	686.07	(73)
Solar gains	532.92	862.04	1,296.59	1,831.17	2,133.30	2,320.64	2,207.32	1,971.64	1,605.70	1,074.98	669.39	441.29	(83)
Total gains	1,237.56	1,561.78	1,970.80	2,465.54	2,726.48	2,877.11	2,742.43	2,515.87	2,172.94	1,682.30	1,321.32	1,127.36	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.97	0.91	0.77	0.55	0.36	0.21	0.13	0.15	0.32	0.65	0.91	0.98	(86)
Util elsewhere	0.96	0.89	0.73	0.50	0.31	0.16	0.08	0.09	0.26	0.59	0.88	0.97	(89)
Living area fraction												0.68	(91)
Util overall	0.95	0.89	0.75	0.52	0.34	0.19	0.10	0.12	0.29	0.62	0.89	0.97	(94)
Space heating kWh	526.30	307.40	121.87	19.93	2.07	0.00	0.00	0.00	0.00	35.92	251.88	575.51	(98)
Total space heating requirement kWh												1,840.87	(98)
Space heating demand												1,841	(98)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.19	0.19	0.18	0.17	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	(22b)
Effective ach	0.38	0.38	0.37	0.35	0.35	0.33	0.33	0.33	0.34	0.35	0.36	0.36	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A *U (W /K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45		-	-			
Floor	63.66		0.00	63.66		-	-		30	1909.8		(26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034		30	4140.51		(26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544		30	2008.86		(26-33)	
TMP										250.00		(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									96.17			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	131.72	131.36	131.01	129.26	128.91	127.15	127.15	126.80	127.85	128.91	129.61	130.31	(39)
HLP	1.19	1.19	1.19	1.17	1.17	1.15	1.15	1.15	1.16	1.17	1.17	1.18	(40)
HLP (average)												1.17	(40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Average daily water use (litres/day)	101.11											(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume	150.00											(50)	
Store loss factor (kWh/litre/day)												(51)	
Volume factor												(52)	
Temperature factor	0.54											(53)	
Energy lost from store in kWh/day	0.75											(55)	
Storage loss	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(57)
Storage loss (solar store)	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(64)
Total water output												2,139.44	(64)
Heat gains (kWh)	92.12	81.63	86.77	79.23	78.68	71.80	70.39	75.27	74.52	82.08	84.98	90.39	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	(66)
Lighting	60.65	53.86	43.81	33.16	24.79	20.93	22.61	29.39	39.45	50.09	58.47	62.33	(67)
Appliances	406.12	410.33	399.72	377.11	348.57	321.75	303.83	299.61	310.23	332.83	361.37	388.19	(68)
Cooking	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	123.81	121.48	116.63	110.04	105.75	99.73	94.60	101.17	103.50	110.32	118.03	121.49	(72)
Total internal	704.64	699.74	674.21	634.37	593.18	556.47	535.11	544.23	567.24	607.31	651.93	686.07	(73)
Solar gains	495.09	890.60	1,330.62	1,814.48	2,167.72	2,207.32	2,105.40	1,836.24	1,498.78	1,015.82	601.94	417.74	(83)
Total gains	1,199.73	1,590.34	2,004.83	2,448.85	2,760.90	2,763.79	2,640.51	2,380.47	2,066.02	1,623.13	1,253.87	1,103.81	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.98	0.92	0.81	0.61	0.43	0.29	0.21	0.24	0.42	0.74	0.94	0.98	(86)
Util elsewhere	0.97	0.91	0.77	0.57	0.38	0.25	0.16	0.19	0.36	0.69	0.93	0.98	(89)
Living area fraction												0.68	(91)
Util overall	0.97	0.91	0.78	0.59	0.41	0.27	0.19	0.22	0.39	0.71	0.93	0.97	(94)
Space heating kWh	632.89	357.66	172.36	38.20	6.04	0.00	0.00	0.00	0.00	77.34	363.60	681.16	(98)
Total space heating requirement kWh												2,329.25	(98)
Space heating requirement per m ²												21.10	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												70.0	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	632.89	357.66	172.36	38.20	6.04	0.00	0.00	0.00	0.00	77.34	363.60	681.16	(98)
Space heating (main system 1)	904.13	510.94	246.23	54.58	8.63	0.00	0.00	0.00	0.00	110.48	519.42	973.09	(210)

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(64)
Efficiency of water heater (%)	67.19	66.22	64.30	61.58	60.29	60.00	60.00	60.00	60.00	62.68	66.19	67.39	(217)
Water heating fuel	314.80	281.39	303.94	283.98	283.81	254.24	243.61	268.09	267.86	289.33	290.37	306.17	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	3,327.50	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	3,387.61	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	255.24	(231)
Electricity for lighting	428.40	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	7,473.74	(238)

10a. Fuel costs using Table 12 prices

	kWh/year	£/kWh	£/year	
Space heating - main system 1	3,327.50	3.48	115.80	(240)
Space heating - main system 2	0.00	-	0.00	(241)
Space heating - secondary system	0.00	-	0.00	(242)
Water heating	3,387.61	3.48	117.89	(247)
Space cooling	0.00	-	0.00	(248)
Pumps and fans	75.00	13.19	9.89	(249)
Mechanical ventilation	255.24	13.19	33.67	(249)
Energy for lighting	428.40	13.19	56.51	(250)
Additional standing charges			120	(251)
Photovoltaics	0.00	-	0.00	(252)
Micro wind turbines	0.00	-	0.00	(252)
Hydroelectric energy	0.00	-	0.00	(252)
mCHP	0.00	-	0.00	(252)
Total energy cost			453.75	(255)

11a. SAP Rating

Energy cost deflator	0.42	(256)
Energy cost factor (ECF)	1.23	(257)
SAP value	82.89	
SAP rating	83	(258)
SAP band	B	

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	3,327.50	0.216	718.74	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	3,387.61	0.216	731.72	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	255.24	0.519	132.468522	(267)
Energy for lighting	428.40	0.519	222.34	(268)
Photovoltaics	0.00	0.529	0.00	

Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00	0.529	0.00	(269)
Total kg/year			1,844.19	(272)
CO2 emissions per m²			16.71	(273)
EI value			84.10	(274)
EI rating			84	(274)
EI band			B	

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of EPC Costs, Emissions and Primary Energy
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: LEAN_Finchley top Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.17	0.17	0.17	0.15	0.15	0.14	0.14	0.14	0.14	0.15	0.15	0.16	(22b)
Effective ach	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.33	0.33	0.34	0.33	0.35	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45			-	-		
Floor	63.66		0.00	63.66		-	-			30	1909.8 (26-33)		
ext wall	195.39		57.37	138.02		0.20	27.6034			30	4140.51 (26-33)		
ceiling	66.96		0.00	66.96		0.12	8.03544			30	2008.86 (26-33)		
TMP											250.00 (35)		
Thermal bridges							0.08				(36)		
Total fabric heat loss										96.17	(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	129.96	129.61	129.26	128.21	128.21	126.80	127.15	126.80	126.80	127.85	127.50	128.91	(39)
HLP	1.18	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.15	1.16	1.16	1.17	(40)
HLP (average)												1.16	(40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Average daily water use (litres/day)	101.11											(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume	150.00											(50)	
Store loss factor (kWh/litre/day)												(51)	
Volume factor												(52)	
Temperature factor	0.54											(53)	
Energy lost from store in kWh/day	0.75											(55)	
Storage loss	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(57)
Storage loss (solar store)	23.34	21.08	23.34	22.58	23.34	22.58	23.34	23.34	22.58	23.34	22.58	23.34	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(64)
Total water output												2,139.44	(64)
Heat gains (kWh)	92.12	81.63	86.77	79.23	78.68	71.80	70.39	75.27	74.52	82.08	84.98	90.39	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	(66)
Lighting	60.65	53.86	43.81	33.16	24.79	20.93	22.61	29.39	39.45	50.09	58.47	62.33	(67)
Appliances	406.12	410.33	399.72	377.11	348.57	321.75	303.83	299.61	310.23	332.83	361.37	388.19	(68)
Cooking	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	123.81	121.48	116.63	110.04	105.75	99.73	94.60	101.17	103.50	110.32	118.03	121.49	(72)
Total internal	704.64	699.74	674.21	634.37	593.18	556.47	535.11	544.23	567.24	607.31	651.93	686.07	(73)
Solar gains	532.92	862.04	1,296.59	1,831.17	2,133.30	2,320.64	2,207.32	1,971.64	1,605.70	1,074.98	669.39	441.29	(83)
Total gains	1,237.56	1,561.78	1,970.80	2,465.54	2,726.48	2,877.11	2,742.43	2,515.87	2,172.94	1,682.30	1,321.32	1,127.36	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.97	0.91	0.77	0.55	0.36	0.21	0.13	0.15	0.32	0.65	0.91	0.98	(86)
Util elsewhere	0.96	0.89	0.73	0.50	0.31	0.16	0.08	0.09	0.26	0.59	0.88	0.97	(89)
Living area fraction												0.68	(91)
Util overall	0.95	0.89	0.75	0.52	0.34	0.19	0.10	0.12	0.29	0.62	0.89	0.97	(94)
Space heating kWh	526.30	307.40	121.87	19.93	2.07	0.00	0.00	0.00	0.00	35.92	251.88	575.51	(98)
Total space heating requirement kWh												1,840.87	(98)
Space heating requirement per m ²												16.68	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												70.0	(206)
Efficiency of main system 2 (%)													(207)
Efficiency of secondary system (%)												0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	526.30	307.40	121.87	19.93	2.07	0.00	0.00	0.00	0.00	35.92	251.88	575.51	(98)
Space heating (main system 1)	751.86	439.14	174.09	28.47	2.95	0.00	0.00	0.00	0.00	51.31	359.83	822.16	(210)

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Flue gas heat rec.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	eq.(G6)
Water heating requirement	211.53	186.34	195.45	174.87	171.12	152.55	146.17	160.86	160.72	181.34	192.18	206.32	(64)
Efficiency of water heater (%)	66.81	65.86	63.48	60.89	60.10	60.00	60.00	60.00	60.00	61.45	65.29	67.05	(217)
Water heating fuel	316.62	282.94	307.88	287.19	284.71	254.24	243.61	268.09	267.86	295.10	294.35	307.71	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	2,629.82	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	3,410.32	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	255.24	(231)
Electricity for lighting	428.40	(232)
<u>Energy saving / generation technologies</u>		
Energy generated by PVs	0.00	(233)
Energy generated by wind turbine	0.00	(234)
mCHP	0.00	(235)
Hydroenergy	0.00	(235a)
Total delivered energy for all uses	6,798.77	(238)

10a. Fuel costs using PCDF prices (rev: 503)

	kWh/year	£/kWh	£/year	
Space heating - main system 1	2,629.82	3.63	95.46	(240)
Space heating - main system 2	0.00	-	0.00	(241)
Space heating - secondary system	0.00	-	0.00	(242)
Water heating	3,410.32	3.63	123.79	(247)
Space cooling	0.00	-	0.00	(248)
Pumps and fans	75.00	19.44	14.58	(249)
Mechanical ventilation	255.24	19.44	49.62	(249)
Energy for lighting	428.40	19.44	83.28	(250)
Additional standing charges			95	(251)
Photovoltaics	0.00	-	0.00	(252)
Micro wind turbines	0.00	-	0.00	(252)
Hydroelectric energy	0.00	-	0.00	(252)
mCHP	0.00	-	0.00	(252)
Total energy cost			461.74	(255)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	2,629.82	0.216	568.04	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	3,410.32	0.216	736.63	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	255.24	0.519	132.468522	(267)
Energy for lighting	428.40	0.519	222.34	(268)
Photovoltaics	0.00	0.529	0.00	
Micro wind turbines	0.00	0.529	0.00	
Hydroelectric energy	0.00	0.529	0.00	
mCHP	0.00	0.529	0.00	(269)
Total kg/year			1,698.40	(272)

13. Primary energy

	kWh/year	Primary factor	Primary energy kWh/year	
Space heating - main system 1	2,629.82	1.22	3,208.38	(261)
Space heating - main system 2	0.00		0.00	(262)
Space heating - secondary system	0.00	0	0.00	(263)
Water heating	3,410.32	1.22	4,160.59	(264)
Space cooling	0.00	3.07	0	(266)
Pumps and fans	75.00	3.07	230.25	(267)
Mechanical ventilation	255.24	3.07	783.58066	(267)
Energy for lighting	428.40	3.07	1,315.18	(268)
Photovoltaics	0.00	3.07		(269)
Micro wind turbines	0.00	3.07		(269)
Hydroelectric energy	0.00	3.07		(269)
mCHP	0.00	3.07	0.00	(269)
Primary energy kWh/year			9,697.98	(272)
Primary energy kWh/m ² /year			87.86	(273)



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN_Finchley Basement Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
Region: Thames
Postcode: NW3 6EP
UPRN: 0000000000
RRN: (not assigned)
Date of assessment: 16 June 2022
Tenure: Owner-occupied
Date of certificate: 15 August 2022
Assessment type: New dwelling as designed
Transaction type: New dwelling
Year completed: 2018
Related Party Disclosure: No related party
PCDF revision number: 503

Property description

Dwelling type: Flat
Detachment: Semi-detached
Number of dwellings above: 5
Number of dwellings below: 0

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	55.32	2.50	138.30	Yes
2	30.55	2.50	76.38	-

Living area: 100.00 %
Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	West	9.44	1.00

Overshading: More than average

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value
1	basementfloor	55.32	-	55.32	0.13	30
1 from below	basementfloor	55.32	-	55.32	-	30

ceiling	partyceiling	30.55	-	30.55	-	30
party	party wall	119.03	-	119.03	-	30
ext wall	wall	60.06	9.44	50.62	0.20	30

Thermal bridges:

User-defined (individual ϕ -values)

Junction	Length	ϕ -value	Source of data
Exposed floor (normal)	8.00	0.320	default detail

Thermal mass

Calculated from κ values (see exposed elements table)

Ventilation

Pressure test:	Yes (design value)
Ventilation:	Balanced with heat recovery (MVHR) (Appendix Q datasheet)
Brand/Model:	Nuaire
Approved installation scheme?	Yes
Duct type:	Rigid
SFP:	0.59
Wet rooms:	Kitchen + 3
Duct insulation:	Not insulated
Efficiency (%):	89
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	0
Number of passive stacks:	0
Number of sides sheltered:	4
q50:	3.00

Main heating system

Community heating scheme

Fraction of primary space heating provided: 1

CHP Heat source: CHP (Mains gas) Efficiency: 44% Fraction: 0.6 Power efficiency: 20%
 BOILERS Heat source: Boiler (Mains gas) Efficiency: 95% Fraction: 0.4
 Distribution loss factor: Piping system $\geq$ 1991, pre-insulated, medium temp, variable flow
 Radiators

Main heating controls

Charging system linked to use of community heating, programmer and TRVs

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system

Solar panel: No

Other information

Water use $\leq$ 125 litres/person/day Yes
 Electricity tariff: Standard tariff
 Conservatory: No conservatory

Photovoltaics: None

Terrain type: Dense urban
 Wind turbine? No

Special feature (App. Q) No

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2

Regulations: Approved Document L1A, 2013 Edition, England

SAP 2012 = B 87 | EI 2012 = B 89 | DFEE = 28.31 | TFEE = 34.57 | DER = 13.84 | TER = 14.87

Heat demand kWh: space 458 water space 2147

Weather data for: postcode NW3

PCDF revision number: 503 (31 July 2022)

External Definitions revision number: 5.0 (11 June 2014)

Applicable recommendations: None

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
 Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

CLEAN_Finchley Basement Reduced Window Areas

Dwelling type: Semi-detached Flat Ground-floor
 Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation not possible.
 Region: Thames
 Front of dwelling faces: Unknown or unspecified
 Overshading: More than average
 Overhangs: see below
 Thermal mass parameter: 108.6 (calculated from construction elements)
 Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
 Ventilation rate during hot weather: 4 (Windows fully open)

Summer ventilation heat loss coefficient: 283.37 (P1)
 Transmission heat loss coefficient: 27.34 (37)
 Summer heat loss coefficient: 310.71 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
West	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
West	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	341	321	283	(P3)
Internal gains:	547	525	534	
Total summer gains:	888	847	817	(P5)
Solar gain/loss ratio:	2.86	2.73	2.63	(P6)
Threshold temperature:	20.10	21.87	21.67	
Likelihood of high internal temperature	Not significant	Slight	Slight	(P7)

Assessment of likelihood of high internal temperature: Slight



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: CLEAN_Finchley Basement Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Ground-floor flat , total floor area 86m²

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

1 TER and DER

Fuel for main heating: Mains gas (community)

Fuel factor: 1.00 (Gas)

Target Carbon Dioxide Emission Rate (TER): 14.87kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 13.84kg/m²

Result: OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 34.6kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 28.3kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.20 (max 0.30)	0.20 (max 0.70)	OK
Party wall	0.00 (max 0.20)	0.00 (no max)	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.10 (max 2.00)	1.10 (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: 10.00

OK

4 Heating efficiency

Main heating system : Community heating scheme

Secondary heating
No secondary system specified

5 Cylinder insulation

Hot water storage:
No cylinder

Solar hot water cylinder: No solar water heating

6 Controls

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

Hot water controls:
No cylinder

7 Low energy lights

Percentage of lights with low-energy fittings: 100%

Minimum: 75% - OK

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.59 W/(l/s)

Maximum: 1.5 W/(l/s)

Efficiency: 89% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Slight - OK

Based on:

Overshading: More than average

Air change rate: 4

Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

Opening U-value: 1.10W/m²K

Party wall U-value: 0.00W/m²K

Thermal bridging ψ -value is 0.001W/m²K

Design air permeability is 3.00m³/h.m²

CHP community heating

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.13	0.13	0.13	0.12	0.11	0.10	0.10	0.10	0.11	0.11	0.12	0.12	(22b)
Effective ach	0.32	0.32	0.32	0.30	0.30	0.29	0.29	0.29	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-		-		9.44	1.05	9.95		-		-		
1	55.32		0.00		55.32	0.13	7.1916		30		1659.6	(26-33)	
ext wall	60.06		9.44		50.62	0.20	10.124		30		1518.6	(26-33)	
party	119.03		0.00		119.03	-	-		30		3570.9	(26-33)	
ceiling	30.55		0.00		30.55	-	-		30		916.5	(26-33)	
TMP											108.60	(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									27.34			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	50.18	49.99	49.81	48.88	48.69	47.76	47.76	47.58	48.13	48.69	49.06	49.44	(39)
HLP	0.58	0.58	0.58	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.57	0.58	(40)
HLP (average)												0.57	(40)

4. Water heating energy requirements

Assumed occupancy:												2.56	(42)
Average daily water use (litres/day)												95.12	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	104.63	100.82	97.02	93.21	89.41	85.60	85.60	89.41	93.21	97.02	100.82	104.63	(44)
Energy content	155.16	135.70	140.03	122.08	117.14	101.09	93.67	107.49	108.77	126.76	138.37	150.26	(45)
Distribution loss	23.27	20.36	21.01	18.31	17.57	15.16	14.05	16.12	16.32	19.01	20.76	22.54	(46)
Store volume										110.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										1.03			(52)
Temperature factor										0.60			(53)
Energy lost from store in kWh/day										1.03			(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	210.44	185.63	195.31	175.58	172.42	154.58	148.95	162.77	162.27	182.04	191.87	205.54	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	210.44	185.63	195.31	175.58	172.42	154.58	148.95	162.77	162.27	182.04	191.87	205.54	(64)
Total water output												2,147.38	(64)
Heat gains (kWh)	95.81	85.06	90.78	83.39	83.17	76.41	75.37	79.96	78.96	86.37	88.80	94.18	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	(66)
Lighting	22.07	19.61	15.94	12.07	9.02	7.62	8.23	10.70	14.36	18.23	21.28	22.69	(67)
Appliances	231.27	233.67	227.62	214.75	198.50	183.22	173.02	170.62	176.66	189.54	205.79	221.06	(68)
Cooking	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	(71)
Water heating	128.78	126.58	122.02	115.82	111.79	106.12	101.30	107.47	109.67	116.09	123.34	126.59	(72)
Total internal	443.60	441.33	427.06	404.11	380.78	358.43	344.02	350.26	362.17	385.33	411.88	431.81	(73)
Solar gains	53.19	104.06	171.37	249.93	306.30	313.55	298.51	256.42	199.31	123.47	66.33	43.74	(83)
Total gains	496.79	545.39	598.43	654.04	687.08	671.98	642.53	606.68	561.47	508.80	478.21	475.56	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.96	0.94	0.88	0.78	0.62	0.45	0.33	0.36	0.57	0.82	0.93	0.96	(86)
Util elsewhere	0.95	0.93	0.87	0.75	0.59	0.41	0.29	0.32	0.53	0.80	0.92	0.96	(89)
Living area fraction												1.00	(91)
Util overall	0.95	0.93	0.87	0.77	0.62	0.45	0.33	0.36	0.57	0.81	0.92	0.96	(94)
Space heating kWh	239.69	177.54	130.66	56.95	18.61	0.00	0.00	0.00	0.00	62.58	153.64	246.31	(98)
Total space heating requirement kWh												1,085.98	(98)
Space heating requirement per m ²												12.65	(99)

9b. Energy requirements

Fraction of space heat from secondary system		0	(301)
Fraction of space heat from community system		1	(302)
Fraction of community heat from CHP		0.6	(303a)
Fraction of community heat from BOILERS		0.4	(303b)
Fraction of total space heat from CHP		0.6	(304a)
Fraction of total space heat from BOILERS		0.4	(304b)
Factor for control and charging method for community space heating		1	(305)
Factor for charging method for community water heating		1	(305a)
Distribution loss factor for community heating system		1.1	(306)
Space heating			
Annual space heating requirement		1,085.98	(98)
Space heat from boilers		477.83	(307)

Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	716.75	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,147.38	(64)
Water heat from boilers	944.85	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,417.27	(310)
Other energy		
Electrical energy for heat distribution	35.57	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	193.15	(330)
Cooling energy	0	(330)
Electricity for lighting	389.82	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		1,628.97	0.216	351.858	(363)
less credit emissions for electricity		-325.79	0.5190	-169.087	(364)
Space heating from boilers	95.00	502.98	0.216	108.644	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,221.07	0.216	695.751	(363)
less credit emissions for electricity		-644.21	0.5190	-334.347	(364)
Water heating from boilers	95.00	994.58	0.216	214.828	(340)
Electrical energy for heat distribution		35.57	0.519	18.459	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		193.15	0.519	100.247	(378)
Lighting energy		389.82	0.519	202.316	(379)
Energy generated by PVs		0.00	0.529	0.000	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				1,188.669	(383)
				kg/m ² /year	
Dwelling Carbon Dioxide Emission Rate (DER)				13.84	(384)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
q50	5		
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.41	0.41	0.36	0.36	0.31	0.31	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)		A*U (W/K)		κ (kJ/m ² K)		A*κ (kJ/K)		
Door	-		-	0.00				0.00		-		-		(26)
Windows	-		-	9.44		1.33		12.52		-		-		(27)
Ground floor	-		-	0.00		0.13		0.00		-		-		(28a)
Walls	60.06		9.44	50.62		0.18		9.11		-		-		(29a)
Roof	-		-	0.00		0.13		0.00		-		-		(30)
Total area of external elements				60.06										(31)
Fabric heat loss								21.63						(33)
TMP												250.00		(35)
Thermal bridges						2.56								(36)
Total fabric heat loss								24.19						(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Ventilation heat loss	41.74	41.50	41.26	40.13	39.91	38.93	38.93	38.75	39.31	39.91	40.34	40.79	(38)	
Heat transfer	65.93	65.68	65.44	64.31	64.10	63.12	63.12	62.93	63.50	64.10	64.53	64.98	(39)	
HLP	0.77	0.76	0.76	0.75	0.75	0.74	0.74	0.73	0.74	0.75	0.75	0.76	(40)	

4. Water heating energy requirements

Assumed occupancy:												2.56	(42)
Average daily water use (litres/day)												95.12	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	104.63	100.82	97.02	93.21	89.41	85.60	85.60	89.41	93.21	97.02	100.82	104.63	(44)
Energy content	155.16	135.70	140.03	122.08	117.14	101.09	93.67	107.49	108.77	126.76	138.37	150.26	(45)
Distribution loss	23.27	20.36	21.01	18.31	17.57	15.16	14.05	16.12	16.32	19.01	20.76	22.54	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										0.93			(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										1.44			(55)
Storage loss	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	201.76	177.79	186.63	167.18	163.74	146.18	140.27	154.08	153.87	173.36	183.47	196.86	(64)
Total water output												2,443.29	(64)
Heat gains (kWh)	88.87	78.79	83.84	76.67	76.23	69.69	68.42	73.02	72.24	79.43	82.08	87.24	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	(66)
Lighting	24.40	21.67	17.62	13.34	9.97	8.42	9.10	11.82	15.87	20.15	23.52	25.07	(67)
Appliances	231.27	233.67	227.62	214.75	198.50	183.22	173.02	170.62	176.66	189.54	205.79	221.06	(68)
Cooking	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	(71)
Water heating	119.45	117.25	112.69	106.48	102.46	96.79	91.97	98.14	100.33	106.76	114.00	117.26	(72)
Total internal	439.59	437.06	422.41	399.05	375.40	352.90	338.55	345.06	357.34	380.92	407.79	427.87	(73)
Solar gains	39.74	77.73	128.02	186.70	228.81	234.23	223.00	191.55	148.89	92.24	49.55	32.68	(83)
Total gains	479.32	514.80	550.42	585.75	604.21	587.13	561.55	536.61	506.23	473.15	457.33	460.55	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												1.00	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	427.40	337.85	277.83	143.58	49.40	0.00	0.00	0.00	0.00	142.78	293.98	434.09	(98)
Total space heating requirement kWh												2,106.91	(98)
Space heating requirement per m ²												24.54	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												93.5	(206)
Efficiency of main system 2 (%)												0.0	(207)
Efficiency of secondary system (%)												100	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	427.40	337.85	277.83	143.58	49.40	0.00	0.00	0.00	0.00	142.78	293.98	434.09	(98)

