Synergy

Greenwood Place Resource Centre
Energy Statement

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EXPLANATORY NOTES RELATING TO REVISION K

This revision of the energy statement, which is provided in support of an amended Greenwood Place Resource Centre planning application, includes amendments arising from the installation of a PV array on a neighbouring building. This will act as an additional source of renewable energy, supplementing the photovoltaic installations on the Greenwood Place site. This has been instructed by Camden Council.

The principles set out in Camden Council's planning policies have been followed. These policy documents have been listed in the body of the report.

Energy consumption and carbon reduction results for Greenwood Place Resource Centre have been obtained from calculations undertaken using the National Calculation Methodology. Improvement over Building Regulations Part L, as expressed in this energy statement and earlier versions, are based upon the Building Regulations 2013.

1.0 INTRODUCTION

1.1 PREAMBLE

A team of construction professionals are developing proposals for the demolition of a number of single storey buildings in Greenwood Place and the construction of a new Community Centre building.

A planning application was submitted and approved for this scheme in 2013. This revision of the Energy Statement seeks to confirm that the planning conditions set out by Camden Council are met in line with the current building regulations following the approval of a PV installation on a neighbouring building which will provide a renewable energy source to the Greenwood Centre.

1.2 CAMDEN COUNCIL PLANNING POLICIES

All new building developments in the London Borough of Camden are required to meet minimum standards relating to sustainability, energy efficiency and carbon reduction. This is inline with London wide and national aspirations set by the London Mayor and the UK Government.

In the London Borough of Camden area, sustainability, energy efficiency and carbon reduction all feature in the planning process. Planning guidance on these matters is set out in the Local Development Framework and, in particular, in the following inter-related policy documents:

- CPG3 - Sustainability
- CS13 - Tackling Climate Change Through Promoting Higher Environmental
- Standards
- DP22 - Promoting Sustainable Design and Construction
- DP23 - Water
- CS16 - Improving Camden's Health and Wellbeing
- DP32 - Air Quality & Camden's Clear Zone

The formulation of a viable servicing strategy and energy plan for this project, as defined in this Energy Statement, takes into account guidance contained in the above listed documentation.

The planning condition specified by the London Borough of Camden's planning department relating to reduction of carbon emission reductions for the development is stated below:

'Prior to commencement of any part of the development, (excluding demolition and enabling works) the applicant and/or developer shall submit to the local planning authority for approval an Energy Efficiency and Renewable Energy Plan setting out a package of measures to achieve target carbon emission reduction levels of 25.16% for the community centre and 32.65% for the residential building of the development. The Plan shall contain mechanisms for monitoring, review and further approval by the local planning authority, and shall include an Air Quality Assessment for any CHP system proposed for inclusion. The development shall at all times proceed in accordance with such Plan as will have been approved.'

Following the sale of the residential development it has been agreed with the London Borough of Camden's planning department that the current design team are not required to fulfil the condition relating to the residential building.

1.3 THE ENERGY HIERARCHY

It is now customary to consider energy supply and energy efficiency in buildings in a three tier process known as an 'Energy Hierarchy'.

The Energy Hierarchy:

1. Be Lean – *Design and construct a new building to consume less energy*
2. Be Clean – *Deliver and consume energy efficiently*
3. Be Green – *Deliver some or all of the required energy from renewable sources.*

The importance of the 'Energy Hierarchy' is in its drive to ensure that new buildings are designed and constructed to consume only the minimum amount of energy in the first instance.

After this first objective in the hierarchy has been defined, the design of the energy generation and delivery systems can be considered.

The final step in the energy planning process is to identify how much of the buildings energy needs can be met from renewable energy sources.

1.4 CAVEAT

The energy consumption analysis and results, which underpin the recommendations included in this Energy Statement, have been derived by applying the National Calculation Methodology (NCM). This methodology is embedded in the SBEM and SAP calculation procedures. The energy consumption for the completed buildings may differ from the predictions given by SBEM and SAP.

