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Consulting Engineers

58, Regent's Park Road, Camden
Energy Strategy Report

Project:	58, Regent's Park Road, Camden
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EXECUTIVE SUMMARY

The proposed 58 Regent's Park Road development entails the refurbishment of an existing 5-storey 6-bedroom dwelling to incorporate a minor back extension and minor alterations to the roof.

The proposed development addresses national planning policies on energy; in particular, mitigation of climate change and energy security through energy efficiency enhancements and use of alternative energy technologies. In order to reduce the carbon footprint of the building beyond the requirements of current regulatory and market standards, the development will benefit from the following integrated systems:

- Passive design features;
- Zero carbon energy systems;
- Energy efficiency measures

The building fabric U-values of the new elements will exceed the Part L 2010 requirements. Energy efficient light fittings will minimise the electricity demand for lighting.

An energy assessment has been carried out based on design information to identify the improvement in CO_2 emissions of the proposed refurbishment strategy, incorporating a minor back extension and minor alterations to the roof together with upgrading the existing building envelope and services, compared to just carrying out the extension and alteration only whilst retaining the existing fabric and services. The feasibility of installing renewable energy technologies is assessed.

The proposed refurbishment strategy to upgrade the existing building envelope and systems has the potential of improving the CO_2 emission by 50% compared to retaining the existing dwelling. No renewable energy technologies are deemed feasible primarily due to the site's restrictions. The EcoHomes minimum energy requirements set out by the London Borough of Camden are met through the proposed passive design and energy efficient measures

1.2. Objective

This report summarises the work undertaken to support the development of an energy strategy for 58 Regent's Park Road. This work has resulted in a strategy, which requires design, technical and commercial decisions in order to continue the design development and ultimately select the final solution for ensuring a low carbon development.

This report outlines the energy strategy for the development, including passive design, energy and CO_2 footprint of the proposed scheme, and renewable energy options. The final proposed strategy will allow the scheme to achieve the minimum CO_2 reduction for EcoHomes 'Very Good' Rating and a minimum 60% un-weighted credits in the Energy section.

Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy. This development is not a major development and therefore does not need to meet these requirements, however the hierarchy has been followed in order to maximise the CO_2 saving.

4. PASSIVE DESIGN AND ENERGEY EFFICIENCY MEASURES

Passive design measures have been considered throughout the pre-planning stage to reduce energy demand. Opportunities for day lighting, efficient ventilation and passive solar heating have been identified.

4.1. Solar Gain Control & Daylighting

The U-Values of all glazed elements will exceed Building Regulations standards, and incorporate low emissivity coating, resulting in an efficient balance between passive solar gain and the thermal losses from each room. Daylight levels are high throughout and are supplemented with low energy light fittings.

4.2. Energy Efficiency

Studies have been carried out to determine the energy and carbon emissions benefits of various enhancements to the thermal performance of the new proposed building envelope by using increased U-Values for new elements and improving overall air tightness, resulting in a significant improvement over Building Regulations standards.

Fabric Performance

Table 4-1 shows a summary of the proposed U-values, air tightness, heating and ventilation strategy for the 58 Regent's Park Road scheme. These measures will be considered for the development, and have been assumed for the analysis at this stage.

Element	Measure
Walls (New)	0.15 W/m^{2}K
Walls (Existing)	0.30 W/m^{2}K
Roof (New)	0.15 W/m^{2}K
Roof (Existing)	0.18 W/m^{2}K
Floor (New)	0.15 W/m^{2}K
Floor (Existing)	0.25 W/m^{2}K
Windows (New)	1.80 W/m^{2}K (Sash); 1.20 W/m^{2}K (Others)
Rooflights	1.20 W/m^{2}K
Heating systems	91% Efficient Gas Condensing Combi Boilers (SEDBUK 2009)
Heating controls	Time & temperature zone control

Table 4-1: Passive design and energy efficient measures

5. ESTIMATED ENERGY AND CARBON DIOXIDE FOOTPRINT

Table 5-1 below outlines the estimated total energy demand and associated carbon emissions for the proposed strategy for 58, Regent's Park Road development, taking into account the passive measures and energy efficient measures identified in the previous section. The calculations have been based on SAP 2009 results with an inclusion for appliance use (unregulated emissions), not covered by SAP (based on BRE methodology). Full details of assumptions are included in Appendix A.

Energy and CO2											
Gas Demand				Electricity Demand						Total Energy (kWh/yr)	Total CO_2 (kg/yr)
Space heating - Main (kWh/yr)	Hot Water (kWh/yr)	Total (kWh/yr)	Gas CO_2 (kg/yr)	Space heating - Secondary (kWh/yr)	Pumps & Fans (kWh/yr)	Lighting (kWh/yr)	Appliances (kWh/yr)	Total (kWh/yr)	Electricity CO_2 (kgCO2/yr)		
37,204	6,252	43,456	8,430	3,844	175	4,290	3,699	12,008	5,067	55,464	13,498

Table 5-1: Estimated energy demand and CO_2 emissions of the site by energy source

