CGP | MEP

STAMFORD ROAD

Mechanical, Electrical and Public Health Services

Revised Energy Strategy

February 2021

DOCUMENT DETAILS

PROJECT NAME	PROJECT NUMBER	DOCUMENT TITLE	DATE CREATED
Stamford Road	CGP 14131	Revised Energy Strategy	2 March 2021
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CHANGE HISTORY

REVISION No.	REVISION DATE	DOCUMENT UPDATE DETAILS	REVISED BY	
P1	02.03.2021		BST/RH	
			Checked Dave Parker	Approved Michael Callaghan
P2	04.07.2023		JF	
			Checked Dave Parker	Approved Michael Callaghan

DISTRIBUTION LIST

NAME	ORGANISATION

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SECTION A – EXECUTIVE SUMMARY

A.1 Executive Summary

This energy strategy technical note outlines the as built energy performance and carbon dioxide emissions as compared with the predicted energy performance and carbon dioxide emissions for the Planning Application for the proposed development at Stamford Road. This in line with the requirements set out by the London Plan and the London Borough of Haringey and based on the revised design strategy.

The calculations presented within this document conclude that in order to comply with the Haringey and London Plan planning requirements waste water heat recovery can be omitted and offset payment (i.e. allowable solutions payment of £113,230) can be reduced. This can be achieved by utilising the revised GLA carbon factors, upgrading glazing u-values (from 1.35 to 1.2 W/(m^2K)) and improving air permeability from 4m^3/hr per m^2 @ 50Pa to 3m^3/hr per m^2 @ 50Pa.

The preliminary calculations at design stage demonstrated that by omitting waste water heat recovery, and instead improving u-values and air permeability a **68% of carbon saving** and **2% energy saving** can be achieved when compared to the baseline benchmark.

The actual as built development demonstrates that the development has an **62% carbon saving** and a **3.5% energy saving**. The difference in savings is due to a change in the as designed glazing U-Values.

These figures have been taken from the as built SAP calculations.

The as designed carbon savings (62%) compared to the previously calculated carbon savings (36.6% as per Stamford Road Energy Strategy v2.0), significantly reduce the offset payment (allowable solution). These payments can be reduced even further when utilising the London Plan's revised carbon factors, however, this is subject to a more detailed calculation as per London Plan's GLA Guidance.

Additionally, the table below demonstrates the compliance with Building Regulations, where the average energy use and carbon emissions of the actual buildings are lower than the notional building figures.

	Energy demand (kWh/m2)	Regulated CO2 emissions (kg per m2)
Notional Building ("Baseline" energy demand & emissions) **AS DESIGNED**	47.60	26.0
Actual Building **AS DESIGNED**	46.52	8.2
Notional Building ("Baseline" energy demand & emissions) **AS BUILT**	36.1	14.9
Actual Building **AS BUILT**	28.1	5.6

Table 1: Comparison of Notional and Actual buildings for Building Regulation compliance.

SECTION B – ENERGY MODELLING

B.1 Energy Modelling

To demonstrate compliance with the Haringey and London Plan planning policies the energy efficiency and low carbon measures below have been utilised.

B.1.1 Building Fabric

New dwellings are currently subject to Building Regulations requirements on energy efficiency which are set out in the 2013 edition approved document L1A. This requires that new dwellings meet a minimum Target Emission Rate (TER) for CO2 emissions as well as a Target Fabric Energy Efficiency (TFEE) Rate for energy consumption. The TER is expressed in terms of kilograms of CO2 emitted per square meter of floor area per annum, while the TFEE is measured in kilowatt hours (kWh) of energy consumed per square meter of floor area per annum. Both are calculated and compared with the dwelling's actual performance as part of the Building Regulations process.

For the proposed apartments, significant improvements on the minimum values have been proposed to minimise operational energy use and carbon dioxide emissions, as well as further exceed Part L requirements. The table below demonstrates that fabric elements for the proposed building are surpassing the minimum Building Regulation standards.

