NEW CITY COURT

Energy Statement
CHAPMAN BDSP

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Contents

1 Executive Summary

This Energy Statement has been prepared by chapmanbdsp to support the planning application for New City Court.

The proposed design consists of a comprehensive redevelopment of the site to include demolition of existing 1980s office buildings and erection of a 37-storey building (including ground and mezzanine) of a maximum height of 144m (AOD), restoration and refurbishment of existing listed terrace, and redevelopment of Keats House with retention of existing façade to provide a total of 46,374 sqm of Class B1 office floorspace, 765 sqm of Class A1 retail floorspace, 1,139 sqm of Class A3 retail floorspace, 615 sqm of leisure floorspace (Class D2), 719 sqm hub space (Class B1/D2) and a 825 sqm elevated public garden, associated public realm and highways improvements, new station entrance, cycling parking, car parking, servicing, refuse and plant areas, and all ancillary or associated works .

The overriding objective in the formulation of the Energy Assessment has been to maximise the viable reductions in total carbon dioxide emissions of the New City Court project within the framework of the London Plan energy hierarchy. The environmental and building services design strategy aims to first minimise the energy demand through passive design and the selection of efficient building systems and controls. Subsequently the energy strategy assesses applicable low and zero carbon systems.

The report has been developed with reference to the following guidance documents:

- National Planning Policy Framework (2018);
- London Plan (2016);
- Greater London Authority (GLA) guidance on preparing energy assessments (2016).

As guided by Building Control, the Tower and Keats House are assessed under Part L2A of the building regulations, while the Georgian Terrace is assessed under Part L2B.

The energy assessment was undertaken in two parts:

- The new-build portion of the proposed design; the section that falls under Part L2A;
- The refurbished portion of the proposed design; the section that falls under Part L2B.

Following the London Plan Energy Hierarchy;

- The project was first assessed considering the building fabric and energy efficiency measures; 'Be Lean' case;
- The use of Combined Heat and Power (CHP) and connection to an existing district heating system have not been considered viable for the scheme, due to the lack of a heating base load (not having a residential component) and the fact that there is no district heating network in the area. However, the development will be made 'connection ready' for the possibility of connecting to a future district heating network when this becomes available; 'Be Clean' case;
- Finally, the benefits and applicability of different renewable technologies have been reviewed with regards to the scheme and a photovoltaics and air source heat pump (considered as renewable in heating mode) has been specified for the development; 'Be Green' case.

The whole development reduction in carbon emissions for the three stages of the energy hierarchy are:

- 'Be Lean': 37.1 % CO2 emissions reduction;
- 'Be Green': 3.7 % CO2 emissions reduction;
- Total Cumulative CO2 emissions reduction: 40.7%.

A reduction in carbon emissions of 37.1 % is registered when the proposed design is compared to the baseline building, considering only the systems efficiency ('Be Lean' case). The proposed design indicates a 40.7% reduction in carbon emissions when considering both 'Be Lean' and the 'Be Green' case, meeting the London Plan requirement of 35% reduction in CO_2 emissions.

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Existing Building/ Notional Building Part L2A	897.2	1421.8
After Energy Demand Reduction (Be Lean)	564.7	1298.8
After CHP (Be Clean)	564.7	1298.8
After Renewable Energy (Be Green)	531.8	1298.8

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

Case	Regulated CO_2 savings	
	Tonnes CO_2 per annum	%
After Energy Demand Reduction (Be Lean)	332.5	37.1%
After CHP (Be Clean)	0.0	0.0%
After Renewable Energy (Be Green)	32.9	3.7%
Total Cumulative Savings	**365.4**	**40.7%**

