Planning Stage Report on Energy Statement

Royal College Street

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Revision Sheet

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1 Introduction

This Energy Strategy demonstrates how Part L1A compliance is to be achieved for the new building consists of 3 flats and describes how to achieve savings in energy and carbon dioxide emissions (CO_2) following a strategy of measures to reduce energy consumption and using necessary energy more efficiently.
All energy and carbon figures have been calculated using approved Standardised Assessment Procedure SAP for domestic units and are used to demonstrate compliance with Approved Document Part L1A 2013 edition.

2 Energy Strategy

The energy strategy encourages new developments to conserve energy using a defined energy hierarchy, which should be implemented in the following order:
- Use less energy
- Supply energy efficiently
- Use renewable energy

2.1 Step 1- Using less energy- 'Be Lean'

Passive design is usually a cost- effective way of reducing operational demand on building services equipment and the overall energy consumption and running costs of the building. Passive design includes the use of thermal mass, improved thermal insulation, optimised glazing ratio and glass specification or use of passive night- time cooling.
Complying with the first stage of the energy hierarchy, it can be achieved by implementing 'passive' energy efficiency measures for the new building to reduce the demand for energy.
This development will benefit from:
- The provision of high thermal performance by means of high level of insulation to new walls, roof, floor and windows with low u- value and g- value to reduce heat loss and heat gains to meet Part L1A requirements.
- Air- tight construction techniques to minimise unwanted air infiltration.

Table 1 below introduces fabric requirements for the new dwellings to meet Part L1A.

Table 1 Minimum u-values as per Part L1A

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

Notes:
1. Where a swimming pool is constructed as part of a new building, reasonable provision should be made to limit heat loss from the pool basin by achieving a U-value no worse than 0.25 W/(m^2·K) as calculated according to BS EN ISO 13370.
2. For the purposes of checking compliance with the limiting fabric values for roof-lights, the true U-value based on aperture area can be converted to the U-value based on the developed area of the roof-light. Further guidance on evaluating the U-value of out-of-plane roof-lights is given in *Assessment of thermal performance of out-of-plane rooflights*, NARM Technical Document NTD 2 (2010).

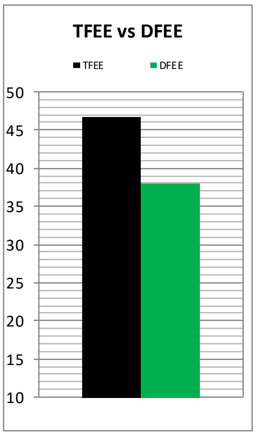
Note: *Approved Document C gives limiting values for individual elements to minimise the risk of condensation.*

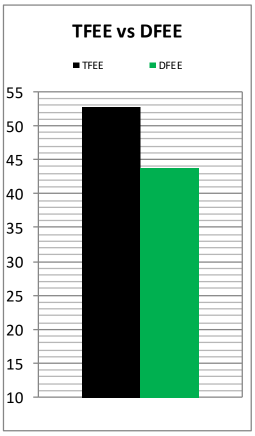
To meet the above Part L ‘Be Lean’ step fabric improvement of the new dwelling as indicated in the Table 1 is introduced.

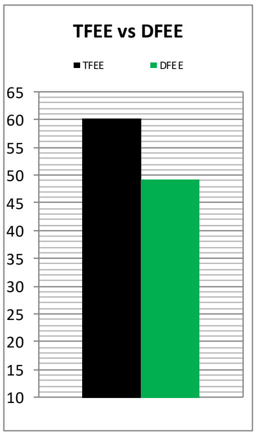
Table 2 Measures of passive energy- ‘Be Lean’

