102
Camley Street, London N1C 4PF

Energy Strategy

August 2014

REGENT RENEWAL LTD

ENERGY STRATEGY
REV 4

FOR

102 CAMLEY STREET,
LONDON

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REVISION HISTORY

Version No.	Version Date	Summary of Changes	Changes Marked
Rev 1	16/06/2014	Draft planning document	
Rev 2	26/06/2014	Updated figures and comments incorporated	
Rev 3	31/07/2014	Amendments following LB Camden comments (25.07.14)	
Rev 4	18/08/2014	Amendments following GLA Stage 1 comments (06.08.14)	

APPROVALS

This document requires the following approvals.

Name	Title
Anthony Coumidis	Director

Signed…… dated…….

For and on behalf of McBains Cooper Consulting Limited

1.0 EXECUTIVE SUMMARY

This Energy Statement has been prepared by McBains Cooper Consulting Ltd for the proposed mixed use development at 102 Camley Street, in support of a planning application to the London Borough of Camden. It has been prepared as part of a series of documents to support the application, in conjunction with which it should be read, and addresses requirements related to energy use and carbon dioxide emissions reduction in accordance with local, regional and national policy. The main policy and guidance context of the responses includes:

- UK national sustainable development policies
- The London Plan 2011 (Draft Further Alterations to the London Plan January 2014) and the Mayor's Supplementary Planning Guidance – Revised Sustainable Design and Construction (2014)
- The requirements of Camden Council as outlined in the Core Strategy (2010), Development Policies (2010 – 2015) and Planning Guidance 3 – Sustainability (April 2011);

The proposed development has a mix of uses, including residential (154 dwellings) and B1 employment areas (1,620m^2 GEA)

Having analysed the loads of the development, we have produced a site-wide energy strategy in accordance with the Mayor's energy hierarchy, maximising the contribution at each step. A summary of key outcomes is provided below.

Regulated carbon dioxide emissions of the proposed scheme have been reduced by over 40% from a Part L 2010 compliant baseline by maximising the contribution at each step of the energy hierarchy. Having minimised energy demand, a Combined Heat and Power unit will be specified and, finally, a combination of Heat Pumps and PV array that will meet a significant proportion of thermal loads of the residential and commercial elements of the scheme.

LEAN:

Energy demand has been minimised through a highly efficient building envelope and systems in terms of U-values and air-tightness, inverter driven pumps, reduced thermal bridges, the inclusion of high efficiency lighting throughout coupled with PIR sensors, occupancy detectors and dimmers. High efficiency heat recovery in the mechanical ventilation system will also be specified.

The overall contribution of lean measures across the site is a 5% reduction in carbon dioxide emissions.

CLEAN:

Further reductions have been achieved through the use of a 100kW$_{th}$ Combined Heat and Power (CHP) unit. To ensure efficient operation throughout the year, the CHP unit will be sized to meet a 60% of the space heating and domestic hot water load of the residential units and B1 employment space, generating electricity to serve landlord areas only. No electricity will be exported from the site. The remaining heating load will be met by high efficiency gas boilers.

The overall contribution of clean measures across the site is a further 36% reduction in carbon dioxide emissions.

GREEN:

To further reduce the carbon dioxide emissions of the proposed development, an assessment of potential low and zero carbon technologies has been undertaken. The preferred option would be to install a combination of Heat Pumps (~40kW) and PV arrays (75 – 100m^2) to contribute towards the cooling and electrical loads of the B1 space respectively.

The overall contribution of green measures across the site is a further 2% reduction in carbon dioxide emissions.

It is expected that the proposed development will achieve a reduction of over 40% in regulated CO_2 reductions compared to Part L 2010.

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy

Carbon dioxide emissions from proposed measures (tonnes CO_2/annum)	Regulated	Unregulated
Building Regulations 2010 Part L Compliant Development	293.4	153.5
After energy demand reduction	281.7	153.5
After CHP	175.2	153.5
After renewable energy	**171.6**	**153.5**

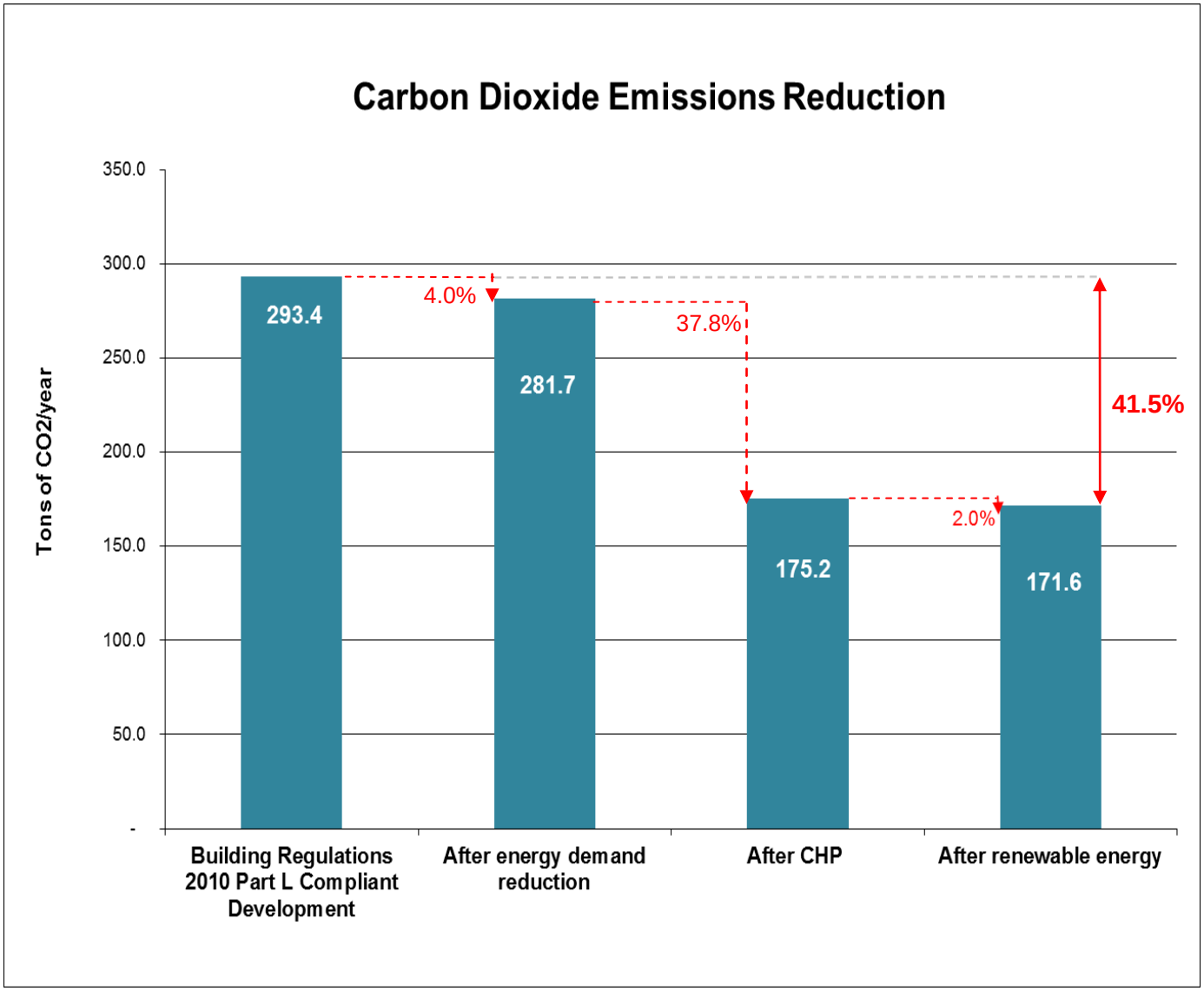
Table 2: Regulated carbon dioxide savings from each stage of the Energy Hierarchy

Regulated carbon dioxide emissions savings from proposed measures	($tnCO_2$/annum)	(%)
Savings from energy demand reduction	11.6	4.0%
Savings from CHP	106.6	37.8%
Savings from renewable energy	3.5	2.0%
Cumulative savings from Part L compliant development	**121.7**	41.5%
Total Target Savings	**117.3**	**40.00%**
Annual Surplus	**4.4**	

Table 3: Shortfall in regulated carbon dioxide savings

	Annual Shortfall (Tonnes CO_2)	Cumulative Shortfall (Tonnes CO_2)
Shortfall	-4.4	0.0

The development is expected to achieve regulated CO_2 reductions of 40 % or more compared with Part L 2010 as shown below.



The table below summarises the policies that have been address within this Energy Statement and in which section for ease of reference.

Greater London Authority (GLA) Policy Document	Relevant section of the Energy Strategy for the Proposed Development
The London Plan 2011 (with further alterations (January 2014)); - Policy 5.2 Minimising Carbon Dioxide Emissions - Policy 5.5 Decentralised Energy Networks - Policy 5.6 Decentralised Energy in Development Proposals - Policy 5.7 Renewable Energy - Policy 5.9 Overheating and Cooling	Section 8 Section 6.1 Section 7.0 Section 5A, 5F
Revised Sustainable Design and Construction Supplementary Planning Guidance (SPG) (April 2014); - Energy and carbon dioxide emissions - Energy demand assessment - Use less energy - Efficient Energy Supply - Renewable Energy - Carbon dioxide off-setting - Monitoring energy use - Supporting a resilient energy supply	- Section 8 - Sections 4.0 and 5.0 - Sections 4.0 and 5.0 - Section 6.0 - Section 7.0 - Section 1 – Table 3 - Section 5G - Section 6
GLA guidance on preparing energy assessments (April 2014)	Section 1 – Table 1, 2 and 3

2.0 INTRODUCTION

McBains Cooper Consulting Limited has been appointed by Regent Renewal Ltd (the applicant) to produce an Energy Statement for the proposed mixed use development at 102 Camley Street to respond to national, regional and local policy, guides and regulations.

The site borders the Network Rail and Channel tunnel Rail Link (CTRL) railway line leading into St Pancras station to the east, offices and warehouse to the north and the Regents Canal to the south. The 102 Camley Street site is currently occupied by a Class B8 warehouse whose tenants have surrendered their short term lease and relocated to a purpose built unit in Tottenham, North London.

It is proposed that the existing warehouse is demolished to redevelop the site to provide a mixed use development comprising 1,620m^2 GEA of flexible commercial/employment floorspace and 154 residential dwellings.

Figure 1: Site location

This document describes the approach taken with regards to the energy strategy of the proposed development. It has been structured according to *Energy Planning Greater London Authority guidance on preparing Energy assessments (April 2014)*

In accordance with this GLA guidance, which states that applications received by the Mayor before 6th July 2014 can demonstrate compliance with the 40% reduction target beyond Building Regulations 2010, this Energy Strategy has been developed against the 2010 baseline.

Please note that this document does not intend to provide a full response to policies referenced and should be read in conjunction with statements and specialist reports such as the:

- Design and Access Statement (GHA)
- Engineering Constraints Report (Arup)
- Sustainability Statement (McBains Cooper)
- Ecology and Biodiversity Statement (Aspect Ecology)
- Transport Statement (TTP Consulting)
- Residential planning noise and vibration report (Sandy Brown)
- Air Quality Assessment (Arup)

The remainder of this document looks at the policies and standards for energy, presenting how the proposed development will respond to the requirements following the energy hierarchy. Furthermore:

- Appendix A includes information on policies and standards, summarising where responses have been provided within the document.

- Appendices B and C show summaries of the domestic (SAP) and non-domestic (SBEM) assumptions and outputs and which sample dwellings have been modelled.

- Appendices E and F include correspondence with district heating network operator for the King's Cross masterplan and LB Camden regarding Phoenix Court to assess the possibility of connecting the proposed development

- Appendix G includes the proposals for the Euston Road district heating network which the GLA agreed at the pre application meeting is geographically unsuitable for the proposed development to connect to

- Appendix I shows a schematic of the proposed energy centre comprising a Combined Heat and Power unit, Heat Pump and gas-fired boilers

3.0 METHODOLOGY

3.1 The Accredited Software

In order to develop the Simplified Building Energy Model (SBEM) for the non-domestic elements of the development Hevacomp software was used (version 4.1.e.5). This is an accredited piece of software in accordance with CIBSE TM33:2006.

In order to determine the baseline consumption and improvements in the private residential element, a series of Standard Assessment Procedure (SAP) assessments were carried out. A representative sample of 18 dwellings from the top and typical floors were selected to show a range of compliance strategies and potential improvements. For this exercise the Stroma FSAP 2009 Calculator Version 1.4.0.38 was used, which is also a government accredited software package (checked by BRE on behalf of DECC, CLG, SBS and DFPNI).

3.2 The Approach

The development was modelled in two parts; the B1 employment element in SBEM, and the residential element (private and affordable) for which a sample of SAP assessments were carried out.

Once the models were set up according to the information from the rest of the design team, the energy hierarchy was applied as described in London Plan Policy 5.2 Minimising carbon dioxide emissions;

1. Be lean: Use less energy
2. Be clean: Supply energy efficiently
3. Be green: Use renewable energy

- The Baseline: The Building/Dwelling Emission Rate (BER/DER) of the proposed development and the Target Emission Rates (TER) of the corresponding notional buildings were calculated using SAP and SBEM in accordance with Building Regulations Part L 2010. For the residential element of the development a representative sample of SAP calculations was carried out. These were selected to provide a range of environmental performances and then area-weighted to provide an overall figure for the Dwelling Emission Rate (DER) across the residential element of the development. Similarly, full SBEM simulations were carried out for the employment areas to estimate the associated energy demand and regulated carbon dioxide emissions.

- The Energy Hierarchy: Once the baselines were determined, the Mayor's energy hierarchy was applied to maximise the reduction of carbon dioxide emissions; energy efficiency measures first, followed by an assessment of the options for meeting the remaining energy demand efficiently and finally an assessment of the options to further reduce carbon dioxide emissions from renewable energy generated onsite.

Following preliminary calculations it is expected that overall regulated carbon dioxide emissions will be reduced by more than 40% across the development compared to Part L 2010 through the Lean, Clean and Green measures. This is in accordance with policy guidance.

The next sections present the baseline consumption figures estimated for the domestic and non-domestic elements based on the accredited SBEM and SAP calculations.