Space heating (main system 1)	457.11	361.34	297.14	153.56	52.83	0.00	0.00	0.00	0.00	152.71	314.42	464.27	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	201.76	177.79	186.63	167.18	163.74	146.18	140.27	154.08	153.87	173.36	183.47	196.86	(64)
Efficiency of water heater (%)	86.77	86.50	85.87	84.41	82.05	79.80	79.80	79.80	79.80	84.30	86.07	86.87	(217)
Water heating fuel	232.52	205.54	217.33	198.05	199.56	183.18	175.77	193.09	192.81	205.64	213.17	226.62	(219)
Annual totals (kWh/year):													
Space heating fuel used, main system 1										2,253.38			(211)
Space heating fuel used, main system 2										0.00			(212)
Space heating fuel used, secondary system										0.00			(215)
Water heating fuel										2,443.29			(219)
Cooling energy										0.00			(221)
Electricity for pumps and fans										75.00			(231)
Electricity for ventilation										0.00			(231)
Electricity for lighting										430.85			(232)
Total delivered energy for all uses										5,127.52			(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	2,253.38	0.216	486.73	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,443.29	0.216	527.75	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	430.85	0.519	223.61	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,277.02	(272)
Emissions per m ² for space and water heating			11.81	(272a)
Emissions per m ² for lighting			2.60	(272b)
Emissions per m ² for pumps and fans			0.45	(272c)
Target Carbon Dioxide Emission Rate (TER)			14.87	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.20	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.20	0.22	0.23	0.24	(22b)
Effective ach	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.53	0.53	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)	A*U (W / K)	κ (kJ/m ² K)	A*κ (kJ/K)						
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05	9.95	-	-						
1	55.32	0.00	55.32	0.13	7.1916	30	1659.6	(26-33)					
ext wall	60.06	9.44	50.62	0.20	10.124	30	1518.6	(26-33)					
party	119.03	0.00	119.03	-	-	30	3570.9	(26-33)					
ceiling	30.55	0.00	30.55	-	-	30	916.5	(26-33)					
TMP							108.60	(35)					
Thermal bridges					0.08			(36)					
Total fabric heat loss						27.34		(37)					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	65.13	65.04	64.95	64.53	64.45	64.08	64.08	64.01	64.22	64.45	64.61	64.78	(39)
HLP	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	(40)
HLP (average)												0.75	(40)

4. Water heating energy requirements

File name: CLEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	593.30	467.06	478.30	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.95	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	563.94	458.73	465.68	-	-	-	-	(102)
Gains W	-	-	-	-	-	732.24	701.06	667.47	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	121.18	180.29	150.14	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	30.29	45.07	37.53	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.14	(8)
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.41	0.41	0.36	0.36	0.31	0.31	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	9.44	1.33	12.52	-	-	(27)

SAP 2012 worksheet (Version 9.92, October 2013)
 Calculation of Heat Demand
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN_Finchley Basement Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.12	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.10	0.11	(22b)
Effective ach	0.31	0.31	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	49.25	49.06	48.88	48.32	48.32	47.58	47.76	47.58	47.58	48.13	47.95	48.69	(39)
HLP	0.57	0.57	0.57	0.56	0.56	0.55	0.56	0.55	0.55	0.56	0.56	0.57	(40)
HLP (average)												0.56	(40)

4. Water heating energy requirements

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.13	0.13	0.13	0.12	0.11	0.10	0.10	0.10	0.11	0.11	0.12	0.12	(22b)
Effective ach	0.32	0.32	0.32	0.30	0.30	0.29	0.29	0.29	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	50.18	49.99	49.81	48.88	48.69	47.76	47.76	47.58	48.13	48.69	49.06	49.44	(39)
HLP	0.58	0.58	0.58	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.57	0.58	(40)
HLP (average)												0.57	(40)

4. Water heating energy requirements

Assumed occupancy:												2.56	(42)
Average daily water use (litres/day)												95.12	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	104.63	100.82	97.02	93.21	89.41	85.60	85.60	89.41	93.21	97.02	100.82	104.63	(44)
Energy content	155.16	135.70	140.03	122.08	117.14	101.09	93.67	107.49	108.77	126.76	138.37	150.26	(45)
Distribution loss	23.27	20.36	21.01	18.31	17.57	15.16	14.05	16.12	16.32	19.01	20.76	22.54	(46)
Store volume										110.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										1.03			(52)
Temperature factor										0.60			(53)
Energy lost from store in kWh/day										1.03			(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	210.44	185.63	195.31	175.58	172.42	154.58	148.95	162.77	162.27	182.04	191.87	205.54	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	210.44	185.63	195.31	175.58	172.42	154.58	148.95	162.77	162.27	182.04	191.87	205.54	(64)
Total water output												2,147.38	(64)
Heat gains (kWh)	95.81	85.06	90.78	83.39	83.17	76.41	75.37	79.96	78.96	86.37	88.80	94.18	(65)

5. Internal gains / 6. Solar gains (in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	153.89	(66)
Lighting	53.15	47.20	38.39	29.06	21.73	18.34	19.82	25.76	34.57	43.90	51.24	54.62	(67)
Appliances	345.18	348.76	339.74	320.52	296.27	273.47	258.24	254.65	263.68	282.89	307.15	329.94	(68)
Cooking	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	52.95	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	(71)
Water heating	128.78	126.58	122.02	115.82	111.79	106.12	101.30	107.47	109.67	116.09	123.34	126.59	(72)
Total internal	631.36	626.80	604.40	569.65	534.03	502.18	483.61	492.14	512.17	547.13	585.97	615.41	(73)
Solar gains	69.08	135.14	222.55	324.58	397.79	407.20	387.68	333.01	258.84	160.35	86.14	56.81	(83)
Total gains	700.44	761.94	826.95	894.23	931.82	909.39	871.28	825.15	771.01	707.48	672.11	672.22	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.88	0.84	0.76	0.62	0.48	0.33	0.24	0.26	0.43	0.66	0.82	0.89	(86)
Util elsewhere	0.87	0.82	0.74	0.60	0.45	0.31	0.21	0.23	0.39	0.64	0.81	0.88	(89)
Living area fraction												1.00	(91)
Util overall	0.87	0.83	0.75	0.62	0.48	0.33	0.24	0.26	0.42	0.66	0.82	0.88	(94)
Space heating kWh	149.72	103.12	67.06	23.92	6.56	0.00	0.00	0.00	0.00	26.78	85.38	155.94	(98)
Total space heating requirement kWh												618.48	(98)
Space heating requirement per m ²												7.20	(99)

9b. Energy requirements

Fraction of space heat from secondary system		0	(301)
Fraction of space heat from community system		1	(302)
Fraction of community heat from CHP		0.6	(303a)
Fraction of community heat from BOILERS		0.4	(303b)
Fraction of total space heat from CHP		0.6	(304a)
Fraction of total space heat from BOILERS		0.4	(304b)
Factor for control and charging method for community space heating		1	(305)
Factor for charging method for community water heating		1	(305a)
Distribution loss factor for community heating system		1.1	(306)
Space heating			
Annual space heating requirement		618.48	(98)
Space heat from boilers		272.13	(307)

Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	408.20	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,147.38	(64)
Water heat from boilers	944.85	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,417.27	(310)
Other energy		
Electrical energy for heat distribution	30.42	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	193.15	(330)
Cooling energy	0	(330)
Electricity for lighting	375.42	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

10b. Fuel costs - community heating scheme

	kWh/year	£/kWh	£/year	
Space heating from CHP	408.20	2.97	12.12	(340)
Space heating from boilers	272.13	4.24	11.54	(340)
Space heating (secondary)	0.00	-	0.00	(341)
Water heating from CHP	1,417.27	2.97	42.09	(342)
Water heating from boilers	944.85	4.24	40.06	(342)
Pump/fan energy	0.00	-	0.00	(349)
Mechanical ventilation	193.15	13.19	25.48	(349)
Lighting energy	375.42	13.19	49.52	(350)
Additional standing charges			120	(351)
Energy generated by PVs	0.00		0.00	(352)
Energy generated by wind turbine	0.00		0.00	(353)
Energy generated by hydro energy	0.00		0.00	(353)
Energy generated by other technologies	0.00		0.00	(354)
Total energy cost			300.81	(355)

11b. SAP rating

Energy cost deflator	0.47	(356)
Energy cost factor (ECF)	0.00	(357)
SAP value	0.00	
SAP rating	0	(358)
SAP band		

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		927.72	0.216	200.387	(363)
less credit emissions for electricity		-185.54	0.5190	-96.297	(364)
Space heating from boilers	95.00	286.45	0.216	61.874	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,221.07	0.216	695.751	(363)
less credit emissions for electricity		-644.21	0.5190	-334.347	(364)
Water heating from boilers	95.00	994.58	0.216	214.828	(340)
Electrical energy for heat distribution		30.42	0.519	15.790	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		193.15	0.519	100.247	(378)

Lighting energy	375.42	0.519	194.843	(379)
Energy generated by PVs	0.00	0.529	0.000	(380)
Energy generated by wind turbine	0.00	0.529	0.000	(381)
Energy generated by hydro energy	0.00	0.529	0.000	(381)
Energy generated by other technologies	0.00		0.000	(382)
Total kg/year			1,053.076	(383)

			kg / m ² / year	
CO2 emissions per m ²			12.26	(384)
EI Value			0.00	(384a)
EI rating			0	(385)
EI band				

13b. Primary energy

	Efficiency	kWh / year	Primary factor	kWh / year	
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		927.72	1.220	1,131.817	(363)
less credit emissions for electricity		-185.54	2.920	-569.619	(364)
Space heating from boilers	95.00	286.45	1.220	349.473	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,221.07	1.220	3,929.704	(363)
less credit emissions for electricity		-644.21	2.920	-1,977.736	(364)
Water heating from boilers	95.00	994.58	1.220	1,213.382	(340)
Electrical energy for heat distribution		30.42	3.07	0.000	(372)
Pump/fan energy		0.00	2.920	0.000	(378)
Mechanical ventilation		193.15	2.920	0.000	(378)
Lighting energy		375.42	2.920	0.000	(379)
Energy generated by PVs		0.00	2.920	0.000	(380)
Energy generated by wind turbine		0.00	2.920	0.000	(381)
Energy generated by hydro energy		0.00	2.920	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Primary energy kWh / year				0.000	(383)
Primary energy kWh / m ² / year				0.000	(383)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of EPC Costs, Emissions and Primary Energy
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN_Finchley Basement Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.12	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.10	0.11	(22b)
Effective ach	0.31	0.31	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	49.25	49.06	48.88	48.32	48.32	47.58	47.76	47.58	47.58	48.13	47.95	48.69	(39)
HLP	0.57	0.57	0.57	0.56	0.56	0.55	0.56	0.55	0.55	0.56	0.56	0.57	(40)
HLP (average)												0.56	(40)

4. Water heating energy requirements

Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	302.33	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,147.38	(64)
Water heat from boilers	944.85	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,417.27	(310)
Other energy		
Electrical energy for heat distribution	28.66	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	193.15	(330)
Cooling energy	0	(330)
Electricity for lighting	375.42	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		687.11	0.216	148.416	(363)
less credit emissions for electricity		-137.42	0.5190	-71.322	(364)
Space heating from boilers	95.00	212.16	0.216	45.827	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,221.07	0.216	695.751	(363)
less credit emissions for electricity		-644.21	0.5190	-334.347	(364)
Water heating from boilers	95.00	994.58	0.216	214.828	(340)
Electrical energy for heat distribution		28.66	0.519	14.875	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		193.15	0.519	100.247	(378)
Lighting energy		375.42	0.519	194.843	(379)
Energy generated by PVs		0.00	0.529	0.000	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				1,009.117	(383)

	kg/m ² /year	
CO2 emissions per m ²	11.75	(384)
EI Value	0.00	(384a)
EI rating	0	(385)
EI band		



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
Region: Thames
Postcode: NW3 6EP
UPRN: 0000000000
RRN: (not assigned)
Date of assessment: 16 June 2022
Tenure: Owner-occupied
Date of certificate: 15 August 2022
Assessment type: New dwelling as designed
Transaction type: New dwelling
Year completed: 2018
Related Party Disclosure: No related party
PCDF revision number: 503

Property description

Dwelling type: Flat
Detachment: Semi-detached
Number of dwellings above: 4
Number of dwellings below: 2

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	74.60	2.57	191.72	-

Living area: 100.00 %
Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	North	6.94	1.00
Finchley Window_updated 22.06.08	ext wall	East	6.65	1.00
Finchley Window_updated 22.06.08	ext wall	South	14.38	1.00

Overshading: Average or unknown

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value
ceiling	partyceiling	74.60	-	74.60	-	30

Floor	partyfloor	74.60	-	74.60	-	30
Floor from below	partyfloor	74.60	-	74.60	-	30
ext wall	wall	105.04	27.97	77.07	0.13	30

Thermal bridges:

Default (y = 0.15)

Thermal mass

TMP = 250kJ/m²K

Ventilation

Pressure test: Yes (design value)

Ventilation: Balanced with heat recovery (MVHR) (database revision 503, product index 500569)

Brand/Model: The Nuaire Group: Nuaire MRXBOXAB-ECO-LP2

Approved installation scheme? No

Duct type: Rigid

SFP: 0.61

Wet rooms: Kitchen + 2

Duct insulation: Insulated

Efficiency (%): 79

Number of chimneys: 0

Number of open flues: 0

Number of intermittent fans: 0

Number of passive stacks: 0

Number of sides sheltered: 2

q50: 3.00

Main heating system

Community heating scheme

Fraction of primary space heating provided: 1

CHP Heat source: CHP (Mains gas) Efficiency: 63.4% Fraction: 0.6 Power efficiency: 28.8%

BOILERS Heat source: Boiler (Mains gas) Efficiency: 95% Fraction: 0.4

Distribution loss factor: Piping system >= 1991, pre-insulated, medium temp, variable flow

Radiators

Main heating controls

Flat rate charging, programmer and TRVs

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system

Cylinder volume: 150l

Insulation: 150mm factory insulated

Cylinder in heated space

Water separately timed

Primary pipework: Fully insulated

Cylinderstat

Solar panel: No

Other information

Water use <= 125 litres/person/day Yes

Electricity tariff: Standard tariff

Conservatory: Separated heated conservatory

Photovoltaics: None

Dense urban

Wind turbine?

Terrain type:
No

Special feature (App. Q)

No

Total fixed lighting outlets:

30

Low energy fixed lighting outlets:

30 (= 100% of total outlets)

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2

Regulations: Approved Document L1A, 2013 Edition, England

SAP 2012 = B 85 | EI 2012 = B 91 | DFEE = 41.59 | TFEE = 46.18 | DER = 12.79 | TER = 17.25

Heat demand kWh: space 737 water space 2068

Weather data for: postcode NW3

PCDF revision number: 503 (31 July 2022)

External Definitions revision number: 5.0 (11 June 2014)

Applicable recommendations: None

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.



SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

CLEAN of Finchley 3rd Reduced Window Areas

Dwelling type: Semi-detached Flat Mid-floor
Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation possible.
Region: Thames
Front of dwelling faces: Unknown or unspecified
Overshading: Average or unknown
Overhangs: see below
Thermal mass parameter: 250.0 (global variable applied)
Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
Ventilation rate during hot weather: 6 (Windows fully open)

Summer ventilation heat loss coefficient: 379.61 (P1)
Transmission heat loss coefficient: 55.25 (37)
Summer heat loss coefficient: 434.85 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
North	-	1.00	None
East	-	1.00	None
South	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
North	1.00	1.00	1.00	1.00	(P8)
East	1.00	1.00	1.00	1.00	(P8)
South	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	902	857	793	(P3)
Internal gains:	496	478	486	
Total summer gains:	1,398	1,335	1,280	(P5)
Solar gain/loss ratio:	3.22	3.07	2.94	(P6)
Threshold temperature:	19.47	21.22	20.99	
Likelihood of high internal temperature	Not significant	Slight	Slight	(P7)

Assessment of likelihood of high internal temperature: Slight

This SAP software supplied by Energy Design Tools is currently undergoing approval from the BRE and by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Mid-floor flat , total floor area 75m²

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

1 TER and DER

Fuel for main heating: Mains gas (community)

Fuel factor: 1.00 (Gas)

Target Carbon Dioxide Emission Rate (TER): 17.25kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 12.79kg/m²

Result: OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 46.2kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 41.6kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.13 (max 0.30)	0.13 (max 0.70)	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.10 (max 2.00)	1.10 (max 3.30)	OK

2a Thermal bridging

Default y-value of 0.15

Note: Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 3.00 (design value)

Maximum: 10.00

OK

4 Heating efficiency

Main heating system : Community heating scheme

Secondary heating
No secondary system specified

5 Cylinder insulation

Hot water storage:
No cylinder

Solar hot water cylinder: No solar water heating

6 Controls

Space heating controls : Flat rate charging, programmer and TRVs OK

Hot water controls:
No cylinder

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.61 W/(l/s)
Maximum: 1.5 W/(l/s)
Efficiency: 79% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Slight - OK
Based on:
Overshading: Average or unknown
Air change rate: 6
Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

External wall U-value: 0.13W/m²K
Opening U-value: 1.10W/m²K
Design air permeability is 3.00m³/h.m²

CHP community heating

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	(22b)
Effective ach	0.33	0.32	0.32	0.30	0.30	0.29	0.29	0.28	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-		-		27.97	1.05	29.47		-		-		
Floor	74.60		0.00		74.60	-	-		30		2238	(26-33)	
ext wall	105.04		27.97		77.07	0.13	10.0191		30		2312.1	(26-33)	
ceiling	74.60		0.00		74.60	-	-		30		2238	(26-33)	
TMP											250.00	(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	75.92	75.72	75.52	74.51	74.31	73.30	73.30	73.10	73.70	74.31	74.71	75.12	(39)
HLP	1.02	1.02	1.01	1.00	1.00	0.98	0.98	0.98	0.99	1.00	1.00	1.01	(40)
HLP (average)												1.00	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									110.00				(50)
Store loss factor (kWh/litre/day)									0.02				(51)
Volume factor									1.03				(52)
Temperature factor									0.60				(53)
Energy lost from store in kWh/day									1.03				(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(64)
Total water output												2,068.00	(64)
Heat gains (kWh)	93.08	82.67	88.31	81.23	81.11	74.62	73.71	78.07	77.04	84.13	86.36	91.53	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	125.10	123.02	118.70	112.83	109.01	103.64	99.08	104.93	107.00	113.08	119.95	123.03	(72)
Total internal	409.70	407.70	394.88	374.19	353.21	332.94	319.72	325.48	336.07	356.96	380.99	398.97	(73)
Solar gains	251.53	429.66	591.86	741.28	838.45	836.22	804.59	731.36	643.41	475.86	301.47	215.13	(83)
Total gains	661.23	837.36	986.74	1,115.47	1,191.67	1,169.16	1,124.32	1,056.84	979.48	832.82	682.46	614.10	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.99	0.96	0.89	0.75	0.57	0.40	0.29	0.32	0.51	0.82	0.97	0.99	(86)
Util elsewhere	0.98	0.95	0.86	0.70	0.52	0.34	0.23	0.26	0.45	0.77	0.95	0.99	(89)
Living area fraction												1.00	(91)
Util overall	0.98	0.95	0.88	0.74	0.57	0.40	0.29	0.32	0.51	0.81	0.96	0.99	(94)
Space heating kWh	414.55	256.39	151.87	47.93	10.12	0.00	0.00	0.00	0.00	66.08	249.57	440.13	(98)
Total space heating requirement kWh												1,636.64	(98)
Space heating requirement per m ²												21.94	(99)

9b. Energy requirements

Fraction of space heat from secondary system		0	(301)
Fraction of space heat from community system		1	(302)
Fraction of community heat from CHP		0.6	(303a)
Fraction of community heat from BOILERS		0.4	(303b)
Fraction of total space heat from CHP		0.6	(304a)
Fraction of total space heat from BOILERS		0.4	(304b)
Factor for control and charging method for community space heating		1.05	(305)
Factor for charging method for community water heating		1.05	(305a)
Distribution loss factor for community heating system		1.1	(306)
Space heating			
Annual space heating requirement		1,636.64	(98)
Space heat from boilers		756.13	(307)
Space heat from heat pump		0.00	(307)
Space heat from geothermal heat source		0.00	(307)

Space heat from waste heat source	0.00	(307)
Space heat from CHP	1,134.19	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,068.00	(64)
Water heat from boilers	955.41	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,433.12	(310)
Other energy		
Electrical energy for heat distribution	42.79	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	199.75	(330)
Cooling energy	0	(330)
Electricity for lighting	327.14	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh / year	Emission factor	kg / year	
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		1,788.95	0.216	386.412	(363)
less credit emissions for electricity		-515.22	0.5190	-267.397	(364)
Space heating from boilers	95.00	795.92	0.216	171.920	(340)
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		2,260.45	0.216	488.256	(363)
less credit emissions for electricity		-651.01	0.5190	-337.873	(364)
Water heating from boilers	95.00	1,005.70	0.216	217.231	(340)
Electrical energy for heat distribution		42.79	0.519	22.207	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		199.75	0.519	103.671	(378)
Lighting energy		327.14	0.519	169.786	(379)
Energy generated by PVs		0.00	0.529	0.000	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				954.213	(383)
				kg / m ² / year	
Dwelling Carbon Dioxide Emission Rate (DER)				12.79	(384)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.16	(8)
q50	5		
Infiltration rate		0.41	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.35	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.35	0.37	0.39	0.41	(22b)
Effective ach	0.60	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)		A* U (W / K)		κ (kJ / m ² K)	A*κ (kJ / K)		
Door	-		-	0.00				0.00		-	-		(26)
Windows	-		-	18.65		1.33		24.73		-	-		(27)
Ground floor	-		-	0.00		0.13		0.00		-	-		(28a)
Walls	105.04		18.65	86.39		0.18		15.55		-	-		(29a)
Roof	-		-	0.00		0.13		0.00		-	-		(30)
Total area of external elements				105.04									(31)
Fabric heat loss								40.28					(33)
TMP											250.00		(35)
Thermal bridges						5.252							(36)
Total fabric heat loss								45.53					(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ventilation heat loss	37.77	37.53	37.30	36.20	36.00	35.04	35.04	34.87	35.41	36.00	36.41	36.85	(38)
Heat transfer	83.30	83.06	82.83	81.73	81.53	80.57	80.57	80.39	80.94	81.53	81.94	82.38	(39)
HLP	1.12	1.11	1.11	1.10	1.09	1.08	1.08	1.08	1.08	1.09	1.10	1.10	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)

Average daily water use (litres/day)												90.07	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										0.93			(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										1.44			(55)
Storage loss	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Total water output												2,341.90	(64)
Heat gains (kWh)	86.13	76.40	81.37	74.51	74.16	67.90	66.77	71.12	70.32	77.19	79.64	84.59	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	115.77	113.69	109.37	103.49	99.68	94.31	89.75	95.59	97.67	103.75	110.61	113.70	(72)
Total internal	403.37	401.37	388.54	367.85	346.88	326.61	313.39	319.15	329.73	350.63	374.65	392.64	(73)
Solar gains	178.65	305.17	420.38	526.51	595.53	593.94	571.48	519.46	457.00	337.99	214.13	152.80	(83)
Total gains	582.02	706.54	808.93	894.37	942.41	920.55	884.87	838.61	786.73	688.62	588.78	545.44	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												1.00	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	541.94	388.89	290.23	136.22	45.79	0.00	0.00	0.00	0.00	150.19	362.52	561.02	(98)
Total space heating requirement kWh												2,476.79	(98)
Space heating requirement per m ²												33.20	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												93.5	(206)
Efficiency of main system 2 (%)												0.0	(207)
Efficiency of secondary system (%)												100	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	541.94	388.89	290.23	136.22	45.79	0.00	0.00	0.00	0.00	150.19	362.52	561.02	(98)
Space heating (main system 1)	579.62	415.92	310.41	145.69	48.97	0.00	0.00	0.00	0.00	160.63	387.72	600.02	(210)

