NORMAN BROMLEY
PARTNERSHIP

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52-53 Russell Square, London, WC1B 4HP

Energy Statement

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PROJECT REVISION SHEET

Revision No.	Date	Details	Changes	Author	Approved
P1	*11/09/17*	*For Comments*	*N/A*	*MD*	*MR*

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1.0 EXECUTIVE SUMMARY

Norman Bromley Partnership were commissioned by Ecole Jeannine Manuel to provide an Energy Statement to support the planning application for the proposed change of use from an existing office to a French School at 52-53 Russell Square, London, EC1B 4HP.

The proposed building will comprise teaching and other ancillary spaces arranged over 6 floors.

The aim of this report is to satisfy the conditions applicable to the proposed new school building as required within the outline planning consent.

This report demonstrates our intended approach to ensuring the proposed new school building achieves the energy and sustainability requirements and policies of the local authority as well as the current Building Regulations.

Our assessment methodology adopts the principles and procedures outlined within the Greater London Authority Energy Planning Document 2016 and consequently the key stages described therein have been fully incorporated within our calculation, review and reporting processes in delivering this report.

The calculations are based on assumed U values, internal gains and infiltration rates and have not been verified. The model has been produced in the absence of architectural sections and elevations and we are working from record drawings provided by the landlord with on-site check measurements, not a full measured survey.

Because the building is an existing listed building with limited proposed works to the structure and fabric, it does not need to satisfy the London Plan Energy criteria which would be required for a major new build development or large extension. We have however set out the estimated 'Baseline' calculation and the Step 2 – Energy Demand Reduction, however due to reasons detailed further in the report it has not been possible to incorporate any measures for Step 3 (Low Carbon Energy Supplies) or Step 4 (Renewable Energy).

Our assessment conclusion can be summarized by the following tables:

	Regulated Carbon Dioxide Emissions (Tonnes CO_2/Annum)
Step 1 – Baseline	59
Step 2 – Energy Demand Reduction	33.04
Step 3 – Low Carbon Energy Supply	33.04
Step 4 – Renewable Energy	33.04

	Regulated Carbon Dioxide Emissions (Tonnes CO_2/Annum)	CO_2 Emissions Reduction (%)
Savings from Energy Demand Reduction	25.96	44
Savings from Low Carbon Energy Supply	0	0
Savings from Renewable Energy	0	0
Total Cumulative Savings	25.96	44
Total Target Savings	25.96	44

Our assessment concludes that the proposed French School, based upon the proposed building geometry and incorporating the proposed energy saving measures will achieve a 44 % improvement in carbon emissions when compared with the existing building with its current use as an office.

2.0 PROPOSED DEVELOPMENT

The scheme comprises of a refurbished building to incorporate a school split over 6 storeys with associated classrooms, group rooms, offices, laboratories and other ancillary spaces.

The existing building is used as an office and is Grade 2 listed.

Minor extensions to the lower ground floor are proposed.

Figure 1 – Proposed Site Plan

3.0 PLANNING REQUIREMENTS

The development is required to adhere to a number of national, regional and local policies. These form the key principles in the development of the energy strategy and as such ensure compliance is achieved with all relevant targets.

The following key policies and legislation must be met:

1. Building Regulations Part L2B 2013
2. BREEAM Excellent

4.0 ASSESSMENT METHODOLOGY

The London Plan Energy Hierarchy strategy provides an inclusive approach to energy use considering on site energy use, efficiency of energy supply and the use of sources of renewable energy.

The purpose of the energy hierarchy approach is to demonstrate that climate change mitigation measures form a fundamental part of the proposed scheme's design and evolution. Any measures taken forward must be demonstrated as appropriate and feasible in the context of the overall development.

Although this approach is not required for an existing building it has been adopted in this instance where possible.

There are 4 steps to the energy hierarchy process:

1. Design Criteria Building Regulations compliant building	2. 'Be Lean' Reduction by energy efficiency measures	3. 'Be Clean' Selection of low carbon energy supply strategy	4. 'Be Green' Renewable technologies

Step 1 – Design Criteria

As this is an existing building we have taken the baseline scheme as the existing buildings U values and fixed building services arrangement.

Step 2 – 'Be Lean' – Reduction by Energy Efficiency Measures

Apply energy demand reduction measures specific to the scheme such as enhanced building fabric to deliver reduced heat loss, heat gain and improved air permeability.

Other measures include improved efficiency of fixed building services beyond that of the statutory requirements.

Step 3 – 'Be Clean' – Selection of low carbon energy supply strategy

Once demand for energy has been minimised it should be demonstrated that the use of a low carbon energy supply has been explored through the order of preference of the following options:

1 - Connection to an existing heat distribution network
Investigate the potential for connecting onto an existing heat network referencing the London Heat Map and contacting local heat network operators.

2 - Connection to a planned heat distribution network
Investigate the potential for connecting onto a planned heat network referencing the London Heat Map and local energy master plans.