Items	Royal College Street		
	FLAT (LEFT)	**FLAT (MID)**	**FLAT (RIGHT)**
Approved Calculated Thermal Bridges(4-8)	**+**	**+**	**+**
Windows/ Rooflights/ Floorlights/ Doors- BFRC approved(1)(4)(5)(6)	**-**	**-**	**-**
Pressure test q50 (air tightness)(4)(5)(6)	**4.0**	**4.0**	**4.0**
Average u- values [W/m2*K]			
External walls above ground(4)(5)(6)	**0.13**	**0.13**	**0.13**
External basement walls(4)(5)(6)	**NA**	**NA**	**NA**
[Windows/ Rooflights] / g value- solar transmission(4)(5)(6)	**1.20/0.57**	**1.20/0.57**	**1.20/0.57**
[Floorlights/ Pavement lights] / g value- solar transmission(4)(5)(6)	**NA**	**NA**	**NA**
External door(4)(5)(6)	**1.60**	**1.60**	**1.60**
Floor(4)(5)(6)	**0,11**	**0,11**	**0,11**
Roof(4)(5)(6)	**0,11**	**0,11**	**0,11**
Party walls solid(4)(5)(6)	**+**	**+**	**+**
TFEE- Target Fabric Energy Efficiency [kWh/m^2*yr]	**46.73**	**52.79**	**60.09**
DFEE- Dwelling Fabric Energy Efficiency [kWh/m^2*yr]	**38.03**	**43.74**	**49.10**
DFEE Reduction	**18.62%**	**17.14%**	**18.29%**

NOTES:
"+"- included
"-"- not included
(3) u -values as per Part L minimum requirements
(4) item affecting DFEE
(5) item affecting DER
(7) item affecting TFEE
(8) item affecting TER







2.2 Step 2: Supplying energy efficiently- ‘Be Clean’

Where there is a demand for energy, this should be supplied through clean and efficient technologies. This would include for example the use of high efficiency boilers, Air Source Heat Pumps (ASHP), fans with low Specific Fan Powers (SFP), variable speed pumps, energy efficient lighting, etc in line with the requirements of Building Regulations Approved Document Part L.

2.2.1 Combined heat and power (CHP)

The economic viability of the CHP is heavily dependent on the consistent demand for heat and electricity. The building will have considerable heat demand during winter but sporadic heat demand during summer for domestic hot water use only, this would leave a CHP sitting idle during summer which will make the system inefficient as a whole.

Further, following the Energy Planning GLA guidance, it is not expected that small purely residential developments include on-site CHP.

Therefore, given the size and nature of the development and lack of consistent and synchronous base thermal and electrical loads, a CHP has been discounted for the scheme.

2.2.2 District Heating network

An investigation of the area was undertaken using the London Heat Map tool to determine whether there are any opportunities to connect to existing heat infrastructure. The London Heat Map in Figure 1 below shows that there are no current energy supply plants/sites in proximity of the proposed development site area thus a district heating connection has also been discounted for the scheme.