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Efficiency of water heater (%)	87.42	86.95	86.09	84.38	81.98	79.80	79.80	79.80	79.80	84.54	86.70	87.54	(217)
Water heating fuel	221.38	196.21	208.15	190.46	192.14	176.46	169.55	185.94	185.58	197.11	203.15	215.77	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	2,648.98	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,341.90	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	0.00	(231)
Electricity for lighting	327.14	(232)
Total delivered energy for all uses	5,318.02	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	2,648.98	0.216	572.18	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,341.90	0.216	505.85	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	327.14	0.519	169.79	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,286.74	(272)
Emissions per m ² for space and water heating			14.45	(272a)
Emissions per m ² for lighting			2.28	(272b)
Emissions per m ² for pumps and fans			0.52	(272c)
Target Carbon Dioxide Emission Rate (TER)			17.25	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.16	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.26	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.33	0.33	0.32	0.29	0.28	0.25	0.25	0.24	0.26	0.28	0.29	0.31	(22b)
Effective ach	0.56	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.53	0.54	0.54	0.55	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)						
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	27.97	1.05	29.47	-	-						
Floor	74.60	0.00	74.60	-	-	30	2238	(26-33)					
ext wall	105.04	27.97	77.07	0.13	10.0191	30	2312.1	(26-33)					
ceiling	74.60	0.00	74.60	-	-	30	2238	(26-33)					
TMP							250.00	(35)					
Thermal bridges					15.76			(36)					
Total fabric heat loss						55.25		(37)					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	90.37	90.23	90.10	89.48	89.36	88.82	88.82	88.72	89.03	89.36	89.60	89.84	(39)
HLP	1.21	1.21	1.21	1.20	1.20	1.19	1.19	1.19	1.19	1.20	1.20	1.20	(40)
HLP (average)												1.20	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(46)
Storage loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Storage loss (solar store)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(58)
Primary loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	124.89	109.23	112.71	98.27	94.29	81.37	75.40	86.52	87.55	102.03	111.38	120.95	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	124.89	109.23	112.71	98.27	94.29	81.37	75.40	86.52	87.55	102.03	111.38	120.95	(64)
Total water output												1,204.58	(64)
Heat gains (kWh)	31.22	27.31	28.18	24.57	23.57	20.34	18.85	21.63	21.89	25.51	27.84	30.24	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	41.97	40.64	37.87	34.12	31.68	28.25	25.33	29.07	30.40	34.29	38.67	40.64	(72)
Total internal	326.56	325.32	314.05	295.48	275.88	257.55	245.98	249.63	259.46	278.16	299.71	316.58	(73)
Solar gains	251.53	429.66	591.86	741.28	838.45	836.22	804.59	731.36	643.41	475.86	301.47	215.13	(83)
Total gains	578.09	754.97	905.91	1,036.77	1,114.34	1,093.77	1,050.57	980.99	902.87	754.03	601.18	531.72	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.99	0.98	0.94	0.85	0.69	0.51	0.37	0.41	0.64	0.90	0.98	1.00	(86)
Util elsewhere	0.99	0.97	0.92	0.81	0.63	0.43	0.28	0.32	0.56	0.87	0.98	0.99	(89)
Living area fraction												1.00	(91)
Util overall	0.99	0.97	0.93	0.84	0.69	0.51	0.37	0.41	0.64	0.89	0.98	0.99	(94)
Space heating kWh	618.02	428.18	305.63	137.27	44.37	0.00	0.00	0.00	0.00	169.09	419.66	647.99	(98)
Total space heating requirement kWh												2,770.21	(98)
Space heating requirement per m ²												37.13	(99)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	834.88	657.25	674.24	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.96	0.98	0.98	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	803.92	645.93	657.87	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,365.85	1,313.57	1,233.66	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	404.59	496.72	428.38	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	101.15	124.18	107.10	-	-	-	-	(100)

Space cooling (June to August) 332.42 (107)

Space cooling per m² 4.46 (108)

8f. Dwelling Fabric Energy Efficiency (kWh/m²) 41.6 (109)

SAP 2012 worksheet
Calculation of Target Fabric Energy Efficiency
Approved Document L1A, 2013 Edition, England
Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	757.36	596.22	610.99	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.95	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	718.88	582.43	591.61	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,082.67	1,041.10	985.99	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	261.93	341.25	293.42	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	65.48	85.31	73.36	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.16	(8)
Infiltration rate		0.41	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.35	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.35	0.37	0.39	0.41	(22b)
Effective ach	0.60	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	18.65	1.33	24.73	-	-	(27)
Ground floor	-	-	0.00	0.13	0.00	-	-	(28a)

SAP 2012 worksheet (Version 9.92, October 2013)
 Calculation of Heat Demand
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.12	0.13	0.12	0.14	(22b)
Effective ach	0.31	0.31	0.30	0.29	0.29	0.28	0.29	0.28	0.28	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47		-	-			
Floor	74.60		0.00	74.60		-	-		30	2238		(26-33)	
ext wall	105.04		27.97	77.07		0.13	10.0191		30	2312.1		(26-33)	
ceiling	74.60		0.00	74.60		-	-		30	2238		(26-33)	
TMP										250.00		(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	74.91	74.71	74.51	73.91	73.91	73.10	73.30	73.10	73.10	73.70	73.50	74.31	(39)
HLP	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.98	0.99	0.99	1.00	(40)
HLP (average)												0.99	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	(22b)
Effective ach	0.33	0.32	0.32	0.30	0.30	0.29	0.29	0.28	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47		-	-			
Floor	74.60		0.00	74.60		-	-		30	2238		(26-33)	
ext wall	105.04		27.97	77.07		0.13	10.0191		30	2312.1		(26-33)	
ceiling	74.60		0.00	74.60		-	-		30	2238		(26-33)	
TMP										250.00		(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	75.92	75.72	75.52	74.51	74.31	73.30	73.30	73.10	73.70	74.31	74.71	75.12	(39)
HLP	1.02	1.02	1.01	1.00	1.00	0.98	0.98	0.98	0.99	1.00	1.00	1.01	(40)
HLP (average)												1.00	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									110.00				(50)
Store loss factor (kWh/litre/day)									0.02				(51)
Volume factor									1.03				(52)
Temperature factor									0.60				(53)
Energy lost from store in kWh/day									1.03				(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(64)
Total water output												2,068.00	(64)
Heat gains (kWh)	93.08	82.67	88.31	81.23	81.11	74.62	73.71	78.07	77.04	84.13	86.36	91.53	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	(66)
Lighting	46.31	41.13	33.45	25.33	18.93	15.98	17.27	22.45	30.13	38.25	44.65	47.60	(67)
Appliances	310.13	313.35	305.24	287.97	266.18	245.70	232.01	228.79	236.90	254.16	275.96	296.44	(68)
Cooking	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	125.10	123.02	118.70	112.83	109.01	103.64	99.08	104.93	107.00	113.08	119.95	123.03	(72)
Total internal	580.06	576.02	555.91	524.64	492.64	463.84	446.88	454.68	472.55	504.02	539.07	565.58	(73)
Solar gains	326.66	557.99	768.65	962.71	1,088.90	1,086.00	1,044.93	949.81	835.60	618.00	391.52	279.39	(83)
Total gains	906.72	1,134.01	1,324.56	1,487.35	1,581.54	1,549.84	1,491.80	1,404.50	1,308.15	1,122.02	930.59	844.98	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.95	0.88	0.76	0.59	0.43	0.30	0.22	0.24	0.39	0.66	0.89	0.96	(86)
Util elsewhere	0.94	0.85	0.72	0.55	0.39	0.26	0.17	0.19	0.34	0.61	0.87	0.95	(89)
Living area fraction												1.00	(91)
Util overall	0.94	0.87	0.75	0.59	0.43	0.30	0.22	0.24	0.39	0.66	0.88	0.96	(94)
Space heating kWh	277.10	141.80	66.02	15.60	2.70	0.00	0.00	0.00	0.00	23.31	140.56	305.08	(98)
Total space heating requirement kWh												972.17	(98)
Space heating requirement per m ²												13.03	(99)

9b. Energy requirements

Fraction of space heat from secondary system	0	(301)
Fraction of space heat from community system	1	(302)
Fraction of community heat from CHP	0.6	(303a)
Fraction of community heat from BOILERS	0.4	(303b)
Fraction of total space heat from CHP	0.6	(304a)
Fraction of total space heat from BOILERS	0.4	(304b)
Factor for control and charging method for community space heating	1.05	(305)
Factor for charging method for community water heating	1.05	(305a)
Distribution loss factor for community heating system	1.1	(306)
Space heating		
Annual space heating requirement	972.17	(98)
Space heat from boilers	449.14	(307)
Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)

Space heat from waste heat source	0.00	(307)
Space heat from CHP	673.71	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,068.00	(64)
Water heat from boilers	955.41	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,433.12	(310)
Other energy		
Electrical energy for heat distribution	35.11	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	199.75	(330)
Cooling energy	0	(330)
Electricity for lighting	327.14	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

10b. Fuel costs - community heating scheme

	kWh/year	£/kWh	£/year	
Space heating from CHP	673.71	2.97	20.01	(340)
Space heating from boilers	449.14	4.24	19.04	(340)
Space heating (secondary)	0.00	-	0.00	(341)
Water heating from CHP	1,433.12	2.97	42.56	(342)
Water heating from boilers	955.41	4.24	40.51	(342)
Pump/fan energy	0.00	-	0.00	(349)
Mechanical ventilation	199.75	13.19	26.35	(349)
Lighting energy	327.14	13.19	43.15	(350)
Additional standing charges			120	(351)
Energy generated by PVs	0.00		0.00	(352)
Energy generated by wind turbine	0.00		0.00	(353)
Energy generated by hydro energy	0.00		0.00	(353)
Energy generated by other technologies	0.00		0.00	(354)
Total energy cost			311.62	(355)

11b. SAP rating

Energy cost deflator	0.47	(356)
Energy cost factor (ECF)	0.00	(357)
SAP value	0.00	
SAP rating	0	(358)
SAP band		

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		1,062.64	0.216	229.530	(363)
less credit emissions for electricity		-306.04	0.5190	-158.835	(364)
Space heating from boilers	95.00	472.78	0.216	102.121	(340)
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		2,260.45	0.216	488.256	(363)
less credit emissions for electricity		-651.01	0.5190	-337.873	(364)
Water heating from boilers	95.00	1,005.70	0.216	217.231	(340)
Electrical energy for heat distribution		35.11	0.519	18.224	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		199.75	0.519	103.671	(378)
Lighting energy		327.14	0.519	169.786	(379)
Energy generated by PVs		0.00	0.529	0.000	(380)

Energy generated by wind turbine	0.00	0.529	0.000	(381)
Energy generated by hydro energy	0.00	0.529	0.000	(381)
Energy generated by other technologies	0.00		0.000	(382)
Total kg/year			832.111	(383)

			kg / m ² / year	
CO2 emissions per m ²			11.15	(384)
EI Value			0.00	(384a)
EI rating			0	(385)
EI band				

13b. Primary energy

	Efficiency	kWh/year	Primary factor	kWh/year	
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		1,062.64	1.220	1,296.422	(363)
less credit emissions for electricity		-306.04	2.920	-939.544	(364)
Space heating from boilers	95.00	472.78	1.220	576.794	(340)
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		2,260.45	1.220	2,757.743	(363)
less credit emissions for electricity		-651.01	2.920	-1,998.595	(364)
Water heating from boilers	95.00	1,005.70	1.220	1,226.954	(340)
Electrical energy for heat distribution		35.11	3.07	0.000	(372)
Pump/fan energy		0.00	2.920	0.000	(378)
Mechanical ventilation		199.75	2.920	0.000	(378)
Lighting energy		327.14	2.920	0.000	(379)
Energy generated by PVs		0.00	2.920	0.000	(380)
Energy generated by wind turbine		0.00	2.920	0.000	(381)
Energy generated by hydro energy		0.00	2.920	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Primary energy kWh/year				0.000	(383)
Primary energy kWh/m ² /year				0.000	(383)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
Calculation of EPC Costs, Emissions and Primary Energy
Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: CLEAN of Finchley 3rd Reduced Window Areas
Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.12	0.13	0.12	0.14	(22b)
Effective ach	0.31	0.31	0.30	0.29	0.29	0.28	0.29	0.28	0.28	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47		-	-			
Floor	74.60		0.00	74.60		-	-		30	2238		(26-33)	
ext wall	105.04		27.97	77.07		0.13	10.0191		30	2312.1		(26-33)	
ceiling	74.60		0.00	74.60		-	-		30	2238		(26-33)	
TMP										250.00		(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	74.91	74.71	74.51	73.91	73.91	73.10	73.30	73.10	73.10	73.70	73.50	74.31	(39)
HLP	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.98	0.99	0.99	1.00	(40)
HLP (average)												0.99	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									110.00				(50)
Store loss factor (kWh/litre/day)									0.02				(51)
Volume factor									1.03				(52)
Temperature factor									0.60				(53)
Energy lost from store in kWh/day									1.03				(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(64)
Total water output												2,068.00	(64)
Heat gains (kWh)	93.08	82.67	88.31	81.23	81.11	74.62	73.71	78.07	77.04	84.13	86.36	91.53	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	(66)
Lighting	46.31	41.13	33.45	25.33	18.93	15.98	17.27	22.45	30.13	38.25	44.65	47.60	(67)
Appliances	310.13	313.35	305.24	287.97	266.18	245.70	232.01	228.79	236.90	254.16	275.96	296.44	(68)
Cooking	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	125.10	123.02	118.70	112.83	109.01	103.64	99.08	104.93	107.00	113.08	119.95	123.03	(72)
Total internal	580.06	576.02	555.91	524.64	492.64	463.84	446.88	454.68	472.55	504.02	539.07	565.58	(73)
Solar gains	347.51	532.89	738.27	959.33	1,061.33	1,132.67	1,086.00	1,008.21	882.69	644.87	430.07	291.86	(83)
Total gains	927.57	1,108.91	1,294.18	1,483.97	1,553.98	1,596.51	1,532.88	1,462.90	1,355.24	1,148.88	969.14	857.44	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.93	0.86	0.72	0.53	0.37	0.22	0.13	0.14	0.30	0.57	0.84	0.95	(86)
Util elsewhere	0.91	0.84	0.68	0.49	0.32	0.17	0.09	0.10	0.25	0.52	0.80	0.93	(89)
Living area fraction												1.00	(91)
Util overall	0.92	0.86	0.71	0.53	0.37	0.22	0.13	0.14	0.30	0.57	0.83	0.94	(94)
Space heating kWh	219.72	118.81	44.94	7.94	0.90	0.00	0.00	0.00	0.00	9.91	88.05	247.05	(98)
Total space heating requirement kWh												737.31	(98)
Space heating requirement per m ²												9.88	(99)

9b. Energy requirements

Fraction of space heat from secondary system	0	(301)
Fraction of space heat from community system	1	(302)
Fraction of community heat from CHP	0.6	(303a)
Fraction of community heat from BOILERS	0.4	(303b)
Fraction of total space heat from CHP	0.6	(304a)
Fraction of total space heat from BOILERS	0.4	(304b)
Factor for control and charging method for community space heating	1.05	(305)
Factor for charging method for community water heating	1.05	(305a)
Distribution loss factor for community heating system	1.1	(306)
Space heating		
Annual space heating requirement	737.31	(98)
Space heat from boilers	340.64	(307)
Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)

Space heat from waste heat source	0.00	(307)
Space heat from CHP	510.96	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,068.00	(64)
Water heat from boilers	955.41	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,433.12	(310)
Other energy		
Electrical energy for heat distribution	32.40	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	199.75	(330)
Cooling energy	0	(330)
Electricity for lighting	327.14	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		805.92	0.216	174.080	(363)
less credit emissions for electricity		-232.11	0.5190	-120.463	(364)
Space heating from boilers	95.00	358.57	0.216	77.450	(340)
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		2,260.45	0.216	488.256	(363)
less credit emissions for electricity		-651.01	0.5190	-337.873	(364)
Water heating from boilers	95.00	1,005.70	0.216	217.231	(340)
Electrical energy for heat distribution		32.40	0.519	16.816	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		199.75	0.519	103.671	(378)
Lighting energy		327.14	0.519	169.786	(379)
Energy generated by PVs		0.00	0.529	0.000	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				788.954	(383)

	kg/m ² /year	
CO2 emissions per m ²	10.58	(384)
EI Value	0.00	(384a)
EI rating	0	(385)
EI band		



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: Finchley top CLEAN Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
Region: Thames
Postcode: NW3 6EP
UPRN: 0000000000
RRN: (not assigned)
Date of assessment: 16 June 2022
Tenure: Owner-occupied
Date of certificate: 15 August 2022
Assessment type: New dwelling as designed
Transaction type: New dwelling
Year completed: 2018
Related Party Disclosure: No related party
PCDF revision number: 503

Property description

Dwelling type: Flat
Detachment: Semi-detached
Number of dwellings above: 0
Number of dwellings below: 2

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	63.66	2.57	163.61	-
2	46.72	2.57	120.07	-

Living area: 67.58 %
Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	North	18.09	1.00
Finchley Window_updated 22.06.08	ext wall	East	25.82	1.00
Finchley Window_updated 22.06.08	ext wall	South	13.46	1.00

Overshading: Average or unknown

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value

Floor	partyfloor	63.66	-	63.66	-	30
Floor from below	partyfloor	63.66	-	63.66	-	30
ceiling	roof	66.96	-	66.96	0.12	30
ext wall	wall	195.39	57.37	138.02	0.20	30

Thermal bridges:

User-defined (individual ϕ -values)

Junction	Length	ϕ -value	Source of data
Exposed floor (normal)	8.00	0.320	default detail

Thermal mass

TMP = 250kJ/m²K

Ventilation

Pressure test:	Yes (design value)
Ventilation:	Balanced with heat recovery (MVHR) (Appendix Q datasheet)
Brand/Model:	Nuaire
Approved installation scheme?	Yes
Duct type:	Rigid
SFP:	0.59
Wet rooms:	Kitchen + 2
Duct insulation:	Not insulated
Efficiency (%):	89
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	0
Number of passive stacks:	0
Number of sides sheltered:	0
q50:	3.00

Main heating system

Community heating scheme

Fraction of primary space heating provided: 1

BOILERS Heat source: Boiler (Mains gas) Efficiency: 95% Fraction: 0.4
 CHP Heat source: CHP (Mains gas) Efficiency: 44% Fraction: 0.6 Power efficiency: 20%
 Distribution loss factor: Piping system $\geq$ 1991, pre-insulated, medium temp, variable flow
 Radiators

Main heating controls

Charging system linked to use of community heating, programmer and TRVs

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system

Solar panel: No

Other information

Water use $\leq$ 125 litres/person/day Yes
 Electricity tariff: Standard tariff
 Conservatory: No conservatory

Photovoltaics: None

Terrain type: Dense urban
 Wind turbine? No

No	Total fixed lighting outlets:	Special feature (App. Q)
Low energy fixed lighting outlets:	40 (= 100% of total outlets)	40

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2

Regulations: Approved Document L1A, 2013 Edition, England

SAP 2012 = B 85 | EI 2012 = B 86 | DFEE = 49.10 | TFEE = 56.38 | DER = 17.31 | TER = 17.25

Heat demand kWh: space 1884 water space 2242

Weather data for: postcode NW3

PCDF revision number: 503 (31 July 2022)

External Definitions revision number: 5.0 (11 June 2014)

Applicable recommendations: None

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SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

Finchley top CLEAN Reduced Window Areas

Dwelling type: Semi-detached Flat Top-floor
Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation not possible.
Region: Thames
Front of dwelling faces: Unknown or unspecified
Overshading: Average or unknown
Overhangs: see below
Thermal mass parameter: 250.0 (global variable applied)
Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
Ventilation rate during hot weather: 4 (Windows fully open)

Summer ventilation heat loss coefficient: 374.45 (P1)
Transmission heat loss coefficient: 96.17 (37)
Summer heat loss coefficient: 470.62 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
North	-	1.00	None
East	-	1.00	None
South	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
North	1.00	1.00	1.00	1.00	(P8)
East	1.00	1.00	1.00	1.00	(P8)
South	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	1,848	1,743	1,551	(P3)
Internal gains:	476	459	467	
Total summer gains:	2,324	2,202	2,019	(P5)
Solar gain/loss ratio:	4.94	4.68	4.29	(P6)
Threshold temperature:	21.19	22.83	22.34	
Likelihood of high internal temperature	Slight	Medium	Medium	(P7)

Assessment of likelihood of high internal temperature: Medium

This SAP software supplied by Energy Design Tools is currently undergoing approval from the BRE and by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: Finchley top CLEAN Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Top-floor flat, total floor area 110m²

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

1 TER and DER

Fuel for main heating: Mains gas (community)

Fuel factor: 1.00 (Gas)

Target Carbon Dioxide Emission Rate (TER): 17.25kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 17.31kg/m²

Excess emissions: 0.06kg/m² (0.3%)

Result: Fail

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 56.4kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 49.1kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.20 (max 0.30)	0.20 (max 0.70)	OK
Floor	(no floor)		
Roof	0.12 (max 0.20)	0.12 (max 0.35)	OK
Openings	1.10 (max 2.00)	1.10 (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: 10.00

OK

4 Heating efficiency

Main heating system : Community heating scheme

Secondary heating
No secondary system specified

5 Cylinder insulation

Hot water storage:
No cylinder

Solar hot water cylinder: No solar water heating

6 Controls

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

Hot water controls:
No cylinder

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.59 W/(l/s)
Maximum: 1.5 W/(l/s)
Efficiency: 89% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Medium - OK

Based on:

Overshading: Average or unknown

Air change rate: 4

Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

Roof U-value: 0.12W/m²K

Opening U-value: 1.10W/m²K

Thermal bridging ψ -value is 0W/m²K

Design air permeability is 3.00m³/h.m²

CHP community heating

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: Finchley top CLEAN Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.19	0.19	0.18	0.17	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	(22b)
Effective ach	0.38	0.38	0.37	0.35	0.35	0.33	0.33	0.33	0.34	0.35	0.36	0.36	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45		-	-			
Floor	63.66		0.00	63.66		-	-		30	1909.8		(26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034		30	4140.51		(26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544		30	2008.86		(26-33)	
TMP										250.00		(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									96.17			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	131.72	131.36	131.01	129.26	128.91	127.15	127.15	126.80	127.85	128.91	129.61	130.31	(39)
HLP	1.19	1.19	1.19	1.17	1.17	1.15	1.15	1.15	1.16	1.17	1.17	1.18	(40)
HLP (average)												1.17	(40)

4. Water heating energy requirements

Assumed occupancy: 2.82 (42)

Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	2,267.25	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,241.63	(64)
Water heat from boilers	986.32	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,479.47	(310)
Other energy		
Electrical energy for heat distribution	62.45	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	255.24	(330)
Cooling energy	0	(330)
Electricity for lighting	428.40	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh / year	Emission factor	kg / year	
Space heating from boilers	95.00	1,591.06	0.216	343.668	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		5,152.85	0.216	1,113.016	(363)
less credit emissions for electricity		-1,030.57	0.5190	-534.866	(364)
Water heating from boilers	95.00	1,038.23	0.216	224.257	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,362.44	0.216	726.288	(363)
less credit emissions for electricity		-672.49	0.5190	-349.022	(364)
Electrical energy for heat distribution		62.45	0.519	32.409	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		255.24	0.519	132.469	(378)
Lighting energy		428.40	0.519	222.338	(379)
Energy generated by PVs		0.00	0.529	0.000	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				1,910.557	(383)

	kg / m ² / year	
Dwelling Carbon Dioxide Emission Rate (DER)	17.31	(384)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: Finchley top CLEAN Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

			m ³ /hr	
Number of chimneys	0		0	(6a)
Number of open flues	0		0	(6b)
Number of intermittent fans	4		40	(7a)
Number of passive vents	0		0	(7b)
Number of flueless gas fires	0		0	(7c)
Infiltration due to chimneys, flues and fans			0.14	(8)
q50	5			
Infiltration rate			0.39	(18)
Sides sheltered			2	(19)
Shelter factor			0.85	(20)
Infiltration rate incorporating shelter factor			0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)		A*U (W/K)		κ (kJ/m ² K)		A*κ (kJ/K)		
Door	-		-	0.00				0.00		-		-		(26)
Windows	-		-	27.60		1.33		36.58		-		-		(27)
Ground floor	-		-	0.00		0.13		0.00		-		-		(28a)
Walls	195.387		27.60	167.79		0.18		30.20		-		-		(29a)
Roof	-		-	66.96		0.13		8.71		-		-		(30)
Total area of external elements				262.35										(31)
Fabric heat loss								75.49						(33)
TMP												250.00		(35)
Thermal bridges						2.56								(36)
Total fabric heat loss								78.05						(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Ventilation heat loss	55.21	54.89	54.57	53.06	52.78	51.47	51.47	51.23	51.98	52.78	53.35	53.94	(38)	
Heat transfer	133.26	132.94	132.62	131.11	130.83	129.52	129.52	129.28	130.03	130.83	131.40	132.00	(39)	
HLP	1.21	1.20	1.20	1.19	1.19	1.17	1.17	1.17	1.18	1.19	1.19	1.20	(40)	

4. Water heating energy requirements

Assumed occupancy:												2.82	(42)
Average daily water use (litres/day)												101.11	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										0.93			(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										1.44			(55)
Storage loss	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	211.53	186.34	195.45	174.87	171.12	152.54	146.17	160.85	160.72	181.34	192.18	206.32	(64)
Total water output												2,519.70	(64)
Heat gains (kWh)	92.12	81.63	86.77	79.22	78.68	71.80	70.38	75.27	74.52	82.08	84.98	90.39	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	(66)
Lighting	24.26	21.55	17.52	13.27	9.92	8.37	9.05	11.76	15.78	20.04	23.39	24.93	(67)
Appliances	272.10	274.92	267.81	252.66	233.54	215.57	203.56	200.74	207.85	223.00	242.12	260.09	(68)
Cooking	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	123.81	121.48	116.63	110.03	105.75	99.73	94.60	101.17	103.50	110.32	118.03	121.49	(72)
Total internal	488.43	486.20	470.22	444.22	417.47	391.92	375.47	381.92	395.39	421.61	451.79	474.77	(73)
Solar gains	195.33	351.36	524.96	715.86	855.22	870.84	830.63	724.44	591.31	400.77	237.48	164.81	(83)
Total gains	683.75	837.57	995.18	1,160.08	1,272.69	1,262.77	1,206.10	1,106.36	986.69	822.38	689.27	639.57	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												0.68	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	971.54	741.44	591.25	303.57	111.93	0.00	0.00	0.00	0.00	347.31	690.45	996.08	(98)
Total space heating requirement kWh												4,753.58	(98)
Space heating requirement per m ²												43.07	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												93.5	(206)
Efficiency of main system 2 (%)												0.0	(207)
Efficiency of secondary system (%)												100	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	971.54	741.44	591.25	303.57	111.93	0.00	0.00	0.00	0.00	347.31	690.45	996.08	(98)