4.0 THE BASELINE

4.1 Residential

To assess the performance of the residential element of the development, a representative of 18 dwellings were selected as shown in Appendix B . The table below summarises the input assumptions :

Residential - Part L 1A				
Element or system	**102 Camley St**	**Notional building (Part L1A 2013)**	**Limiting Values (Part L1A 2013)**	**Units**
External walls	0.18	0.18	0.3	W/m2K
Party walls	0	0	0.2	W/m2K
Floor	-	0.13	0.25	W/m2K
Roof	0.11	0.13	0.2	W/m2K
Windows, roof windows, glazed rooflights and glazed doors	1.3	1.4	2	W/m2K
g value	0.4	0.63	-	
frame factor	0.7			
Opaque doors		1	-	W/m2K
Semi-glazed doors	-	1.2	-	W/m2K
Airtightness	3	5	10	m3/hr/m2
Thermal bridging (y factor)	0.10			
CHP efficiency (fraction of thermal load)	89.8 (0.6)			%
Boiler efficiency (fraction of thermal load)	91 (0.6)	89.5	-	%
Energy efficient lighting	100	100	100	%
Mechanical cooling SEER	No cooling	No cooling	-	
Mechanical ventilation with heat recovery: Specific Fan Power (SFP) / heat recovery efficiency	0.47 / 93%	-	-	W / L / s

4.2 Non-residential

The assumptions on which the SBEM is based can be summarised as follows:

B1 Offices - Part L 2A				
Element or system	**102 Camley St**	**Notional building (Part L2A 2013)**	**Limiting Values (Part L2A 2013)**	**Units**
External walls	0.25	0.26	0.35	W/m2K
Party walls	-	-	-	W/m2K
Floor	0.25	0.22	0.25	W/m2K
Roof	0.15	0.18	0.25	W/m2K
Windows, roof windows, glazed rooflights and glazed doors		1.6	2.2	W/m2K
g value		0.4		
frame factor		0.9		
Opaque doors				W/m2K
Semi-glazed doors				W/m2K
Airtightness	5	5	10	m3/hr/m2
Thermal bridging (y factor)				
CHP efficiency (fraction of thermal load)	89.8 (0.6)			%
Boiler efficiency (fraction of thermal load)	89 (0.6)	91	-	%
Mechanical cooling (SEER / SSEER) (Air conditioned)	3.75 / 3	4.5 / 3.6	-	
Mechanical cooling (SEER / SSEER) (Mixed mode)		2.7	-	
Lighting luminaire	95	60	-	lumens per circuit watt

5.0 IMPROVEMENTS FROM REDUCING ENERGY DEMAND ('Be Lean')

Reducing carbon emissions from the total energy needs (heating, cooling and power) of the development is one of the fundamental aims of any development adopting the principles of sustainable design in order to mitigate the effects of climate change and help conserve fossil fuel resources.

The first step in the energy hierarchy is to use passive design and energy efficiency measures to reduce the energy demand of the building. From preliminary calculations, it is estimated that a regulated carbon dioxide emissions reduction of 4% over Part L 2010 across the development as a whole through lean measures alone.

A. Building Fabric Improvements and Overheating

Although it has been agreed with Building Control that the development will be assessed under the 2010 version of the Building Regulations Part L, the fabric thermal performance will aim to meet those required by Part L 2013.

The glazed areas in the residential element of the scheme is a key component. The proportion of glazing to façade area (approximately 40% across the development) was assessed with careful consideration of beneficial heat gain, winter heat losses, daylight and aesthetic appeal of the building. Instead of the minimum required U-value of 2.20 W/m^2K for Building Regulations 2010, a window system for the residential element with a U-value of 1.30 W/m^2K is proposed. This will help to minimise excessive heat loss in winter and solar gain in the summer, reducing the associated heating load in winter and the risk of overheating in summer. Furthermore, external wall U-values of 0.18 W/m^2K have been selected, an improvement of almost 30% over Building Regulations 2010. Finally, the inclusion of a significant area of green roof (~175m^2) will provide an additional layer of insulation and reduce the impacts of the heat island effect, in addition to the biodiversity and rainwater attenuation benefits.

Similarly for the non-residential uses, the fabric performance aim to meet or marginally improve upon the Part L 2013 requirements.

B. Air Tightness Improvements

A significant improvement upon the minimum requirements under Part L 2010 will be targeted such that Part L 2013 will be achieved or improved upon. The 2010 requirements of 10 m^3/m^2hour will be exceeded by achieving the Part L 2013 requirements of 5 m^3/m^2hour at 50 Pa pressure for the employment areas and further improved with 3 m^3/m^2hour at 50 Pa pressure targeted for the residential dwellings. The Contractor

will incorporate suitable construction details into the design and adopt best practice construction practices in order to achieve these figures.

C. Thermal Bridging

Thermal bridging will be carefully considered to improve upon the minimum default values assumed under Part L 2010. Thermal bridges at junctions and at the interface of different building elements will be designed to ensure that heat is transferred through to the building is reduced. Particular attention will be paid to the balconies, which are one of the highest risk areas to cause thermal bridging due to construction method and detailing.

D. Luminaires and Controls

Low energy lighting has become an essential feature of building design. Advances in lamp and ballast design have led to higher efficiency luminaires with control measures having become standard in most new developments in order to respond to changes to standards such as Part L1 of the Building Regulations and sustainability assessment methods such as BREEAM and the Code for Sustainable Homes.

Lighting controls can consist of simple presence detection which when combined with daylight control can switch luminaires on/off automatically or regulate the lighting levels in accordance with the outside conditions. These systems are proposed used in conjunction with each other for the most energy efficient installation. Daylight control is intended for use to control external lighting.

Energy efficient light fittings will be provided throughout the building to reduce the electrical load. Daylight sensors and timers will be installed to all external lighting (not including security lighting). High efficiency lamps will be installed in communal areas managed by the landlord. These will be controlled by a combination of infra-red occupancy control.

E. Ventilation

Due to the high performance of the building fabric and the scale of the development, relying solely on natural ventilation is not an appropriate strategy and a balanced mechanical ventilation strategy with mechanical extract, as required, in kitchen and toilet areas and mechanical supply in the living areas is proposed. This will ensure minimum fresh air requirements, moisture and odour removal from the kitchen and toilet areas and allow for a boost and purge facility to increase the volume of air flow controlled through both temperature and humidity sensors or manual activation. In order to optimise the energy performance of the system, each unit incorporate heat recovery.

F. Comfort Cooling

The controlled ventilation strategy and high performance windows ensure that comfort cooling will not be required in the residential units. For market reasons, the penthouse apartments will provide the option for future inclusion of mechanical cooling, although all dwellings comply with the Part L overheating risk assessment through the provision of openable windows. The employment element of the scheme will have a proportion of cooling provided by Heat Pumps.

The following table demonstrates how the proposed development has addressed the issue of cooling in line with Cooling Hierarchy as included within Policy 5.2 of the London Plan 2011 (and Draft Further Alterations January 2014)

Cooling hierarchy	Proposed development
1 minimise internal heat generation through energy efficient design	Selection of high performance glazing units with U values and g- values that or exceed Part L 2013 requirements.
2 reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls	A significant area of green roof (~175m^2) is proposed within the roof design.
3 manage the heat within the building through exposed internal thermal mass and high ceilings	A robust floor – ceiling height of 2.5m is provided.
4 passive ventilation	Openable windows are provided to all dwellings.
5 mechanical ventilation	Mechanical ventilation with heat recovery is to be installed in all units, with a summertime boost function.
6 active cooling systems (ensuring they are the lowest carbon options).	No mechanical cooling is to be installed, although the penthouse dwellings will be adaptable should the market require this.

G. Building Energy Management System

Sub-metering of heating and electricity consumption will be installed to each dwelling easily accessible for tenants with the inclusion energy display devices to show live and historic consumption. Energy use of the non-residential units in the development will monitored through a Building Energy Management System (BEMS) that will be remotely controlled by the landlord. The BMS will also enable the plant to operate more efficiently by automating and controlling the sequences of its various operations. Digital displays of energy consumed and generated in the main entrances to educate building occupants and visitors is to be considered.

H. Inverter-driven pumps and fans

Substantial overall savings in energy and carbon dioxide emissions can be realised with the effective application of variable speed AC inverter drives. There are also significant indirect resource savings available by extending motor life and reduction of overall noise pollution.

Baseline energy demand

Applying the above energy efficiency measures produces the following figures for hot water and space heating demand. These figures are used in the sizing of the CHP in section 6.2.

Parameter	Residential kWh	B1 Employment areas kWh
Demand per m^2		
Hot Water Energy Requirement /m² basis	27.49	2.99
Heating Energy Requirement /m2 basis	29.30	12.83
Annual demand		
Hot Water Energy Requirement /yr basis	386,165	4,805
Heating Energy Requirement /yr basis	411,487	20,623
TOTAL	823,080	

6.0 IMPROVEMENT FROM SUPPLYING ENERGY EFFICIENTLY ('Be Clean')

6.1 District Heating Network

The London Plan shows great support for district heating networks and all developments are required to assess the feasibility of connecting to existing or planned networks, and also the integration with nearby proposed development.

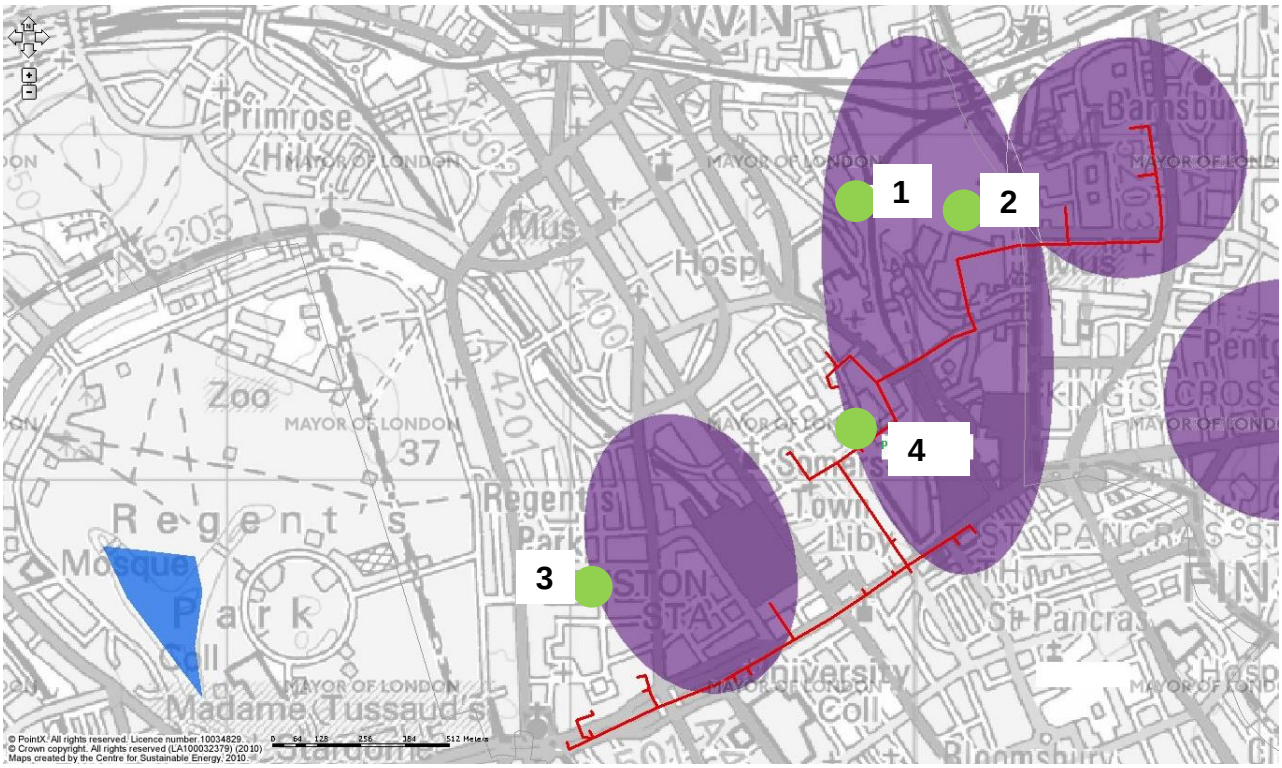


Figure 2: London Heat Map showing heat loads and district heating networks in the vicinity of the proposed development.

1. Proposed Development
2. Existing King's Cross district heating network
3. Proposed Euston Road district heating network
4. Proposed Phoenix Court district heating network

The applicant has liaised with the Kings Cross masterplan district heating network provider. This ESCo, Metropolitan, has confirmed that due to the presence of the Regents Canal, between the proposed development and the King Cross energy centre, and the magnitude of existing sub stations and electrical infrastructure along the canal route, connection to proposed development would not be feasible. (Please refer to Appendix (Please refer to Appendix E).

Having investigated district heating networks further afield, the Euston Road district heating network proposals has been reviewed and found to focus on installing capacity to the western side of Euston station and that phasing plans that extend to 2029 do not envisage an extension in the direction of the proposed development. The eastern edge of the current proposals are over 800m from the application site. (Please refer to Appendix G).

Additional proposals for a standalone network proposed to the east of Euston Station, with its energy centre located at Phoenix Court, have also been considered. However, the intended pipework layout would connect to buildings a significant distance (~450m) from the proposed development. Multiple attempts have been made to liaise with London Borough of Camden to understand the scheme in more detail but only one response has been received stating that the proposed development is likely too far from the Phoenix Court scheme. (Please refer to Appendix F). It is considered that connection to the Phoenix Court scheme would incur high heat losses and pump energy.

In terms of adjacent developments, the proposed development will be located close by the two adjacent developments, 101 and 103 Camley Street. The integration of a heating network between the three developments will be investigated although it is highlighted that as all schemes are at different stages of the design and construction process, it is not guaranteed that there is scope for an integrated solution with regards to district heating. 103 Camley Street already has a CHP system specifically tailored to that development without spare capacity for adjacent sites.

Notwithstanding and in order to future-proof the development, the infrastructure will be provided to enable future connection to a suitable district heating network.

6.2 Combined Heat and Power (CHP)

Connecting to a district heating network was the first option assessed. As it is unlikely this will be viable, the next priority in Policy 5.6 of the London Plan 2011 to be assessed is to install a Combined Heat and Power (CHP) unit. As the technology would be installed onsite, the transmission losses associated with larger district networks would be far reduced. Furthermore, for every unit of electricity generated, the heat can be captured and used for ‘free’ to contribute to a thermal base load. These two main advantages lead to significant carbon dioxide emissions reductions.

The mixed use nature of the development is also suited to CHP. The electricity generated will meet the loads of the circulation spaces and employment spaces during the day, and lighting/appliances of the dwellings in the evenings. A thermal demand will consist of the employment spaces and dwellings during the day, and the subsequent increased load in the dwellings in the evenings.