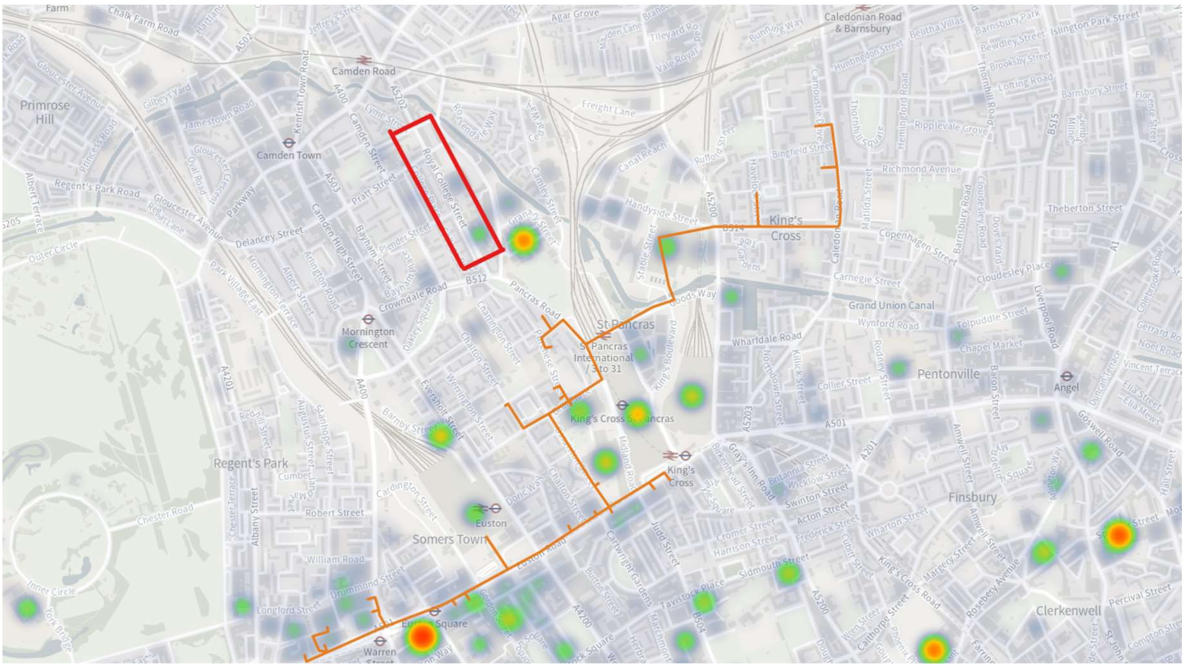


Figure 1 The London heat map extract (site area- red rectangular highlighted)

2.2.3 Gas Boiler

Considering that the UK government has committed to reducing carbon emissions to net zero by 2050 the gas boiler has not been considered as a solution.

As per above, the ‘Be Clean’ measurements cannot be incorporated for the new building.

2.3 Step 3: Using renewable energy- 'Be Green'

Having established that sufficient improvements in emissions have been demonstrated through the means detailed in steps 1 and 2, further considerations made through the integration of potential renewable technologies are presented here as options only to further reduce energy loads and increase the buildings carbon reduction.

2.2.4 Photovoltaics (PVs)

As the building will have a steady regulated and unregulated energy demand, PVs are considered as zero carbon technology.
However, as high efficiency Air Source Heat Pump (ASHP) to be introduced and as there could be lack of space for PVs on the roof, PVs has been disregarded.

2.2.5 Solar Hot Water

The scheme investigated based on installing a nominal active area of high efficiency (evacuated tube) solar hot water panels, accommodated on the roof of the building. Such systems are relatively low maintenance, are a proven technology and are a visible indication of the development's green aspirations.
Although efficient and cost effective in implementation, low domestic hot water demand for the site means solar hot water systems can only offset a fraction of carbon and will have very long payback, thus, making the Solar hot water panels not technically and economically viable for this development.

2.2.6 Biomass

We have excluded Biomass from this study, as the system emits high particulate matter (PM) and nitrogen oxide (NOx) emissions, and the potential nitrous oxide (N_2O) biomass and biofuel installations may not meet the air quality requirements.
Furthermore, biomass heating systems require more space to site a boiler and fuel hopper along with a supply of fuel. There are also further issues, which mitigate against this technology, particularly as this is an existing listed site, the major amendments required to accommodate the Biomass Plant room requirements would be prohibited.

2.2.7 Ground source heating

Ground source heating extracts heat from the ground, the carbon benefit being that considerably more heat energy is extracted than electrical energy is used to run the system.
The system requires a connection to the general mass of the ground, either using an array of horizontal pipes buried in an open area (for example a field) or an array of vertical pipes contained within deep (perhaps 100M) boreholes. This site is located within an urban area with potential only for the vertical system, which would be very expensive and only able to provide a fraction of the demand. Hence this technology will not be economically feasible.