Space heating (main system 1)	1,039.08	792.99	632.35	324.68	119.71	0.00	0.00	0.00	0.00	371.46	738.45	1,065.33	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	211.53	186.34	195.45	174.87	171.12	152.54	146.17	160.85	160.72	181.34	192.18	206.32	(64)
Efficiency of water heater (%)	88.38	88.13	87.58	86.27	83.71	79.80	79.80	79.80	79.80	86.52	87.93	88.46	(217)
Water heating fuel	239.33	211.44	223.16	202.69	204.41	191.16	183.17	201.57	201.40	209.60	218.55	233.23	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	5,084.05	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,519.70	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	0.00	(231)
Electricity for lighting	428.40	(232)
Total delivered energy for all uses	8,032.14	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	5,084.05	0.216	1,098.15	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,519.70	0.216	544.26	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	428.40	0.519	222.34	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,903.67	(272)
Emissions per m ² for space and water heating			14.88	(272a)
Emissions per m ² for lighting			2.01	(272b)
Emissions per m ² for pumps and fans			0.35	(272c)
Target Carbon Dioxide Emission Rate (TER)			17.25	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: Finchley top CLEAN Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	4	40	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.29	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.37	0.36	0.36	0.32	0.31	0.28	0.28	0.27	0.29	0.31	0.33	0.34	(22b)
Effective ach	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A *U (W /K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45			-	-		
Floor	63.66		0.00	63.66		-	-			30	1909.8 (26-33)		
ext wall	195.39		57.37	138.02		0.20	27.6034			30	4140.51 (26-33)		
ceiling	66.96		0.00	66.96		0.12	8.03544			30	2008.86 (26-33)		
TMP											250.00 (35)		
Thermal bridges							0.08				(36)		
Total fabric heat loss										96.17	(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	149.42	149.17	148.92	147.77	147.55	146.55	146.55	146.36	146.94	147.55	147.99	148.45	(39)
HLP	1.35	1.35	1.35	1.34	1.34	1.33	1.33	1.33	1.33	1.34	1.34	1.34	(40)
HLP (average)												1.34	(40)

4. Water heating energy requirements

Assumed occupancy: 2.82 (42)

Average daily water use (litres/day)												101.11	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(46)
Storage loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Storage loss (solar store)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(58)
Primary loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	140.19	122.61	126.52	110.31	105.84	91.33	84.63	97.12	98.28	114.53	125.02	135.77	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	140.19	122.61	126.52	110.31	105.84	91.33	84.63	97.12	98.28	114.53	125.02	135.77	(64)
Total water output												1,352.17	(64)
Heat gains (kWh)	35.05	30.65	31.63	27.58	26.46	22.83	21.16	24.28	24.57	28.63	31.26	33.94	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	(66)
Lighting	24.26	21.55	17.52	13.27	9.92	8.37	9.05	11.76	15.78	20.04	23.39	24.93	(67)
Appliances	272.10	274.92	267.81	252.66	233.54	215.57	203.56	200.74	207.85	223.00	242.12	260.09	(68)
Cooking	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	47.11	45.61	42.52	38.30	35.57	31.71	28.44	32.63	34.12	38.49	43.41	45.62	(72)
Total internal	408.72	407.34	393.10	369.49	344.28	320.91	306.31	310.39	323.01	346.78	374.17	395.90	(73)
Solar gains	381.22	685.76	1,024.58	1,397.15	1,669.15	1,699.64	1,621.16	1,413.90	1,154.06	782.18	463.50	321.66	(83)
Total gains	789.94	1,093.10	1,417.68	1,766.64	2,013.43	2,020.55	1,927.47	1,724.29	1,477.07	1,128.96	837.67	717.56	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	1.00	0.98	0.94	0.82	0.64	0.46	0.33	0.39	0.64	0.92	0.99	1.00	(86)
Util elsewhere	0.99	0.98	0.92	0.78	0.57	0.38	0.24	0.29	0.55	0.88	0.98	1.00	(89)
Living area fraction												0.68	(91)
Util overall	0.99	0.98	0.93	0.80	0.61	0.43	0.30	0.36	0.61	0.90	0.98	1.00	(94)
Space heating kWh	1,078.76	753.21	516.44	203.06	54.59	0.00	0.00	0.00	0.00	304.60	743.76	1,125.02	(98)
Total space heating requirement kWh												4,779.44	(98)
Space heating requirement per m ²												43.30	(99)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	1,377.57	1,084.47	1,112.37	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.97	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	1,331.47	1,066.34	1,082.57	-	-	-	-	(102)
Gains W	-	-	-	-	-	2,472.04	2,360.81	2,125.31	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	821.21	963.08	775.80	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	205.30	240.77	193.95	-	-	-	-	(100)

Space cooling (June to August) 640.02 (107)

Space cooling per m² 5.80 (108)

8f. Dwelling Fabric Energy Efficiency (kWh/m²) 49.1 (109)

File name: Finchley top CLEAN Reduced Window Areas
Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	1,217.53	958.48	982.55	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.91	0.95	0.93	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	1,103.35	911.12	912.11	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,503.32	1,436.81	1,319.45	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	287.98	391.12	303.06	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	72.00	97.78	75.76	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	4	40	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.14	(8)
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	27.60	1.33	36.58	-	-	(27)

SAP 2012 worksheet (Version 9.92, October 2013)
 Calculation of Heat Demand
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: Finchley top CLEAN Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.17	0.17	0.17	0.15	0.15	0.14	0.14	0.14	0.14	0.15	0.15	0.16	(22b)
Effective ach	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.33	0.33	0.34	0.33	0.35	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A *U (W /K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45			-	-		
Floor	63.66		0.00	63.66		-	-			30	1909.8 (26-33)		
ext wall	195.39		57.37	138.02		0.20	27.6034			30	4140.51 (26-33)		
ceiling	66.96		0.00	66.96		0.12	8.03544			30	2008.86 (26-33)		
TMP											250.00 (35)		
Thermal bridges							0.08				(36)		
Total fabric heat loss										96.17	(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	129.96	129.61	129.26	128.21	128.21	126.80	127.15	126.80	126.80	127.85	127.50	128.91	(39)
HLP	1.18	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.15	1.16	1.16	1.17	(40)
HLP (average)												1.16	(40)

4. Water heating energy requirements

Assumed occupancy: 2.82 (42)

Average daily water use (litres/day)												101.11	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume										110.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										1.03			(52)
Temperature factor										0.60			(53)
Energy lost from store in kWh/day										1.03			(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	220.21	194.18	204.13	183.27	179.80	160.95	154.85	169.53	169.12	190.02	200.58	215.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	220.21	194.18	204.13	183.27	179.80	160.95	154.85	169.53	169.12	190.02	200.58	215.00	(64)
Total water output												2,241.63	(64)
Water heating demand												2,242	(64)
Heat gains (kWh)	99.06	87.90	93.71	85.94	85.62	78.52	77.33	82.21	81.24	89.02	91.70	97.33	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	(66)
Lighting	60.65	53.86	43.81	33.16	24.79	20.93	22.61	29.39	39.45	50.09	58.47	62.33	(67)
Appliances	406.12	410.33	399.72	377.11	348.57	321.75	303.83	299.61	310.23	332.83	361.37	388.19	(68)
Cooking	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	133.15	130.81	125.96	119.37	115.09	109.06	103.94	110.50	112.83	119.66	127.36	130.82	(72)
Total internal	710.97	706.07	680.54	640.70	599.51	562.80	541.44	550.57	573.57	613.64	658.26	692.41	(73)
Solar gains	532.92	862.04	1,296.59	1,831.17	2,133.30	2,320.64	2,207.32	1,971.64	1,605.70	1,074.98	669.39	441.29	(83)
Total gains	1,243.89	1,568.12	1,977.13	2,471.87	2,732.81	2,883.44	2,748.76	2,522.21	2,179.27	1,688.63	1,327.65	1,133.69	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.96	0.91	0.77	0.55	0.36	0.21	0.12	0.15	0.32	0.65	0.91	0.98	(86)
Util elsewhere	0.95	0.89	0.73	0.50	0.31	0.16	0.08	0.09	0.26	0.59	0.88	0.97	(89)
Living area fraction												0.68	(91)
Util overall	0.95	0.90	0.75	0.53	0.34	0.19	0.11	0.13	0.30	0.63	0.89	0.97	(94)
Space heating kWh	535.96	314.82	126.59	21.20	2.29	0.00	0.00	0.00	0.00	38.40	259.43	585.31	(98)
Total space heating requirement kWh												1,884.01	(98)
Space heating demand												1,884	(98)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: Finchley top CLEAN Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.19	0.19	0.18	0.17	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	(22b)
Effective ach	0.38	0.38	0.37	0.35	0.35	0.33	0.33	0.33	0.34	0.35	0.36	0.36	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A *U (W /K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45		-	-			
Floor	63.66		0.00	63.66		-	-		30	1909.8		(26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034		30	4140.51		(26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544		30	2008.86		(26-33)	
TMP										250.00		(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									96.17			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	131.72	131.36	131.01	129.26	128.91	127.15	127.15	126.80	127.85	128.91	129.61	130.31	(39)
HLP	1.19	1.19	1.19	1.17	1.17	1.15	1.15	1.15	1.16	1.17	1.17	1.18	(40)
HLP (average)												1.17	(40)

4. Water heating energy requirements

Assumed occupancy: 2.82 (42)

Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	1,569.70	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,241.63	(64)
Water heat from boilers	986.32	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,479.47	(310)
Other energy		
Electrical energy for heat distribution	50.82	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	255.24	(330)
Cooling energy	0	(330)
Electricity for lighting	428.40	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

10b. Fuel costs - community heating scheme

	kWh / year	£ / kWh	£ / year	
Space heating from boilers	1,046.47	4.24	44.37	(340)
Space heating from CHP	1,569.70	2.97	46.62	(340)
Space heating (secondary)	0.00	-	0.00	(341)
Water heating from boilers	986.32	4.24	41.82	(342)
Water heating from CHP	1,479.47	2.97	43.94	(342)
Pump/fan energy	0.00	-	0.00	(349)
Mechanical ventilation	255.24	13.19	33.67	(349)
Lighting energy	428.40	13.19	56.51	(350)
Additional standing charges			120	(351)
Energy generated by PVs	0.00		0.00	(352)
Energy generated by wind turbine	0.00		0.00	(353)
Energy generated by hydro energy	0.00		0.00	(353)
Energy generated by other technologies	0.00		0.00	(354)
Total energy cost			386.92	(355)

11b. SAP rating

Energy cost deflator	0.47	(356)
Energy cost factor (ECF)	0.00	(357)
SAP value	0.00	
SAP rating	0	(358)
SAP band		

12b. Carbon dioxide emissions

	Efficiency	kWh / year	Emission factor	kg / year	
Space heating from boilers	95.00	1,101.54	0.216	237.934	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,567.50	0.216	770.581	(363)
less credit emissions for electricity		-713.50	0.5190	-370.307	(364)
Water heating from boilers	95.00	1,038.23	0.216	224.257	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,362.44	0.216	726.288	(363)
less credit emissions for electricity		-672.49	0.5190	-349.022	(364)
Electrical energy for heat distribution		50.82	0.519	26.375	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		255.24	0.519	132.469	(378)
Lighting energy		428.40	0.519	222.338	(379)

Energy generated by PVs	0.00	0.529	0.000	(380)
Energy generated by wind turbine	0.00	0.529	0.000	(381)
Energy generated by hydro energy	0.00	0.529	0.000	(381)
Energy generated by other technologies	0.00		0.000	(382)
Total kg/year			1,620.913	(383)

			kg / m ² / year	
CO2 emissions per m ²			14.68	(384)
EI Value			0.00	(384a)
EI rating			0	(385)
EI band				

13b. Primary energy

	Efficiency	kWh/year	Primary factor	kWh/year	
Space heating from boilers	95.00	1,101.54	1.220	1,343.885	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,567.50	1.220	4,352.354	(363)
less credit emissions for electricity		-713.50	2.920	-2,190.447	(364)
Water heating from boilers	95.00	1,038.23	1.220	1,266.638	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,362.44	1.220	4,102.180	(363)
less credit emissions for electricity		-672.49	2.920	-2,064.540	(364)
Electrical energy for heat distribution		50.82	3.07	0.000	(372)
Pump/fan energy		0.00	2.920	0.000	(378)
Mechanical ventilation		255.24	2.920	0.000	(378)
Lighting energy		428.40	2.920	0.000	(379)
Energy generated by PVs		0.00	2.920	0.000	(380)
Energy generated by wind turbine		0.00	2.920	0.000	(381)
Energy generated by hydro energy		0.00	2.920	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Primary energy kWh/year				0.000	(383)
Primary energy kWh/m ² /year				0.000	(383)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of EPC Costs, Emissions and Primary Energy
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: Finchley top CLEAN Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.17	0.17	0.17	0.15	0.15	0.14	0.14	0.14	0.14	0.15	0.15	0.16	(22b)
Effective ach	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.33	0.33	0.34	0.33	0.35	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45		-	-			
Floor	63.66		0.00	63.66		-	-		30	1909.8		(26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034		30	4140.51		(26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544		30	2008.86		(26-33)	
TMP										250.00		(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									96.17			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	129.96	129.61	129.26	128.21	128.21	126.80	127.15	126.80	126.80	127.85	127.50	128.91	(39)
HLP	1.18	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.15	1.16	1.16	1.17	(40)
HLP (average)												1.16	(40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	1,243.45	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,241.63	(64)
Water heat from boilers	986.32	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,479.47	(310)
Other energy		
Electrical energy for heat distribution	45.38	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	255.24	(330)
Cooling energy	0	(330)
Electricity for lighting	428.40	(332)
Electricity generated by PVs	0.00	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh / year	Emission factor	kg / year	
Space heating from boilers	95.00	872.59	0.216	188.480	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		2,826.01	0.216	610.419	(363)
less credit emissions for electricity		-565.20	0.5190	-293.340	(364)
Water heating from boilers	95.00	1,038.23	0.216	224.257	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,362.44	0.216	726.288	(363)
less credit emissions for electricity		-672.49	0.5190	-349.022	(364)
Electrical energy for heat distribution		45.38	0.519	23.553	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		255.24	0.519	132.469	(378)
Lighting energy		428.40	0.519	222.338	(379)
Energy generated by PVs		0.00	0.529	0.000	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				1,485.442	(383)

	kg / m ² / year	
CO2 emissions per m ²	13.46	(384)
EI Value	0.00	(384a)
EI rating	0	(385)
EI band		



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
 Region: Thames
 Postcode: NW3 6EP
 UPRN: 0000000000
 RRN: (not assigned)
 Date of assessment: 16 June 2022
 Tenure: Owner-occupied
 Date of certificate: 15 August 2022
 Assessment type: New dwelling as designed
 Transaction type: New dwelling
 Year completed: 2018
 Related Party Disclosure: No related party
 PCDF revision number: 503

Property description

Dwelling type: Flat
 Detachment: Semi-detached
 Number of dwellings above: 5
 Number of dwellings below: 0

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	55.32	2.50	138.30	Yes
2	30.55	2.50	76.38	-

Living area: 100.00 %
 Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	West	9.44	1.00

Overshading: More than average

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value
1	basementfloor	55.32	-	55.32	0.13	30
1 from below	basementfloor	55.32	-	55.32	-	30

ceiling	partyceiling	30.55	-	30.55	-	30
party	party wall	119.03	-	119.03	-	30
ext wall	wall	60.06	9.44	50.62	0.20	30

Thermal bridges:

User-defined (individual ϕ -values)

Junction	Length	ϕ -value	Source of data
Exposed floor (normal)	8.00	0.320	default detail

Thermal mass

Calculated from κ values (see exposed elements table)

Ventilation

Pressure test:	Yes (design value)
Ventilation:	Balanced with heat recovery (MVHR) (Appendix Q datasheet)
Brand/Model:	Nuaire
Approved installation scheme?	Yes
Duct type:	Rigid
SEF:	0.59
Wet rooms:	Kitchen + 3
Duct insulation:	Not insulated
Efficiency (%):	89
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	0
Number of passive stacks:	0
Number of sides sheltered:	4
q50:	3.00

Main heating system

Community heating scheme

Fraction of primary space heating provided: 1

CHP Heat source: CHP (Mains gas) Efficiency: 44% Fraction: 0.6 Power efficiency: 20%
 BOILERS Heat source: Boiler (Mains gas) Efficiency: 95% Fraction: 0.4
 Distribution loss factor: Piping system $\geq$ 1991, pre-insulated, medium temp, variable flow
 Radiators

Main heating controls

Charging system linked to use of community heating, programmer and TRVs

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system

Solar panel: No

Other information

Water use $\leq$ 125 litres/person/day Yes
 Electricity tariff: Standard tariff
 Conservatory: No conservatory

Photovoltaics:
 Peak kW: 0.3
 Tilt: 30°
 Overshading: Very little
 Orientation: South
 PV connected to dwelling's electricity meter: Yes

Terrain type:	Dense urban
Wind turbine?	No
Special feature (App. Q)	No
Total fixed lighting outlets:	35
Low energy fixed lighting outlets:	35 (= 100% of total outlets)

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2

Regulations: Approved Document L1A, 2013 Edition, England

SAP 2012 = B 88 | EI 2012 = B 91 | DFEE = 28.31 | TFEE = 34.57 | DER = 12.28 | TER = 14.87

Heat demand kWh: space 458 water space 2147

Weather data for: postcode NW3

PCDF revision number: 503 (31 July 2022)

External Definitions revision number: 5.0 (11 June 2014)

Applicable recommendations: None

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

GREEN_Finchley Basement Reduced Window Areas

Dwelling type: Semi-detached Flat Ground-floor
Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation not possible.
Region: Thames
Front of dwelling faces: Unknown or unspecified
Overshading: More than average
Overhangs: see below
Thermal mass parameter: 108.6 (calculated from construction elements)
Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
Ventilation rate during hot weather: 4 (Windows fully open)

Summer ventilation heat loss coefficient: 283.37 (P1)
Transmission heat loss coefficient: 27.34 (37)
Summer heat loss coefficient: 310.71 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
West	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
West	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	341	321	283	(P3)
Internal gains:	556	535	544	
Total summer gains:	897	856	827	(P5)
Solar gain/loss ratio:	2.89	2.76	2.66	(P6)
Threshold temperature:	20.13	21.90	21.70	
Likelihood of high internal temperature	Not significant	Slight	Slight	(P7)

Assessment of likelihood of high internal temperature: Slight



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Ground-floor flat , total floor area 86m²

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

1 TER and DER

Fuel for main heating: Mains gas (community)

Fuel factor: 1.00 (Gas)

Target Carbon Dioxide Emission Rate (TER): 14.87kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 12.28kg/m²

Result: OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 34.6kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 28.3kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.20 (max 0.30)	0.20 (max 0.70)	OK
Party wall	0.00 (max 0.20)	0.00 (no max)	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.10 (max 2.00)	1.10 (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: 10.00

OK

4 Heating efficiency

Main heating system : Community heating scheme

Secondary heating
No secondary system specified

5 Cylinder insulation

Hot water storage:
No cylinder

Solar hot water cylinder: No solar water heating

6 Controls

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

Hot water controls:
No cylinder

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.59 W/(l/s)
Maximum: 1.5 W/(l/s)
Efficiency: 89% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Slight - OK

Based on:

Overshading: More than average

Air change rate: 4

Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

Opening U-value: 1.10W/m²K

Party wall U-value: 0.00W/m²K

Thermal bridging ψ -value is 0.001W/m²K

Design air permeability is 3.00m³/h.m²

CHP community heating
Photovoltaic array

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.13	0.13	0.13	0.12	0.11	0.10	0.10	0.10	0.11	0.11	0.12	0.12	(22b)
Effective ach	0.32	0.32	0.32	0.30	0.30	0.29	0.29	0.29	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)		A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	9.44		1.05		9.95	-	-			
1	55.32	0.00	0.00	55.32		0.13		7.1916	30	1659.6 (26-33)			
ext wall	60.06	9.44	9.44	50.62		0.20		10.124	30	1518.6 (26-33)			
party	119.03	0.00	0.00	119.03		-		-	30	3570.9 (26-33)			
ceiling	30.55	0.00	0.00	30.55		-		-	30	916.5 (26-33)			
TMP										108.60 (35)			
Thermal bridges								0.08			(36)		
Total fabric heat loss									27.34		(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	50.18	49.99	49.81	48.88	48.69	47.76	47.76	47.58	48.13	48.69	49.06	49.44	(39)
HLP	0.58	0.58	0.58	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.57	0.58	(40)
HLP (average)												0.57	(40)

4. Water heating energy requirements

Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	716.75	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,147.38	(64)
Water heat from boilers	944.85	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,417.27	(310)
Other energy		
Electrical energy for heat distribution	35.57	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	193.15	(330)
Cooling energy	0	(330)
Electricity for lighting	389.82	(332)
Electricity generated by PVs	259.09	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		1,628.97	0.216	351.858	(363)
less credit emissions for electricity		-325.79	0.5190	-169.087	(364)
Space heating from boilers	95.00	502.98	0.216	108.644	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,221.07	0.216	695.751	(363)
less credit emissions for electricity		-644.21	0.5190	-334.347	(364)
Water heating from boilers	95.00	994.58	0.216	214.828	(340)
Electrical energy for heat distribution		35.57	0.519	18.459	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		193.15	0.519	100.247	(378)
Lighting energy		389.82	0.519	202.316	(379)
Energy generated by PVs		259.09	0.529	134.466	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				1,054.203	(383)
				kg/m ² /year	
Dwelling Carbon Dioxide Emission Rate (DER)				12.28	(384)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
q50	5		
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.41	0.41	0.36	0.36	0.31	0.31	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)		A*U (W/K)		κ (kJ/m ² K)		A*κ (kJ/K)		
Door	-		-	0.00				0.00		-		-		(26)
Windows	-		-	9.44		1.33		12.52		-		-		(27)
Ground floor	-		-	0.00		0.13		0.00		-		-		(28a)
Walls	60.06		9.44	50.62		0.18		9.11		-		-		(29a)
Roof	-		-	0.00		0.13		0.00		-		-		(30)
Total area of external elements				60.06										(31)
Fabric heat loss								21.63						(33)
TMP												250.00		(35)
Thermal bridges						2.56								(36)
Total fabric heat loss								24.19						(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Ventilation heat loss	41.74	41.50	41.26	40.13	39.91	38.93	38.93	38.75	39.31	39.91	40.34	40.79	(38)	
Heat transfer	65.93	65.68	65.44	64.31	64.10	63.12	63.12	62.93	63.50	64.10	64.53	64.98	(39)	
HLP	0.77	0.76	0.76	0.75	0.75	0.74	0.74	0.73	0.74	0.75	0.75	0.76	(40)	

4. Water heating energy requirements

Assumed occupancy:												2.56	(42)
Average daily water use (litres/day)												95.12	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	104.63	100.82	97.02	93.21	89.41	85.60	85.60	89.41	93.21	97.02	100.82	104.63	(44)
Energy content	155.16	135.70	140.03	122.08	117.14	101.09	93.67	107.49	108.77	126.76	138.37	150.26	(45)
Distribution loss	23.27	20.36	21.01	18.31	17.57	15.16	14.05	16.12	16.32	19.01	20.76	22.54	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										0.93			(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										1.44			(55)
Storage loss	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	201.76	177.79	186.63	167.18	163.74	146.18	140.27	154.08	153.87	173.36	183.47	196.86	(64)
Total water output												2,443.29	(64)
Heat gains (kWh)	88.87	78.79	83.84	76.67	76.23	69.69	68.42	73.02	72.24	79.43	82.08	87.24	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	128.24	(66)
Lighting	24.40	21.67	17.62	13.34	9.97	8.42	9.10	11.82	15.87	20.15	23.52	25.07	(67)
Appliances	231.27	233.67	227.62	214.75	198.50	183.22	173.02	170.62	176.66	189.54	205.79	221.06	(68)
Cooking	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	35.82	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	-102.59	(71)
Water heating	119.45	117.25	112.69	106.48	102.46	96.79	91.97	98.14	100.33	106.76	114.00	117.26	(72)
Total internal	439.59	437.06	422.41	399.05	375.40	352.90	338.55	345.06	357.34	380.92	407.79	427.87	(73)
Solar gains	39.74	77.73	128.02	186.70	228.81	234.23	223.00	191.55	148.89	92.24	49.55	32.68	(83)
Total gains	479.32	514.80	550.42	585.75	604.21	587.13	561.55	536.61	506.23	473.15	457.33	460.55	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												1.00	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	427.40	337.85	277.83	143.58	49.40	0.00	0.00	0.00	0.00	142.78	293.98	434.09	(98)
Total space heating requirement kWh												2,106.91	(98)
Space heating requirement per m ²												24.54	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												93.5	(206)
Efficiency of main system 2 (%)												0.0	(207)
Efficiency of secondary system (%)												100	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	427.40	337.85	277.83	143.58	49.40	0.00	0.00	0.00	0.00	142.78	293.98	434.09	(98)