3 - Site wide heating networks - Where multiple buildings are proposed or where the building density is sufficient, a communal heating system should be adopted with all buildings/uses within a development normally connected into a single site wide heating network, thus facilitating future connection to decentralised energy networks.

4 - Combined heat and power (CHP) – Consider the appropriateness of CHP for the development. Typically CHP is deemed feasible where there is a simultaneous demand for heat and power in excess of 5,000 hours per annum.

Step 4 – 'Be Green' – Renewable Energy Technologies

Subject to the 'Be Lean and Be Clean' principles being appropriately satisfied and demonstrated accordingly, consideration should be made to feasible renewable energy technologies.

Figure 2 provides a graphical representation of the London Plan Energy Hierarchy.

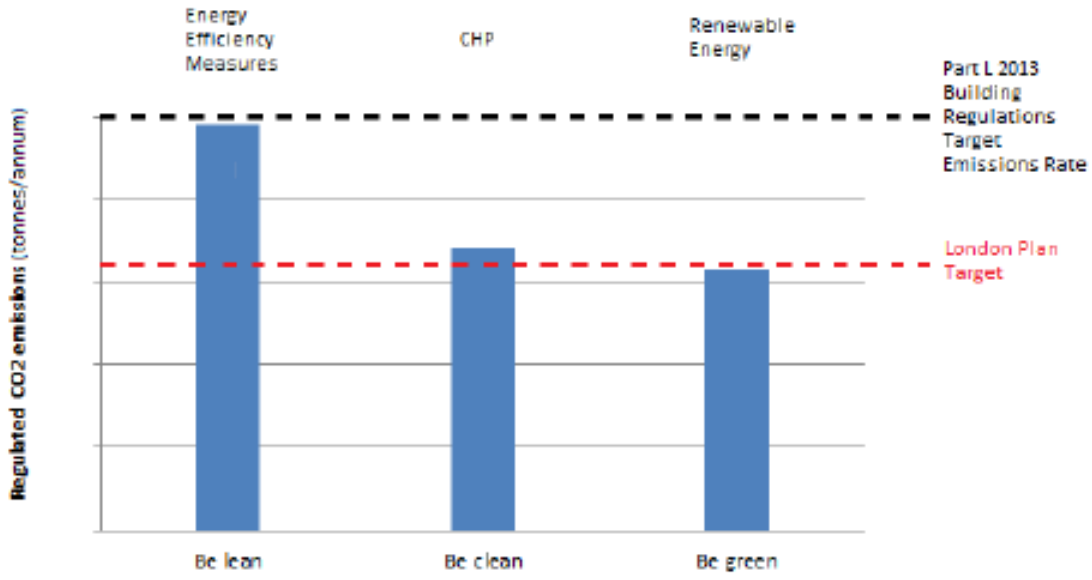

Figure 2 – 'Be Lean, Be Clean and Be Green' Diagram, London Plan

5.0 CARBON EMISSIONS

5.1 Baseline Scheme

As the building is existing we have taken the existing construction and fixed services as the baseline scheme.

Building fabric details

U Values	Existing	Units
Wall	1.715	W/m2K
Roof	2.65	W/m2K
Floor	0.5	W/m2K
Windows	2.2	W/m2K
Infiltration	0.25	(Air Permeability of 3m³/h/m² @50Pa)

Fixed Building Services

Service	
Lighting Luminaire	70 lm/circuit watt
Lighting Occupancy control	No
Lighting presence detections	No
Heating / Hot Water	Efficiency 91%
Variable speed control of pumps	Yes
Heat Recovery Ventilation SFP	1.9 W/l/s
Heat Recovery Efficiency	70%
Zonal Extract Ventilation SFP	0.5 W/l/s
Local Supply or Extract Ventilation SFP	0.3 W/l/s
Ventilation demand control	Yes

Based upon the building inputs detailed above, the SBEM calculation has identified the following baseline CO_2 emissions:

Notional building emissions	59 kgCO_2/m^2

5.2 "Be Lean" Reduction by Energy Efficient Measures

To further reduce the CO2 emissions associated with the scheme, the following measures have been applied to exceed the standards used as part of the baseline scheme.

1. New insulation to roof
2. Replacement of lighting with high efficiency luminaires
3. Inclusion of lighting controls including daylight / presence sensors in classrooms / offices and PIR's to corridors and WC's.