1.5 THIS REPORT

The purpose of this report is to set out design strategies and performance targets relating to energy conservation, energy efficiency and energy supply, which have been embodied into the development proposals and will be carried forward into the detailed design and construction phases of the project.

In the first instance, the information contained in this report will enable the local authority Planning Team to consider and understand the adopted measures and features, relating to energy, that have been incorporated into the development proposals thus far.

The emphasis in this report is on energy consumption and carbon reduction. Other issues, which come under the general heading of 'sustainability', will be covered in a separate document.

2.0 DEVELOPMENT PROPOSALS

2.1 PROJECT DESCRIPTION

Greenwood Place Resource Centre comprises a 3200m^2, 4-storey day centre building including an accessible roof garden area. This building is to be designed to the BRE BREEAM 'Excellent' rating with the building achieving at least 60% of the un-weighted energy credits.

The following section of this report describes the strategies that have been adopted, firstly to reduce the energy demand imposed by the new buildings to comply with Part L 2013 of the Building Regulations and secondly to identify the principal mode of energy delivery.

Finally, the provision of renewable energy systems is described.

2.2 GREENWOOD PLACE COMMUNITY CENTRE

Reduce Energy Demands

This building is designed to incorporate effective use of passive, internal climate moderating, features where achievable. This will result in less reliance of building engineering systems and hence reduced energy consumption. In a number of areas it was necessary to introduce mechanical ventilation and cooling due to acoustic constraints and to mitigate overheating.

Passive features that have been included:

- Natural ventilation in summertime to maintain comfortable internal temperature conditions
- Background supplementary mechanical ventilation with heat recovery
- Good day lighting in interior spaces
- Night time ventilation/cooling, coupled with exposed concrete room surfaces in the occupied spaces
- Effective use of winter sunshine on southern elevations
- Effective shading strategies to prevent unwanted solar heat admission in the summertime

The building envelope is to comprise highly insulated elements with improved u-values over minimum statutory standards. The building will be highly air-tight, preventing uncontrolled and wasteful air infiltration.

U values and the air permeability standard, adopted for this project, are those values identified in CPG3 and are considered to be current best practice.

Good construction detailing will identify and address the issue of 'cold bridging' which now accounts for a significant proportion of the conducted heat losses through a building envelope.

A green roof feature is to be incorporated onto part of the roof area.

Efficient Energy Generation and Delivery

Space heating will be delivered to the occupied spaces through underfloor heating.

The use of mechanical ventilation systems will be limited to those spaces that require mechanical ventilation to suit function, such as toilet areas, food prep areas, areas in which opening windows are not suitable and internalspaces. Some of the deep planned perimeter spaces will be provided with supplementary mechanical supply and extract ventilation. Mechanical supply and extract ventilation systems will include efficient heat recovery equipment.

Mechanical cooling will be kept to minimum unless adequate comfort conditions cannot be achieved in summer. Generally, this will be limited to high use IT spaces, IT equipment rooms and rooms where opening windows are not appropriate due to acoustic requirements.

Interior lighting systems will be designed to take full advantage of the natural daylight admitted into the building and will include automatic daylight controls in perimeter spaces.

Energy efficient light sources will be selected and automatic presence and absence detection and switching will be incorporated, and daylight dimming controls where appropriate.

A comprehensive energy metering strategy will be adopted and all meters will be read and logged, automatically.

A building energy management system (BEMS) will be provided to manage and control all of the fixed building services in an energy efficient manner. Systems will be suitably zoned and controlled and individual systems will be automatically set back or switched off when not inuse or required.

Renewable Energy

Building Integrated Photovoltaic's are to be installed in areas of curtain walling. Free standing photovoltaic cells are to be installed on a designated area of the Greenwood Place Resource Centre roof and on the roof of a neighbouring building to generate electricity from solar energy; refer to architect's plans for locations.

2.3 THIRD PARTY ENERGY CONSUMERS

The central energy centre, which is to be established in the Greenwood Centre Building, has been space planned to allow the system to be expanded to serve other potential third party energy consumers.