Space heating (main system 1)	457.11	361.34	297.14	153.56	52.83	0.00	0.00	0.00	0.00	152.71	314.42	464.27	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	201.76	177.79	186.63	167.18	163.74	146.18	140.27	154.08	153.87	173.36	183.47	196.86	(64)
Efficiency of water heater (%)	86.77	86.50	85.87	84.41	82.05	79.80	79.80	79.80	79.80	84.30	86.07	86.87	(217)
Water heating fuel	232.52	205.54	217.33	198.05	199.56	183.18	175.77	193.09	192.81	205.64	213.17	226.62	(219)
Annual totals (kWh/year):													
Space heating fuel used, main system 1										2,253.38			(211)
Space heating fuel used, main system 2										0.00			(212)
Space heating fuel used, secondary system										0.00			(215)
Water heating fuel										2,443.29			(219)
Cooling energy										0.00			(221)
Electricity for pumps and fans										75.00			(231)
Electricity for ventilation										0.00			(231)
Electricity for lighting										430.85			(232)
Total delivered energy for all uses										5,127.52			(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	2,253.38	0.216	486.73	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,443.29	0.216	527.75	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	430.85	0.519	223.61	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,277.02	(272)
Emissions per m ² for space and water heating			11.81	(272a)
Emissions per m ² for lighting			2.60	(272b)
Emissions per m ² for pumps and fans			0.45	(272c)
Target Carbon Dioxide Emission Rate (TER)			14.87	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.20	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.26	0.25	0.25	0.22	0.22	0.19	0.19	0.19	0.20	0.22	0.23	0.24	(22b)
Effective ach	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.53	0.53	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)	A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)						
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05	9.95	-	-						
1	55.32	0.00	55.32	0.13	7.1916	30	1659.6	(26-33)					
ext wall	60.06	9.44	50.62	0.20	10.124	30	1518.6	(26-33)					
party	119.03	0.00	119.03	-	-	30	3570.9	(26-33)					
ceiling	30.55	0.00	30.55	-	-	30	916.5	(26-33)					
TMP							108.60	(35)					
Thermal bridges					0.08			(36)					
Total fabric heat loss						27.34		(37)					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	65.13	65.04	64.95	64.53	64.45	64.08	64.08	64.01	64.22	64.45	64.61	64.78	(39)
HLP	0.76	0.76	0.76	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	(40)
HLP (average)												0.75	(40)

4. Water heating energy requirements

SAP 2012 worksheet
 Calculation of Target Fabric Energy Efficiency
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	593.30	467.06	478.30	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.95	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	563.94	458.73	465.68	-	-	-	-	(102)
Gains W	-	-	-	-	-	732.24	701.06	667.47	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	121.18	180.29	150.14	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	30.29	45.07	37.53	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.14	(8)
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.41	0.41	0.36	0.36	0.31	0.31	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	9.44	1.33	12.52	-	-	(27)

SAP 2012 worksheet (Version 9.92, October 2013)
 Calculation of Heat Demand
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.12	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.10	0.11	(22b)
Effective ach	0.31	0.31	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	49.25	49.06	48.88	48.32	48.32	47.58	47.76	47.58	47.58	48.13	47.95	48.69	(39)
HLP	0.57	0.57	0.57	0.56	0.56	0.55	0.56	0.55	0.55	0.56	0.56	0.57	(40)
HLP (average)												0.56	(40)

4. Water heating energy requirements

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.13	0.13	0.13	0.12	0.11	0.10	0.10	0.10	0.11	0.11	0.12	0.12	(22b)
Effective ach	0.32	0.32	0.32	0.30	0.30	0.29	0.29	0.29	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	50.18	49.99	49.81	48.88	48.69	47.76	47.76	47.58	48.13	48.69	49.06	49.44	(39)
HLP	0.58	0.58	0.58	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.57	0.58	(40)
HLP (average)												0.57	(40)

4. Water heating energy requirements

Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	408.20	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,147.38	(64)
Water heat from boilers	944.85	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,417.27	(310)
Other energy		
Electrical energy for heat distribution	30.42	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	193.15	(330)
Cooling energy	0	(330)
Electricity for lighting	375.42	(332)
Electricity generated by PVs	259.09	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

10b. Fuel costs - community heating scheme

	kWh/year	£/kWh	£/year	
Space heating from CHP	408.20	2.97	12.12	(340)
Space heating from boilers	272.13	4.24	11.54	(340)
Space heating (secondary)	0.00	-	0.00	(341)
Water heating from CHP	1,417.27	2.97	42.09	(342)
Water heating from boilers	944.85	4.24	40.06	(342)
Pump/fan energy	0.00	-	0.00	(349)
Mechanical ventilation	193.15	13.19	25.48	(349)
Lighting energy	375.42	13.19	49.52	(350)
Additional standing charges			120	(351)
Energy generated by PVs	259.09	13.19	34.17	(352)
Energy generated by wind turbine	0.00		0.00	(353)
Energy generated by hydro energy	0.00		0.00	(353)
Energy generated by other technologies	0.00		0.00	(354)
Total energy cost			266.64	(355)

11b. SAP rating

Energy cost deflator	0.47	(356)
Energy cost factor (ECF)	0.00	(357)
SAP value	0.00	
SAP rating	0	(358)
SAP band		

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		927.72	0.216	200.387	(363)
less credit emissions for electricity		-185.54	0.5190	-96.297	(364)
Space heating from boilers	95.00	286.45	0.216	61.874	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,221.07	0.216	695.751	(363)
less credit emissions for electricity		-644.21	0.5190	-334.347	(364)
Water heating from boilers	95.00	994.58	0.216	214.828	(340)
Electrical energy for heat distribution		30.42	0.519	15.790	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		193.15	0.519	100.247	(378)

Lighting energy	375.42	0.519	194.843	(379)
Energy generated by PVs	259.09	0.529	134.466	(380)
Energy generated by wind turbine	0.00	0.529	0.000	(381)
Energy generated by hydro energy	0.00	0.529	0.000	(381)
Energy generated by other technologies	0.00		0.000	(382)
Total kg/year			918.610	(383)

			kg / m ² / year	
CO2 emissions per m ²			10.70	(384)
EI Value			0.00	(384a)
EI rating			0	(385)
EI band				

13b. Primary energy

	Efficiency	kWh / year	Primary factor	kWh / year	
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		927.72	1.220	1,131.817	(363)
less credit emissions for electricity		-185.54	2.920	-569.619	(364)
Space heating from boilers	95.00	286.45	1.220	349.473	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,221.07	1.220	3,929.704	(363)
less credit emissions for electricity		-644.21	2.920	-1,977.736	(364)
Water heating from boilers	95.00	994.58	1.220	1,213.382	(340)
Electrical energy for heat distribution		30.42	3.07	0.000	(372)
Pump/fan energy		0.00	2.920	0.000	(378)
Mechanical ventilation		193.15	2.920	0.000	(378)
Lighting energy		375.42	2.920	0.000	(379)
Energy generated by PVs		259.09	2.920	795.394	(380)
Energy generated by wind turbine		0.00	2.920	0.000	(381)
Energy generated by hydro energy		0.00	2.920	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Primary energy kWh / year				0.000	(383)
Primary energy kWh / m ² / year				0.000	(383)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of EPC Costs, Emissions and Primary Energy
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley Basement Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	55.32	2.50	138.30	
Storey 2	30.55	2.50	76.38	
Total floor area	85.87			(4)
Dwelling volume			214.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		4	(19)
Shelter factor		0.7	(20)
Infiltration rate incorporating shelter factor		0.11	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.12	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.10	0.11	(22b)
Effective ach	0.31	0.31	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W / m ² K)		A *U (W /K)	κ (kJ/m ² K)	A*κ (kJ/K)					
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	9.44	1.05		9.95	-	-					
1	55.32	0.00	55.32	0.13		7.1916	30	1659.6	(26-33)				
ext wall	60.06	9.44	50.62	0.20		10.124	30	1518.6	(26-33)				
party	119.03	0.00	119.03	-		-	30	3570.9	(26-33)				
ceiling	30.55	0.00	30.55	-		-	30	916.5	(26-33)				
TMP								108.60	(35)				
Thermal bridges						0.08			(36)				
Total fabric heat loss							27.34		(37)				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	49.25	49.06	48.88	48.32	48.32	47.58	47.76	47.58	47.58	48.13	47.95	48.69	(39)
HLP	0.57	0.57	0.57	0.56	0.56	0.55	0.56	0.55	0.55	0.56	0.56	0.57	(40)
HLP (average)												0.56	(40)

4. Water heating energy requirements

Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	302.33	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,147.38	(64)
Water heat from boilers	944.85	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,417.27	(310)
Other energy		
Electrical energy for heat distribution	28.66	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	193.15	(330)
Cooling energy	0	(330)
Electricity for lighting	375.42	(332)
Electricity generated by PVs	268.40	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		687.11	0.216	148.416	(363)
less credit emissions for electricity		-137.42	0.5190	-71.322	(364)
Space heating from boilers	95.00	212.16	0.216	45.827	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,221.07	0.216	695.751	(363)
less credit emissions for electricity		-644.21	0.5190	-334.347	(364)
Water heating from boilers	95.00	994.58	0.216	214.828	(340)
Electrical energy for heat distribution		28.66	0.519	14.875	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		193.15	0.519	100.247	(378)
Lighting energy		375.42	0.519	194.843	(379)
Energy generated by PVs		268.40	0.529	139.299	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				869.818	(383)

	kg/m ² /year	
CO2 emissions per m ²	10.13	(384)
EI Value	0.00	(384a)
EI rating	0	(385)
EI band		



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN of Finchley 3rd Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
Region: Thames
Postcode: NW3 6EP
UPRN: 0000000000
RRN: (not assigned)
Date of assessment: 16 June 2022
Tenure: Owner-occupied
Date of certificate: 15 August 2022
Assessment type: New dwelling as designed
Transaction type: New dwelling
Year completed: 2018
Related Party Disclosure: No related party
PCDF revision number: 503

Property description

Dwelling type: Flat
Detachment: Semi-detached
Number of dwellings above: 4
Number of dwellings below: 2

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	74.60	2.57	191.72	-

Living area: 100.00 %
Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	North	6.94	1.00
Finchley Window_updated 22.06.08	ext wall	East	6.65	1.00
Finchley Window_updated 22.06.08	ext wall	South	14.38	1.00

Overshading: Average or unknown

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value
ceiling	partyceiling	74.60	-	74.60	-	30

Floor	partyfloor	74.60	-	74.60	-	30
Floor from below	partyfloor	74.60	-	74.60	-	30
ext wall	wall	105.04	27.97	77.07	0.13	30

Thermal bridges:

Default (y = 0.15)

Thermal mass

TMP = 250kJ/m²K

Ventilation

Pressure test: Yes (design value)

Ventilation: Balanced with heat recovery (MVHR) (database revision 503, product index 500569)

Brand/Model: The Nuaire Group: Nuaire MRXBOXAB-ECO-LP2

Approved installation scheme? No

Duct type: Rigid

SFP: 0.61

Wet rooms: Kitchen + 2

Duct insulation: Insulated

Efficiency (%): 79

Number of chimneys: 0

Number of open flues: 0

Number of intermittent fans: 0

Number of passive stacks: 0

Number of sides sheltered: 2

q50: 3.00

Main heating system

Community heating scheme

Fraction of primary space heating provided: 1

CHP Heat source: CHP (Mains gas) Efficiency: 63.4% Fraction: 0.6 Power efficiency: 28.8%

BOILERS Heat source: Boiler (Mains gas) Efficiency: 95% Fraction: 0.4

Distribution loss factor: Piping system >= 1991, pre-insulated, medium temp, variable flow

Radiators

Main heating controls

Flat rate charging, programmer and TRVs

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system

Cylinder volume: 150l

Insulation: 150mm factory insulated

Cylinder in heated space

Water separately timed

Primary pipework: Fully insulated

Cylinderstat

Solar panel: No

Other information

Water use <= 125 litres/person/day Yes

Electricity tariff: Standard tariff

Conservatory: Separated heated conservatory

Photovoltaics:

Peak kW: 0.15

	Tilt:	30°
Overshading:	Very little	
Orientation:	South	
PV connected to dwelling's electricity meter:	Yes	
Terrain type:	Dense urban	
Wind turbine?	No	
Special feature (App. Q)	No	
Total fixed lighting outlets:	30	
Low energy fixed lighting outlets:	30 (= 100% of total outlets)	

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2
Regulations: Approved Document L1A, 2013 Edition, England
SAP 2012 = B 86 | EI 2012 = B 91 | DFEE = 41.59 | TFEE = 46.18 | DER = 11.89 | TER = 17.25
Heat demand kWh: space 737 water space 2068
Weather data for: postcode NW3
PCDF revision number: 503 (31 July 2022)
External Definitions revision number: 5.0 (11 June 2014)
Applicable recommendations: None

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.



SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

GREEN of Finchley 3rd Reduced Window Areas

Dwelling type: Semi-detached Flat Mid-floor
Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation possible.
Region: Thames
Front of dwelling faces: Unknown or unspecified
Overshading: Average or unknown
Overhangs: see below
Thermal mass parameter: 250.0 (global variable applied)
Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
Ventilation rate during hot weather: 6 (Windows fully open)

Summer ventilation heat loss coefficient: 379.61 (P1)
Transmission heat loss coefficient: 55.25 (37)
Summer heat loss coefficient: 434.85 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
North	-	1.00	None
East	-	1.00	None
South	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
North	1.00	1.00	1.00	1.00	(P8)
East	1.00	1.00	1.00	1.00	(P8)
South	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	902	857	793	(P3)
Internal gains:	496	478	486	
Total summer gains:	1,398	1,335	1,280	(P5)
Solar gain/loss ratio:	3.22	3.07	2.94	(P6)
Threshold temperature:	19.47	21.22	20.99	
Likelihood of high internal temperature	Not significant	Slight	Slight	(P7)

Assessment of likelihood of high internal temperature: Slight

This SAP software supplied by Energy Design Tools is currently undergoing approval from the BRE and by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: GREEN of Finchley 3rd Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Mid-floor flat , total floor area 75m²

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

1 TER and DER

Fuel for main heating: Mains gas (community)

Fuel factor: 1.00 (Gas)

Target Carbon Dioxide Emission Rate (TER): 17.25kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 11.89kg/m²

Result: OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 46.2kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 41.6kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.13 (max 0.30)	0.13 (max 0.70)	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.10 (max 2.00)	1.10 (max 3.30)	OK

2a Thermal bridging

Default ψ -value of 0.15

Note: Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 3.00 (design value)

Maximum: 10.00

OK

4 Heating efficiency

Main heating system : Community heating scheme

Secondary heating
No secondary system specified

5 Cylinder insulation

Hot water storage:
No cylinder

Solar hot water cylinder: No solar water heating

6 Controls

Space heating controls : Flat rate charging, programmer and TRVs OK

Hot water controls:
No cylinder

7 Low energy lights

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

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.61 W/(l/s)
Maximum: 1.5 W/(l/s)
Efficiency: 79% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Slight - OK
Based on:
Overshading: Average or unknown
Air change rate: 6
Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

External wall U-value: 0.13W/m²K
Opening U-value: 1.10W/m²K
Design air permeability is 3.00m³/h.m²

CHP community heating
Photovoltaic array

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This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	(22b)
Effective ach	0.33	0.32	0.32	0.30	0.30	0.29	0.29	0.28	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47		-	-			
Floor	74.60		0.00	74.60		-	-		30	2238		(26-33)	
ext wall	105.04		27.97	77.07		0.13	10.0191		30	2312.1		(26-33)	
ceiling	74.60		0.00	74.60		-	-		30	2238		(26-33)	
TMP										250.00		(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	75.92	75.72	75.52	74.51	74.31	73.30	73.30	73.10	73.70	74.31	74.71	75.12	(39)
HLP	1.02	1.02	1.01	1.00	1.00	0.98	0.98	0.98	0.99	1.00	1.00	1.01	(40)
HLP (average)												1.00	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									110.00				(50)
Store loss factor (kWh/litre/day)									0.02				(51)
Volume factor									1.03				(52)
Temperature factor									0.60				(53)
Energy lost from store in kWh/day									1.03				(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(64)
Total water output												2,068.00	(64)
Heat gains (kWh)	93.08	82.67	88.31	81.23	81.11	74.62	73.71	78.07	77.04	84.13	86.36	91.53	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	125.10	123.02	118.70	112.83	109.01	103.64	99.08	104.93	107.00	113.08	119.95	123.03	(72)
Total internal	409.70	407.70	394.88	374.19	353.21	332.94	319.72	325.48	336.07	356.96	380.99	398.97	(73)
Solar gains	251.53	429.66	591.86	741.28	838.45	836.22	804.59	731.36	643.41	475.86	301.47	215.13	(83)
Total gains	661.23	837.36	986.74	1,115.47	1,191.67	1,169.16	1,124.32	1,056.84	979.48	832.82	682.46	614.10	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.99	0.96	0.89	0.75	0.57	0.40	0.29	0.32	0.51	0.82	0.97	0.99	(86)
Util elsewhere	0.98	0.95	0.86	0.70	0.52	0.34	0.23	0.26	0.45	0.77	0.95	0.99	(89)
Living area fraction												1.00	(91)
Util overall	0.98	0.95	0.88	0.74	0.57	0.40	0.29	0.32	0.51	0.81	0.96	0.99	(94)
Space heating kWh	414.55	256.39	151.87	47.93	10.12	0.00	0.00	0.00	0.00	66.08	249.57	440.13	(98)
Total space heating requirement kWh												1,636.64	(98)
Space heating requirement per m ²												21.94	(99)

9b. Energy requirements

Fraction of space heat from secondary system		0	(301)
Fraction of space heat from community system		1	(302)
Fraction of community heat from CHP		0.6	(303a)
Fraction of community heat from BOILERS		0.4	(303b)
Fraction of total space heat from CHP		0.6	(304a)
Fraction of total space heat from BOILERS		0.4	(304b)
Factor for control and charging method for community space heating		1.05	(305)
Factor for charging method for community water heating		1.05	(305a)
Distribution loss factor for community heating system		1.1	(306)
Space heating			
Annual space heating requirement		1,636.64	(98)
Space heat from boilers		756.13	(307)
Space heat from heat pump		0.00	(307)
Space heat from geothermal heat source		0.00	(307)

Space heat from waste heat source	0.00	(307)
Space heat from CHP	1,134.19	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,068.00	(64)
Water heat from boilers	955.41	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,433.12	(310)
Other energy		
Electrical energy for heat distribution	42.79	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	199.75	(330)
Cooling energy	0	(330)
Electricity for lighting	327.14	(332)
Electricity generated by PVs	129.54	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		1,788.95	0.216	386.412	(363)
less credit emissions for electricity		-515.22	0.5190	-267.397	(364)
Space heating from boilers	95.00	795.92	0.216	171.920	(340)
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		2,260.45	0.216	488.256	(363)
less credit emissions for electricity		-651.01	0.5190	-337.873	(364)
Water heating from boilers	95.00	1,005.70	0.216	217.231	(340)
Electrical energy for heat distribution		42.79	0.519	22.207	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		199.75	0.519	103.671	(378)
Lighting energy		327.14	0.519	169.786	(379)
Energy generated by PVs		129.54	0.529	67.233	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				886.980	(383)
				kg/m ² /year	
Dwelling Carbon Dioxide Emission Rate (DER)				11.89	(384)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.16	(8)
q50	5		
Infiltration rate		0.41	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.35	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.35	0.37	0.39	0.41	(22b)
Effective ach	0.60	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)		A*U (W / K)		κ (kJ / m ² K)		A*κ (kJ / K)	
Door	-		-	0.00				0.00		-		- (26)	
Windows	-		-	18.65		1.33		24.73		-		- (27)	
Ground floor	-		-	0.00		0.13		0.00		-		- (28a)	
Walls	105.04		18.65	86.39		0.18		15.55		-		- (29a)	
Roof	-		-	0.00		0.13		0.00		-		- (30)	
Total area of external elements				105.04								(31)	
Fabric heat loss								40.28				(33)	
TMP												250.00 (35)	
Thermal bridges						5.252						(36)	
Total fabric heat loss								45.53				(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ventilation heat loss	37.77	37.53	37.30	36.20	36.00	35.04	35.04	34.87	35.41	36.00	36.41	36.85	(38)
Heat transfer	83.30	83.06	82.83	81.73	81.53	80.57	80.57	80.39	80.94	81.53	81.94	82.38	(39)
HLP	1.12	1.11	1.11	1.10	1.09	1.08	1.08	1.08	1.08	1.09	1.10	1.10	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)

Average daily water use (litres/day)												90.07	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										0.93			(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										1.44			(55)
Storage loss	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.08	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Total water output												2,341.90	(64)
Heat gains (kWh)	86.13	76.40	81.37	74.51	74.16	67.90	66.77	71.12	70.32	77.19	79.64	84.59	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	115.77	113.69	109.37	103.49	99.68	94.31	89.75	95.59	97.67	103.75	110.61	113.70	(72)
Total internal	403.37	401.37	388.54	367.85	346.88	326.61	313.39	319.15	329.73	350.63	374.65	392.64	(73)
Solar gains	178.65	305.17	420.38	526.51	595.53	593.94	571.48	519.46	457.00	337.99	214.13	152.80	(83)
Total gains	582.02	706.54	808.93	894.37	942.41	920.55	884.87	838.61	786.73	688.62	588.78	545.44	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												1.00	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	541.94	388.89	290.23	136.22	45.79	0.00	0.00	0.00	0.00	150.19	362.52	561.02	(98)
Total space heating requirement kWh												2,476.79	(98)
Space heating requirement per m ²												33.20	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												93.5	(206)
Efficiency of main system 2 (%)												0.0	(207)
Efficiency of secondary system (%)												100	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	541.94	388.89	290.23	136.22	45.79	0.00	0.00	0.00	0.00	150.19	362.52	561.02	(98)
Space heating (main system 1)	579.62	415.92	310.41	145.69	48.97	0.00	0.00	0.00	0.00	160.63	387.72	600.02	(210)

Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	193.53	170.59	179.20	160.70	157.53	140.82	135.30	148.38	148.10	166.64	176.13	188.89	(64)
Efficiency of water heater (%)	87.42	86.95	86.09	84.38	81.98	79.80	79.80	79.80	79.80	84.54	86.70	87.54	(217)
Water heating fuel	221.38	196.21	208.15	190.46	192.14	176.46	169.55	185.94	185.58	197.11	203.15	215.77	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	2,648.98	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,341.90	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	0.00	(231)
Electricity for lighting	327.14	(232)
Total delivered energy for all uses	5,318.02	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	2,648.98	0.216	572.18	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,341.90	0.216	505.85	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	327.14	0.519	169.79	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,286.74	(272)
Emissions per m ² for space and water heating			14.45	(272a)
Emissions per m ² for lighting			2.28	(272b)
Emissions per m ² for pumps and fans			0.52	(272c)
Target Carbon Dioxide Emission Rate (TER)			17.25	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.16	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.26	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.33	0.33	0.32	0.29	0.28	0.25	0.25	0.24	0.26	0.28	0.29	0.31	(22b)
Effective ach	0.56	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.53	0.54	0.54	0.55	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47		-	-			
Floor	74.60		0.00	74.60		-	-		30	2238 (26-33)			
ext wall	105.04		27.97	77.07		0.13	10.0191		30	2312.1 (26-33)			
ceiling	74.60		0.00	74.60		-	-		30	2238 (26-33)			
TMP										250.00 (35)			
Thermal bridges										15.76 (36)			
Total fabric heat loss										55.25 (37)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	90.37	90.23	90.10	89.48	89.36	88.82	88.82	88.72	89.03	89.36	89.60	89.84	(39)
HLP	1.21	1.21	1.21	1.20	1.20	1.19	1.19	1.19	1.19	1.20	1.20	1.20	(40)
HLP (average)													1.20 (40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(46)
Storage loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Storage loss (solar store)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(58)
Primary loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	124.89	109.23	112.71	98.27	94.29	81.37	75.40	86.52	87.55	102.03	111.38	120.95	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	124.89	109.23	112.71	98.27	94.29	81.37	75.40	86.52	87.55	102.03	111.38	120.95	(64)
Total water output												1,204.58	(64)
Heat gains (kWh)	31.22	27.31	28.18	24.57	23.57	20.34	18.85	21.63	21.89	25.51	27.84	30.24	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	117.62	(66)
Lighting	18.52	16.45	13.38	10.13	7.57	6.39	6.91	8.98	12.05	15.30	17.86	19.04	(67)
Appliances	207.79	209.94	204.51	192.94	178.34	164.62	155.45	153.29	158.72	170.29	184.89	198.62	(68)
Cooking	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	34.76	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	41.97	40.64	37.87	34.12	31.68	28.25	25.33	29.07	30.40	34.29	38.67	40.64	(72)
Total internal	326.56	325.32	314.05	295.48	275.88	257.55	245.98	249.63	259.46	278.16	299.71	316.58	(73)
Solar gains	251.53	429.66	591.86	741.28	838.45	836.22	804.59	731.36	643.41	475.86	301.47	215.13	(83)
Total gains	578.09	754.97	905.91	1,036.77	1,114.34	1,093.77	1,050.57	980.99	902.87	754.03	601.18	531.72	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.99	0.98	0.94	0.85	0.69	0.51	0.37	0.41	0.64	0.90	0.98	1.00	(86)
Util elsewhere	0.99	0.97	0.92	0.81	0.63	0.43	0.28	0.32	0.56	0.87	0.98	0.99	(89)
Living area fraction												1.00	(91)
Util overall	0.99	0.97	0.93	0.84	0.69	0.51	0.37	0.41	0.64	0.89	0.98	0.99	(94)
Space heating kWh	618.02	428.18	305.63	137.27	44.37	0.00	0.00	0.00	0.00	169.09	419.66	647.99	(98)
Total space heating requirement kWh												2,770.21	(98)
Space heating requirement per m ²												37.13	(99)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	834.88	657.25	674.24	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.96	0.98	0.98	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	803.92	645.93	657.87	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,365.85	1,313.57	1,233.66	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	404.59	496.72	428.38	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	101.15	124.18	107.10	-	-	-	-	(100)