U-values ($W/(m^2K)$)	Building Regulations Part L	Notional Building	Proposed Building	% Improvement over Building Regulations Part L	Actual Building
Roof	0.20	0.13	0.12	40%	0.12
Wall	0.30	0.18	0.16	46%	0.16
Floor	0.25	0.13	0.12	52%	0.12
Glazing elements (including frame)	2.0	1.4; g-value = 0.63	1.2; g-value = 0.60/0.45	40%	1.35; g-value = 0.60/0.45
Party wall	0.20	0.0	0.0	n/a	0.0
Thermal mass	Not Specified	Medium	High	n/a	High

Table 2: Comparison of building fabric parameters for Part L 2013 and the proposed design standards.

It should be noted that in buildings with high internal heat gains and long occupancy hours, similar to the proposed apartments, the effect of insulation on total energy use and occupant comfort should be carefully evaluated. It is recognised that low U-values are beneficial for winter periods as they prevent heat loss, however it's a delicate balance as increased thermal performance and air tightness can also lead to internal overheating issues which is currently a wide spread problem in the UK construction industry. In many cases over-insulation of the building retains high amounts of warm air, limits air extraction and leads to higher internal temperatures – in most cases creating an increased need for mechanical cooling systems.

The thermal bridging values of the apartments were set at a default Y-Value of 0.15. By using accredited details in the following areas, the thermal bridging can be further reduced, thereby reducing heat loss through the walls and

subsequently the building heating demand. This is subject to a careful specification by the Architect and Contractor at later design stages.

It has been proposed that the party walls (i.e. those between houses, apartments) will be fully filled cavity walls with effective edge sealing. The SAP software automatically determines these to have a U-Value of 0.0 W/m^{2}K.

Summer (i.e. unwanted) solar gains encourage the consumption of energy in the form of mechanical cooling. This will be limited by the shading provided from the adjacent buildings. Solar gain reduction will also be enhanced by using glass with a relatively low g-value.

Based on this it can be noted that the U-values of the proposed building represent an improvement over and above both the 2013 Part L Building Regulations specification, which is sufficient to prevent extreme heat losses over the winter and to prevent overheating issues over the summer whilst avoiding additional energy use and carbon emissions associated with increased or higher capacity of mechanical cooling systems.

Glazing

Low U-values for glazing are as important as low U-values for fabric elements. Building design of the proposed building will utilise low U-value glazing in order to diminish heat losses over the winter period.

The proposed building design includes glazing with a U-value of 1.2 W/(m^{2}K), which is lower than the Building Regulation minimum value of 2.0 W/(m^{2}K), and below the Notional Building value of 1.4 W/(m^{2}K).

It should be noted that as part of the final development a different glazing has be used that has a U-Value of 1.35 W/(m^{2}K), which whilst better that the notional building this is worse than what the proposed design utilised. Therefore the over all figures for the developments have changed.

B.1.2 Air Permeability

The air tightness of a building impacts on its energy consumption and hence the CO_2 emissions. The lower the air tightness, the more heated warm air is retained within the occupied spaces of the building, therefore less energy is required to heat the building in winter. Part L of Building Regulations identifies that air permeability of less than 10m^3/hr per m^2 @ 50Pa should be achieved. However, as 'a rule of thumb' it is usually necessary to make significant improvements on the statutory limit to achieve CO_2 emissions compliance. A new build should generally target a value no higher than 5m^3/hr per m^2 @ 50Pa.

The target proposed for the proposed apartments blocks is 3m^3/hr per m^2 @ 50Pa as opposed to 4m^3/hr per m^2 @ 50Pa. This demonstrates an improvement over the current Part L Building Regulations value of 70%.

The as built air tests that have been completed and all are below 3m^3/hr per m^2 @ 50Pa.

B.1.3 Building Services

In addition to upgrading the insulation and air tightness standards, it is important that the energy used within the building is efficient. Therefore, the building services systems should be designed to optimise the efficiency of the

systems by matching installed capacity to anticipated building demand. Items of equipment, which make up the building's building services installation, will be specified to achieve high annual energy efficiency in operation and will be regularly serviced to maintain their performance. Please note that all systems have efficiencies and controls which will meet or exceed the requirements of Part L1A.