Building fabric details

U Values	Proposed	Units
Wall	1.715	W/m2K
Roof	0.18	W/m2K
Floor	0.5	W/m2K
Windows	2.2	W/m2K
Infiltration	0.25	(Air Permeability of 3m³/h/m² @50Pa)

Fixed Building Services

Service	
Lighting Luminaire	100 lm/circuit watt
Lighting Occupancy control	Yes
Lighting presence detections	Yes
Heating / Hot Water	Efficiency 91%
Variable speed control of pumps	Yes
Heat Recovery Ventilation SFP	1.9 W/l/s
Heat Recovery Efficiency	70%
Zonal Extract Ventilation SFP	0.5 W/l/s
Local Supply or Extract Ventilation SFP	0.3 W/l/s
Ventilation demand control	Yes

Based upon the building inputs detailed above, the SBEM calculation has identified the following "Be Lean" CO_2 emissions:

Notional building emissions	59 $kgCO_2/m^2$
Building emissions rate	25.96 $kgCO_2/m^2$
% emissions improvement	44

5.3 "Be Clean" Reduction by Energy Efficient Measures

5.3.1 - Connection to an Existing Heat Distribution Network

The potential for connecting onto an existing heat network has been investigated and the London Heat Map does not identify supply network close enough to the site.

5.3.2 - Connection to a Planned Heat Distribution Network

The potential for connecting onto a planned heat network has been investigated and the London Heat Map does not identify a proposed supply network close enough to the site.

5.3.3 - Combined Heat and Power (CHP)

The development as a school will not achieve the 5,000 hours per annum of simultaneous demand for heat and power required for CHP to be deemed feasible.

There is also limited space in the building plantroom to incorporate a CHP unit and the installation of a flue would cause damage to the building's historic fabric.

5.4 "Be Green" Renewable Energy Technologies

The energy efficient measures undertaken as part of the "be lean" design are sufficient to achieve Part L2A 2013 compliance and to achieve the 35% CO_2 reduction required for The London Plan.

The following renewable energy technologies have been investigated and discounted:-

- Wind Turbines
- Photovoltaics
- Solar Water Heating
- Ground Source Heat Pump
- Air Source Heat Pump

5.4.1 - Wind Turbines

Wind turbines exploit a natural resource to generate electricity, which can be used to serve the building with any excess exported and sold to the electricity provider.

However, wind turbines must be cited to operate in an undisturbed air flow. Considering the proximity of adjacent buildings, the wind turbine would have to be mounted at some height, and require a suitable support structure, both highly visible. Due to the property's listed status, this technology is not considered a feasible option.

5.4.2 - Photovoltaics

Photovoltaic (PV) panels produce electrical energy which can also be used to serve the building, with any excess exported to the electricity provider. Again though the location of PV panels on the roof of this property would be problematic.

Due to the Mansard roof style there is very limited useable roof space available, and suitable access has to be achieved for inspection and maintenance. The existing parapet walls would also cause significant shading to the panels. For these reasons PV panels are not considered a viable option for this property.

5.4.3 - Solar Water Heating

A solar water heating system could be used in conjunction with a conventional gas boiler system and a dual element hot water cylinder.

Similar to the use of PV panels though, there is very limited roof space available for the citing of panels. To compound this, the hot water demand within this building will be very modest, so solar hot water technology would make only a limited contribution to the reduction in $C0_2$ emissions. As a result it is not considered an appropriate option for this property.

5.4.4 - Ground Source Heat Pumps

A ground source heat pump would require some form of ground pipework loop, either at a shallow depth or throughout the height of a borehole, to extract usable energy from the ground. This building has virtually no available land for the installation of either. For that reason this technology is not considered remotely viable for this building.

5.4.5 - Biomass Boilers

A biomass boiler could be introduced at this building to provide a heat source for the central heating system. However, there is very limited space for fuel storage, thereby necessitating frequent deliveries to what is a very busy part of London.

Furthermore, and considering the city centre location, there would be considerable concern over the height of the chimney required to ensure compliance with the Clean Air Act Memorandum.

For these reasons the introduction of a biomass boiler is not considered viable for this building.

5.4.6 - Air Source Heat Pumps

The proposals are to retain the existing air source heat pump units and internal heating and cooling units to serve the classrooms.

The heat pump utilises energy from the external air and converts this energy to either heating or cooling energy for the building. The system is admittedly less

efficient than a ground source heat pump, with relatively greater variation in that COP as external condition fluctuate.

However, the technology will make a significant contribution to reducing carbon emissions associated with this building, particularly when compared to the alternative heat source such as a gas fired boiler.

Finally the technology has already been discretely incorporated into this building, and therefore has been shown to be viable for use here.

Based on the above the SBEM Calculation has not changed following the Step 2 – 'Be Lean' – Reduction by Energy Efficiency Measures.

6.0 CONCLUSION

Following the assessment methodology set out by the London Plan we have identified a number of measures to improve energy efficiency and limit CO_2 emissions for the proposed French School Building.

The table below provides a summary of the improvements achieved at each step of the energy hierarchy approach:

	Regulated Carbon Dioxide Emissions (Tonnes CO_2/Annum)	CO_2 Emissions Reduction (%)
Savings from Energy Demand Reduction	25.96	44
Savings from Low Carbon Energy Supply	0	0
Savings from Renewable Energy	0	0
Total Cumulative Savings	25.96	44
Total Target Savings	25.96	44

The building's change of use from an office to a school combined with the energy saving proposed is predicted to achieve reduced CO_2 omissions of 44 %.