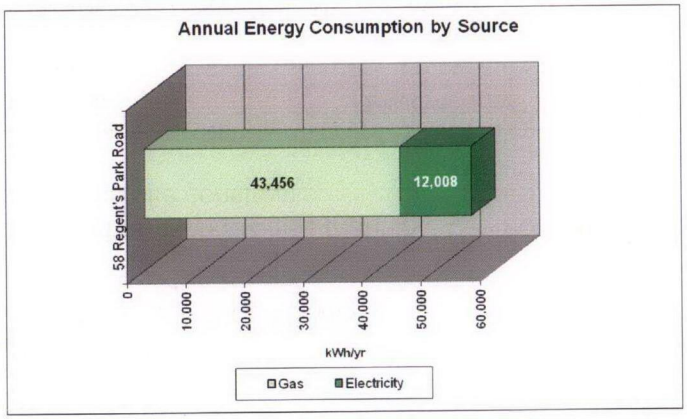

Figure 5-1: Annual Energy Consumption by Source

CHP [Combined Heat & Power]	CHP systems use an engine driven alternator to generate electricity while using the waste heat from the engine, jacket and exhaust to provide heating and hot water. Economic viability relies on at least 4000 hours running time per annum.	Mature technology High CO_2 savings	Cost of the system is relatively high for small schemes such as this. Only appropriate for large development with high heat loads.	Communal CHP is not viable for a single dwelling. Micro CHP would be technically feasible but the anticipated CO2 savings are low.	x
Biomass heating	Solid, liquid or gaseous fuels derived from plant material can provide boiler heat for space and water heating.	Potential to reduce large component of the total CO_2 A biomass boiler would replace a standard gas heating system so some of the cost may be offset through money saved on a traditional boiler.	Regular maintenance will be required Reliability of fuel may become a problem, therefore limited cost saving for residents The noise generated by a biomass boiler is similar to that of a gas boiler. It is advisable not to locate next to particularly sensitive areas such as bedrooms. A plant room and fuel store will be required which may take additional land from the proposed development or surroundings The fuel will need to be delivered, which can cause issues with access etc. Biomass is often not a favoured technology in new development due to the potential local impacts of NOx emissions and delivery vehicles.	This is a small tight site in an urban area. Biomass is not considered feasible for such a development due to issues of fuel storages, access for delivery vehicles and local NOx emissions.	x

Air Source Heat Pump (ASHP) - heating	Air Source Heat Pumps extract latent energy from the air in a manner similar to ground source heat pumps.	ASHP systems are generally cheaper than ground source as there is no requirement for long lengths of buried piping. Low maintenance and easy to manage Optimum efficiency with under-floor heating systems As heat pumps would replace standard heating systems, some of the cost may offset through money saved on a traditional boiler.	The heat pump has a noise level around 50-60dB so some attenuation may be required and it should be sensibly located. The potential noise from the external unit may mean there is local opposition to their installation. Requires electricity to run the pump, therefore limited carbon savings in most cases For communal systems plant room required which may take additional land from the proposed development/surroundings Potential noise issues	The use of ASHP is unlikely to be feasible as it would require the installation of several external units for the whole dwelling. In addition, since an ASHP would be used to supply heating only, it is not considered to be the most carbon effective solution when compared to alternative gas-fired condensing boilers.	x

Table 6-1: Feasibility of LZC technologies for the site

CONCLUSION

For 58 Regent's Park Road development, passive design and energy efficient measures have been identified to help to reduce the energy load. After reducing demand, options for further reducing CO_2 emissions through renewables have been assessed.

The energy strategy for the proposed development, incorporating a minor back extension and minor alterations to the roof together with an upgrade to the existing building's envelope and systems, achieves a 50% improvement in the DER over the DER of the existing dwelling including the extensions only without upgrading the retained fabric and systems. No renewable energy technologies are deemed feasible primarily due to the site's restrictions being in a conservation area, thus impeding the installation of solar technologies on the front elevation roof. The EcoHomes minimum energy requirements set out by the London Borough of Camden are met through the proposed passive design and energy efficient measures.

The figures in this report are based on preliminary analysis only. The advised option will be considered at the detailed design and construction stages and adequate provisions made to ensure that the various carbon reduction targets are met.

APPENDIX B

The following tables show figures used in the energy and CO_2 calculations to estimate energy produced and CO_2 savings from renewable technologies. These figures can be used to validate the results.

CO2 Intensity Values	
Gas Intensity	0.194 kgCO_2/kWh
Electricity Intensity	0.422 kgCO_2/kWh

Carbon Emission reduction target (CERT)	Energy	Housing sector (new & existing)	• Energy efficiency measures in existing homes. Renewable technologies installed to offset carbon emissions over and above planning requirements.	CERT money comes direct from energy companies and can usually be accessed through renewable technology suppliers who have set up deals with these companies. E.g. EON provide funding for GSHP & ASHP through Calorex. Find out from suppliers if they have access to this funding when getting costs.
Bioenergy Capital Grant	Department of Energy & Climate Change	Industrial, commercial sector (This includes, but is not restricted to, public and private limited companies (Ltd and plc), sole traders, farmers etc) Community sector (This includes, but is not restricted to, schools, colleges, universities, hospitals, local authorities, housing associations, charities etc.)	• Biomass heat boilers and biomass combined heat and power (CHP) equipment, including anaerobic digesters for heat-only or CHP.	Up to 40% of the capital cost & Installation of the difference in cost of installing the biomass boiler or CHP plant compared to installing the fossil fuel alternative. Max £500,000. Funding is available in rounds. Check http://www.bioenergycapitalgrants.org.uk/ to see if a round is open now or will be available in time for your development.