In order to estimate the size for the CHP unit, the main considerations are twofold:

1. To ensure the unit would run at the rated output for at least 10 hours per day and 329 days a year (to account for maintenance 10% downtime); and
2. Avoid the need to export electricity or heat

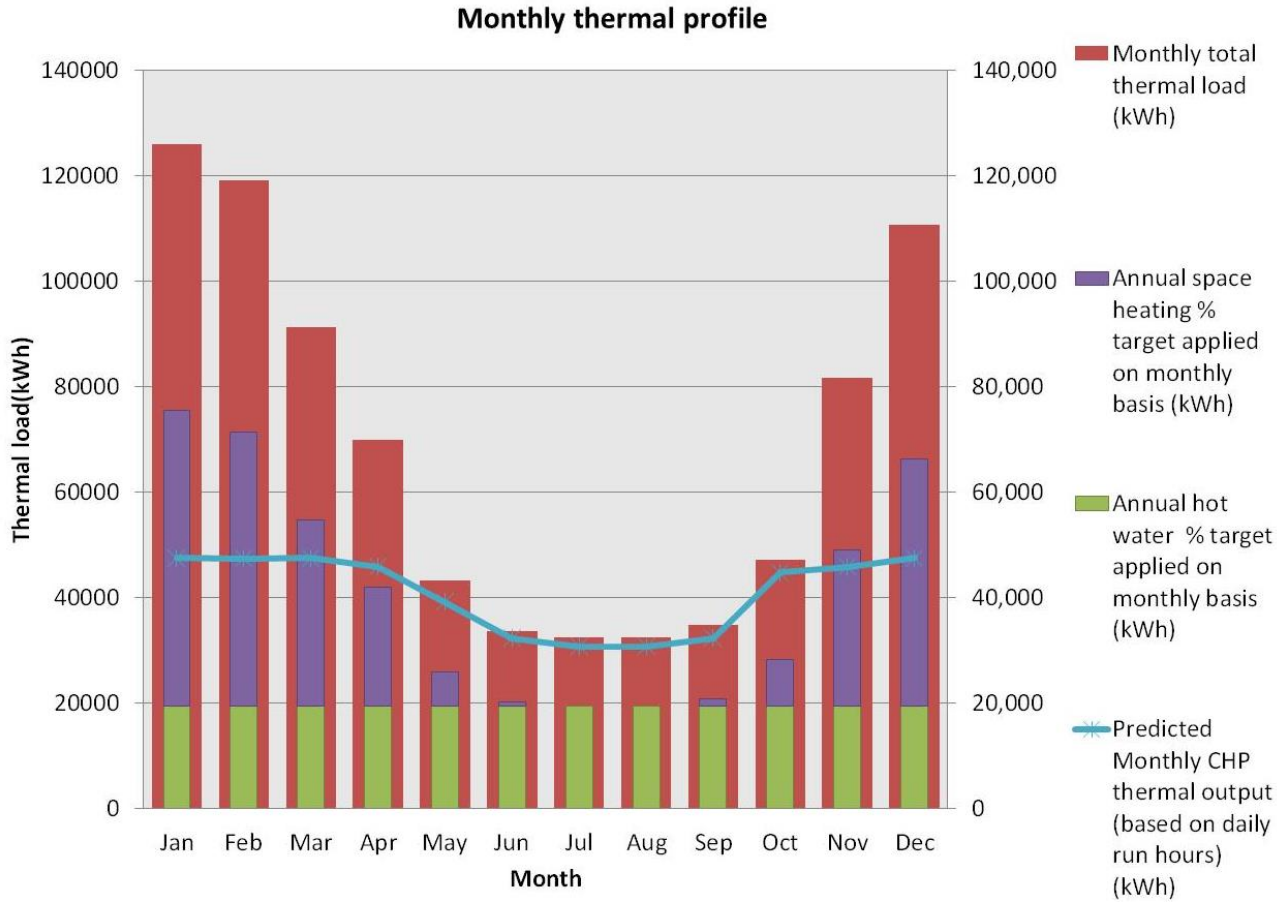


Figure 3: Indicative monthly thermal load met by the CHP

To meet the above requirements, we propose a CHP unit with 100 kW_{th} capacity. The CHP has been sized to meet 60% of the space heating and hot water load of the residential and employment elements combined. Figure 3 shows this 60% target applied to each month, but also the expected thermal output of the CHP based upon varying daily run hours i.e. 10 hours per day in the summer months and up to 16 hours per day in the winter.

A predicted daily running hours and monthly thermal output is summarised in the table below, with a total of 492,500 kWh/yr, which is 60% of the total thermal load (823,080 kWh).

A 100kWth unit would have an electrical output of ~ 60kWe, that is, approximately 0.4kWe per dwelling in line with the recommendations of CHP manufacturer, Energ.

CHP Daily run hours	17	19	17	17	14	12	11	11	12	16	17	17
Operating Days per month	28	25	28	27	28	27	28	28	27	28	27	28
Predicted Monthly CHP thermal output (based on daily run hours) (kWh)	47,600	47,500	47,600	45,900	39,200	32,400	30,800	30,800	32,400	44,800	45,900	47,600
Predicted Annual CHP thermal output (based on daily run hours) (kWh)	492,500											

The electricity generated will meet a proportion of the landlord's and employment spaces electrical load and thus it is not proposed to export electricity. Therefore, an electrical sales and management strategy has not been developed.

The CHP will further reduce carbon dioxide emissions by ~36% across the whole development. For the remaining thermal load, highly efficient gas-fired boilers will be specified.

It is worth noting that SBEM analysis demonstrates compliance with Part L 2010 rather than provide a wholly accurate energy prediction of the scheme. Therefore, the size of the proposed CHP unit is subject to change following a more detailed analysis of the projected energy use at detailed design. Indicative figures for the size of the CHP have been provided to demonstrate compliance with policy and present the approach of the energy strategy.

Space in the communal plant room will be provided for a heat exchanger, and any other necessary connections for a future connection to a local network.

The plant will be located in the basement, where natural ventilation has been provided and adequate openings for flues.

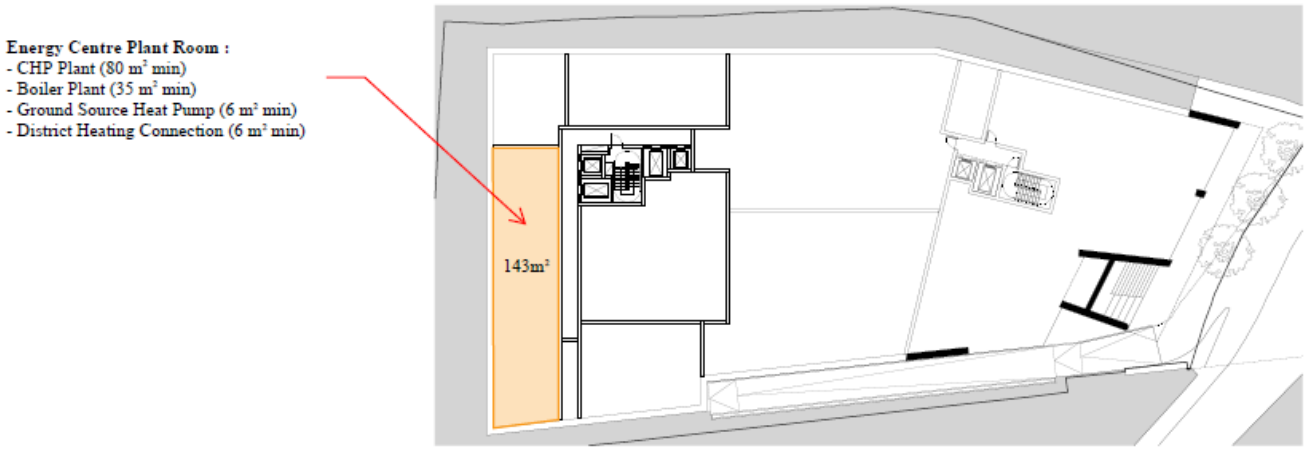


Figure 4: Indicative energy centre plant room layout

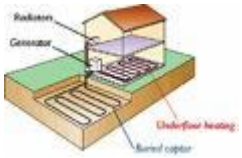
Any plant specified will be required to comply with the Clean Air Act and local air quality requirements.

7.0 IMPROVEMENT FROM INTRODUCING RENEWABLE ENERGY TECHNOLOGIES ('Be Green')

7.1 Initial feasibility

A renewable and low carbon technology feasibility study has been carried out to investigate the contribution that on-site generation from renewable energy technologies could make to further reduce the carbon dioxide emissions in the proposed development. The following technologies have been assessed in terms of their technical feasibility and potential CO_2 emissions savings:

- Solar thermal water heating;
- Photovoltaics;
- Biomass heating;
- Building mounted and stand-alone wind turbines;
- Ground source heat pumps (GSHP); and
- Air source heat pumps (ASHP).

Technology	Feasibility	Comments
Ground or Air Source Heat Pumps  	✔	Heat Pumps could meet a proportion of the cooling load. As the building will be piled, a closed loop would be placed to run through these piles to release heat to the ground. Once more details of ground conditions are known at Detailed Design stage, it may be necessary for the system to run in conjunction with dry air coolers of with equivalent cooling efficiency to meet peak cooling loads, and / or to allow the ground heat storage capacity to recover. Air source heat pumps function in a similar manner, albeit extracting and releasing heat to the air. The performance of these heat pumps can decrease at temperatures approaching 0°c and thus a ground source system is preferred at this stage, subject to detailed ground condition surveys at Detailed Design.
Photovoltaics 	✔	The proposed development has a large area of flat roof and thus with the appropriate mounting systems can be favourable for the installation of Photovoltaic panels. Photovoltaic cells could contribute to a proportion of the electrical load of the commercial element of the scheme and still allow the inclusion of areas of green roof.

Technology	Feasibility	Comments
Solar Hot Water Systems 	✗	The hot water load is very high in any multi-storey residential led scheme. In this case this has been addressed at the second step of the energy hierarchy through the Combined Heat and Power plant; therefore the solar thermal technology would not make a further contribution to the carbon dioxide emissions reduction and will not be considered further.
Biomass Heating 	✗	A communal biomass boiler would be unsuitable for the development due to the central London location and the associated implications of fuel deliveries. Furthermore, given the commercial premises and proximity to the Regents Canal, suitable space for fuel storage, typically in the form of a basement store would be impractical. This will not be further considered.
Wind (roof mounted) 	✗	Roof mounted wind turbines are not recommended for this site due to noise, flicker and vibration implications on this residential buildings. Numerous inner city wind turbine trials have shown that such turbines' energy yields are significantly lower than manufacturers' estimations. This will not be further considered.
Wind (standalone) 	✗	Small-scale, standalone turbines are not suitable for this development due to lack of space on the site and relatively low wind speeds that would be achieved in this very urban environment. This will not be further considered.

7.2 Preferred Options for Renewables

As the proposed development will include structural piles, a heat pump system can integrate a group loop within the piles, to enable the release of heat to the ground to provide cooling to employment spaces. At this stage, approximately 50 No. piles at a ~20m depth are proposed, generating up to 70kW of cooling, assuming a COP = 3. This is subject to more indepth ground condition investigations at detailed design stage. This is estimated to meet up to half of the employment areas' peak cooling demand.

In addition, a large area of PV array (75m^2 – 100m^2 or 10 – 15 kWp) is proposed to supply renewable electricity to the office areas of the development. Please refer to Appendix H for an indicative roof plan.

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy

Carbon dioxide emissions from proposed measures (tonnes CO_2/annum)	Regulated	Unregulated
Building Regulations 2010 Part L Compliant Development	293.4	153.5
After energy demand reduction	281.7	153.5
After CHP	175.2	153.5
After renewable energy	**171.6**	**153.5**

Table 2: Regulated carbon dioxide savings from each stage of the Energy Hierarchy

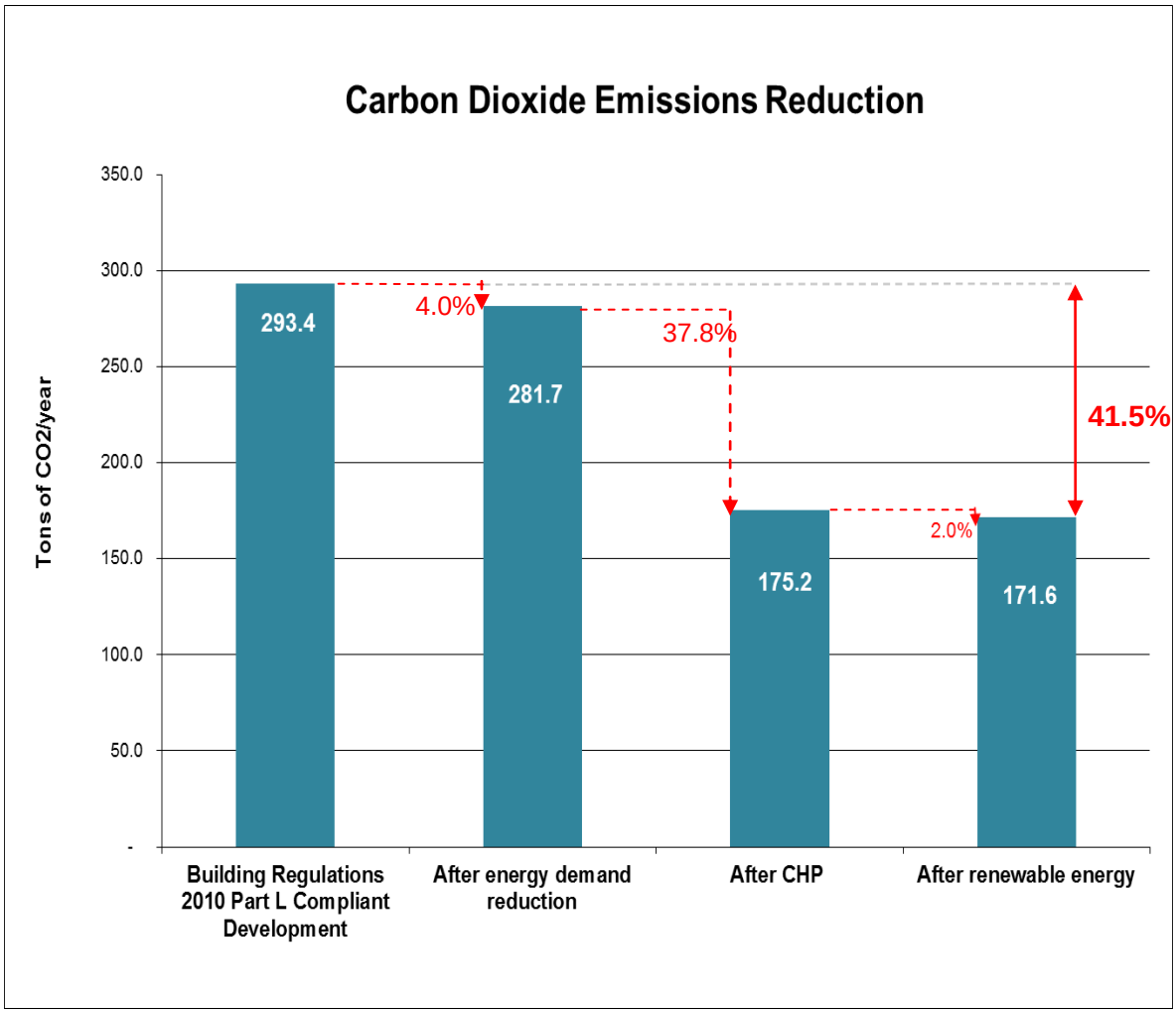
Regulated carbon dioxide emissions savings from proposed measures	($tnCO_2$/annum)	(%)
Savings from energy demand reduction	11.6	4.0%
Savings from CHP	106.6	37.8%
Savings from renewable energy	3.5	2.0%
Cumulative savings from Part L compliant development	**121.7**	41.5%
Total Target Savings	**117.3**	**40.00%**
Annual Surplus	**4.4**	