2.2.8 Air source heating

Air source heating operates on a similar principle to GSHP but uses external ambient air as a heat source or heat sink. A high COP are required to gain worthwhile benefits over gas heating methods.
High COP can be achieved when low temperature systems such as underfloor heating or fan assisted radiators are utilised. Unlike gas and oil- based systems, air source heat pumps do not require annual safety inspections. Additionally, a heat pump has a reasonable life expectancy of 20– 25 years. Using electricity to operate the payback periods for these systems are currently reducing as gas costs have been rising significantly recently, as such investment costs can be recovered much quicker than previously.
Since the grid is being continually de- carbonised, electricity is now seen as the energy source which will enable the UK and the world to achieve a zero- carbon

future. This means using grid electricity becomes a lower carbon source of energy than gas. This favours electrically powered heat pumps for heating.
This renewable technology has been deemed suitable for the development. It is proposed the building will be heated via ASHP. This aligns with the Net Zero Carbon pathway.

2.2.9 Wind Turbines

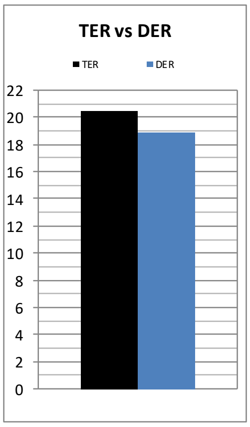
Wind turbines produce electricity directly from the energy in wind. The site is in an urban environment largely sheltered from the winds, and wind turbines would create unacceptable noise levels during day and night. Consequently, wind turbines are not considered to be appropriate for this project.

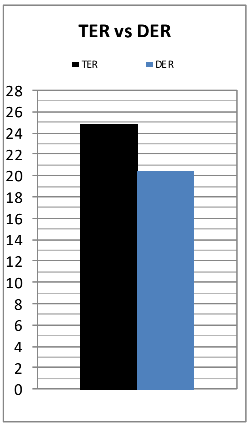
The additional 'Be Green' solution has been developed incorporating ASHP discussed above, located internally within each flat thus no external unit is required. The resulting carbon savings are shown in the Table 4 below:

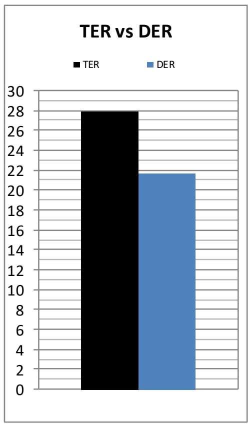
Table 4 Use of renewable technologies- 'Be Green'

Items	Royal College Street		
	FLAT (LEFT)	FLAT (MID)	FLAT (RIGHT)
PV- Photovoltaics[5][6]	-	-	-
ASHP- Air Source Heat Pump[5][6]	+	+	+
TER- Target CO2 Emission Rate [kg/yr]	20.44	24.86	27.87
DER- Dwelling CO2 Emission Rate [kg/yr]	18.87	20.42	21.68
DER Reduction	7.68%	17.86%	22.21%

NOTES:
"+"- included
"-"- not included
[4] item affecting DFEE
[5] item affecting DER
[7] item affecting TFEE
[8] item affecting TER







3 Overheating and cooling hierarchy

For this new development, in accordance with the London Policy, potential overheating risk, cooling requirements and measurement has been considered following cooling hierarchy. To minimize this risk and cooling requirements below measurements has been introduced:

- Energy efficient services and appliances including low energy lighting
- Heat gains have been minimized via optimal glazing size, orientation, shading performance etc.
- The provision of high thermal performance by means of high level of insulation to new walls and windows with low u- value and g- value to reduce heat loss and heat gains.
- Mechanical ventilation with heat recovery with natural cross ventilation possibility to reduce overheating and maintain comfortable environment.
- No active cooling system is to be considered.