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

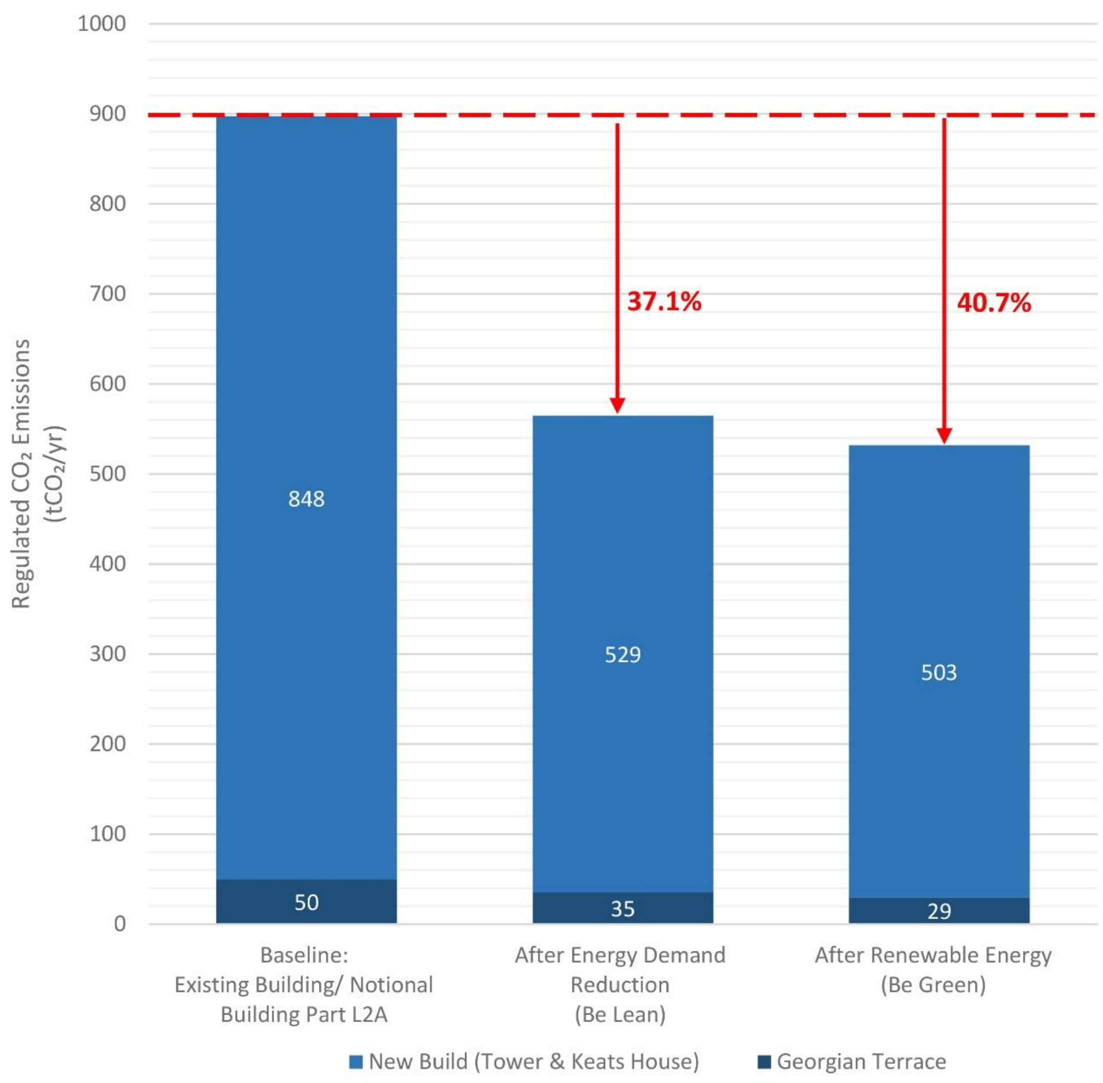


Figure 1-1 The Energy Hierarchy for the proposed development.

2 Introduction

This Energy Statement (Assessment) has been prepared by chapmanbdsp to support the Planning Application for New City Court

The main aim of the Energy Statement has been to reduce the total carbon dioxide emissions within the framework of the London Plan energy hierarchy.

Following the London Plan Energy Hierarchy, the project was first assessed considering the building fabric and energy efficiency measures; ‘Be Lean’ case. The use of Combined Heat and Power (CHP) and connection to an existing district heating system have not been considered viable for the scheme for reasons given in chapter five. However, as indicated in chapter five, the project will be constructed ‘connection ready’ for the possibility to connect to a future district heating network when and if this becomes available; ‘Be Clean’ case. Finally, the benefits of different renewable technologies have been assessed with regards to the scheme and a photovoltaics and efficient air source heat pump has been specified for the development; ‘Be Green’ case.