Table 3: Shortfall in regulated carbon dioxide savings

	Annual Shortfall (Tonnes CO_2)	Cumulative Shortfall (Tonnes CO_2)
Shortfall	-4.4	0.0

8.0 CONCLUSIONS

Following the energy hierarchy we have demonstrated how the proposed development will employ lean, clean and green measures to achieve at least 40% reduction in regulated CO_2 emissions according to a Part L 2010 baseline. This is a robust baseline figure in accordance with the GLA guidance which accepts applications received before 6th July to be assessed against a 40% reduction on Part L 2010. The expected contributions from each step of the hierarchy are shown graphically below:



The development is expected to achieve regulated CO_2 reductions of 40 % or more compared with Part L 2010.

Having maximised the contribution from each step of the energy hierarchy, an overall carbon dioxide emission reduction of 42%, exceeds the 40% reduction required under the London Plan 2011.

APPENDIX A

Main Documents for Policy Context

Main Policy Documents and Response References

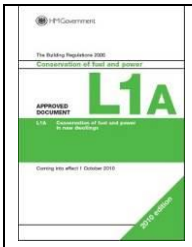
Climate change – the rise in average global temperature due to increasing levels of greenhouse gases in the earth's atmosphere – is a fundamental challenge facing the world. There is mounting evidence of its seriousness and its potential impacts and consensus has largely been reached that it is caused by the emission of greenhouse gases (primarily carbon dioxide) that prevent the radiation of heat into space. Unless these are reduced, temperatures will continue to rise. Eventually, a tipping point could be reached, overcoming the earth's natural buffering systems and bringing catastrophic climate change.

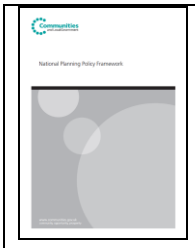
London is particularly vulnerable to flooding, overheating and drought conditions which can lead to water supply shortfalls. Based on UKCP projections, climate change will increase the probability and severity of these effects through rising sea levels, heavier winter rainfall, higher tidal surges, hotter summers and less summer rainfall.

In order to address the issue of climate change, and as part of the Climate Change Act 2008, the Government established a target to reduce the UK's greenhouse gas emissions by 80 per cent by 2050 and has proposed carbon budgets as a means to work towards this UK target. Further policy, guidance and regulations have been developed at national, regional and local level, in relation to which the development proposals have been considered. These include:

National Policy on Planning and Sustainable Development

There are various national policies, the two most relevant to energy are summarised below:

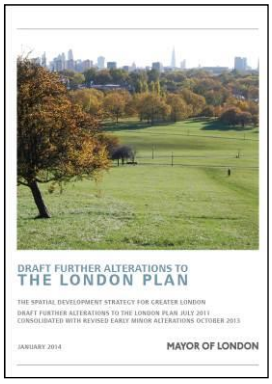
	Building Regulations Part L The Approved Document Part L sets minimum requirements in terms of a building's energy performance (and associated CO_2 emissions). The 2010 version requires regulated CO_2 emissions to be reduced by 25% on average compared to the previous version (Part L 2006). Limiting the overheating risk due to excessive solar gains is also assessed. April 2014 saw an updated version of the Part L which includes more onerous targets in terms of minimum fabric and services performance parameters, and changes to the assessment of overheating risk.

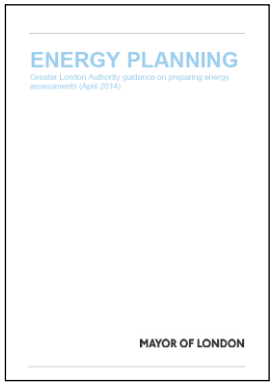
	National Planning Policy Framework The National Planning Policy Framework (NPPF) was introduced in 2012 and has superseded all Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) documents, with the exception of PPS10 (Waste). The NPPF sets out the Government's strategy on the delivery of sustainable development through the planning system in a more simplified approach.

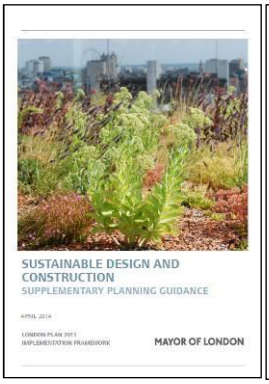
Greater London Authority Documents

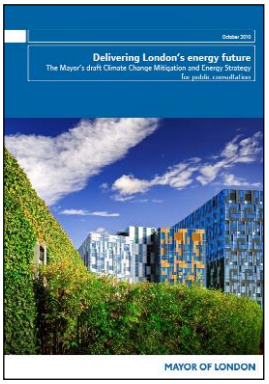
Relevant Greater London Authority (GLA) policy documents which have been reviewed and addressed in the production of the Sustainability Statement are as follows:

- The London Plan 2011 (with further alterations (January 2014));
- GLA guidance on preparing energy assessments (April 2014)
- Revised Sustainable Design and Construction Supplementary Planning Guidance (SPG) (April 2014);
- The Mayor's Climate Change Mitigation and Energy Strategy (2010);
- London Heating Network Manual (April 2014)



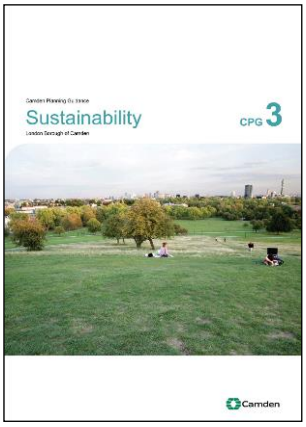


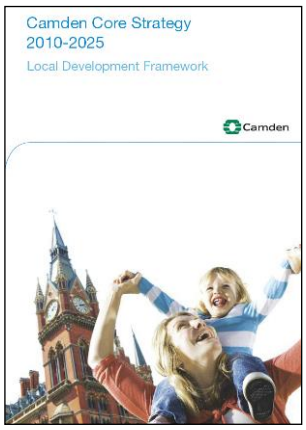


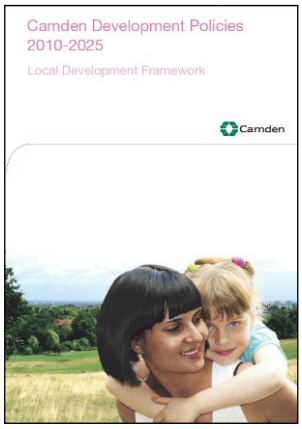


Local Planning Policies and Guidance – London Borough of Camden

- London Borough of Camden Core Strategy 2010 – 2025 (November 2010);
- London Borough of Camden Development Policies 2010 – 2025 (November 2010);
- London Borough of Camden Planning Guidance 3 – Sustainability (April 2011);







Camden Planning Guidance 3 – Sustainability (CPG 3)	Proposed Development
minimise carbon dioxide emissions by being as energy efficient as is feasible and viable	40% reduction in regulated CO_2 emissions through passive design, energy efficiency, CHP and renewable energy technologies
use or building a community heating network will be expected.	Local energy networks have been consulted but connection to these have been found to not be technically viable. A communal heating network is proposed, powered by gas fired CHP. Space in the communal plant room will be provided for a heat exchanger, and any other necessary connections for a future connection to a local network.
at least a 20% reduction in carbon dioxide emissions through the installation of on-site renewable energy technologies	In line with the GLA's Energy hierarchy, a 'fabric first' approach is proposed, whereby the 40% reduction in regulated CO_2 emissions is achieved with a preference for passive design measures and clean energy (CHP). PVs and Heat pumps are proposed for inclusion within the site's energy strategy.

London Plan 2011	**Policy 5.2 Minimising Carbon Dioxide Emissions** **Planning Decisions** A Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy: 1. Be lean: use less energy 2. Be clean: supply energy efficiently (see Policies 5.5 and 5.6) 3. Be green: use renewable energy (see Policy 5.8) B The Mayor will work with Boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019. **Residential buildings:** 40 per cent improvement on 2010 Building Regulations for developments between 2013 – 2016 **Non-domestic buildings:** 25 per cent improvement on 2010 Building Regulations for developments between 2013 – 2016 C Major developments should include a detailed energy assessment to demonstrate how the targets for the carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.

Policy 5.5 Decentralised Energy Networks

Strategic

A The Mayor expects 25 per cent of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025. In order to achieve this target the Mayor prioritises the development of decentralised heating and cooling networks at the development and area wide levels, including larger scale heat transmission networks.

5.32 […] The decentralised energy systems will be predominantly based around the use of gas-fired CHP, district heating and cooling in the first instance.

Policy 5.6 Decentralised Energy in Development Proposals

Planning Decisions

A Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites.

B Major development proposals should select energy systems in accordance with the following hierarchy:

1. Connection to existing heating and cooling networks
2. Site wide CHP network
3. Communal heating and cooling

C Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are identified, proposals should be designed to connect to these networks.

Policy 5.7 Renewable Energy

Strategic

A The Mayor seeks to increase the proportion of energy generated from renewable sources, and expects that the projections for installed renewable energy capacity outlined in the Climate Change Mitigation and Energy Strategy and in supplementary planning guidance will be achieved in London.

Planning Decisions

B Within the framework of the energy hierarchy (see Policy 5.2), major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.

5.42 Individual development proposals will also help to achieve these targets by applying the energy hierarchy in Policy 5.2. There is a presumption that all major development proposals will seek to reduce carbon dioxide emissions by at least 20 per cent through the use of on-site renewable energy generation wherever feasible. Development proposals should seek to utilise renewable energy technologies such as: biomass heating; cooling and electricity; renewable energy from waste; photovoltaics; solar water heating; wind and heat pumps. The Mayor encourages the use of a full range of renewable energy technologies, which should be incorporated wherever site conditions make them feasible and where they contribute to the highest overall and most cost effective carbon dioxide emissions savings for a development proposal.

Policy 5.9 Overheating and Cooling

Strategic

A The Mayor seeks to reduce the impact of the urban heat island effect in London and encourages the design of places and spaces to avoid overheating and excessive heat generation, and to reduce overheating due to the impacts of climate change and the urban heat island effect on an area wide basis.

Planning decisions

B Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

1. minimise internal heat generation through energy efficient design
2. reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls
3. manage the heat within the building through exposed internal thermal mass and high ceilings
4. passive ventilation
5. mechanical ventilation
6. active cooling systems (ensuring they are the lowest carbon options)

C Major development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. New development in London should also be designed to avoid the need for energy intensive air-conditioning systems as much as possible.

Revised Sustainable Design and Construction Supplementary Planning Guidance (SPG) (April 2014);

The relevant requirements are shown below:

Energy and carbon dioxide emissions		Relevant section of the Energy strategy - Proposed Development
Mayor's Priority	**London Plan policy**	
The overall carbon dioxide emissions from a development should be minimised through the implementation of the energy hierarchy set out in London Plan policy 5.2.	5.2, 5.3	Sections 3.0 and 4.0
Mayor's Priority	**London Plan policy**	
Developments should be designed to meet the following Regulated carbon dioxide standards, in line with London Plan policy 5.2.	5.2	

Residential buildings	
Year	Improvements beyond 2010 Building Regulations
1st October 2013 - 2016	40 per cent
2016 - 2031	Zero carbon

Non-domestic buildings	
Year	Improvements beyond 2010 Building Regulations
1st October 2013 - 2016	40 per cent
2016 - 2019	As per the Building Regulation requirements
2019 - 2031	Zero carbon

Mayor's best practice	**London Plan policy**	
Developments should contribute to ensuring resilient energy infrastructure and a reliable energy supply, including from local low and zero carbon sources.	5.1, 5.5, 5.6, 5.7, 5.8, 5.17	Section 6.1
Mayor's best practice	**London Plan policy**	
Developers are encouraged to include innovative low and zero carbon technologies to minimise carbon dioxide emissions within developments and keep up to date with rapidly improving technologies.	5.2, 5.17	Section 6.1
Energy demand assessment		
Mayor's Priority	**London Plan policy**	
Development applications are to be accompanied by an energy demand assessment	5.2	Sections 4 and 5

		Relevant section of the Energy strategy - Proposed Development
Use less energy		
Mayor's Priority	**London Plan policy**	
The design of developments should prioritise passive measures.	5.2, 5.3, 5.9	Section 5
Mayor's best practice	**London Plan policy**	
Developers should aim to achieve Part L 2013 Building Regulations requirements through design and energy efficiency alone, as far as is practical.	5.2, 5.3	Section 5
Efficient energy supply		
Mayor's Priority	**London Plan policy**	
Where borough heat maps have identified district heating opportunities, boroughs should prepare more detailed Energy Master Plans (EMPs) to establish the extent of market competitive district heating networks.	5.5, 5.6	Section 6
Mayor's Priority	**London Plan policy**	
Developers should assess the potential for their development to: • connect to an existing district heating or cooling network; • expand an existing district heating or cooling network, and connect to it; or • establish a site wide network, and enable the connection of existing buildings in the vicinity of the development.	5.5, 5.6	Section 6
Mayor's Priority	**London Plan policy**	
Where opportunities arise, developers generating energy or waste heat should maximise long term carbon dioxide savings by feeding the decentralised energy network with low or zero carbon hot, and where required, cold water.	5.5, 5.6	Section 6
Renewable energy		
Mayor's Priority	**London Plan policy**	
Boroughs and neighbourhoods should identify opportunities for the installation of renewable energy technologies in their boroughs and neighbourhoods.	5.4, 5.7	Section 7
Mayor's Priority	**London Plan policy**	
Major developments should incorporate renewable energy technologies to minimise overall carbon dioxide emissions, where feasible.	5.7	
Carbon dioxide off-setting		
Mayor's Priority	**London Plan policy**	
Boroughs should establish a carbon off-set fund and identify suitable projects to be funded.	5.2, 5.4	Section 1, Table 3
Where developments do not achieve the Mayor's carbon dioxide reduction targets set out in London Plan policy 5.2, the developer should make a contribution to the local borough's carbon dioxide off-setting fund.	5.2, 5.4	Section 1, Table 3