Localised heat and power infrastructure can be expanded in the future, along with the installed heat energy generating plant capacity, so that other energy consumers can be connected and served by the new community heating system.

The adjacent Deane House, which is a Council owned building, is a prime candidate for future connection into the community heating system.

The energy centre has space allocated for the future introduction of suitable plate heat exchanger assemblies so that advantage can be taken if a large scale municipal heat network is brought into the area in the future. See Appendix 1 for location of allocated space.

2.4 TECHNOLOGIES NOT INCLUDED

Consideration has been given to a number of energy supply/energy generation technologies in the early design stages of this project.

Table 2.1, below provides a summary of those technologies that have been considered and excluded.

Table 2.1

Item	Description	Remark
Ground Source Heat Pump (GSHP) Technology	Central GSHP unit in basement plant room and vertical or horizontal ground loop pipework.	Inadequate unobstructed ground available to accommodate ground loops.
Air Source Heat Pump Technology	Central ASHP unit mounted on roof plant area and connected pipe systems in the building.	Available roof space limited due to competing requirements to include green spaces and amenity spaces.
Biomass	Automatic wood burning boiler incorporated in a community heating system	Air quality issues on and around the site preclude the inclusion of wood burning appliances.
Wind Turbine	Building mounted wind turbinegenerators.	Poor availability of wind energy at this site precludes inclusion of this technology.

2.5 UN-REGULATED ENERGY CONSUMPTION

Un-regulated energy use and consumption is concerned with the energy consumed by white goods, household appliances, portable electrical equipment and the like. In essence, Un-regulated energy use is the energy consumed by products which are not part of the fixed building services.

Energy labelling of electric appliances is regulated under EU Directive 2010/30 EU. All such appliances, which are to be supplied and installed under the building contract, will be specified A-Rated or better.

Replacement lamps in light fittings also come under the above mentioned EU directive.

Handover documentation provided at the end of the construction project will include a ‘User Guide’ and this document will include user advice relating to energy efficient product replacements along with general advice about energy efficiency and energy conservation.

3.0 THE ENERGY PLAN

3.1 GENERAL

In order to formulate a viable energy strategy for this development, a 'baseline' energy model has been produced using IES virtual environment software and SBEM/SAP calculation methodologies.

Iterations to the baseline energy model have been performed and a final energy strategy has been derived.

The servicing strategy, described in section 2.0 of this report, is based upon the establishment of a central energy centre which will serve the building and will be available for connection to other buildings subject to council agreement and any necessary upgrades.

Heat for the development will be produced supplemented by high efficiency condensing boiler units and distributed via interconnection pipeline routed in the public highway.

The community centre buildings will be provided with renewable energy systems, by way of Photovoltaic solar panels.

This section of the report presents a summary of the results obtained during the model processing.

3.2 BASELINE SOLUTION

Building envelope u-values adopted for this development have been enhanced and exceed the minimum statutory values defined in Building Regulations Approved Document L and the accompanying Compliance Guides.

Table 3.1 below, identifies u-values and an air-permeability value adopted and used in the modelling process.

Table 3.1 Envelope Parameters

ITEM	VALUE	UNITS
External Wall	0.2	W/m^2/K
Roof	0.13	W/m2/K
Floor	0.2	W/m2/K
Window	1.5	W/m2/K
Glazed Door	1.5	W/m2/K
Solid Door	1.0	W/m2/K
Air Permeability	5.0	m3/h.m2

The methodology adopted in the analysis process first generated a baseline solution. From this baseline, further iterations have been produced whereby improvements in energy delivery systems and the introduction of renewable energy sources have been analysed.

The first calculation iteration, using enhances u-value and air permeability values included intable 3.1, is based upon central heating for the building being provided by high efficiency gas-fired boilers, only. No allowance has been made for CHP or for energy supply from renewable sources. This baseline 'Be Lean' calculation improves of the Building Regulations Part L 2013 minimum requirements.