The above overheating compliance has been also confirmed in line with the latest regulations (AD O- Approved Document O) as indicated below:

Left flat:

elmhurst energy

Approved Document O - Simplified Method Report

Created in the Elmhurst Overheating tool - For use in England only

Building and Site Details

Residential building name/number	Royal College Street
Street	
Town	London
County	
Postcode	NW1
Proposed building use/type of building	Domestic flat
Are there any security, noise or pollution issues?	
Site Details	High risk location with cross ventilation
Is this building high risk and shading stategy required?	Yes
Shading strategy included? (Give details)	External shutters with means of ventilation or Glazing with a max. g-value of 0.4 and a min. light transmittance of 0.7

Results

	Target	Result		Pass/Fail?
Maximum area of glazing (%)	15	14.71		Pass
Maximum area of glazing in the most glazed room (%)	22	17.59		Pass
Total minimum free area as % floor area (m²)	8.34	24.82		Pass
Total minimum free area % glazing area (m²)	14.31	24.82		Pass
The greater of the minimum free area(floor area or glazing area) should pass - Highlighted yellow				
Bedroom 1 minimum free area (m	2.06	4.23		Pass
Bedroom 2 minimum free area (m	3.19	5.23		Pass
Bedroom 3 minimum free area (m	2.51	3.39		Pass
Bedroom 4 minimum free area (m	0.00	0.00		Pass
Bedroom 5 minimum free area (m	0.00	0.00		Pass
Dwelling overall result	**Pass**			

Middle Flat

Approved Document O - Simplified Method Report

Created in the Elmhurst Overheating tool - For use in England only

Building and Site Details

Residential building name/number	Royal College Street
Street	
Town	London
County	
Postcode	NW1
Proposed building use/type of building	Domestic flat
Are there any security, noise or pollution issues?	
Site Details	High risk location with cross ventilation
Is this building high risk and shading stategy required?	Yes
Shading strategy included? (Give details)	External shutters with means of ventilation or Glazing with a max. g-value of 0.4 and a min. light transmittance of 0.7

Results

	Target	Result		Pass/Fail?
Maximum area of glazing (%)	15	14.06		**Pass**
Maximum area of glazing in the most glazed room (%)	22	21.92		**Pass**
Total minimum free area as % floor area (m^2)	5.63	16.03		**Pass**
Total minimum free area % glazing area (m^2)	9.24	16.03		**Pass**
The greater of the minimum free area(floor area or glazing area) should pass - Highlighted yellow				
Bedroom 1 minimum free area (m^2)	1.82	3.75		**Pass**
Bedroom 2 minimum free area (m^2)	1.82	3.75		**Pass**
Bedroom 3 minimum free area (m^2)	0.00	0.00		**Pass**
Bedroom 4 minimum free area (m^2)	0.00	0.00		**Pass**
Bedroom 5 minimum free area (m^2)	0.00	0.00		**Pass**
Dwelling overall result	**Pass**			

Right Flat

Approved Document O - Simplified Method Report
Created in the Elmhurst Overheating tool - For use in England only

Building and Site Details

Residential building name/number	Royal College Street
Street	
Town	London
County	
Postcode	NW1
Proposed building use/type of building	Domestic flat
Are there any security, noise or pollution issues?	
Site Details	High risk location with cross ventilation
Is this building high risk and shading stategy required?	Yes
Shading strategy included? (Give details)	External shutters with means of ventilation or Glazing with a max. g-value of 0.4 and a min. light transmittance of 0.7

Results

	Target	Result		Pass/Fail?
Maximum area of glazing (%)	15	14.59		Pass
Maximum area of glazing in the most glazed room (%)	22	12.12		Pass
Total minimum free area as % floor area (m²)	5.29	15.60		Pass
Total minimum free area % glazing area (m²)	9.00	15.60		Pass
The greater of the minimum free area(floor area or glazing area) should pass - Highlighted yellow				
Bedroom 1 minimum free area (m²)	1.31	2.70		Pass
Bedroom 2 minimum free area (m²)	1.13	1.54		Pass
Bedroom 3 minimum free area (m²)	1.62	3.33		Pass
Bedroom 4 minimum free area (m²)	0.00	0.00		Pass
Bedroom 5 minimum free area (m²)	0.00	0.00		Pass
Dwelling overall result	Pass			

4 Conclusion

The Energy Strategy adopts a ‘Lean’, ‘Clean’ and ‘Green’ approach, to minimise energy consumption and carbon dioxide emissions through passive design, energy efficient systems and renewable energy technology respectively.
It also approaches cooling hierarchy and overheating risk via various measurements, which confirms high performance and no need for active cooling system in the high- risk overheating London area.