		Relevant section of the Energy strategy - Proposed Development
Retrofitting		
Mayor's Priority	**London Plan policy**	
Boroughs should set out policies to encourage the retrofitting of carbon dioxide and water saving measures in their borough.	5.4, 5.15	**N / A as new build**
Mayor's Priority	**London Plan policy**	
Where works to existing developments are proposed developers should retrofit carbon dioxide and water saving measures.	5.4, 5.15	**N / A as new build**
Monitoring energy use		
Mayor's best practice	**London Plan policy**	
Developers are encouraged to incorporate monitoring equipment, and systems where appropriate to enable occupiers to monitor and reduce their energy use.	5.2, 5.3	**Section 5G**
Supporting a resilient energy supply		
Mayor's best practice	**London Plan policy**	
Developers are encouraged to incorporate equipment that would enable their schemes to participate in demand side response opportunities.	5.2, 5.3	**Section 5G**

Greater London Authority (GLA) Policy Document	Relevant section of the Energy Strategy for the Proposed Development
The London Plan 2011 (with further alterations (January 2014)); - Policy 5.2 Minimising Carbon Dioxide Emissions - Policy 5.5 Decentralised Energy Networks - Policy 5.6 Decentralised Energy in Development Proposals - Policy 5.7 Renewable Energy - Policy 5.9 Overheating and Cooling	Section 8 Section 6.1 Section 7.0 Section 5A, 5F
Revised Sustainable Design and Construction Supplementary Planning Guidance (SPG) (April 2014); - Energy and carbon dioxide emissions - Energy demand assessment - Use less energy - Efficient Energy Supply - Renewable Energy - Carbon dioxide off-setting - Retrofitting - Monitoring energy use - Supporting a resilient energy supply	- Section 8 - Sections 4.0 and 5.0 - Sections 4.0 and 5.0 - Section 6.0 - Section 7.0 - Section 1 – Table 3 - Section 5G - Section 6
GLA guidance on preparing energy assessments (April 2014)	Section 1 – Table 1, 2 and 3

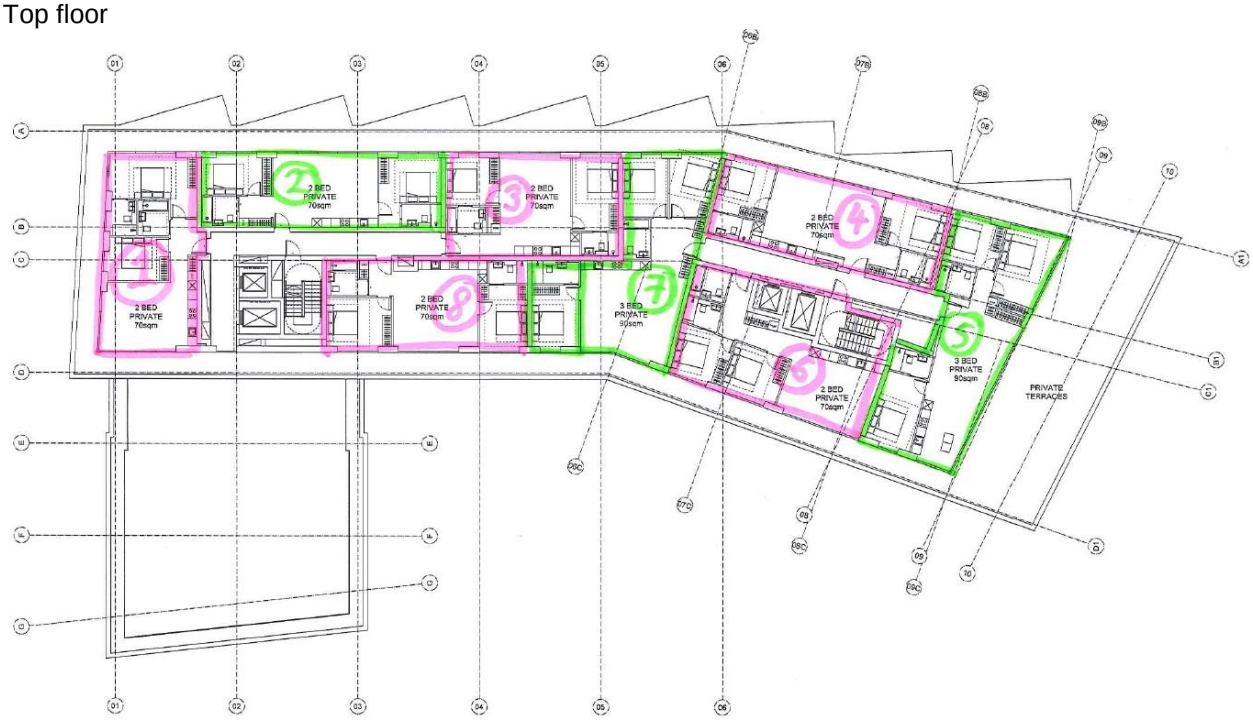
APPENDIX B
RESIDENTIAL – SAP SAMPLE DWELLINGS

Reference Drawings

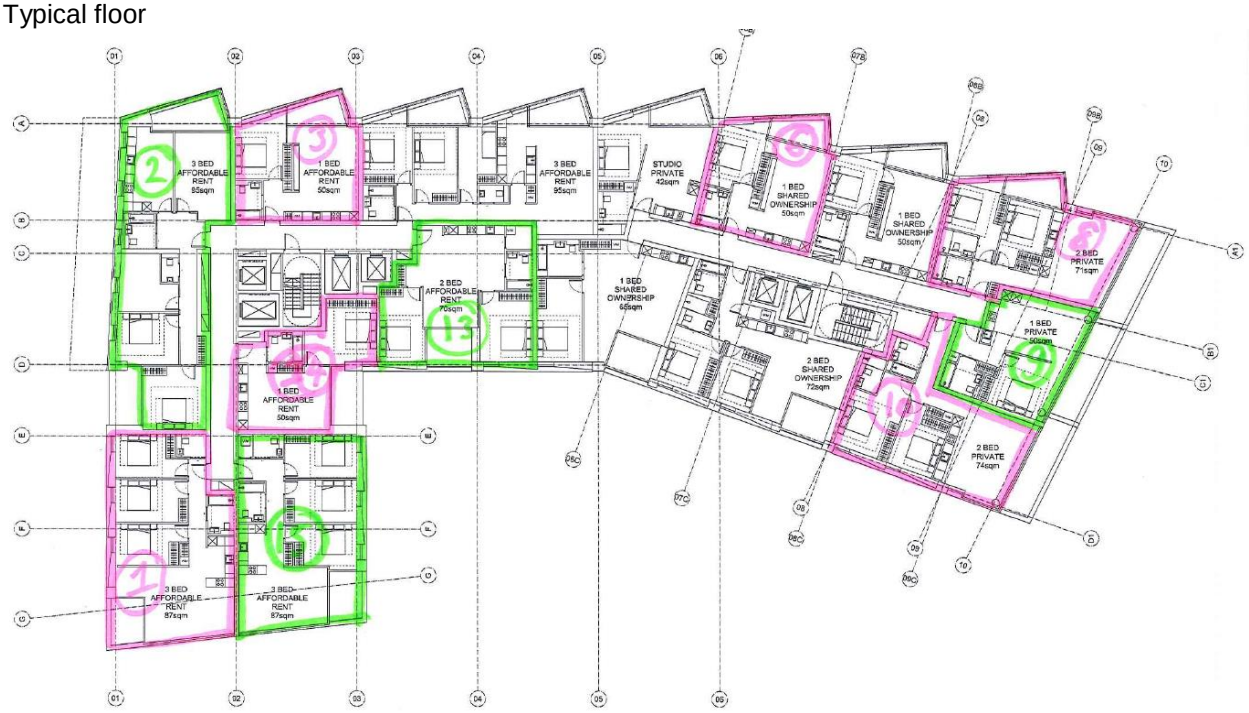
The drawings listed in the table below, issued by Glen Howells, the architects, were used to develop the SAP models.

	Architect's Drawing Reference
Plans	**1985-A-L-100 (Rev B)**
	1985-A-L-103 (Rev B)
	1985-A-L-104 (Rev B)
	1985-A-L-105 (Rev B)
	1985-A-L-106 (Rev B)
	1985-A-L-107 (Rev B)
	1985-A-L-108 (Rev B)
	1985-A-L-111 (Rev B)
	1985-A-L-112 (Rev B)
	1985-A-L-113 (Rev B)
	1985-A-L-114 (Rev B)

Top floor



Typical floor



APPENDIX C
RESIDENTIAL – SAP RESULTS

Regulations Compliance Report

Approved Document L1A 2010 edition assessed by Stroma FSAP 2009 program, Version: 1.5.0.71
Printed on 19 May 2014 at 18:41:24

Project Information:

Assessed By: () **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Site Reference : CLEAN **Plot Reference:** 1-1

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1 TER and DER

Fuel for main heating system: Mains gas (c), Mains gas (c)
Fuel factor: 1.00 (mains gas (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)	15.86 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.42 kg/m²	**OK**

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

3 Air permeability

Air permeability at 50 pascals	3.00	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:	Community heating schemes - mains gas
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, TRVs	**OK**
Hot water controls:	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power:	0.47

Regulations Compliance Report

Maximum	1.5	**OK**
MVHR efficiency:	93%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: West	19.25m²,
Windows facing: North	7.28m²,
Windows facing: North	7.53m²,
Ventilation rate:	4.00
Blinds/curtains:	shutter closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	1.3 W/m²K
External Walls U-value	0.18 W/m²K
External Walls U-value	0.17 W/m²K

Community heating, heat from boilers – mains gas

SAP Input

Property Details: 1-1

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	16 May 2014
Date of certificate:	19 May 2014
Assessment type:	New dwelling design stage
Transaction type:	Marketed sale
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium
Dwelling designed to use less than 125 litres per Person per day:	True

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2014

Floor Location:	Floor area:	Storey height:
Floor 0	87 m²	3.06 m

Living area:	41 m² (fraction 0.471)
Front of dwelling faces:	South

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
W1	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	
W2	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	
W3	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
W1	16mm or more	0.7	0.4	1.3	19.25	1
W2	16mm or more	0.7	0.4	1.3	7.28	1
W3	16mm or more	0.7	0.4	1.3	2.51	3

Name:	Type-Name:	Location:	Orient:	Width:	Height:
W1		External	West	7.67	2.51
W2		External	North	2.9	2.51
W3		External	North	1	2.51

Overshading:	Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External	53.288	34.06	19.23	0.18	0	False	N/A
To corridor	14.006	0	14.01	0.17	0	False	N/A
Internal Elements							
Party Elements							

Thermal bridges:

Thermal bridges:	User-defined y-value y =0.1 Reference: Assumed

Ventilation:

Pressure test:	Yes (As designed)

SAP Input

Ventilation:	Balanced with heat recovery Brand/Model: Greenwood Fusion HRV2 Test efficiency: 93%, SFP: 0.47 Number of wet rooms: Kitchen + 2 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of sides sheltered:	2
Pressure test:	3

Main heating system:

Main heating system:	Community heating schemes Heat source: Community CHP heat from boilers – mains gas, heat fraction 0.6, efficiency 89.8 Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 89 Piping>=1991, pre-insulated, medium temp, variable flow

Main heating Control:

Main heating Control:	Charging system linked to use of community heating, TRVs Control code: 2310

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :heat from boilers – mains gas No hot water cylinder Solar panel: False

Others:

Electricity tariff:	standard tariff
In Smoke Control Area:	Yes
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Dense urban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None
Assess Zero Carbon Home:	No

Regulations Compliance Report

Approved Document L1A 2010 edition assessed by Stroma FSAP 2009 program, Version: 1.5.0.71
Printed on 19 May 2014 at 18:41:23

Project Information:

Assessed By: () **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Site Reference : CLEAN **Plot Reference:** 1-3

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1 TER and DER

Fuel for main heating system: Mains gas (c), Mains gas (c)
Fuel factor: 1.00 (mains gas (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)	18.58 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	9.60 kg/m²	**OK**

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.18 (max. 0.70)	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

3 Air permeability

Air permeability at 50 pascals	3.00	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:	Community heating schemes - mains gas
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, TRVs	**OK**
Hot water controls:	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power:	0.48

Regulations Compliance Report

Maximum	1.5	**OK**
MVHR efficiency:	93%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: East	9.61m²,
Windows facing: South	2.46m²,
Ventilation rate:	4.00
Blinds/curtains:	shutter closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	1.3 W/m²K
External Walls U-value	0.18 W/m²K
External Walls U-value	0.17 W/m²K

Community heating, heat from boilers – mains gas

SAP Input

Property Details: 1-3

Address:
Located in: England
Region: Thames valley
UPRN:
Date of assessment: 16 May 2014
Date of certificate: 19 May 2014
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Dwelling designed to use less than 125 litres per Person per day: True

Property description:

Dwelling type: Flat
Detachment:
Year Completed: 2014

Floor Location:	Floor area:	Storey height:
Floor 0	50 m²	3.06 m

Living area: 28.1 m² (fraction 0.562)
Front of dwelling faces: South

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
W1	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	
W2	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
W1	16mm or more	0.7	0.4	1.3	9.61	1
W2	16mm or more	0.7	0.4	1.3	2.46	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
W1		External	East	3.83	2.51
W2		External	South	0.98	2.51

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External	19.955	12.07	7.89	0.18	0	False	N/A
To corridor	19.955	0	19.95	0.17	0	False	N/A
Internal Elements							
Party Elements							

Thermal bridges:

Thermal bridges: User-defined y-value
y =0.1
Reference: Assumed

Ventilation:

Pressure test: Yes (As designed)
Ventilation: Balanced with heat recovery

SAP Input

	Brand/Model: Greenwood Fusion HRV2 Test efficiency: 93%, SFP: 0.48
	Number of wet rooms: Kitchen + 1
	Ductwork: Insulation, rigid
	Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of sides sheltered:	2
Pressure test:	3

Main heating system:

Main heating system:	Community heating schemes Heat source: Community CHP heat from boilers – mains gas, heat fraction 0.6, efficiency 89.8 Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 89 Piping>=1991, pre-insulated, medium temp, variable flow

Main heating Control:

Main heating Control:	Charging system linked to use of community heating, TRVs Control code: 2310

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :heat from boilers – mains gas No hot water cylinder Solar panel: False

Others:

Electricity tariff:	standard tariff
In Smoke Control Area:	Yes
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Dense urban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None
Assess Zero Carbon Home:	No

Regulations Compliance Report

Approved Document L1A 2010 edition assessed by Stroma FSAP 2009 program, Version: 1.5.0.71
Printed on 19 May 2014 at 18:41:22

Project Information:

Assessed By: () **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Site Reference : CLEAN **Plot Reference:** R1

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1 TER and DER

Fuel for main heating system: Mains gas (c), Mains gas (c)
Fuel factor: 1.00 (mains gas (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)	20.44 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.19 kg/m²	**OK**

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.18 (max. 0.70)	**OK**
Floor	(no floor)		
Roof	0.12 (max. 0.20)	0.12 (max. 0.35)	**OK**
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

3 Air permeability

Air permeability at 50 pascals	3.00	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:	Community heating schemes - mains gas
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, TRVs	**OK**
Hot water controls:	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power:	0.47

Regulations Compliance Report

Maximum	1.5	**OK**
MVHR efficiency:	93%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Medium	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: East	10.62m²,
Windows facing: West	12.4m²,
Windows facing: North	22.82m²,
Ventilation rate:	4.00
Blinds/curtains:	shutter closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	1.3 W/m²K
Roofs U-value	0.12 W/m²K
External Walls U-value	0.18 W/m²K
External Walls U-value	0.17 W/m²K

Community heating, heat from boilers – mains gas

SAP Input

Property Details: R1

Address:
Located in: England
Region: Thames valley
UPRN:
Date of assessment: 16 May 2014
Date of certificate: 19 May 2014
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Dwelling designed to use less than 125 litres per Person per day: True

Property description:

Dwelling type: Flat
Detachment:
Year Completed: 2014

Floor Location:	Floor area:	Storey height:
Floor 0	70 m²	3.06 m

Living area: 34.25 m² (fraction 0.489)
Front of dwelling faces: South

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
W1	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	
W2	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	
W3	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
W1	16mm or more	0.7	0.4	1.3	10.62	1
W2	16mm or more	0.7	0.4	1.3	12.4	1
W3	16mm or more	0.7	0.4	1.3	3.26	7

Name:	Type-Name:	Location:	Orient:	Width:	Height:
W1		External	East	4.23	2.51
W2		External	West	4.94	2.51
W3		External	North	1.3	2.51

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External	62.123	45.84	16.28	0.18	0	False	N/A
To corridor	18.449	0	18.45	0.17	0	False	N/A
Roof	70	0	70	0.12	0		N/A
Internal Elements							
Party Elements							

Thermal bridges:

Thermal bridges: User-defined y-value
y =0.1
Reference: Assumed

SAP Input

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Brand/Model: Greenwood Fusion HRV2 Test efficiency: 93%, SFP: 0.47 Number of wet rooms: Kitchen + 2 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of sides sheltered:	1
Pressure test:	3

Main heating system:

Main heating system:	Community heating schemes Heat source: Community CHP heat from boilers – mains gas, heat fraction 0.6, efficiency 89.8 Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 89 Piping>=1991, pre-insulated, medium temp, variable flow

Main heating Control:

Main heating Control:	Charging system linked to use of community heating, TRVs Control code: 2310

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :heat from boilers – mains gas No hot water cylinder Solar panel: False

Others:

Electricity tariff:	standard tariff
In Smoke Control Area:	Yes
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Dense urban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None
Assess Zero Carbon Home:	No

Regulations Compliance Report

Approved Document L1A 2010 edition assessed by Stroma FSAP 2009 program, Version: 1.5.0.71
Printed on 19 May 2014 at 18:41:22

Project Information:

Assessed By: () **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Site Reference : CLEAN **Plot Reference:** R6

Address :

Client Details:

Name:

Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1 TER and DER

Fuel for main heating system: Mains gas (c), Mains gas (c)
Fuel factor: 1.00 (mains gas (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER)	20.28 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.44 kg/m²	**OK**

2 Fabric U-values

Element	Average	Highest	
External wall	0.17 (max. 0.30)	0.18 (max. 0.70)	**OK**
Floor	(no floor)		
Roof	0.12 (max. 0.20)	0.12 (max. 0.35)	**OK**
Openings	1.30 (max. 2.00)	1.30 (max. 3.30)	**OK**

3 Air permeability

Air permeability at 50 pascals	3.00	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:	Community heating schemes - mains gas
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, TRVs	**OK**
Hot water controls:	No cylinder	

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power:	0.47

Regulations Compliance Report

Maximum	1.5	**OK**
MVHR efficiency:	93%	
Minimum	70%	**OK**

9 Summertime temperature

Overheating risk (Thames valley):	Slight	**OK**

Based on:

Overshading:	Average or unknown
Windows facing: West	26.08m²,
Ventilation rate:	4.00
Blinds/curtains:	shutter closed 100% of daylight hours

10 Key features

Air permeablility	3.0 m³/m²h
Windows U-value	1.3 W/m²K
Roofs U-value	0.12 W/m²K
External Walls U-value	0.18 W/m²K
External Walls U-value	0.17 W/m²K

Community heating, heat from boilers – mains gas

SAP Input

Property Details: R6

Address:	
Located in:	England
Region:	Thames valley
UPRN:	
Date of assessment:	16 May 2014
Date of certificate:	19 May 2014
Assessment type:	New dwelling design stage
Transaction type:	Marketed sale
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Indicative Value Medium

Dwelling designed to use less than 125 litres per Person per day: True

Property description:

Dwelling type:	Flat
Detachment:	
Year Completed:	2014

Floor Location:	Floor area:	Storey height:
Floor 0	70 m²	3.06 m

Living area:	38.76 m² (fraction 0.554)
Front of dwelling faces:	South

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
W1	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
W1	16mm or more	0.7	0.4	1.3	3.26	8

Name:	Type-Name:	Location:	Orient:	Width:	Height:
W1		External	West	1.3	2.51

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External	32.63	26.08	6.55	0.18	0	False	N/A
To corridor	42.62	0	42.62	0.17	0	False	N/A
Roof	70	0	70	0.12	0		N/A
Internal Elements							
Party Elements							

Thermal bridges:

Thermal bridges: User-defined y-value
y =0.1
Reference: Assumed

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery Brand/Model: Greenwood Fusion HRV2 Test efficiency: 93%, SFP: 0.47 Number of wet rooms: Kitchen + 2 Ductwork: Insulation, rigid Approved Installation Scheme: True
Number of chimneys:	0

SAP Input

Number of open flues:	0
Number of fans:	0
Number of sides sheltered:	3
Pressure test:	3

Main heating system:

Main heating system:	Community heating schemes Heat source: Community CHP heat from boilers – mains gas, heat fraction 0.6, efficiency 89.8 Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 89 Piping>=1991, pre-insulated, medium temp, variable flow

Main heating Control:

Main heating Control:	Charging system linked to use of community heating, TRVs Control code: 2310

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :heat from boilers – mains gas No hot water cylinder Solar panel: False

Others:

Electricity tariff:	standard tariff
In Smoke Control Area:	Yes
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Dense urban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None
Assess Zero Carbon Home:	No

The table below summarises the results from the SAP sample dwellings.

Ref	DER	TER	% Improvement	TFA (m2)
1-1	9.42	15.86	40.61	87
1-2	9.95	16.95	41.3	95
1-3	9.6	18.58	48.33	50
1-6	9.6	18.58	48.33	50
1-8	9.56	16.66	42.62	71
1-9	9.71	18.04	46.18	50
1-10	10.42	19.56	46.73	74
1-13	9.89	16.64	40.56	70
1-14	11.05	21.69	49.05	50
1-15	8.7	15.57	44.12	87
	9.74	**17.52**	**44.17**	**72.49**
R1	13.72	20.44	32.88	70
R2	11.67	20.32	42.57	70
R3	10.35	17.66	41.39	70
R4	12.02	20.25	40.64	70
R5	11.91	19.16	37.84	90
R6	11.84	20.28	41.62	70
R7	9.82	16.59	40.81	90
R8	11.36	19.59	42.01	70
	11.54	**19.19**	**39.93**	**76.00**

APPENDIX D

OFFICES (B1) – SBEM RESULTS

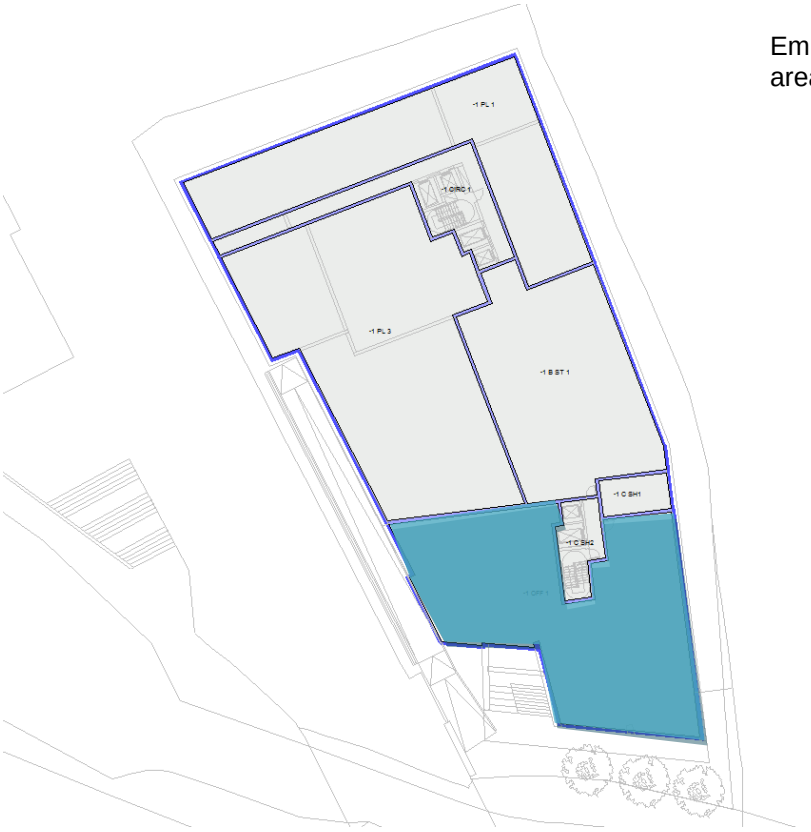
Reference Drawings

The drawings listed in the table below, issued by Glen Howells, the architects, were used to develop the SBEM models.

	Architect's Drawing Reference
Plans	1985-A-L-100 (Rev B)
	1985-A-L-103 (Rev B)
	1985-A-L-104 (Rev B)
	1985-A-L-105 (Rev B)
	1985-A-L-106 (Rev B)
	1985-A-L-107 (Rev B)
	1985-A-L-108 (Rev B)
	1985-A-L-111 (Rev B)
	1985-A-L-112 (Rev B)
	1985-A-L-113 (Rev B)
	1985-A-L-114 (Rev B)

Employment areas

Lower Ground floor



Ground floor

BRUKL Output Document

HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name

102 Camley Street - Lean Model

As designed

Date: Tue Jun 24 09:51:21 2014

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v4.1.e.5

Interface to calculation engine: Design Database

Interface to calculation engine version: v25.05

BRUKL compliance check version: v4.1.e.5

Owner Details

Name: Information not provided by the user

Telephone number: Information not provided by the user

Address: Information not provided by the user, Information not provided by the user, Information not provided by the user

Certifier details

Name: Rolfe Jackson

Telephone number: 02077867900

Address: 120 Old Broad Street, London, EC2N1AR

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

1.1	CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	27.4
1.2	Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	27.4
1.3	Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	25.8
1.4	Are emissions from the building less than or equal to the target?	BER =< TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.32	0.35	00 OFF 1 Wall 1
Floor	0.25	0.25	0.25	-1 C SH1 Exposed Floor 1
Roof	0.25	0.15	0.15	-1 C SH1 Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	2.17	2.2	00 OFF 1 Window 1 (1)
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Office space

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
0.9	3	1.2	0.85
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

1- Default DHW

Heating seasonal efficiency	**Hot water storage loss factor [kWh/litre per day]**
Hot water provided by HVAC system	-

"No zones in project where local mechanical ventilation or exhaust is applicable"

General lighting and display lighting

Zone	**General lighting [W]**	**Display lamps efficacy [lm/W]**
-1 C SH1	60	-
-1 C SH2	90	-
-1 OFF 1	2130	-
00 OFF 1	990	-
00 OFF 2	1480	-
00 OFF 3	1020	-
M OFF 1	1000	-
M OFF 2	1490	-
M OFF 3	1030	-

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	**Solar gain limit exceeded? (%)**	**Internal blinds used?**
-1 C SH1	N/A	N/A
-1 C SH2	N/A	N/A
-1 OFF 1	N/A	N/A
00 OFF 1	NO (-26.3%)	NO
00 OFF 2	NO (-30.4%)	NO
00 OFF 3	NO (-32.3%)	NO
M OFF 1	NO (-26.3%)	NO
M OFF 2	NO (-30.4%)	NO
M OFF 3	NO (-32.3%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	1607.5	1607.5
External area [m^2]	1875.6	1875.6
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	5
Average conductance [W/K]	1207.63	1057.21
Average U-value [W/m^2K]	0.64	0.56
Alpha value* [%]	15	14.93

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others - Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	14.25	11
Cooling	10.99	9.48
Auxiliary	16.11	21.68
Lighting	16.13	17.59
Hot water	3.32	3.4
Equipment*	42.56	42.56
TOTAL**	**60.8**	**63.14**

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m^2]	163.61	154.18
Primary energy* [kWh/m^2]	144.15	153.46
Total emissions [kg/m^2]	25.8	27.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	41.6	122	14.3	11	16.1	0.81	3.08	0.9	3.75
	Notional	31.4	122.8	11	9.5	21.7	0.79 / 0.81	3.6	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.25	-1 C SH1 Wall 1
Floor	0.2	0.25	-1 C SH1 Exposed Floor 1
Roof	0.15	0.15	-1 C SH1 Exposed Roof 1
Windows, roof windows, and rooflights	1.5	1.5	00 OFF 1 Door 1
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
$m^3/(h.m^2)$ at 50 Pa	5	5

Thermal bridges

There is at least one junction in the project whose linear thermal transmittance has been defined as having been calculated following a quality-assured accredited construction details approach in accordance with a scheme approved by the Secretary of State.