Space cooling (June to August) 332.42 (107)

Space cooling per m² 4.46 (108)

8f. Dwelling Fabric Energy Efficiency (kWh/m²) 41.6 (109)

File name: GREEN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	757.36	596.22	610.99	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.95	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	718.88	582.43	591.61	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,082.67	1,041.10	985.99	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	261.93	341.25	293.42	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	65.48	85.31	73.36	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	3	30	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.16	(8)
Infiltration rate		0.41	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.35	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.35	0.37	0.39	0.41	(22b)
Effective ach	0.60	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.58	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	18.65	1.33	24.73	-	-	(27)
Ground floor	-	-	0.00	0.13	0.00	-	-	(28a)

SAP 2012 worksheet (Version 9.92, October 2013)
Calculation of Heat Demand
Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN of Finchley 3rd Reduced Window Areas
Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.12	0.13	0.12	0.14	(22b)
Effective ach	0.31	0.31	0.30	0.29	0.29	0.28	0.29	0.28	0.28	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A*U (W / K)		κ (kJ / m ² K)	A*κ (kJ / K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47		-	-			
Floor	74.60		0.00	74.60		-	-		30	2238		(26-33)	
ext wall	105.04		27.97	77.07		0.13	10.0191		30	2312.1		(26-33)	
ceiling	74.60		0.00	74.60		-	-		30	2238		(26-33)	
TMP										250.00		(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	74.91	74.71	74.51	73.91	73.91	73.10	73.30	73.10	73.10	73.70	73.50	74.31	(39)
HLP	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.98	0.99	0.99	1.00	(40)
HLP (average)												0.99	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN of Finchley 3rd Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15	(22b)
Effective ach	0.33	0.32	0.32	0.30	0.30	0.29	0.29	0.28	0.29	0.30	0.31	0.31	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A*U (W / K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	27.97		1.05	29.47			-	-		
Floor	74.60		0.00	74.60		-	-			30	2238 (26-33)		
ext wall	105.04		27.97	77.07		0.13	10.0191			30	2312.1 (26-33)		
ceiling	74.60		0.00	74.60		-	-			30	2238 (26-33)		
TMP											250.00 (35)		
Thermal bridges							15.76				(36)		
Total fabric heat loss										55.25	(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	75.92	75.72	75.52	74.51	74.31	73.30	73.30	73.10	73.70	74.31	74.71	75.12	(39)
HLP	1.02	1.02	1.01	1.00	1.00	0.98	0.98	0.98	0.99	1.00	1.00	1.01	(40)
HLP (average)												1.00	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									110.00				(50)
Store loss factor (kWh/litre/day)									0.02				(51)
Volume factor									1.03				(52)
Temperature factor									0.60				(53)
Energy lost from store in kWh/day									1.03				(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(64)
Total water output												2,068.00	(64)
Heat gains (kWh)	93.08	82.67	88.31	81.23	81.11	74.62	73.71	78.07	77.04	84.13	86.36	91.53	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	(66)
Lighting	46.31	41.13	33.45	25.33	18.93	15.98	17.27	22.45	30.13	38.25	44.65	47.60	(67)
Appliances	310.13	313.35	305.24	287.97	266.18	245.70	232.01	228.79	236.90	254.16	275.96	296.44	(68)
Cooking	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	125.10	123.02	118.70	112.83	109.01	103.64	99.08	104.93	107.00	113.08	119.95	123.03	(72)
Total internal	580.06	576.02	555.91	524.64	492.64	463.84	446.88	454.68	472.55	504.02	539.07	565.58	(73)
Solar gains	326.66	557.99	768.65	962.71	1,088.90	1,086.00	1,044.93	949.81	835.60	618.00	391.52	279.39	(83)
Total gains	906.72	1,134.01	1,324.56	1,487.35	1,581.54	1,549.84	1,491.80	1,404.50	1,308.15	1,122.02	930.59	844.98	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.95	0.88	0.76	0.59	0.43	0.30	0.22	0.24	0.39	0.66	0.89	0.96	(86)
Util elsewhere	0.94	0.85	0.72	0.55	0.39	0.26	0.17	0.19	0.34	0.61	0.87	0.95	(89)
Living area fraction												1.00	(91)
Util overall	0.94	0.87	0.75	0.59	0.43	0.30	0.22	0.24	0.39	0.66	0.88	0.96	(94)
Space heating kWh	277.10	141.80	66.02	15.60	2.70	0.00	0.00	0.00	0.00	23.31	140.56	305.08	(98)
Total space heating requirement kWh												972.17	(98)
Space heating requirement per m ²												13.03	(99)

9b. Energy requirements

Fraction of space heat from secondary system	0	(301)
Fraction of space heat from community system	1	(302)
Fraction of community heat from CHP	0.6	(303a)
Fraction of community heat from BOILERS	0.4	(303b)
Fraction of total space heat from CHP	0.6	(304a)
Fraction of total space heat from BOILERS	0.4	(304b)
Factor for control and charging method for community space heating	1.05	(305)
Factor for charging method for community water heating	1.05	(305a)
Distribution loss factor for community heating system	1.1	(306)
Space heating		
Annual space heating requirement	972.17	(98)
Space heat from boilers	449.14	(307)
Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)

Space heat from waste heat source	0.00	(307)
Space heat from CHP	673.71	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,068.00	(64)
Water heat from boilers	955.41	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,433.12	(310)
Other energy		
Electrical energy for heat distribution	35.11	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	199.75	(330)
Cooling energy	0	(330)
Electricity for lighting	327.14	(332)
Electricity generated by PVs	129.54	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

10b. Fuel costs - community heating scheme

	kWh/year	£/kWh	£/year	
Space heating from CHP	673.71	2.97	20.01	(340)
Space heating from boilers	449.14	4.24	19.04	(340)
Space heating (secondary)	0.00	-	0.00	(341)
Water heating from CHP	1,433.12	2.97	42.56	(342)
Water heating from boilers	955.41	4.24	40.51	(342)
Pump/fan energy	0.00	-	0.00	(349)
Mechanical ventilation	199.75	13.19	26.35	(349)
Lighting energy	327.14	13.19	43.15	(350)
Additional standing charges			120	(351)
Energy generated by PVs	129.54	13.19	17.09	(352)
Energy generated by wind turbine	0.00		0.00	(353)
Energy generated by hydro energy	0.00		0.00	(353)
Energy generated by other technologies	0.00		0.00	(354)
Total energy cost			294.54	(355)

11b. SAP rating

Energy cost deflator	0.47	(356)
Energy cost factor (ECF)	0.00	(357)
SAP value	0.00	
SAP rating	0	(358)
SAP band		

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		1,062.64	0.216	229.530	(363)
less credit emissions for electricity		-306.04	0.5190	-158.835	(364)
Space heating from boilers	95.00	472.78	0.216	102.121	(340)
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		2,260.45	0.216	488.256	(363)
less credit emissions for electricity		-651.01	0.5190	-337.873	(364)
Water heating from boilers	95.00	1,005.70	0.216	217.231	(340)
Electrical energy for heat distribution		35.11	0.519	18.224	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		199.75	0.519	103.671	(378)
Lighting energy		327.14	0.519	169.786	(379)
Energy generated by PVs		129.54	0.529	67.233	(380)

Energy generated by wind turbine	0.00	0.529	0.000	(381)
Energy generated by hydro energy	0.00	0.529	0.000	(381)
Energy generated by other technologies	0.00		0.000	(382)
Total kg/year			764.879	(383)

			kg / m ² / year	
CO2 emissions per m ²			10.25	(384)
EI Value			0.00	(384a)
EI rating			0	(385)
EI band				

13b. Primary energy

	Efficiency	kWh/year	Primary factor	kWh/year	
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		1,062.64	1.220	1,296.422	(363)
less credit emissions for electricity		-306.04	2.920	-939.544	(364)
Space heating from boilers	95.00	472.78	1.220	576.794	(340)
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		2,260.45	1.220	2,757.743	(363)
less credit emissions for electricity		-651.01	2.920	-1,998.595	(364)
Water heating from boilers	95.00	1,005.70	1.220	1,226.954	(340)
Electrical energy for heat distribution		35.11	3.07	0.000	(372)
Pump/fan energy		0.00	2.920	0.000	(378)
Mechanical ventilation		199.75	2.920	0.000	(378)
Lighting energy		327.14	2.920	0.000	(379)
Energy generated by PVs		129.54	2.920	397.697	(380)
Energy generated by wind turbine		0.00	2.920	0.000	(381)
Energy generated by hydro energy		0.00	2.920	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Primary energy kWh/year				0.000	(383)
Primary energy kWh/m ² /year				0.000	(383)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
Calculation of EPC Costs, Emissions and Primary Energy
Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN of Finchley 3rd Reduced Window Areas
Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	74.60	2.57	191.72	
Total floor area	74.60			(4)
Dwelling volume			191.72	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.13	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.12	0.12	0.13	0.12	0.14	(22b)
Effective ach	0.31	0.31	0.30	0.29	0.29	0.28	0.29	0.28	0.28	0.29	0.29	0.30	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-		-		27.97	1.05	29.47		-		-		
Floor	74.60		0.00		74.60	-	-		30		2238	(26-33)	
ext wall	105.04		27.97		77.07	0.13	10.0191		30		2312.1	(26-33)	
ceiling	74.60		0.00		74.60	-	-		30		2238	(26-33)	
TMP											250.00	(35)	
Thermal bridges							15.76					(36)	
Total fabric heat loss									55.25			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	74.91	74.71	74.51	73.91	73.91	73.10	73.30	73.10	73.10	73.70	73.50	74.31	(39)
HLP	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.98	0.99	0.99	1.00	(40)
HLP (average)												0.99	(40)

4. Water heating energy requirements

Assumed occupancy:	2.35	(42)
Average daily water use (litres/day)	90.07	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	99.08	95.47	91.87	88.27	84.67	81.06	81.06	84.67	88.27	91.87	95.47	99.08	(44)
Energy content	146.93	128.50	132.61	115.61	110.93	95.72	88.70	101.79	103.00	120.04	131.03	142.29	(45)
Distribution loss	22.04	19.28	19.89	17.34	16.64	14.36	13.31	15.27	15.45	18.01	19.65	21.34	(46)
Store volume									110.00				(50)
Store loss factor (kWh/litre/day)									0.02				(51)
Volume factor									1.03				(52)
Temperature factor									0.60				(53)
Energy lost from store in kWh/day									1.03				(55)
Storage loss	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(57)
Storage loss (solar store)	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	202.21	178.43	187.88	169.10	166.21	149.22	143.98	157.06	156.50	175.32	184.53	197.57	(64)
Total water output												2,068.00	(64)
Heat gains (kWh)	93.08	82.67	88.31	81.23	81.11	74.62	73.71	78.07	77.04	84.13	86.36	91.53	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	141.15	(66)
Lighting	46.31	41.13	33.45	25.33	18.93	15.98	17.27	22.45	30.13	38.25	44.65	47.60	(67)
Appliances	310.13	313.35	305.24	287.97	266.18	245.70	232.01	228.79	236.90	254.16	275.96	296.44	(68)
Cooking	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	51.47	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	-94.10	(71)
Water heating	125.10	123.02	118.70	112.83	109.01	103.64	99.08	104.93	107.00	113.08	119.95	123.03	(72)
Total internal	580.06	576.02	555.91	524.64	492.64	463.84	446.88	454.68	472.55	504.02	539.07	565.58	(73)
Solar gains	347.51	532.89	738.27	959.33	1,061.33	1,132.67	1,086.00	1,008.21	882.69	644.87	430.07	291.86	(83)
Total gains	927.57	1,108.91	1,294.18	1,483.97	1,553.98	1,596.51	1,532.88	1,462.90	1,355.24	1,148.88	969.14	857.44	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.93	0.86	0.72	0.53	0.37	0.22	0.13	0.14	0.30	0.57	0.84	0.95	(86)
Util elsewhere	0.91	0.84	0.68	0.49	0.32	0.17	0.09	0.10	0.25	0.52	0.80	0.93	(89)
Living area fraction												1.00	(91)
Util overall	0.92	0.86	0.71	0.53	0.37	0.22	0.13	0.14	0.30	0.57	0.83	0.94	(94)
Space heating kWh	219.72	118.81	44.94	7.94	0.90	0.00	0.00	0.00	0.00	9.91	88.05	247.05	(98)
Total space heating requirement kWh												737.31	(98)
Space heating requirement per m ²												9.88	(99)

9b. Energy requirements

Fraction of space heat from secondary system	0	(301)
Fraction of space heat from community system	1	(302)
Fraction of community heat from CHP	0.6	(303a)
Fraction of community heat from BOILERS	0.4	(303b)
Fraction of total space heat from CHP	0.6	(304a)
Fraction of total space heat from BOILERS	0.4	(304b)
Factor for control and charging method for community space heating	1.05	(305)
Factor for charging method for community water heating	1.05	(305a)
Distribution loss factor for community heating system	1.1	(306)
Space heating		
Annual space heating requirement	737.31	(98)
Space heat from boilers	340.64	(307)
Space heat from heat pump	0.00	(307)
Space heat from geothermal heat source	0.00	(307)

Space heat from waste heat source	0.00	(307)
Space heat from CHP	510.96	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,068.00	(64)
Water heat from boilers	955.41	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,433.12	(310)
Other energy		
Electrical energy for heat distribution	32.40	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	199.75	(330)
Cooling energy	0	(330)
Electricity for lighting	327.14	(332)
Electricity generated by PVs	134.20	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh/year	Emission factor	kg/year	
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		805.92	0.216	174.080	(363)
less credit emissions for electricity		-232.11	0.5190	-120.463	(364)
Space heating from boilers	95.00	358.57	0.216	77.450	(340)
Electrical efficiency of CHP unit	28.80				(361)
Heat efficiency of CHP unit	63.40				(362)
Space heating from CHP		2,260.45	0.216	488.256	(363)
less credit emissions for electricity		-651.01	0.5190	-337.873	(364)
Water heating from boilers	95.00	1,005.70	0.216	217.231	(340)
Electrical energy for heat distribution		32.40	0.519	16.816	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		199.75	0.519	103.671	(378)
Lighting energy		327.14	0.519	169.786	(379)
Energy generated by PVs		134.20	0.529	69.650	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				719.304	(383)

	kg/m ² /year	
CO2 emissions per m ²	9.64	(384)
EI Value	0.00	(384a)
EI rating	0	(385)
EI band		



SAP 2012 input data (new dwelling as designed) Generated by Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley top Reduced Window Areas
Printed on: 15 August 2022

Listing of input data

Located In: England
Region: Thames
Postcode: NW3 6EP
UPRN: 0000000000
RRN: (not assigned)
Date of assessment: 16 June 2022
Tenure: Owner-occupied
Date of certificate: 15 August 2022
Assessment type: New dwelling as designed
Transaction type: New dwelling
Year completed: 2018
Related Party Disclosure: No related party
PCDF revision number: 503

Property description

Dwelling type: Flat
Detachment: Semi-detached
Number of dwellings above: 0
Number of dwellings below: 2

Storey number	Area (m ²)	Height (m)	Volume (m ³)	Basement?
1	63.66	2.57	163.61	-
2	46.72	2.57	120.07	-

Living area: 67.58 %
Front of dwelling faces: Unknown or unspecified

Opening types

Name	Source	Type	Glazing	Argon	Gap	Frame	FF	g value	U-Value
Finchley Window_updated 22.06.08	Manufacturer	Window	Double, low E, hard	Yes	-	-	0.90	0.46	1.10

Openings

Type-name	Location	Orientation	Width (m)	Height (m)
Finchley Window_updated 22.06.08	ext wall	North	18.09	1.00
Finchley Window_updated 22.06.08	ext wall	East	25.82	1.00
Finchley Window_updated 22.06.08	ext wall	South	13.46	1.00

Overshading: Average or unknown

Exposed Elements

Element name	Type	Gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value	K-value

Floor	partyfloor	63.66	-	63.66	-	30
Floor from below	partyfloor	63.66	-	63.66	-	30
ceiling	roof	66.96	-	66.96	0.12	30
ext wall	wall	195.39	57.37	138.02	0.20	30

Thermal bridges:

User-defined (individual ϕ -values)

Junction	Length	ϕ -value	Source of data
Exposed floor (normal)	8.00	0.320	default detail

Thermal mass

TMP = 250kJ/m²K

Ventilation

Pressure test:	Yes (design value)
Ventilation:	Balanced with heat recovery (MVHR) (Appendix Q datasheet)
Brand/Model:	Nuaire
Approved installation scheme?	Yes
Duct type:	Rigid
SFP:	0.59
Wet rooms:	Kitchen + 2
Duct insulation:	Not insulated
Efficiency (%):	89
Number of chimneys:	0
Number of open flues:	0
Number of intermittent fans:	0
Number of passive stacks:	0
Number of sides sheltered:	0
q50:	3.00

Main heating system

Community heating scheme

Fraction of primary space heating provided: 1

BOILERS Heat source: Boiler (Mains gas) Efficiency: 95% Fraction: 0.4
 CHP Heat source: CHP (Mains gas) Efficiency: 44% Fraction: 0.6 Power efficiency: 20%
 Distribution loss factor: Piping system >= 1991, pre-insulated, medium temp, variable flow
 Radiators

Main heating controls

Charging system linked to use of community heating, programmer and TRVs

Secondary heating

None

Space cooling system:

None

Water heating

(901) - From main heating system
 Cylinder volume: 150l
 Manufacturer's loss factor: 1.6kWh/day
 Cylinder in heated space
 Water separately timed
 Primary pipework: Fully insulated
 Cylinderstat

Solar panel: No

Other information

Water use <= 125 litres/person/day Yes
 Electricity tariff: Standard tariff
 Conservatory: No conservatory

Photovoltaics:

Peak kW: 0.3
Tilt: 30°
Overshading: Very little
Orientation: South
PV connected to dwelling's electricity meter: Yes

Terrain type: Dense urban
Wind turbine? No

Special feature (App. Q) No
Total fixed lighting outlets: 40
Low energy fixed lighting outlets: 40 (= 100% of total outlets)

Results summary

Results summary - New dwelling as built - Worksheet version 9.92 - Energy Design Tools SAP 2012 v5.2

Regulations: Approved Document L1A, 2013 Edition, England

SAP 2012 = B 87 | EI 2012 = B 87 | DFEE = 49.10 | TFEE = 56.38 | DER = 15.98 | TER = 17.25

Heat demand kWh: space 1896 water space 2180

Weather data for: postcode NW3

PCDF revision number: 503 (31 July 2022)

External Definitions revision number: 5.0 (11 June 2014)

Applicable recommendations: None

energydesigntools

This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.



SAP 2012 OVERHEATING ASSESSMENT FOR NEW DWELLING AS DESIGNED (version 9.92, October 2012)
Calculated by Energy Design Tools SAP 2012 calculator v5.2, printed on 15 August 2022

GREEN_Finchley top Reduced Window Areas

Dwelling type: Semi-detached Flat Top-floor
Window setup and cross ventilation: Single storey dwelling,(bungalow, flat). Cross ventilation not possible.
Region: Thames
Front of dwelling faces: Unknown or unspecified
Overshading: Average or unknown
Overhangs: see below
Thermal mass parameter: 250.0 (global variable applied)
Blinds, curtains, shutters: Net curtain (covering whole window), closed for 0% of daylight hours
Ventilation rate during hot weather: 4 (Windows fully open)

Summer ventilation heat loss coefficient: 374.45 (P1)
Transmission heat loss coefficient: 96.17 (37)
Summer heat loss coefficient: 470.62 (P2)

Overhangs

Orientation	Ratio	Z-overhangs	Overhang type
North	-	1.00	None
East	-	1.00	None
South	-	1.00	None

Solar shading

Orientation	Z-blinds	Solar access	Overhangs	Z-summer	
North	1.00	1.00	1.00	1.00	(P8)
East	1.00	1.00	1.00	1.00	(P8)
South	1.00	1.00	1.00	1.00	(P8)

Monthly calculations

	June	July	August	
External temperature:	16	17.9	17.8	
Solar gains:	1,848	1,743	1,551	(P3)
Internal gains:	557	536	545	
Total summer gains:	2,405	2,278	2,096	(P5)
Solar gain/loss ratio:	5.11	4.84	4.45	(P6)
Threshold temperature:	21.36	22.99	22.50	
Likelihood of high internal temperature	Slight	Medium	Medium	(P7)

Assessment of likelihood of high internal temperature: Medium

This SAP software supplied by Energy Design Tools is currently undergoing approval from the BRE and by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations



Regulations Compliance Report - Approved Document L1A, 2013 Edition, England
generated by Energy Design Tools SAP 2012 calculator, v5.2

File name: GREEN_Finchley top Reduced Window Areas
Printed on: 15 August 2022

Dwelling as Designed
Top-floor flat , total floor area 110m²

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

1 TER and DER

Fuel for main heating: Mains gas (community)

Fuel factor: 1.00 (Gas)

Target Carbon Dioxide Emission Rate (TER): 17.25kg/m²

Dwelling Carbon Dioxide Emission Rate (DER): 15.98kg/m²

Result: OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 56.4kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 49.1kWh/m²

Result: OK

2 Fabric U-values

Element	Average	Highest	Pass/Fail
External wall	0.20 (max 0.30)	0.20 (max 0.70)	OK
Floor	(no floor)		
Roof	0.12 (max 0.20)	0.12 (max 0.35)	OK
Openings	1.10 (max 2.00)	1.10 (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: 10.00

OK

4 Heating efficiency

Main heating system : Community heating scheme

Secondary heating

No secondary system specified

5 Cylinder insulation

Hot water storage:

Manufacturer's declared loss factor: 1.60kWh/day

Permitted by DBSCG: 1.89kWh/day - OK

Primary pipework insulated: Yes - OK

Solar hot water cylinder: No solar water heating

6 Controls

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

Hot water controls:

Cylinderstat: Yes

7 Low energy lights

Percentage of lights with low-energy fittings: 100%

Minimum: 75% - OK

8 Mechanical ventilation

Continuous supply and extract system: SFP = 0.59 W/(l/s)

Maximum: 1.5 W/(l/s)

Efficiency: 89% Minimum: 70% OK

9 Summertime temperature

Overheating risk (Thames): Medium - OK

Based on:

Overshading: Average or unknown

Air change rate: 4

Blinds/curtains: Net curtain (covering whole window), closed 0% of daylight hours

10 Key features

Roof U-value: 0.12W/m²K

Opening U-value: 1.10W/m²K

Thermal bridging γ -value is 0W/m²K

Design air permeability is 3.00m³/h.m²

CHP community heating

Photovoltaic array

energydesigntools

This SAP software supplied by Energy Design Tools has been tested by BRE and approved by the Department for Communities and Local Government, the Scottish Building Standards Agency, the National Assembly for Wales and Northern Ireland Department of Finance and Personnel for use in connection with building regulations.