System	Building Regs/Notional minimum requirements	Proposed Strategy
Space heating	Gas combi boiler - seasonal efficiency >89.5%	ASHP via underfloor heating
Air distribution systems	Local balanced supply and extract ventilation system with heat recovery; SFP=1.5 W/l/s >HR=70%	Local balanced supply and extract ventilation system with heat recovery; SFP=0.47 W/l/s >HR=95%
Cooling	n/a	n/a
Domestic Hot Water	Gas combi boiler system same as space heating	Air Source Heat Pump; Efficiency of 300%
Internal lighting systems	75% Low-energy lighting	100% Low-energy lighting

Table 3: Comparison of building services parameters for Part L 2013 and proposed design standards.

Internal lighting systems

Electric lighting is often one of the largest end-uses of energy within the buildings and can account for a significant proportion of CO_2 emissions. LED lights are an extremely efficient light source, they use much less power to produce the same brightness when compared to traditional lighting, hence LED lighting is very appealing as an opportunity to meet carbon reduction targets. In addition, most LED lights last significantly longer than traditional bulbs, reducing maintenance & replacement costs of traditional light fittings.

In the proposed apartments, 100% of the light fittings will utilise low energy lamps, including storage and infrequently accessed areas. This is an improvement on the minimum requirement which states that only 75% of the fittings need to be low energy.

B.1.4 Low and Zero Carbon Technologies

Air Source Heat Pumps (ASHP) – Adopted

Air source heat pumps (ASHPs) employ the same technology as ground source heat pump (GSHPs). However, instead of using heat exchangers buried in the ground, heat is extracted from the external ambient air.

Air source heat pumps are good at supplying low grade (not very hot) heat. They are best matched with underfloor heating where lower supply temperatures can be used. This is proposed in the domestic part of this development.

The dwelling domestic hot water and space heating needs will be met principally via Low Temperature Hot Water generated via Air Source Heat Pump units.

Photovoltaic Panels - Adopted

Four types of solar cells are available on the market; these are mono-crystalline, poly-crystalline, thin film and hybrid panels. Although mono-crystalline and hybrid cells are the most expensive, they are also the most efficient with an efficiency rate of 12-20%. Poly-crystalline cells are cheaper but they are less efficient (9-15%). Thin film cells are only 5-8% efficient but can be produced as thin and flexible sheets.

Photovoltaics can be considered a suitable technology for this development for the following reasons:

- The development provides sufficient roof space for the installation of PV panels;
- PV arrays are relatively easy to install when compared to other renewable systems;
- PV panels provide significant CO2 savings.

Based on the reasons above 280m^2 of panels have been proposed, rated at approximately 43kWp.

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SECTION C – CONCLUSION

C.1 Conclusion

This energy strategy technical note outlines the predicted energy performance and carbon dioxide emissions for the Planning Application for the proposed development at Stamford Road, in line with the requirements set out by the London Plan and the London Borough of Haringey.

The calculations presented within this document conclude that in order to comply with the Haringey and London Plan planning requirements waste water heat recovery can be omitted and offset payment (i.e.allowable solutions) can be reduced. This can be achieved by utilising the revised GLA carbon factors, upgrading glazing u-values and improving the air permeability.

The preliminary calculations for the as designed demonstrated that by omitting waste water heat recovery, but instead improving u-values and air permeability gave **a 68% carbon saving** and a **2% energy saving** that could be achieved when compared to the baseline benchmark.

The actual as built development demonstrates that the development has an **62% carbon saving** and a **3.5% energy saving**.

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The below table demonstrates the improvements.

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Table 4: Comparison of Notional and Actual buildings for Building Regulation compliance.

It should be noted that the above calculations are preliminary, therefore, an overall energy use and carbon dioxide emissions savings are subject to a full energy strategy calculation as per the London Plan's GLA requirements.