BRUKL Output Document

HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name

102 Camley Street - Clean Model

As designed

Date: Tue Jun 24 09:53:57 2014

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v4.1.e.5

Interface to calculation engine: Design Database

Interface to calculation engine version: v25.05

BRUKL compliance check version: v4.1.e.5

Owner Details

Name: Information not provided by the user

Telephone number: Information not provided by the user

Address: Information not provided by the user, Information not provided by the user, Information not provided by the user

Certifier details

Name: Rolfe Jackson

Telephone number: 02077867900

Address: 120 Old Broad Street, London, EC2N1AR

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

1.1	CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	27.4
1.2	Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	27.4
1.3	Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	21.7
1.4	Are emissions from the building less than or equal to the target?	BER =< TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.32	0.35	00 OFF 1 Wall 1
Floor	0.25	0.25	0.25	-1 C SH1 Exposed Floor 1
Roof	0.25	0.15	0.15	-1 C SH1 Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	2.17	2.2	00 OFF 1 Window 1 (1)
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Office space

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
0.9	3	1.2	0.85
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

1- Default DHW

Heating seasonal efficiency	**Hot water storage loss factor [kWh/litre per day]**
Hot water provided by HVAC system	-

"No zones in project where local mechanical ventilation or exhaust is applicable"

General lighting and display lighting

Zone	**General lighting [W]**	**Display lamps efficacy [lm/W]**
-1 C SH1	60	-
-1 C SH2	90	-
-1 OFF 1	2130	-
00 OFF 1	990	-
00 OFF 2	1480	-
00 OFF 3	1020	-
M OFF 1	1000	-
M OFF 2	1490	-
M OFF 3	1030	-

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	**Solar gain limit exceeded? (%)**	**Internal blinds used?**
-1 C SH1	N/A	N/A
-1 C SH2	N/A	N/A
-1 OFF 1	N/A	N/A
00 OFF 1	NO (-26.3%)	NO
00 OFF 2	NO (-30.4%)	NO
00 OFF 3	NO (-32.3%)	NO
M OFF 1	NO (-26.3%)	NO
M OFF 2	NO (-30.4%)	NO
M OFF 3	NO (-32.3%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	1607.5	1607.5
External area [m^2]	1875.6	1875.6
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	5
Average conductance [W/K]	1207.63	1057.21
Average U-value [W/m^2K]	0.64	0.56
Alpha value* [%]	15	14.93

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others - Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	17.4	11
Cooling	11.78	9.48
Auxiliary	10.33	21.68
Lighting	16.13	17.59
Hot water	4.26	3.4
Equipment*	42.56	42.56
TOTAL**	**55.35**	**63.14**

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	4.56	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m^2]	159.85	154.18
Primary energy* [kWh/m^2]	120.46	153.46
Total emissions [kg/m^2]	21.7	27.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Chilled ceilings or passive chilled beams and displacement ventilation, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Elect										
	Actual	20.4	119.1	7	11.8	10.3	0.8	2.81	0.9	3
	Notional	31.4	122.8	11	9.5	21.7	0.79 / 0.81	3.6	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.25	-1 C SH1 Wall 1
Floor	0.2	0.25	-1 C SH1 Exposed Floor 1
Roof	0.15	0.15	-1 C SH1 Exposed Roof 1
Windows, roof windows, and rooflights	1.5	1.5	00 OFF 1 Door 1
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
$m^3/(h.m^2)$ at 50 Pa	5	5

Thermal bridges

There is at least one junction in the project whose linear thermal transmittance has been defined as having been calculated following a quality-assured accredited construction details approach in accordance with a scheme approved by the Secretary of State.

BRUKL Output Document

HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name

102 Camley Street - Green Model

As designed

Date: Tue Jun 24 09:56:11 2014

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v4.1.e.5

Interface to calculation engine: Design Database

Interface to calculation engine version: v25.05

BRUKL compliance check version: v4.1.e.5

Owner Details

Name: Information not provided by the user

Telephone number: Information not provided by the user

Address: Information not provided by the user, Information not provided by the user, Information not provided by the user

Certifier details

Name: Rolfe Jackson

Telephone number: 02077867900

Address: 120 Old Broad Street, London, EC2N1AR

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

1.1	CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	27.4
1.2	Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	27.4
1.3	Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	19.3
1.4	Are emissions from the building less than or equal to the target?	BER =< TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.32	0.35	00 OFF 1 Wall 1
Floor	0.25	0.25	0.25	-1 C SH1 Exposed Floor 1
Roof	0.25	0.15	0.15	-1 C SH1 Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	2.17	2.2	00 OFF 1 Window 1 (1)
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Office space

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
0.9	3	1.2	0.85
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			YES

1- Default DHW

Heating seasonal efficiency	**Hot water storage loss factor [kWh/litre per day]**
Hot water provided by HVAC system	-

"No zones in project where local mechanical ventilation or exhaust is applicable"

General lighting and display lighting

Zone	**General lighting [W]**	**Display lamps efficacy [lm/W]**
-1 C SH1	60	-
-1 C SH2	90	-
-1 OFF 1	2130	-
00 OFF 1	990	-
00 OFF 2	1480	-
00 OFF 3	1020	-
M OFF 1	1000	-
M OFF 2	1490	-
M OFF 3	1030	-

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	**Solar gain limit exceeded? (%)**	**Internal blinds used?**
-1 C SH1	N/A	N/A
-1 C SH2	N/A	N/A
-1 OFF 1	N/A	N/A
00 OFF 1	NO (-26.3%)	NO
00 OFF 2	NO (-30.4%)	NO
00 OFF 3	NO (-32.3%)	NO
M OFF 1	NO (-26.3%)	NO
M OFF 2	NO (-30.4%)	NO
M OFF 3	NO (-32.3%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	1607.5	1607.5
External area [m^2]	1872.2	1872.2
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	5
Average conductance [W/K]	1206.44	1054.23
Average U-value [W/m^2K]	0.64	0.56
Alpha value* [%]	15.01	14.97

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others - Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	18.04	10.97
Cooling	11.79	9.47
Auxiliary	10.33	21.65
Lighting	16.13	17.59
Hot water	4.45	3.4
Equipment*	42.56	42.56
TOTAL**	**55.28**	**63.08**

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	3.87	0
Wind turbines	0	0
CHP generators	5.47	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m^2]	159.88	154.06
Primary energy* [kWh/m^2]	118.68	153.35
Total emissions [kg/m^2]	19.3	27.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Chilled ceilings or passive chilled beams and displacement ventilation, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Elect										
	Actual	16.3	119.2	5.6	11.8	10.3	0.8	2.81	0.9	3
	Notional	31.3	122.8	11	9.5	21.7	0.79 / 0.81	3.6	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.25	-1 C SH1 Wall 1
Floor	0.2	0.25	-1 C SH1 Exposed Floor 1
Roof	0.15	0.15	-1 C SH1 Exposed Roof 1
Windows, roof windows, and rooflights	1.5	1.5	00 OFF 1 Door 1
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
$m^3/(h.m^2)$ at 50 Pa	5	5

Thermal bridges

There is at least one junction in the project whose linear thermal transmittance has been defined as having been calculated following a quality-assured accredited construction details approach in accordance with a scheme approved by the Secretary of State.

APPENDIX E

LETTER FROM KINGS CROSS DISTRICT HEATING NETWORK

metropolitan

Energy House
Woolpit Business Park
Woolpit
Bury St Edmunds
Suffolk, IP30 9UP
Tel: 0845 055 6194
www.met-i.co.uk

Mr Tim Pegg
McBains Cooper
120 Old Broad Street
London
EC2N 1AR

2nd April 2014

Dear Tim

Many thanks for your enquiry. The ESCo at King's Cross is known as MKC and operated by Metropolitan. I represent both companies and I have discussed your request with my colleagues at MKC.

The installation of a heat network is quite expensive and it can be a challenge for relatively small sites to justify this investment. We have looked as requests for similar potential connections at developments close to your site. Whilst this is near to the King's Cross site, the heat network would need to be extended along the canal path. This would need permission from British Waterways but the path already has large electricity cables running along it. Unfortunately this means it is not viable to install a heat network along so a connection is not viable.

I am sorry I cannot help on this occasion, but again many thanks for your enquiry.

Yours sincerely

John Marsh
Operations Director
Metropolitan

McBAINS COOPER
JOB REF: DIRECTOR:
RECEIVED
03 APR 2014
PASSED TO | ACTION | CLEARED | FILE

APPENDIX F

CORRESPONDANCE WITH LB CAMDEN REGARDING PHOENIX COURT DISTRICT HEATING NETWORK

From: Tim Pegg
Sent: 18 August 2014 15:46
To: 'Garner, Harold'
Cc: 'Belk, Jennifer'; Anthony Coumidis; Marietta Vafea
Subject: RE: Phoenix Court + Euston Road local district heating network

Harold,

I am writing further to your previous email dated 23rd June 2014 where you stated that the Camley development was probably too far away to be connected to the Phoenix Court heating scheme. My subsequent email (later on 23rd June 2014) included a map of the exact location of the Camley development and my understanding is that this confirmed your assertion that the Camley development was indeed too far away. Therefore, we will include for connection to future, heating networks that are in closer proximity but not investigate a connection to Phoenix Court. It is our estimation that connection to an adjacent scheme would have far less heat losses and pump energy than for a system connecting to Phoenix Court.

Kind regards,
Tim

TIM PEGG
Sustainability and Environmental Initiatives

McBains Cooper
120 Old Broad Street, London, EC2N 1AR

From: Tim Pegg
Sent: 23 June 2014 15:21
To: 'Garner, Harold'
Cc: Belk, Jennifer; Anthony Coumidis; Marietta Vafea
Subject: RE: Phoenix Court + Euston Road local district heating network

Harold,

Many thanks for your reply. The development will be located at 102 Camley Street, as shown on the attached image.

Kind regards,
Tim

TIM PEGG
Sustainability and Environmental Initiatives

McBains Cooper
120 Old Broad Street, London, EC2N 1AR

From: Garner, Harold [mailto:Harold.Garner@Camden.gov.uk]
Sent: 23 June 2014 14:00
To: Tim Pegg
Cc: Belk, Jennifer
Subject: RE: Phoenix Court + Euston Road local district heating network

Tim

The Phoenix Court scheme is probably too far away from your development, but please could you confirm the precise location on Camley Street.

Regards

Harold

Harold Garner
Sustainability manager (technical projects)

Telephone: 0207 974 2701

From: Tim Pegg
Sent: 18 June 2014 15:53
To: Belk, Jennifer; Garner, Harold
Cc: Anthony Coumidis; Marietta Vafea; 'Espino, Susana'
Subject: RE: Phoenix Court + Euston Road local district heating network

Jennifer, Harold,

I am working on a residential scheme located just north of St Pancras station in London and wondered if you might be able to help with an urgent query regarding the Euston Road district heating scheme.

The GLA have asked us to investigate local heat networks, and whilst we have had feedback from the Kings Cross system, we also need confirmation from yourselves at LB Camden that the Phoenix Court/Euston Road district network (as detailed in the link below) would not have the capacity , and would be located too far from our site at Camley Street to provide heating to our development (approx. 150 residential units).

> *"Phase 3 – Camden Council intends* ***to extend the network to connect to Council regeneration planned for the wider Somers Town area over the next 4-5 years."***
> http://www.energyforlondon.org/euston-road-energy-centre-and-district-heating-network/

Thanking you in advance,

Kind regards,
Tim
TIM PEGG
Sustainability and Environmental Initiatives

From: Espino, Susana [mailto:Susana.Espino@camden.gov.uk]
Sent: 27 May 2014 15:58
To: Belk, Jennifer; Garner, Harold
Cc: Anthony Coumidis; Marietta Vafea; Tim Pegg
Subject: RE: Phoenix Court + Euston Road local district heating network

Jen/ Harold

Can you assist Tim with his query below

Thanks

Susana

Susana Espino
Sustainability Officer

Telephone: 020 7974 6563

From: Tim Pegg [mailto:t.pegg@mcbainscooper.com]
Sent: 27 May 2014 14:12
To: Espino, Susana
Cc: Anthony Coumidis; Marietta Vafea
Subject: Phoenix Court + Euston Road local district heating network

Susana,

I am working on a residential scheme located just north of St Pancras station in London and wondered if you might be able to help with an urgent query regarding the Euston Road district heating scheme.

The GLA have asked us to investigate local heat networks, and whilst we have had feedback from the Kings Cross system, we also need confirmation from yourselves at LB Camden that the Phoenix Court/Euston Road district network (as detailed in the link below) would not have the capacity , and would be located too far from our site at Camley Street to provide heating to our development (approx. 150 residential units).

> *"Phase 3 – Camden Council intends* ***to extend the network to connect to Council regeneration planned for the wider Somers Town area over the next 4-5 years."***
> http://www.energyforlondon.org/euston-road-energy-centre-and-district-heating-network/

Thanking you in advance,

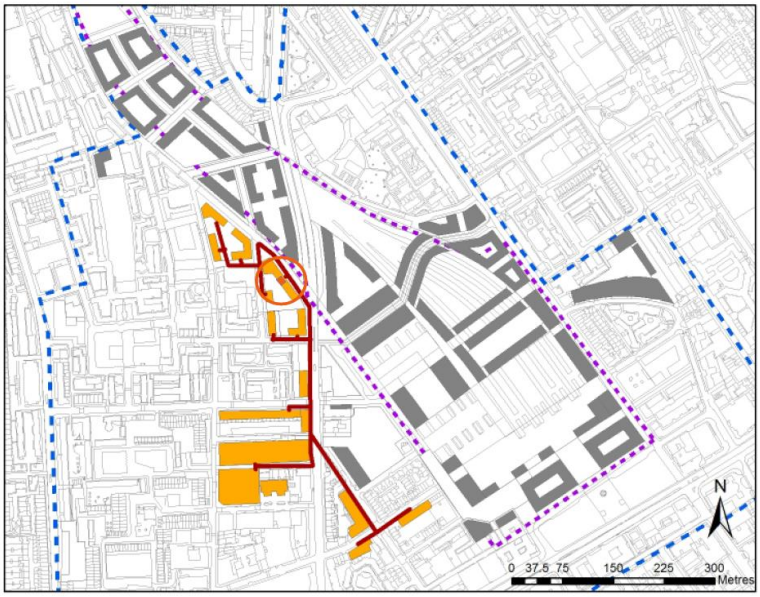
Kind regards,
Tim
TIM PEGG
Sustainability and Environmental Initiatives

APPENDIX G
EUSTON ENERGY NETWORK PROPOSALS

The Euston Road district heating network proposals confirm their focus on the western side of Euston Station. The GLA's formal response to the pre application meeting held on 20th May 2014 noted that GLA officers accept that direct connection of this network to 102 Camley Street is unlikely and should not be investigated further.