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Dwelling Emissions for regulations compliance
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj inflit rate	0.19	0.19	0.18	0.17	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	(22b)
Effective ach	0.38	0.38	0.37	0.35	0.35	0.33	0.33	0.33	0.34	0.35	0.36	0.36	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45		-	-			
Floor	63.66		0.00	63.66		-	-		30	1909.8		(26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034		30	4140.51		(26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544		30	2008.86		(26-33)	
TMP										250.00		(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									96.17			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	131.72	131.36	131.01	129.26	128.91	127.15	127.15	126.80	127.85	128.91	129.61	130.31	(39)
HLP	1.19	1.19	1.19	1.17	1.17	1.15	1.15	1.15	1.16	1.17	1.17	1.18	(40)
HLP (average)												1.17	(40)

4. Water heating energy requirements

Assumed occupancy: 2.82 (42)

Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	2,279.12	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,180.04	(64)
Water heat from boilers	959.22	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,438.83	(310)
Other energy		
Electrical energy for heat distribution	61.97	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	255.24	(330)
Cooling energy	0	(330)
Electricity for lighting	428.40	(332)
Electricity generated by PVs	259.09	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh / year	Emission factor	kg / year	
Space heating from boilers	95.00	1,599.39	0.216	345.467	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		5,179.83	0.216	1,118.843	(363)
less credit emissions for electricity		-1,035.97	0.5190	-537.666	(364)
Water heating from boilers	95.00	1,009.70	0.216	218.096	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,270.07	0.216	706.334	(363)
less credit emissions for electricity		-654.01	0.5190	-339.433	(364)
Electrical energy for heat distribution		61.97	0.519	32.160	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		255.24	0.519	132.469	(378)
Lighting energy		428.40	0.519	222.338	(379)
Energy generated by PVs		259.09	0.529	134.466	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				1,764.143	(383)
				kg / m ² / year	
Dwelling Carbon Dioxide Emission Rate (DER)				15.98	(384)

SAP 2012 worksheet for Notional Dwelling (Version 9.92, October 2013)
 Calculation of Target Emissions
 Approved Document L1A, 2013 Edition, England
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	4	40	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
q50	5		
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)		A*U (W/K)		κ (kJ/m ² K)		A*κ (kJ/K)		
Door	-		-	0.00				0.00		-		-		(26)
Windows	-		-	27.60		1.33		36.58		-		-		(27)
Ground floor	-		-	0.00		0.13		0.00		-		-		(28a)
Walls	195.387		27.60	167.79		0.18		30.20		-		-		(29a)
Roof	-		-	66.96		0.13		8.71		-		-		(30)
Total area of external elements				262.35										(31)
Fabric heat loss								75.49						(33)
TMP												250.00		(35)
Thermal bridges						2.56								(36)
Total fabric heat loss								78.05						(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Ventilation heat loss	55.21	54.89	54.57	53.06	52.78	51.47	51.47	51.23	51.98	52.78	53.35	53.94	(38)	
Heat transfer	133.26	132.94	132.62	131.11	130.83	129.52	129.52	129.28	130.03	130.83	131.40	132.00	(39)	
HLP	1.21	1.20	1.20	1.19	1.19	1.17	1.17	1.17	1.18	1.19	1.19	1.20	(40)	

4. Water heating energy requirements

Assumed occupancy:	2.82											(42)	
Average daily water use (litres/day)	101.11											(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)										0.02			(51)
Volume factor										0.93			(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										1.44			(55)
Storage loss	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(57)
Storage loss (solar store)	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	211.53	186.34	195.45	174.87	171.12	152.54	146.16	160.85	160.71	181.34	192.18	206.32	(64)
Total water output												2,519.68	(64)
Heat gains (kWh)	92.12	81.63	86.77	79.22	78.68	71.80	70.38	75.27	74.52	82.08	84.98	90.39	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	(66)
Lighting	24.26	21.55	17.52	13.27	9.92	8.37	9.05	11.76	15.78	20.04	23.39	24.93	(67)
Appliances	272.10	274.92	267.81	252.66	233.54	215.57	203.56	200.74	207.85	223.00	242.12	260.09	(68)
Cooking	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	(69)
Pumps, fans	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	123.81	121.48	116.63	110.03	105.75	99.72	94.60	101.16	103.50	110.32	118.03	121.49	(72)
Total internal	488.43	486.20	470.21	444.22	417.47	391.92	375.47	381.92	395.39	421.61	451.79	474.76	(73)
Solar gains	195.33	351.36	524.96	715.86	855.22	870.84	830.63	724.44	591.31	400.77	237.48	164.81	(83)
Total gains	683.75	837.57	995.18	1,160.07	1,272.69	1,262.77	1,206.10	1,106.36	986.69	822.38	689.27	639.57	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(86)
Util elsewhere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(89)
Living area fraction												0.68	(91)
Util overall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(94)
Space heating kWh	971.54	741.45	591.25	303.57	111.93	0.00	0.00	0.00	0.00	347.31	690.45	996.08	(98)
Total space heating requirement kWh												4,753.59	(98)
Space heating requirement per m ²												43.07	(99)

9a. Energy requirements

Fraction of space heat from secondary												0	(201)
Fraction of space heat from main systems												1	(202)
Fraction of main heating from main system 2												0	(203)
Fraction of total heating from main system 1												1	(204)
Fraction of total heating from main system 2												0	(205)
Efficiency of main system 1 (%)												93.5	(206)
Efficiency of main system 2 (%)												0.0	(207)
Efficiency of secondary system (%)												100	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	971.54	741.45	591.25	303.57	111.93	0.00	0.00	0.00	0.00	347.31	690.45	996.08	(98)

Space heating (main system 1)	1,039.08	792.99	632.35	324.68	119.71	0.00	0.00	0.00	0.00	371.46	738.45	1,065.33	(210)
Space heating (main system 2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(212)
Space heating (secondary)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(215)
Water heating requirement	211.53	186.34	195.45	174.87	171.12	152.54	146.16	160.85	160.71	181.34	192.18	206.32	(64)
Efficiency of water heater (%)	88.38	88.13	87.58	86.27	83.71	79.80	79.80	79.80	79.80	86.52	87.93	88.46	(217)
Water heating fuel	239.33	211.44	223.16	202.69	204.40	191.16	183.16	201.57	201.40	209.59	218.55	233.22	(219)

Annual totals (kWh/year):

Space heating fuel used, main system 1	5,084.05	(211)
Space heating fuel used, main system 2	0.00	(212)
Space heating fuel used, secondary system	0.00	(215)
Water heating fuel	2,519.68	(219)
Cooling energy	0.00	(221)
Electricity for pumps and fans	75.00	(231)
Electricity for ventilation	0.00	(231)
Electricity for lighting	428.40	(232)
Total delivered energy for all uses	8,032.13	(238)

12a. Carbon dioxide emissions

	kWh/year	Emission factor	Emissions kg/year	
Space heating - main system 1	5,084.05	0.216	1,098.16	(261)
Space heating - main system 2	0.00	0	0.00	(262)
Space heating - secondary system	0.00		0.00	(263)
Water heating	2,519.68	0.216	544.25	(264)
Space cooling	0.00	0.519	0	(266)
Pumps and fans	75.00	0.519	38.93	(267)
Mechanical ventilation	0.00	0.519	0	(267)
Energy for lighting	428.40	0.519	222.34	(268)
Photovoltaics	0.00	0.529	0.00	
Total kg/year			1,903.67	(272)
Emissions per m ² for space and water heating			14.88	(272a)
Emissions per m ² for lighting			2.01	(272b)
Emissions per m ² for pumps and fans			0.35	(272c)
Target Carbon Dioxide Emission Rate (TER)			17.25	(273)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Fabric Energy Efficiency
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	4	40	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.14	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.29	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.37	0.36	0.36	0.32	0.31	0.28	0.28	0.27	0.29	0.31	0.33	0.34	(22b)
Effective ach	0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A *U (W /K)			κ (kJ/m ² K)	A*κ (kJ/K)	
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45			-	-	
Floor	63.66		0.00	63.66		-	-			30	1909.8 (26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034			30	4140.51 (26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544			30	2008.86 (26-33)	
TMP											250.00 (35)	
Thermal bridges							0.08				(36)	
Total fabric heat loss										96.17	(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer	149.42	149.17	148.92	147.77	147.55	146.55	146.55	146.36	146.94	147.55	147.99	148.45 (39)
HLP	1.35	1.35	1.35	1.34	1.34	1.33	1.33	1.33	1.33	1.34	1.34	1.34 (40)
HLP (average)												1.34 (40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Average daily water use (litres/day)												101.11	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(46)
Storage loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Storage loss (solar store)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(58)
Primary loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	140.19	122.61	126.52	110.31	105.84	91.33	84.63	97.12	98.28	114.53	125.02	135.77	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	140.19	122.61	126.52	110.31	105.84	91.33	84.63	97.12	98.28	114.53	125.02	135.77	(64)
Total water output												1,352.17	(64)
Heat gains (kWh)	35.05	30.65	31.63	27.58	26.46	22.83	21.16	24.28	24.57	28.63	31.26	33.94	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	140.85	(66)
Lighting	24.26	21.55	17.52	13.27	9.92	8.37	9.05	11.76	15.78	20.04	23.39	24.93	(67)
Appliances	272.10	274.92	267.81	252.66	233.54	215.57	203.56	200.74	207.85	223.00	242.12	260.09	(68)
Cooking	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	47.11	45.61	42.52	38.30	35.57	31.71	28.44	32.63	34.12	38.49	43.41	45.62	(72)
Total internal	408.72	407.34	393.10	369.49	344.28	320.91	306.31	310.39	323.01	346.78	374.17	395.90	(73)
Solar gains	381.22	685.76	1,024.58	1,397.15	1,669.15	1,699.64	1,621.16	1,413.90	1,154.06	782.18	463.50	321.66	(83)
Total gains	789.94	1,093.10	1,417.68	1,766.64	2,013.43	2,020.55	1,927.47	1,724.29	1,477.07	1,128.96	837.67	717.56	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	1.00	0.98	0.94	0.82	0.64	0.46	0.33	0.39	0.64	0.92	0.99	1.00	(86)
Util elsewhere	0.99	0.98	0.92	0.78	0.57	0.38	0.24	0.29	0.55	0.88	0.98	1.00	(89)
Living area fraction												0.68	(91)
Util overall	0.99	0.98	0.93	0.80	0.61	0.43	0.30	0.36	0.61	0.90	0.98	1.00	(94)
Space heating kWh	1,078.76	753.21	516.44	203.06	54.59	0.00	0.00	0.00	0.00	304.60	743.76	1,125.02	(98)
Total space heating requirement kWh												4,779.44	(98)
Space heating requirement per m ²												43.30	(99)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	1,377.57	1,084.47	1,112.37	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.97	0.98	0.97	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	1,331.47	1,066.34	1,082.57	-	-	-	-	(102)
Gains W	-	-	-	-	-	2,472.04	2,360.81	2,125.31	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	821.21	963.08	775.80	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	205.30	240.77	193.95	-	-	-	-	(100)

Space cooling (June to August) 640.02 (107)

Space cooling per m² 5.80 (108)

8f. Dwelling Fabric Energy Efficiency (kWh/m²) 49.1 (109)

File name: GREEN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

8c. Space cooling requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext temp	-	-	-	-	-	14.60	16.60	16.40	-	-	-	-	
Heat loss rate W	-	-	-	-	-	1,217.53	958.48	982.55	-	-	-	-	(100)
Utilisation	-	-	-	-	-	0.91	0.95	0.93	-	-	-	-	(101)
Useful loss W	-	-	-	-	-	1,103.35	911.12	912.11	-	-	-	-	(102)
Gains W	-	-	-	-	-	1,503.32	1,436.81	1,319.45	-	-	-	-	(103)
Space heating kWh	-	-	-	-	-	0.00	0.00	0.00	-	-	-	-	(103)
Space cooling kWh	-	-	-	-	-	287.98	391.12	303.06	-	-	-	-	(103)
Cooled fraction												1	(105)
Intermittency factor												0.25	(106)
Space cooling	-	-	-	-	-	72.00	97.78	75.76	-	-	-	-	(100)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	4	40	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans q50	5	0.14	(8)
Infiltration rate		0.39	(18)
Sides sheltered		2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.33	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.42	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.33	0.36	0.37	0.39	(22b)
Effective ach	0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)	Openings (m ²)	Net area (m ²)	U-Value (W/m ² K)	A*U (W/K)	κ (kJ/m ² K)	A*κ (kJ/K)	
Door	-	-	0.00		0.00	-	-	(26)
Windows	-	-	27.60	1.33	36.58	-	-	(27)

SAP 2012 worksheet (Version 9.92, October 2013)
 Calculation of Heat Demand
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley top Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.17	0.17	0.17	0.15	0.15	0.14	0.14	0.14	0.14	0.15	0.15	0.16	(22b)
Effective ach	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.33	0.33	0.34	0.33	0.35	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)			κ (kJ/m ² K)	A*κ (kJ/K)		
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45			-	-		
Floor	63.66		0.00	63.66		-	-			30	1909.8 (26-33)		
ext wall	195.39		57.37	138.02		0.20	27.6034			30	4140.51 (26-33)		
ceiling	66.96		0.00	66.96		0.12	8.03544			30	2008.86 (26-33)		
TMP											250.00 (35)		
Thermal bridges							0.08				(36)		
Total fabric heat loss										96.17	(37)		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	129.96	129.61	129.26	128.21	128.21	126.80	127.15	126.80	126.80	127.85	127.50	128.91	(39)
HLP	1.18	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.15	1.16	1.16	1.17	(40)
HLP (average)												1.16	(40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Average daily water use (litres/day)												101.11	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily water use	111.22	107.17	103.13	99.08	95.04	91.00	91.00	95.04	99.08	103.13	107.17	111.22	(44)
Energy content	164.93	144.25	148.85	129.77	124.52	107.45	99.57	114.26	115.62	134.75	147.09	159.73	(45)
Distribution loss	24.74	21.64	22.33	19.47	18.68	16.12	14.94	17.14	17.34	20.21	22.06	23.96	(46)
Store volume										150.00			(50)
Store loss factor (kWh/litre/day)													(51)
Volume factor													(52)
Temperature factor										0.54			(53)
Energy lost from store in kWh/day										0.86			(55)
Storage loss	26.78	24.19	26.78	25.92	26.78	25.92	26.78	26.78	25.92	26.78	25.92	26.78	(57)
Storage loss (solar store)	26.78	24.19	26.78	25.92	26.78	25.92	26.78	26.78	25.92	26.78	25.92	26.78	(58)
Primary loss	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Combi loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total	214.98	189.45	198.90	178.21	174.57	155.88	149.62	164.30	164.05	184.79	195.52	209.77	(62)
WWHR input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Solar input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Output from w/h	214.98	189.45	198.90	178.21	174.57	155.88	149.62	164.30	164.05	184.79	195.52	209.77	(64)
Total water output												2,180.04	(64)
Water heating demand												2,180	(64)
Heat gains (kWh)	94.88	84.13	89.53	81.90	81.44	74.47	73.14	78.03	77.19	84.84	87.65	93.15	(65)

5. Internal gains / 6. Solar gains
(in watts)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	169.03	(66)
Lighting	60.65	53.86	43.81	33.16	24.79	20.93	22.61	29.39	39.45	50.09	58.47	62.33	(67)
Appliances	406.12	410.33	399.72	377.11	348.57	321.75	303.83	299.61	310.23	332.83	361.37	388.19	(68)
Cooking	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	54.72	(69)
Pumps, fans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	-112.68	(71)
Water heating	127.52	125.19	120.34	113.74	109.46	103.44	98.31	104.88	107.21	114.03	121.74	125.20	(72)
Total internal	705.35	700.45	674.92	635.08	593.89	557.17	535.81	544.94	567.95	608.02	652.64	686.78	(73)
Solar gains	532.92	862.04	1,296.59	1,831.17	2,133.30	2,320.64	2,207.32	1,971.64	1,605.70	1,074.98	669.39	441.29	(83)
Total gains	1,238.27	1,562.49	1,971.51	2,466.24	2,727.19	2,877.81	2,743.14	2,516.58	2,173.65	1,683.00	1,322.03	1,128.07	(84)

7. Mean internal temperature / 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Util living area	0.97	0.91	0.77	0.55	0.36	0.21	0.13	0.15	0.32	0.65	0.91	0.98	(86)
Util elsewhere	0.96	0.89	0.73	0.50	0.31	0.16	0.08	0.09	0.26	0.59	0.88	0.97	(89)
Living area fraction												0.68	(91)
Util overall	0.95	0.90	0.75	0.53	0.34	0.19	0.11	0.13	0.30	0.63	0.89	0.97	(94)
Space heating kWh	538.89	316.83	127.61	21.39	2.31	0.00	0.00	0.00	0.00	38.86	261.50	588.41	(98)
Total space heating requirement kWh												1,895.80	(98)
Space heating demand												1,896	(98)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of Energy Ratings
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley top Reduced Window Areas
 Using weather data for: UK average

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	(22)
Wind factor	1.275	1.25	1.225	1.1	1.075	0.95	0.95	0.925	1	1.075	1.125	1.175	(22a)
Adj infilt rate	0.19	0.19	0.18	0.17	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	(22b)
Effective ach	0.38	0.38	0.37	0.35	0.35	0.33	0.33	0.33	0.34	0.35	0.36	0.36	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W / m ² K)	A *U (W /K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45		-	-			
Floor	63.66		0.00	63.66		-	-		30	1909.8		(26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034		30	4140.51		(26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544		30	2008.86		(26-33)	
TMP										250.00		(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									96.17			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	131.72	131.36	131.01	129.26	128.91	127.15	127.15	126.80	127.85	128.91	129.61	130.31	(39)
HLP	1.19	1.19	1.19	1.17	1.17	1.15	1.15	1.15	1.16	1.17	1.17	1.18	(40)
HLP (average)												1.17	(40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	1,578.59	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,180.04	(64)
Water heat from boilers	959.22	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,438.83	(310)
Other energy		
Electrical energy for heat distribution	50.29	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	255.24	(330)
Cooling energy	0	(330)
Electricity for lighting	428.40	(332)
Electricity generated by PVs	259.09	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

10b. Fuel costs - community heating scheme

	kWh / year	£ / kWh	£ / year	
Space heating from boilers	1,052.39	4.24	44.62	(340)
Space heating from CHP	1,578.59	2.97	46.88	(340)
Space heating (secondary)	0.00	-	0.00	(341)
Water heating from boilers	959.22	4.24	40.67	(342)
Water heating from CHP	1,438.83	2.97	42.73	(342)
Pump/fan energy	0.00	-	0.00	(349)
Mechanical ventilation	255.24	13.19	33.67	(349)
Lighting energy	428.40	13.19	56.51	(350)
Additional standing charges			120	(351)
Energy generated by PVs	259.09	13.19	34.17	(352)
Energy generated by wind turbine	0.00		0.00	(353)
Energy generated by hydro energy	0.00		0.00	(353)
Energy generated by other technologies	0.00		0.00	(354)
Total energy cost			350.91	(355)

11b. SAP rating

Energy cost deflator	0.47	(356)
Energy cost factor (ECF)	0.00	(357)
SAP value	0.00	
SAP rating	0	(358)
SAP band		

12b. Carbon dioxide emissions

	Efficiency	kWh / year	Emission factor	kg / year	
Space heating from boilers	95.00	1,107.78	0.216	239.281	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,587.71	0.216	774.944	(363)
less credit emissions for electricity		-717.54	0.5190	-372.404	(364)
Water heating from boilers	95.00	1,009.70	0.216	218.096	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,270.07	0.216	706.334	(363)
less credit emissions for electricity		-654.01	0.5190	-339.433	(364)
Electrical energy for heat distribution		50.29	0.519	26.101	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		255.24	0.519	132.469	(378)
Lighting energy		428.40	0.519	222.338	(379)

Energy generated by PVs	259.09	0.529	134.466	(380)
Energy generated by wind turbine	0.00	0.529	0.000	(381)
Energy generated by hydro energy	0.00	0.529	0.000	(381)
Energy generated by other technologies	0.00		0.000	(382)
Total kg/year			1,473.261	(383)

			kg / m ² / year	
CO2 emissions per m ²			13.35	(384)
EI Value			0.00	(384a)
EI rating			0	(385)
EI band				

13b. Primary energy

	Efficiency	kWh/year	Primary factor	kWh/year	
Space heating from boilers	95.00	1,107.78	1.220	1,351.495	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,587.71	1.220	4,377.001	(363)
less credit emissions for electricity		-717.54	2.920	-2,202.851	(364)
Water heating from boilers	95.00	1,009.70	1.220	1,231.840	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,270.07	1.220	3,989.481	(363)
less credit emissions for electricity		-654.01	2.920	-2,007.821	(364)
Electrical energy for heat distribution		50.29	3.07	0.000	(372)
Pump/fan energy		0.00	2.920	0.000	(378)
Mechanical ventilation		255.24	2.920	0.000	(378)
Lighting energy		428.40	2.920	0.000	(379)
Energy generated by PVs		259.09	2.920	795.394	(380)
Energy generated by wind turbine		0.00	2.920	0.000	(381)
Energy generated by hydro energy		0.00	2.920	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Primary energy kWh/year				0.000	(383)
Primary energy kWh/m ² /year				0.000	(383)

SAP 2012 worksheet for new dwelling as designed (Version 9.92, October 2013)
 Calculation of EPC Costs, Emissions and Primary Energy
 Generated by the Energy Design Tools SAP 2012 calculator v5.2

File name: GREEN_Finchley top Reduced Window Areas
 Using weather data for: NW3

1. Overall dwelling dimensions

	Area (m ²)	Av. storey height (m)	Volume (m ³)	
Storey 1	63.66	2.57	163.61	
Storey 2	46.72	2.57	120.07	
Total floor area	110.38			(4)
Dwelling volume			283.68	(5)

2. Ventilation rate

		m ³ /hr	
Number of chimneys	0	0	(6a)
Number of open flues	0	0	(6b)
Number of intermittent fans	0	0	(7a)
Number of passive vents	0	0	(7b)
Number of flueless gas fires	0	0	(7c)
Infiltration due to chimneys, flues and fans		0.00	(8)
Pressure test	Yes		
q50	3.00		
Infiltration rate		0.15	(18)
Sides sheltered		0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.15	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.6	4.5	4.4	4.1	4.1	3.7	3.8	3.7	3.7	4	3.9	4.3	(22)
Wind factor	1.15	1.125	1.1	1.025	1.025	0.925	0.95	0.925	0.925	1	0.975	1.075	(22a)
Adj infilt rate	0.17	0.17	0.17	0.15	0.15	0.14	0.14	0.14	0.14	0.15	0.15	0.16	(22b)
Effective ach	0.36	0.36	0.35	0.34	0.34	0.33	0.33	0.33	0.33	0.34	0.33	0.35	(25)

3. Heat losses and heat loss parameter

Element	gross area (m ²)		Openings (m ²)	Net area (m ²)		U-Value (W/m ² K)	A*U (W/K)		κ (kJ/m ² K)	A*κ (kJ/K)			
Finchley Window_updated 22.06.08 (Uw=1.10)	-	-	-	57.37		1.05	60.45		-	-			
Floor	63.66		0.00	63.66		-	-		30	1909.8		(26-33)	
ext wall	195.39		57.37	138.02		0.20	27.6034		30	4140.51		(26-33)	
ceiling	66.96		0.00	66.96		0.12	8.03544		30	2008.86		(26-33)	
TMP										250.00		(35)	
Thermal bridges							0.08					(36)	
Total fabric heat loss									96.17			(37)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer	129.96	129.61	129.26	128.21	128.21	126.80	127.15	126.80	126.80	127.85	127.50	128.91	(39)
HLP	1.18	1.17	1.17	1.16	1.16	1.15	1.15	1.15	1.15	1.16	1.16	1.17	(40)
HLP (average)												1.16	(40)

4. Water heating energy requirements

Assumed occupancy:	2.82	(42)

Space heat from geothermal heat source	0.00	(307)
Space heat from waste heat source	0.00	(307)
Space heat from CHP	1,251.23	(307)
Efficiency of secondary system	-	(308)
Space heating fuel for secondary system	0.00	(309)
Water heating		
Annual water heating requirement	2,180.04	(64)
Water heat from boilers	959.22	(310)
Water heat from heat pump	0.00	(310)
Water heat from geothermal heat source	0.00	(310)
Water heat from waste heat source	0.00	(310)
Water heat from CHP	1,438.83	(310)
Other energy		
Electrical energy for heat distribution	44.83	(313)
Pump fan energy	0.00	(330)
Mechanical ventilation energy	255.24	(330)
Cooling energy	0	(330)
Electricity for lighting	428.40	(332)
Electricity generated by PVs	268.40	(333)
Electricity generated by wind turbine	0.00	(334)
Electricity generated by hydroenergy	0.00	(334)
Electricity generated by other technologies	0.00	(336)

12b. Carbon dioxide emissions

	Efficiency	kWh / year	Emission factor	kg / year	
Space heating from boilers	95.00	878.06	0.216	189.660	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		2,843.70	0.216	614.239	(363)
less credit emissions for electricity		-568.74	0.5190	-295.176	(364)
Water heating from boilers	95.00	1,009.70	0.216	218.096	(340)
Electrical efficiency of CHP unit	20.00				(361)
Heat efficiency of CHP unit	44.00				(362)
Space heating from CHP		3,270.07	0.216	706.334	(363)
less credit emissions for electricity		-654.01	0.5190	-339.433	(364)
Electrical energy for heat distribution		44.83	0.519	23.269	(349)
Pump/fan energy		0.00	0.519	0.000	(378)
Mechanical ventilation		255.24	0.519	132.469	(378)
Lighting energy		428.40	0.519	222.338	(379)
Energy generated by PVs		268.40	0.529	139.299	(380)
Energy generated by wind turbine		0.00	0.529	0.000	(381)
Energy generated by hydro energy		0.00	0.529	0.000	(381)
Energy generated by other technologies		0.00		0.000	(382)
Total kg/year				1,332.498	(383)

	kg / m ² / year	
CO2 emissions per m ²	12.07	(384)
EI Value	0.00	(384a)
EI rating	0	(385)
EI band		

APPENDIX B – BRUKL REPORTS

BRUKL Output Document



Compliance with England Building Regulations Part L 2013

Project name

J2680 - Finchley Road Commercial LEAN

As designed

Date: Wed Jun 15 11:45:50 2022

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.1"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.1

BRUKL compliance check version: v5.6.b.0

Certifier details

Name:

Telephone number:

Address: , ,

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	22.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	22.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	20.4
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.13	0.13	External Wall Basement
Floor	0.25	0.13	0.13	Exposed Floor
Roof	0.25	0.12	0.12	Roof
Windows***, roof windows, and rooflights	2.2	1.45	1.45	Retail
Personnel doors	2.2	-	-	No personal doors in project
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)] * There might be more than one surface where the maximum U-value occurs. ** 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. 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	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	3

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- BOH (3 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	1.1	0.7
Standard value	0.91*	N/A	N/A	1.1^	0.5
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. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

2- Retail (GF - Retail)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3.6	-	1.6	0.7
Standard value	0.91*	2.6	N/A	1.6^	0.5
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. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

1- New HWS Circuit

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0
Standard value	0.9*	N/A
* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.		