For the purposes of quantifying the co_2 emissions reduction, the proposed design has been assessed through part L compliance standard methodologies. The modelling was conducted using approved dynamic thermal modelling software; EDSL Tas version 9.4.2 and assessed through the part L compliance SBEM module of the same software.

2.1 Proposed Development Description

<table>
<tr><th>Floor</th><th>Area (GIA, m^2)</th><th>Area (GIA, m^2)</th></tr>
<tr><td>Main Building
(Tower)</td><td>52,192</td><td rowspan="2">52,801
(Part L2A)</td></tr>
<tr><td>Keats House</td><td>609</td></tr>
<tr><td>Georgian Terrace</td><td>1,700</td><td>1,700
(Part L2B)</td></tr>
</table>

Table 3 Proposed development area schedule.

3 Establishing CO_2 Emissions – Baseline

This section presents the baseline CO2 emissions which will are used to assess the CO_2 savings achieved by the proposed design. The following methodology was applied in order to calculate the CO_2 emissions reduction baseline:

- For the floors that are being refurbished (Georgian Terrace), the Baseline consists of the CO_2 emissions of the existing building;
- For the new part of the proposed design (Tower and Keats House), the Baseline is the 'Notional Building' according to Part L2A 2013 of the Building Regulations;
- The baseline for the 'whole building' carbon emissions reduction assessment will be the combination of these two baselines; (1) and (2).

The scheme aims to reduce the unregulated energy consumption as sensibly as possible. Appendix 1 includes further details on the estimated unregulated carbon emissions, also considering emissions reduction measures. The assessment includes lifts, equipment and external lighting.

3.1 New-Build Part - CO_2 Emissions: Baseline

Table 4 indicates the areas assessed under Part L2A of the Building Regulations.

Floor	Area (GIA, m^2)
Tower and Keats House	52,801

Table 4 Areas assessed under Part L2A as 'New Build' including ancillary spaces as toilets, stairs and plant room space.

The Part L2A baseline building carbon emissions are shown in Table 5.

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Notional Building Part L2A	847.6	1406.8
After Energy Demand Reduction (Be Lean)		
After CHP (Be Clean)		
After Renewable Energy (Be Green)		

Table 5 New-built part CO_2 base emissions.

3.2 Refurbishment Part - CO_2 Emissions: Baseline

Table 6 indicates the areas assessed as a refurbishment.

Floor	Area (NIA, m^2)
Georgian Terrace	1,700

Table 6 Areas assessed as refurbishment including ancillary spaces as toilets, stairs and plant room space.

Where data of the current building properties was not available, calculations of u-values were carried out based on available drawings. Similarly, plant properties were based on the timing of when the plant has been installed. The existing baseline building carbon emissions are shown in Table 5.

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Existing Building	49.7	15
After Energy Demand Reduction (Be Lean)		
After CHP (Be Clean)		
After Renewable Energy (Be Green)		

Table 7 Refurbishment part CO_2 base emissions.

3.3 Whole Development - CO_2 Emissions: Baseline

Table 8 provides a combined baseline figure of carbon emissions for the whole site composed of the Part L2A baseline for the new part (Table 5) and the existing Georgian Terrace emissions (Table 7).

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Existing Building/ Notional Building Part L2A	897.2	1421.8
After Energy Demand Reduction (Be Lean)		
After CHP (Be Clean)		
After Renewable Energy (Be Green)		

Table 8 Whole development CO_2 base emissions

4 Demand Reduction (Be Lean)

The project team has sought to maximise energy efficiency through considerate measures, set out in the following paragraphs.