Network Phasing: Option 1 – Phase 1 (2022 to 2029)

The image below indicates the possible extents of a first Phase of network build-out, connecting to a combination of existing and nearby new buildings.



Phase 1

- An initial network has been assessed to link existing buildings to nearby new buildings within the Regent's Park Cluster, comprising a total of 15 buildings.
- Network layout and feasibility heavily dependent upon build-out timings for these buildings.
- Temporary location for heat generation plant suggested in or around the new 'RE4' building within the Regent's Park Cluster, as indicated.
- Length of pipework installed during Phase 1:
  - 2,000 m
- Heat supplied by network at end of Phase 1:
  - 6,800 MWhr/yr

Legend

Buildings
- Other identified buildings

Network Options
- Phase 1 Heatloads
- Potential location for temporary energy centre
- Phase 1 Pipework
- Area Action Plan Boundary
- Euston Station, tracks and cutting

ARUP

Euston Area Energy Masterplan Report
December 2013

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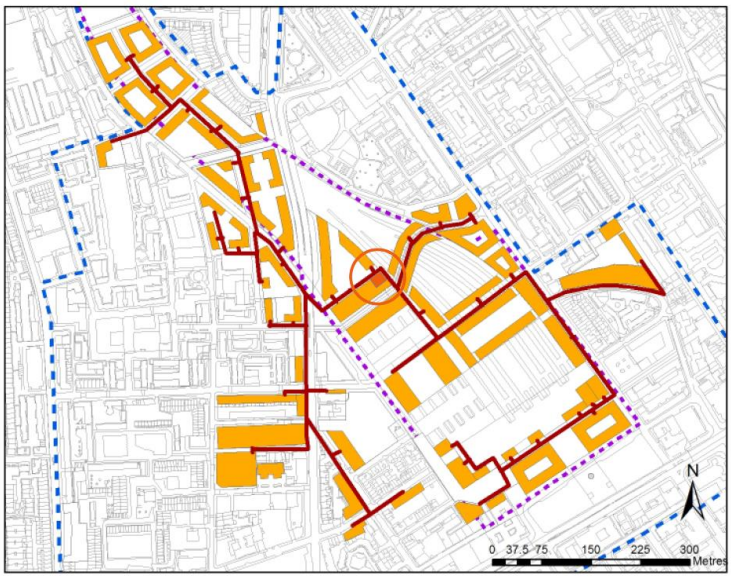
Network Phasing: Option 1 – Phase 2 (from 2029)

Following the completion of Phase 2, all selected buildings would be connected to the DH network.



Phase 2

- Full network to be built out to connect to all selected buildings.
- CHP and supporting plant to sit within a final Energy Centre, with a suggested location in or around building 'ES21' within the Euston Station Cluster, as indicated.
- Energy Centre location selected on the basis of its relatively central position within the wider scheme, plus the relative density of adjacent heat loads.
- Location also acknowledges intended height of this building, in order to facilitate related requirement to run plant flues.
- Length of pipework installed during this phase:
  - 5,400 m
- Total pipework installed for Option 1
  - 7,400 m
- Heat supplied by network at end of phase
  - 33,100 MWhr/yr

Legend

- Proposed Network
- Area Action Plan Boundary
- Euston Station, tracks and cutting

Buildings
- Connected Heatloads
- Potential Energy Centre Location

ARUP

Euston Area Energy Masterplan Report
December 2013

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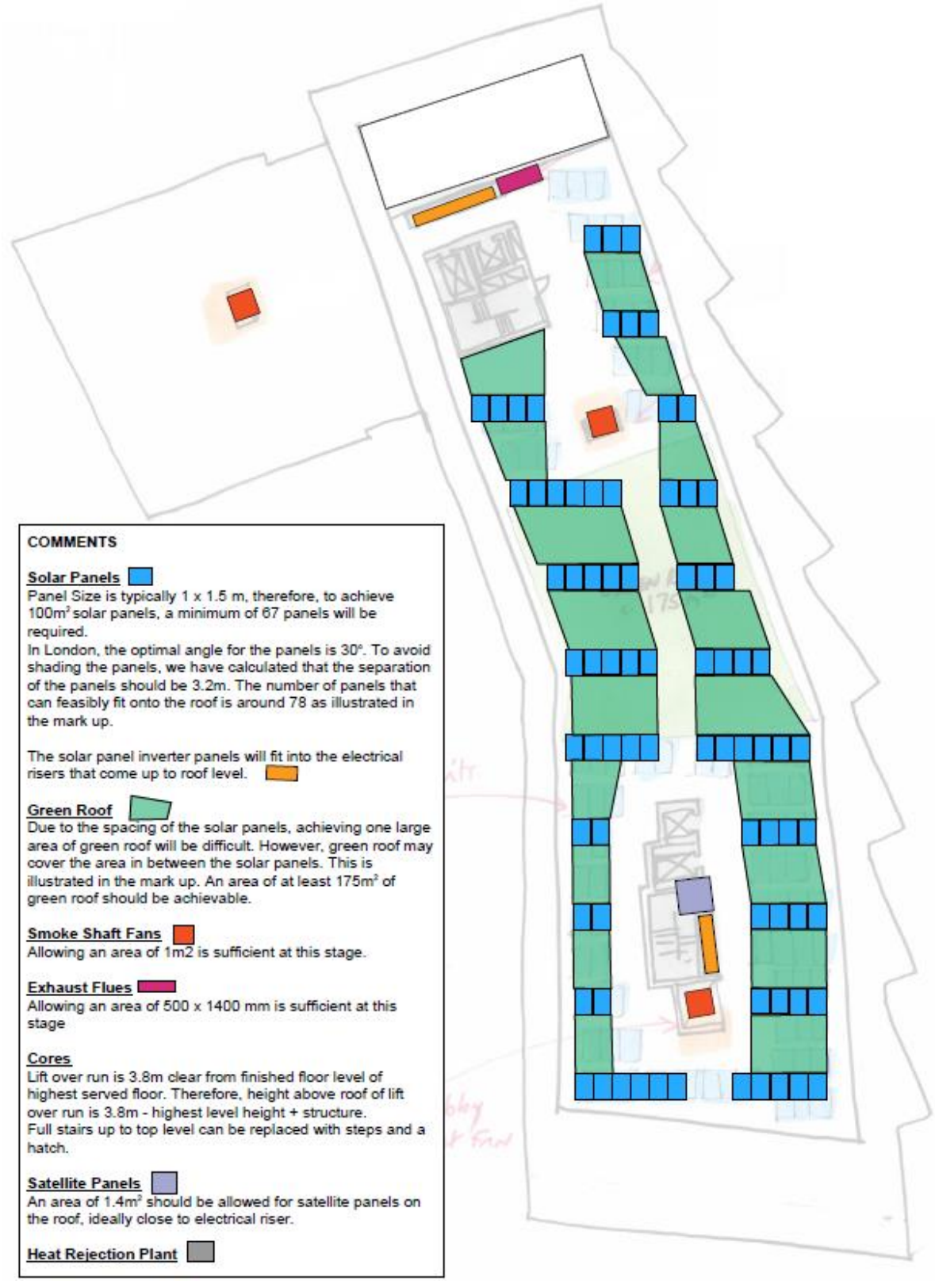
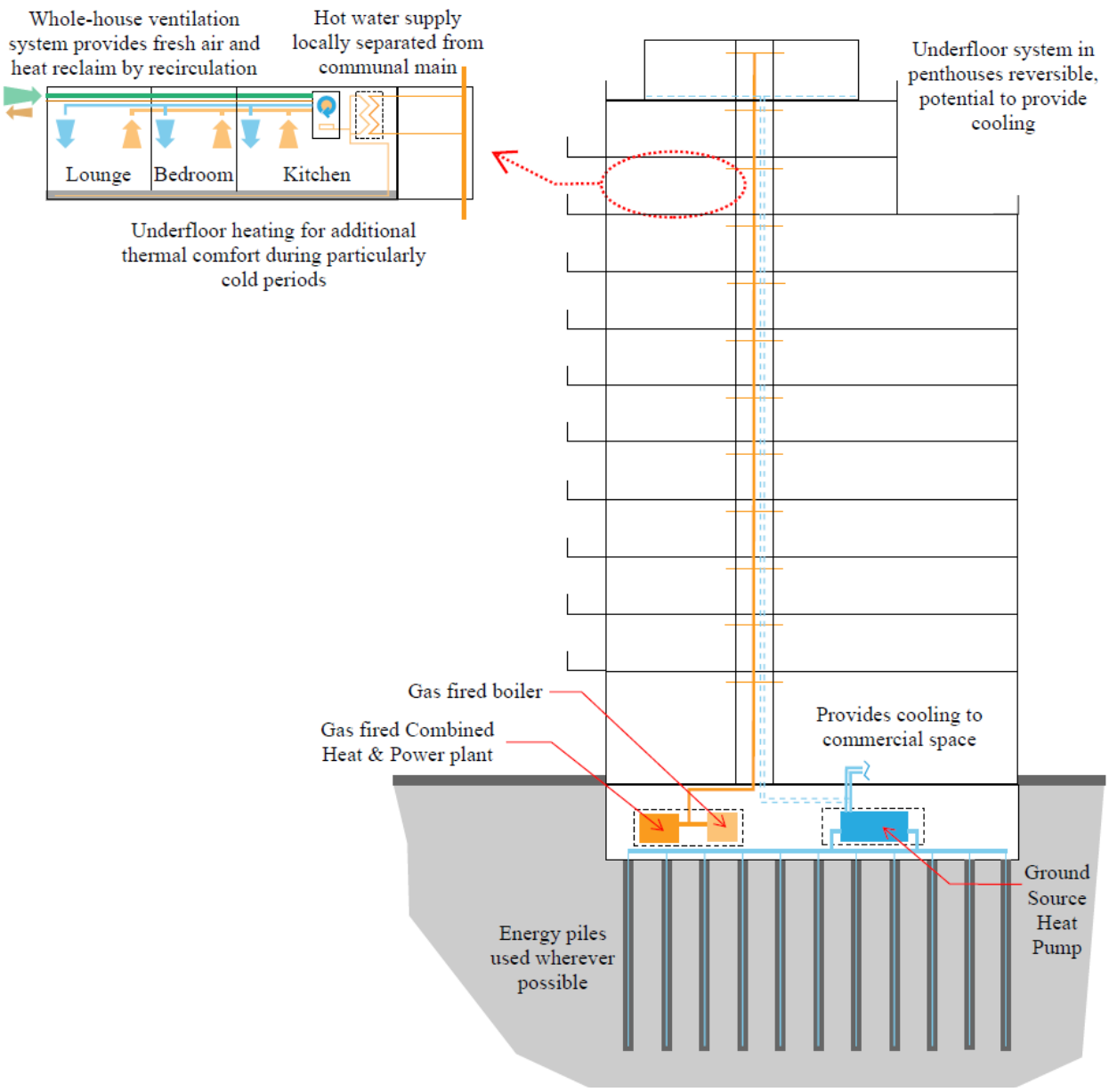
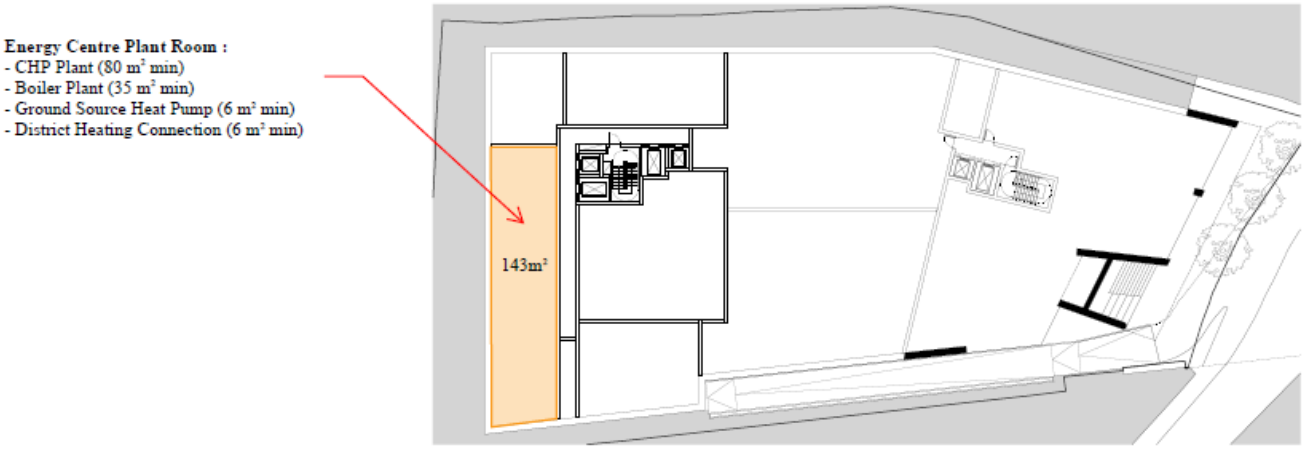
APPENDIX H
INDICATIVE ROOF PLAN

An indicative roof layout is shown below.



APPENDIX I
PROPOSED ENERGY CENTRE LAYOUT


Whole-house ventilation system provides fresh air and heat reclaim by recirculation
Hot water supply locally separated from communal main
Lounge
Bedroom
Kitchen
Underfloor heating for additional thermal comfort during particularly cold periods
Underfloor system in penthouses reversible, potential to provide cooling
Gas fired boiler
Gas fired Combined Heat & Power plant
Provides cooling to commercial space
Ground Source Heat Pump
Energy piles used wherever possible


Energy Centre Plant Room :
- CHP Plant (80 m² min)
- Boiler Plant (35 m² min)
- Ground Source Heat Pump (6 m² min)
- District Heating Connection (6 m² min)
143m²