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1			
GF - Retail	-	-	-	1.6	-	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
Standard value		60	60	22	
Basement - Circulation		-	90	-	73

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Basement - Retail BOH		90	-	-	128
GF - Circulation		-	90	-	36
GF - Retail		-	90	22	2268

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF - Retail	NO (-26%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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
Area [m ²]	428	428
External area [m ²]	406	406
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	211	216
Average U-value [W/m ² K]	0.52	0.53
Alpha value* [%]	8.02	8.02

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

Building Use

% Area	Building Type
100	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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/m²]

	Actual	Notional
Heating	1.85	2.8
Cooling	9.03	9.14
Auxiliary	6.59	5.34
Lighting	22.05	28.7
Hot water	0.84	0.98
Equipment*	11.55	11.55
TOTAL**	40.36	46.97

* 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/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	129.53	133.45
Primary energy* [kWh/m ²]	120.5	133.76
Total emissions [kg/m ²]	20.4	22.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	2.4	0	0.7	0	6.3	0.91	0	0.91	0	
Notional	10.2	0	3.5	0	7	0.82	0	----	----	
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	9.8	235.3	3	18.2	7.5	0.91	3.6	0.91	3.6	
Notional	7.2	238.3	2.5	18.4	4.4	0.82	3.6	----	----	

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 SSEEF	= 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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.13	External Wall
Floor	0.2	0.13	Exposed Floor
Roof	0.15	0.12	Roof
Windows, roof windows, and rooflights	1.5	1.45	Retail
Personnel doors	1.5	-	No personal doors in project
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project
U _{i-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-Min} = Minimum individual element U-values [W/(m²K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	3

BRUKL Output Document



HM Government

Compliance with England Building Regulations Part L 2013

Project name

**J2680 - Finchley Road Commercial
CLEAN**

As designed

Date: Fri Jun 17 12:04:34 2022

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.1"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.1

BRUKL compliance check version: v5.6.b.0

Certifier details

Name:

Telephone number:

Address: , ,

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	22.6
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	22.6
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	20.9
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	External Wall Basement
Floor	0.25	0.13	0.13	Exposed Floor
Roof	0.25	0.12	0.12	Roof
Windows***, roof windows, and rooflights	2.2	1.16	1.16	Retail
Personnel doors	2.2	-	-	No personal doors in project
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)] * There might be more than one surface where the maximum U-value occurs. ** 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. 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	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	3

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- BOH (3 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	-	1.1	0.7
Standard value	2.5*	N/A	N/A	1.1^	0.5
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. For types <=12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

2- Retail (GF - Retail)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3.6	-	1.6	0.7
Standard value	1	2.6	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

1- New HWS Circuit

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0
Standard value	0.9*	N/A
* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.		

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
GF - Retail		-	-	-	1.6	-	-	-	-	-	-	N/A

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
Basement - Circulation	-	95	-	69

General lighting and display lighting		Luminous efficacy [lm/W]		
Zone name		Luminaire	Lamp	Display lamp
	Standard value	60	60	22
Basement - Retail BOH		95	-	-
GF - Circulation		-	95	-
GF - Retail		-	95	22
				2149

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF - Retail	NO (-13%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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
Area [m ²]	428	428
External area [m ²]	406	406
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	190	216
Average U-value [W/m ² K]	0.47	0.53
Alpha value* [%]	8.02	8.02

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

Building Use

% Area	Building Type
100	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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/m²]

	Actual	Notional
Heating	0.44	0.94
Cooling	10.82	9.14
Auxiliary	6.59	5.34
Lighting	21.51	28.7
Hot water	0.84	0.98
Equipment*	11.55	11.55
TOTAL**	40.21	45.11

* 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/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	152.6	133.45
Primary energy* [kWh/m ²]	123.43	133.17
Total emissions [kg/m ²]	20.9	22.6

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	2.7	0	0.3	0	6.3	3	0	3	0
Notional	10.2	0	1.2	0	7	2.43	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity									
Actual	6.9	282	0.6	21.8	14.7	3	3.6	3	3.6
Notional	7.2	238.3	0.8	18.4	8	2.43	3.6	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.2	External Wall
Floor	0.2	0.13	Exposed Floor
Roof	0.15	0.12	Roof
Windows, roof windows, and rooflights	1.5	1.16	Retail
Personnel doors	1.5	-	No personal doors in project
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project
U _{i-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-Min} = Minimum individual element U-values [W/(m²K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	3

APPENDIX C – GLA SPREADSHEET

[illegible]

The applicant should complete all the light blue cells including information on the 'be leaf' energy consumption figures, the 'be leaf' DER, the DPE and the regulated energy demand of the 'be leaf' scenario.

DOMESTIC ENERGY CONSUMPTION AND CO₂ ANALYSIS

Validation Check				REGULATED ENED CONSUMPTION PER UNIT (kWh p.a.) - 'BE LEAF' SAP DER WORKSHEET										REGULATED CO ₂ EMISSIONS PER UNIT (kgCO ₂ p.a.)										REGULATED CO ₂ EMISSIONS PER UNIT										Fabric Energy Efficiency (FEES)
Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area (m ²)	Number of units	Total area represents 6 fig. round (m ²)	Calculated DER 2012 (kgCO ₂ / m ²)	DER Worksheet DER 2012 (kgCO ₂ / m ²)	Space Heating	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Secondary Heating system	Fuel type Space Heating	Lighting	Auxiliary	Cooling	Space Heating CO ₂ emissions (kgCO ₂ p.a.)	Domestic Hot Water CO ₂ emissions (kgCO ₂ p.a.)	Lighting CO ₂ emissions (kgCO ₂ p.a.)	Auxiliary CO ₂ emissions (kgCO ₂ p.a.)	Cooling CO ₂ emissions (kgCO ₂ p.a.)	Unregulated (kgCO ₂ p.a.)	SAP 10.0 CO ₂ emissions (kgCO ₂ p.a.)	Calculated DER SAP 10.0 (kgCO ₂ / m ²)	Calculated DER SAP 10.0 (DPE)	Calculated Fabric Energy Efficiency (kWh/m ²)										
				DER Sheet (Row 304)	DER Sheet (Row 307a) + DER Sheet (Row 307.1)	Select fuel type	DER Sheet (Row 310a + 3.010)	Select fuel type	DER Sheet (Row 308)	Select fuel type	DER Sheet (Row 312)	DER Sheet (Row 313 + 3.01)	DER Sheet (Row 315)																					
				15.9	14.6	Natural Gas	15.9	Natural Gas	15.9	Natural Gas	15.9	15.9	15.9	15.9	241	624	194	139	1.188	234	627	87	62	658	890	11.5								
Baseline Flat	83.87	2	177.74	16.5	16.5	Natural Gas	16.5	Natural Gas	16.5	Natural Gas	16.5	16.5	16.5	16.5	484	811	178	143	1.228	381	487	76	64	594	1,530	13.8								
Mid Floor Flat	74.6	17	1268.2	20.9	20.6	Natural Gas	20.9	Natural Gas	20.6	Natural Gas	20.9	20.9	20.9	20.9	1,082	723	222	171	2,080	1,082	723	188	77	768	1,942	17.6								
Top Floor Flat	110.38	3	331.14																															
Sum				1,771	22	1,771	16.9	-	49,269	N/A	96,876	N/A	0	N/A	7,893	6,198	0	N/A	10,829	12,112	3,341	3,317	0	28,699	10,334	11,716	1,769	1,444	0	13,721	25,327	14.3	8.89	

NON-DOMESTIC ENERGY CONSUMPTION AND CO₂ ANALYSIS

				VALIDATION CHECK		REGULATED ENERGY CONSUMPTION BY END USE (kWh/m² p.a.) 'BE LEAF' BER - SOURCE: BRUKLIN OUTPUT										REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m² p.a.) 'BE LEAF' BER - SOURCE: BRUKLINP or 'SIM.CSV FILE										REGULATED CO₂ EMISSIONS PER UNIT						
Building Use	Model Area (m²)	Number of units	Total area represents 4 by module (m²)	Calculated BER 2012 (kgCO₂ / m²)		Space Heating (kWh/m² p.a.)	Fuel type Space Heating	Domestic Hot Water (kWh/m² p.a.)	Fuel type Domestic Hot Water	Lighting (kWh/m² p.a.)	Auxiliary (kWh/m² p.a.)	Cooling (kWh/m² p.a.)	Natural Gas	Grid Electricity	Equipment	2012 CO₂ emissions (kgCO₂ p.a.)	Natural Gas	Grid Electricity	Equipment	SAP 10.0 CO₂ emissions (kgCO₂ p.a.)	BRUKLIN BER SAP 10.0 (kgCO₂ / m²)											
Freight Road C	426	1	426	21.3	21.3	1.42	Natural Gas	0.81	Grid Electricity	22.05	6.59	22.04	0.216 kgCO₂/kWh	0.819 kgCO₂/kWh	0.819 kgCO₂/kWh	5,110	0.216 kgCO₂/kWh	0.233 kgCO₂/kWh	0.233 kgCO₂/kWh	4,150	9.7											
Sum	426	1	426	21.3	-	698	N/A	369	N/A	N/A	N/A	9,437	2,921	4,682	698	17,390	0	N/A	N/A	N/A	5,110	4,150	9.7									

SITE-WIDE ENERGY CONSUMPTION AND CO₂ ANALYSIS

Use	Total Area (m²)	Calculated BER 2012 (kgCO ₂ / m²)	REGULATED ENERGY CONSUMPTION									REGULATED CO ₂ EMISSIONS		REGULATED CO ₂ EMISSIONS		Σ
			Space Heating (kWh p.a.)	N/A	Domestic Hot Water (kWh p.a.)	N/A	Secondary Heating System (kWh p.a.)	N/A	Lighting (kWh p.a.)	Auxiliary (kWh p.a.)	Cooling (kWh p.a.)	2012 CO ₂ emissions (kgCO ₂ p.a.)	SAP 10.0 CO ₂ emissions (kgCO ₂ p.a.)	Calculated BER SAP 10.0 (kgCO ₂ / m²)		
Sum	2,199	17.7	49,817	N/A	96,436	N/A	0	17,039	9,618	4,682	38,689	28,481	13.4			

DOMESTIC ENERGY CONSUMPTION AND CO ₂ ANALYSIS																																		
VALIDATION CHECK							REGULATED ENERGY CONSUMPTION PER UNIT (kBtu p.a.) - SEE CLEAN SAP DER WORKSHEET										REGULATED CO ₂ EMISSIONS PER UNIT (kgCO ₂ p.a.)							REGULATED CO ₂ EMISSIONS PER UNIT (kgCO ₂ p.a.)										
Unit identifier B-IG plant number, dwelling type etc.)	Model total floor area (m²)	Number of units	Total area represented by model (m²)	Calculated DER 2012 (kgCO ₂ /m²)	DER Worksheet DER 2012 (kgCO ₂ /m²)	Space Heating (Heat Source 1)	Fuel type Space Heating	Domestic Hot Water (Heat Source 1)	Fuel type Domestic Hot Water	Space and Domestic Hot Water from CHP	Fuel type CSP	Total Electricity generated by CSP (kWh p.a.)	Secondary Heating system	Fuel type Secondary Heating	Lighting	Auxiliary	Cooling	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP	Electricity generated by CHP	Lighting	Auxiliary	Cooling	2012 CO ₂ emissions (kgCO ₂ p.a.)	Space Heating	Domestic Hot Water	Space Heating and DHW from CHP	Electricity generated by CHP	Lighting	Auxiliary	Cooling	SAP ISO CO ₂ emissions (kgCO ₂ p.a.)	Calculated DER SAP ISO (kgCO ₂ /m²)
DER Sheet (Row 344)							DER Sheet Select fuel type	DER Sheet (Row 307a + Row 307b + Row 307c + Row 307d + Row 307e + Row 307f + Row 307g + Row 307h + Row 307i + Row 307j + Row 307k + Row 307l + Row 307m + Row 307n + Row 307o + Row 307p + Row 307q + Row 307r + Row 307s + Row 307t + Row 307u + Row 307v + Row 307w + Row 307x + Row 307y + Row 307z + Row 307aa + Row 307ab + Row 307ac + Row 307ad + Row 307ae + Row 307af + Row 307ag + Row 307ah + Row 307ai + Row 307aj + Row 307ak + Row 307al + Row 307am + Row 307an + Row 307ao + Row 307ap + Row 307aq + Row 307ar + Row 307as + Row 307at + Row 307au + Row 307av + Row 307aw + Row 307ax + Row 307ay + Row 307az + Row 307ba + Row 307bb + Row 307bc + Row 307bd + Row 307be + Row 307bf + Row 307bg + Row 307bh + Row 307bi + Row 307bj + Row 307bk + Row 307bl + Row 307bm + Row 307bn + Row 307bo + Row 307bp + Row 307bq + Row 307br + Row 307bs + Row 307bt + Row 307bu + Row 307bv + Row 307bw + Row 307bx + Row 307by + Row 307bz + Row 307ca + Row 307cb + Row 307cc + Row 307cd + Row 307ce + Row 307cf + Row 307cg + Row 307ch + Row 307ci + Row 307cj + Row 307ck + Row 307cl + Row 307cm + Row 307cn + Row 307co + Row 307cp + Row 307cq + Row 307cr + Row 307cs + Row 307ct + Row 307cu + Row 307cv + Row 307cw + Row 307cx + Row 307cy + Row 307cz + Row 307da + Row 307db + Row 307dc + Row 307dd + Row 307de + Row 307df + Row 307dg + Row 307dh + Row 307di + Row 307dj + Row 307dk + Row 307dl + Row 307dm + Row 307dn + Row 307do + Row 307dp + Row 307dq + Row 307dr + Row 307ds + Row 307dt + Row 307du + Row 307dv + Row 307dw + Row 307dx + Row 307dy + Row 307dz + Row 307ea + Row 307eb + Row 307ec + Row 307ed + Row 307ee + Row 307ef + Row 307eg + Row 307eh + Row 307ei + Row 307ej + Row 307ek + Row 307el + Row 307em + Row 307en + Row 307eo + Row 307ep + Row 307eq + Row 307er + Row 307es + Row 307et + Row 307eu + Row 307ev + Row 307ew + Row 307ex + Row 307ey + Row 307ez + Row 307fa + Row 307fb + Row 307fc + Row 307fd + Row 307fe + Row 307ff + Row 307fg + Row 307fh + Row 307fi + Row 307fj + Row 307fk + Row 307fl + Row 307fm + Row 307fn + Row 307fo + Row 307fp + Row 307fq + Row 307fr + Row 307fs + Row 307ft + Row 307fu + Row 307fv + Row 307fw + Row 307fx + Row 307fy + Row 307fz + Row 307ga + Row 307gb + Row 307gc + Row 307gd + Row 307ge + Row 307gf + Row 307gg + Row 307gh + Row 307gi + Row 307gj + Row 307gk + Row 307gl + Row 307gm + Row 307gn + Row 307go + Row 307gp + Row 307gq + Row 307gr + Row 307gs + Row 307gt + Row 307gu + Row 307gv + Row 307gw + Row 307gx + Row 307gy + Row 307gz + Row 307ha + Row 307hb + Row 307hc + Row 307hd + Row 307he + Row 307hf + Row 307hg + Row 307hi + Row 307hj + Row 307hk + Row 307hl + Row 307hm + Row 307hn + Row 307ho + Row 307hp + Row 307hq + Row 307hr + Row 307hs + Row 307ht + Row 307hu + Row 307hv + Row 307hw + Row 307hx + Row 307hy + Row 307hz + Row 307ia + Row 307ib + Row 307ic + Row 307id + Row 307ie + Row 307if + Row 307ig + Row 307ih + Row 307ii + Row 307ij + Row 307ik + Row 307il + Row 307im + Row 307in + Row 307io + Row 307ip + Row 307iq + Row 307ir + Row 307is + Row 307it + Row 307iu + Row 307iv + Row 307iw + Row 307ix + Row 307iy + Row 307iz + Row 307ja + Row 307jb + Row 307jc + Row 307jd + Row 307je + Row 307jf + Row 307jg + Row 307jh + Row 307ji + Row 307jj + Row 307jk + Row 307jl + Row 307jm + Row 307jn + Row 307jo + Row 307jp + Row 307jq + Row 307jr + Row 307js + Row 307jt + Row 307ju + Row 307jv + Row 307jw + Row 307jx + Row 307jy + Row 307jz + Row 307ka + Row 307kb + Row 307kc + Row 307kd + Row 307ke + Row 307kf + Row 307kg + Row 307kh + Row 307ki + Row 307kj + Row 307kl + Row 307km + Row 307kn + Row 307ko + Row 307kp + Row 307kq + Row 307kr + Row 307ks + Row 307kt + Row 307ku + Row 307kv + Row 307kw + Row 307kx + Row 307ky + Row 307kz + Row 307la + Row 307lb + Row 307lc + Row 307ld + Row 307le + Row 307lf + Row 307lg + Row 307lh + Row 307li + Row 307lj + Row 307lk + Row 307ll + Row 307lm + Row 307ln + Row 307lo + Row 307lp + Row 307lq + Row 307lr + Row 307ls + Row 307lt + Row 307lu + Row 307lv + Row 307lw + Row 307lx + Row 307ly + Row 307lz + Row 307ma + Row 307mb + Row 307mc + Row 307md + Row 307me + Row 307mf + Row 307mg + Row 307mh + Row 307mi + Row 307mj + Row 307mk + Row 307ml + Row 307mn + Row 307mo + Row 307mp + Row 307mq + Row 307mr + Row 307ms + Row 307mt + Row 307mu + Row 307mv + Row 307mw + Row 307mx + Row 307my + Row 307mz + Row 307na + Row 307nb + Row 307nc + Row 307nd + Row 307ne + Row 307nf + Row 307ng + Row 307nh + Row 307ni + Row 307nj + Row 307nk + Row 307nl + Row 307nm + Row 307nn + Row 307no + Row 307np + Row 307nq + Row 307nr + Row 307ns + Row 307nt + Row 307nu + Row 307nv + Row 307nw + Row 307nx + Row 307ny + Row 307nz + Row 307oa + Row 307ob + Row 307oc + Row 307od + Row 307oe + Row 307of + Row 307og + Row 307oh + Row 307oi + Row 307oj + Row 307ok + Row 307ol + Row 307om + Row 307on + Row 307oo + Row 307op + Row 307oq + Row 307or + Row 307os + Row 307ot + Row 307ou + Row 307ov + Row 307ow + Row 307ox + Row 307oy + Row 307oz + Row 307pa + Row 307pb + Row 307pc + Row 307																										

[illegible]

SAP 2012 Performance				SAP 10.0 Performance			
Domestic							
Table 1: Carbon Dioxide Emissions after each stage of the Energy Intensity for domestic buildings				Table 1: Carbon Dioxide Emissions after each stage of the Energy Intensity for domestic buildings			
Carbon Dioxide Emissions for domestic buildings (Domestic CO ₂ per annum)				Carbon Dioxide Emissions for domestic buildings (Domestic CO ₂ per annum)			
Regulation Part 1, 2012 of the Building Regulations (Domestic CO ₂ per annum)				Regulation Part 1, 2012 of the Building Regulations (Domestic CO ₂ per annum)			
After energy demand reduction (see table 1)	26.9	26.9		After energy demand reduction (see table 1)	26.9	26.9	
After heat network connection (see table 1)	20.0	20.0		After heat network connection (see table 1)	20.0	20.0	
After renewable energy (see table 1)	20.0	20.0		After renewable energy (see table 1)	20.0	20.0	
Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Intensity for domestic buildings				Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Intensity for domestic buildings			
Regulated domestic carbon dioxide savings (Domestic CO ₂ per annum)				Regulated domestic carbon dioxide savings (Domestic CO ₂ per annum)			
See table 1 savings from energy demand reduction	6.1	1%		See table 1 savings from energy demand reduction	6.1	0%	
See table 1 savings from heat network	7.0	10%		See table 1 savings from heat network	6.0	0%	
See table 1 savings from renewable energy	1.0	0%		See table 1 savings from renewable energy	0.0	0%	
Competition on site savings	0.7	25%		Competition on site savings	2.0	0%	
Renewal savings from off-peak payment	20.0	-		Renewal savings from off-peak payment	20.0	-	
Domestic CO ₂				Domestic CO ₂			
Competition savings for off-peak payment	0.0	-		Competition savings for off-peak payment	7.0	-	
Capex in the contribution (%)	60.0%			Capex in the contribution (%)	60.0%		
Table 3: Carbon Dioxide Emissions after each stage of the Energy Intensity for non-domestic buildings				Table 3: Carbon Dioxide Emissions after each stage of the Energy Intensity for non-domestic buildings			
Carbon Dioxide Emissions for non-domestic buildings (Domestic CO ₂ per annum)				Carbon Dioxide Emissions for non-domestic buildings (Domestic CO ₂ per annum)			
Regulation Part 1, 2012 of the Building Regulations (Domestic CO ₂ per annum)				Regulation Part 1, 2012 of the Building Regulations (Domestic CO ₂ per annum)			
After energy demand reduction (see table 1)	10.1	2.0		After energy demand reduction (see table 1)	4.7	0%	
After heat network connection (see table 1)	9.1	2.0		After heat network connection (see table 1)	4.2		
After renewable energy (see table 1)	9.1	2.0		After renewable energy (see table 1)	4.2		
After renewable energy (see table 1)	9.1	2.0		After renewable energy (see table 1)	4.1		
Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Intensity for non-domestic buildings				Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Intensity for non-domestic buildings			
Regulated non-domestic carbon dioxide savings (Domestic CO ₂ per annum)				Regulated non-domestic carbon dioxide savings (Domestic CO ₂ per annum)			
See table 1 savings from energy demand reduction	1.0	10%		See table 1 savings from energy demand reduction	0.0	10%	
See table 1 savings from heat network	0.0	0%		See table 1 savings from heat network	0.0	0%	
See table 1 savings from renewable energy	0.0	0%		See table 1 savings from renewable energy	0.1	2%	
Total Contribution Savings	1.0	10%		Total Contribution Savings	0.0	10%	
Renewal savings from off-peak payment	9.1	-		Renewal savings from off-peak payment	4.1	-	
Domestic CO ₂				Domestic CO ₂			
Competition savings for off-peak payment	0.0	-		Competition savings for off-peak payment	1.0	-	
Capex in the contribution (%)	20.0%			Capex in the contribution (%)	10.0%		
Table 5: Carbon Dioxide Emissions after each stage of the Energy Intensity for non-domestic buildings				Table 5: Carbon Dioxide Emissions after each stage of the Energy Intensity for non-domestic buildings			
Carbon Dioxide Emissions for non-domestic buildings (Domestic CO ₂ per annum)				Carbon Dioxide Emissions for non-domestic buildings (Domestic CO ₂ per annum)			
Regulation Part 1, 2012 of the Building Regulations (Domestic CO ₂ per annum)				Regulation Part 1, 2012 of the Building Regulations (Domestic CO ₂ per annum)			
After energy demand reduction (see table 1)	10.1	2.0		After energy demand reduction (see table 1)	4.7	0%	
After heat network connection (see table 1)	9.1	2.0		After heat network connection (see table 1)	4.2		
After renewable energy (see table 1)	9.1	2.0		After renewable energy (see table 1)	4.2		
After renewable energy (see table 1)	9.1	2.0		After renewable energy (see table 1)	4.1		
Table 6: Regulated Carbon Dioxide savings from each stage of the Energy Intensity for non-domestic buildings				Table 6: Regulated Carbon Dioxide savings from each stage of the Energy Intensity for non-domestic buildings			
Regulated non-domestic carbon dioxide savings (Domestic CO ₂ per annum)				Regulated non-domestic carbon dioxide savings (Domestic CO ₂ per annum)			
See table 1 savings from energy demand reduction	1.0	10%		See table 1 savings from energy demand reduction	0.0	10%	
See table 1 savings from heat network	0.0	0%		See table 1 savings from heat network	0.0	0%	
See table 1 savings from renewable energy	0.0	0%		See table 1 savings from renewable energy	0.1	2%	
Total Contribution Savings	1.0	10%		Total Contribution Savings	0.0	10%	
Renewal savings from off-peak payment	9.1	-		Renewal savings from off-peak payment	4.1	-	
Domestic CO ₂				Domestic CO ₂			
Competition savings for off-peak payment	0.0	-		Competition savings for off-peak payment	1.0	-	
Capex in the contribution (%)	20.0%			Capex in the contribution (%)	10.0%		

Life-wide

	Total regulated emissions (Domestic CO ₂ / year)	CO ₂ savings (Domestic CO ₂ / year)	Percentage savings (%)
Part 1, 2012 baseline	40.0		
See table 1	20.0	1.0	2%
See table 1	20.0	7.0	15%
See table 1	20.0	1.0	2%
See table 1	20.0	1.0	2%
Total savings	-	10.0	25%
CO ₂ savings off-peak (Domestic CO ₂ / year)	-	-	-
CO ₂ savings	-	0.0	-

	Target Carbon Savings (Domestic CO ₂ / year)	Percentage savings (%)
Domestic CO ₂	10.0	25%

	Area assigned non-domestic savings (Domestic CO ₂ / year)	Total area assigned non-domestic savings (Domestic CO ₂ / year)
Domestic CO ₂	10.0	10.0