Passive ‘Be Lean’ measures include high standards of insulation in the construction, controlled solar gain and the use of thermal mass as much as possible to stabilise temperatures will be sufficient to meet minimum requirements for energy demand for the new development.
‘Be Clean’ measures are no considered to be suitable for the development.
However renewable technologies ‘Be Green’ were investigated and introduced in the form of Air Source Heat Pumps.

All the ‘Be Lean’, ‘Be Clean’, ‘Be Green’ strategies summary with unregulated energy emission and with additional space heating and heating peak load rates are introduced in the Table 6.

Table 6 ‘Be Lean’, ‘Be Clean’, ‘Be Green’ summary with additional rates

Items	Royal College Street		
	FLAT (LEFT)	FLAT (MID)	FLAT (RIGHT)
Approved Calculated Thermal Bridges[(4-8)]	+	+	+
Windows/ Rooflights/ Floorlights/ Doors- BFRC approved[(1)(4)(5)(6)]	-	-	-
Pressure test q50 (air tightness)[(4)(5)(6)]	4.0	4.0	4.0
PV- Photovoltaics[(5)(6)]	-	-	-
ASHP- Air Source Heat Pump[(5)(6)]	-	-	-
LEL- Low Energy Lighting[(5)(6)]	+	+	+
Water use ≤125l/p/d[(5)(6)]	+	+	+
HWC- Hot Water Cylinder[(5)(6)]	+	+	+
MVHR- Mechanical Ventilation Heat Recovery[(5)(6)]	+	+	+
Average u- values [W/m2*K]			
External walls above ground[(4)(5)(6)]	0.13	0.13	0.13
External basement walls[(4)(5)(6)]	NA	NA	NA
[Windows/ Rooflights] / g value- solar transmission[(4)(5)(6)]	1.20/0.57	1.20/0.57	1.20/0.57
[Floorlights/ Pavement lights] / g value- solar transmission[(4)(5)(6)]	NA	NA	NA
External door[(4)(5)(6)]	1.60	1.60	1.60
Floor[(4)(5)(6)]	0,11	0,11	0,11
Roof[(4)(5)(6)]	0,11	0,11	0,11
Party walls solid[(4)(5)(6)]	+	+	+
TER- Target CO2 Emission Rate [kg/yr]	20.44	24.86	27.87
DER- Dwelling CO2 Emission Rate [kg/yr]	18.87	20.42	21.68
DER Reduction	7.68%	17.86%	22.21%
TFEE- Target Fabric Energy Efficiency [kWh/m^2*yr]	46.73	52.79	60.09
DFEE- Dwelling Fabric Energy Efficiency [kWh/m^2*yr]	38.03	43.74	49.10
DFEE Reduction	18.62%	17.14%	18.29%
UEE- Unregulated energy CO2 emissions [kg/yr]	14.49	17.07	17.62
TER including UEE [kg/yr]	34.93	41.93	45.49
DER including UEE [kg/yr]	33.36	37.49	39.30
DER Reduction including UEE	4.50%	10.59%	13.61%
Space heating energy consumption [kWh/m^2*yr]	18.05	18.72	20.36
Space heating peak load [W/m^2]	15.24	18.04	18.63

NOTES:
"+"- included
"-"- not included
[(1)] **BFRC (British Fenestration Rating Council)- The premier UK authority for independently verified ratings of energy efficient windows and doors**
[(3)] **u -values as per Part L minimum requirements**
[(4)] **item affecting DFEE**
[(5)] **item affecting DER**
[(7)] **item affecting TFEE**
[(8)] **item affecting TER**