Results from the next iteration (Be Clean) are the same as the Be Lean figures, since no CHP is to be used on the site.

Finally, the last set of results (Be Green) identifies the improvement in performance gained from renewable energy sources. Roof mounted photovoltaic panels and BIPV (75.1 kWp), located on the greenwood centre roof and on a neighbouring building, have been used.

3.3 CALCULATION RESULTS SUMMARY

Table 3.2 includes the modelling results and identifies energy demand and carbon emissions for the principal iterations.

Table 3.2 – Community Building Energy Demand and Carbon Emissions

Target CO_2 emission rate (TER) for community building: 29.8 $kgCO_2/m^2.yr$		
Energy	**Carbon Emissions**	**Remark**
Baseline Case		
117.89 $kWh/m^2.yr$	29.8 $kg(CO2)/m^2.yr$	Part L 2013 Compliant
Baseline Case with Renewables		
111.66 $kWh/m^2.yr$	19.2 $kg(CO2)/m^2.yr$	35.57 % improvement over Part L

The **Baseline + Renewable Energy** solutions result in a building regulation compliant solution, and achieve a 35.57% improvement over Part L. This successfully achieves the planning condition objective for carbon reduction for the building. BREEAM Excellent energy credits are achieved with this final solution.

3.4 MONITORING, REVIEW & FURTHER APPROVAL

The London Borough of Camden (LBC) require that the mechanisms for monitoring, review and further approval of the Energy Statement proposals is provided within this document.

It is proposed that the following are put in place to satisfy this requirement:

- Approved subcontractor information will be provided to LBC to confirm they are competent and certified to install the photovoltaic cells.
- An 'As Built' Energy Performance Certificate (EPC) will be provided of the final installation with the inclusion of the photovoltaic cells.
- Evidence by way of commissioning certification and photographs of the installed photovoltaic cells will be provided to LBC.
- A Display Energy Certificate (DEC) will be provided for the 'As Built' installation including the photovoltaic cells. This will be provided by the Client for the operational building.

3.5 AIR QUALITY

An Air Quality Assessment Report has been generated by Resource and Environmental Consultants Ltd, dated September 2013 Revision 5, which has been submitted to the LBC planning department. This sets out, in Table AIII.2 in Appendix III, that at that time the CHP units were designed with an emission rate of 0.0046 g/s NO_x emissions.

Subsequently the CHP unit has been removed from the scheme, so this is no longer applicable.

4.0 CONCLUDING REMARKS

As part of a planning submission for this development, an Energy Statement is required to be prepared and submitted. This document is intended to fulfil that requirement.

Development proposals are at RIBA Stage 4 and the measures and features that have been described in this document, relating to energy conservation and energy supply, are a fundamental and integral part of the Stage 4 design solution.

The output from the modelling processes described in this document and the calculated carbon emissions arising has been assessed under the BREEAM. The building exceeds the mandatory energy credits which are required to achieve the stated ratings of **Excellent.**

This development is entirely compatible with a long term, London-wide, drive to deliver heat and power via decentralised heat networks incorporating gas fired boilers.

Project proposals include producing heat for the community centre by site based high efficiency gas fired condensing boilers with the opportunity for connection of other energy users in the future.

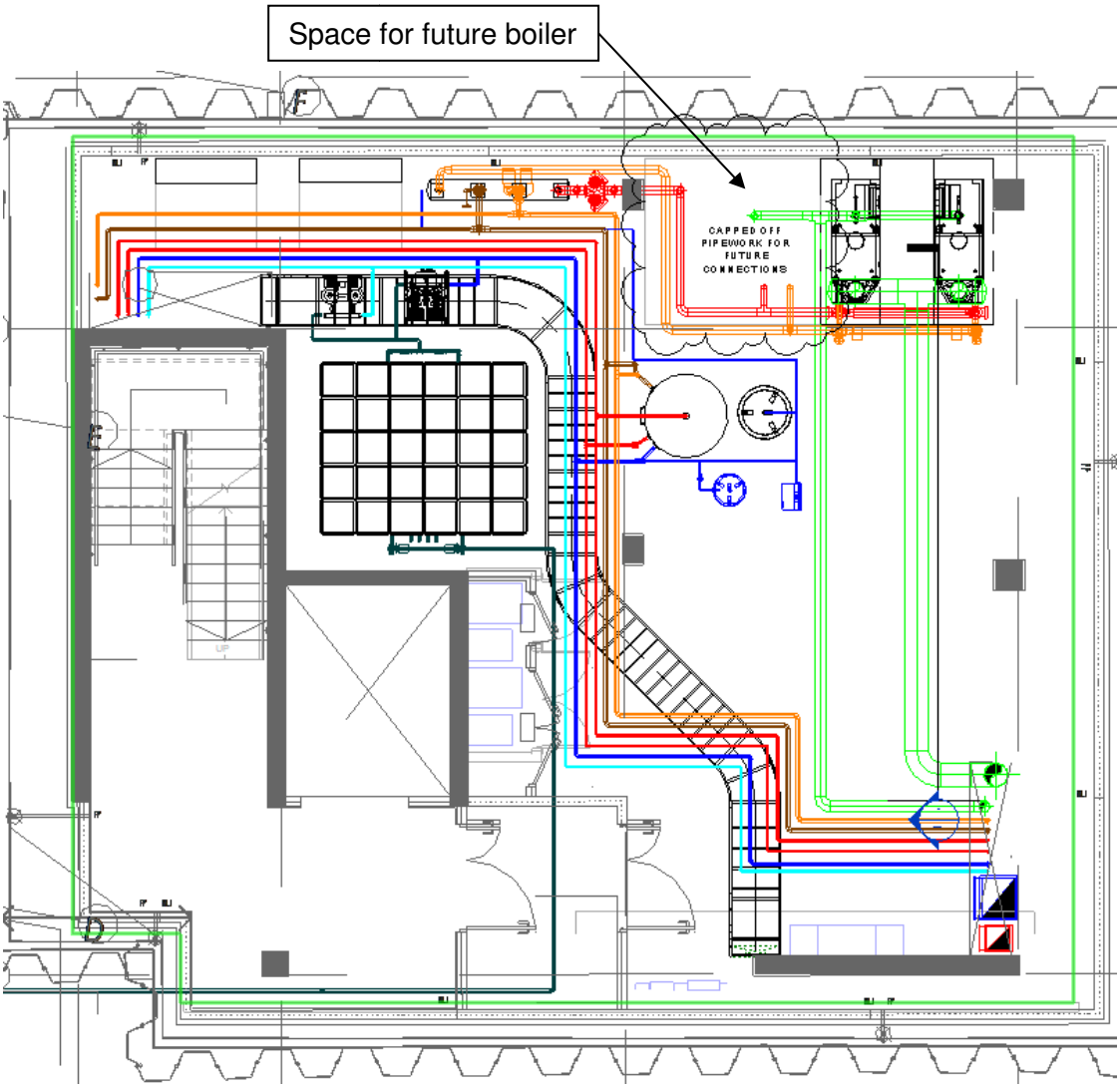
The competing need to provide green spaces and also to provide amenity space for the building users on the roof area has meant that a compromise has been made with respect to the amount of space available for renewable energy systems.

Solar photovoltaic cells have been included in the proposals and this will provide a contribution to the developments annual energy needs. The solar photovoltaic cells installed provide a 35.57% carbon emission reduction which exceeds the 25.16% reduction required to fulfil planning conditions.

Other renewable technologies have been considered. However, site constraints and issues local air quality have precluded their inclusion into the scheme.

In conclusion, Synergy Consulting Engineers believe that the energy conservation and energy supply proposals described in this Energy Statement represents a pragmatic and feasible energy plan for the development.

APPENDIX 1: PLANTROOM LAYOUT


Space for future boiler
CAPPED OFF PIPEWORK FOR FUTURE CONNECTIONS