The energy efficiency strategy has been developed following a hierarchical approach. The strategy aims to reduce energy demands by first incorporating suitable design measures, followed by proposed enhancements to provide an efficient building fabric (where possible) and highly efficient heating, ventilation and air conditioning (HVAC) systems. The cooling hierarchy set out in the London Plan has been followed. In further detail, the energy efficiency of the scheme has been achieved by incorporating the following design and technology features:

Passive and active design measures were included in the proposals to reduce energy demand and carbon dioxide emissions:

4.1 Passive Measures:

- A window g-value of 0.28 was used for the new windows of the Tower to reduce overheating risk and reliance on mechanical cooling;
- The use of a concrete slabs provide high thermal mass to moderate the cooling loads;
- The south facing staircase of the tower incorporates actuated vent shadow boxes to reduce overheating risk;
- Low air permeability;
- Good level of insulation on the new building fabric and where possible also on the refurbished exposed walls and roofs;
- Georgian Terrace and Keats House: openable fenestrations are provided at every floor to allow for the potential of natural ventilation during the mid-season period.

4.1.1 London Plan Cooling Hierarchy:

The London Plan Cooling Hierarchy was followed as indicated in Table 9 below.

London Plan Cooling Hierarchy	Proposed Measures
Minimise internal heat generation through energy efficient design	Highly efficient LED lighting will be used for the proposed design, particularly for the office asset reaching 120 luminaire lumens/circuit watt Energy efficiency lighting with occupancy sensors and daylight control sensors will be used. Well insulated ductwork with very low losses in the heating/hot water systems distribution will be used.
Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls	Low G-value (0.28) glazing will be used in the proposed tower, in order to reduce the overheating risk and reducing the demand for cooling in the summer periods while maintaining high light transmittance to minimize artificial lighting consumption. Good levels of thermal insulation will be included in the solid elements of the new building fabric and the exposed roof and floors of the existing building. Including: New large roof areas U-value: 0.12 W/m².K New build walls U-value: 0.2 W/m².K Curtain wall U-value: 1.3 W/m².K The proposed construction aims to achieve low air permeability.
Manage the heat within the building through exposed internal thermal mass and high ceilings	The proposed concrete slabs provides high thermal mass to moderate the cooling loads for the tower. Keats house and the Georgian Terrace benefit further from the thermal mass of the building envelope structure.
Passive ventilation	Georgian Terrace and Keats House: openable windows are provided at every floor to allow for the potential of natural ventilation during the mid-season period.
Mechanical ventilation	High efficiency mechanical ventilation with heat recovery systems will be provided for the office and retail spaces of the Tower and Keats House.
Active cooling systems (ensuring they are the lowest carbon options)	Highly efficient chiller (chiller SEER > 8) is used for the site. Efficient VRF system for the Georgian Terrace retail assets.

Table 9 Cooling Hierarchy.

4.2 Active Measures

4.2.1 Ventilation

Basement

Fresh air is brought into the basement via floor grilles to serve a common supply plenum connecting onto individual ventilation plant/air handling units servicing different areas within the basement levels. The ventilation plants are fitted with heat recovery devices (where feasible relative to function served) to minimise the pre-heating and pre-cooling required for the supply air.

Variable speed drives to selected fans also assist with providing variable ventilation rates where applicable, relative to fluctuations occupancy levels and thermal loads, in order to minimise energy consumption.

The service yard will be equipped with CO sensors, so that if the traffic usage is low, the fans will be able to turn down whilst keeping good air quality conditions.

Offices

Each office floor is supplied fresh air via its own dedicated AHU located within the backpack plantroom. Additionally, the air from W/C's on each office floor is extracted by fans located at high level within the ceiling void of the W/C's on each floor. The auditorium is serviced using an all air displacement system. The fresh air for the system is supplied via the L21 backpack AHU in conjunction with an additional ceiling mounted AHU located at high level within the auditorium. As opposed to using a centralised ventilation system, the adopted strategy is beneficial to keep the energy for the fans low. The Georgian Terrace is naturally ventilated. Further detail on the plant layout is provided in appendix 5.

4.2.2 Cooling

Chilled water is generated via a central cooling plant that serves all functional assets. Each individual asset, as well as each individual retail unit, is fitted with a combined heating and cooling interface unit that hydraulically decouples each unit from the central system and thus offers quasi operational autonomy to each individual unit. This will also facilitate individual monitoring of cooling energy consumption by each respective asset/tenancy. Variable speed pumps circulate chilled water to suit the variable levels of demand, thereby minimising energy consumption.

The advantage of providing a common centralised cooling infrastructure network (i.e. mini district cooling network) lies in the fact that the central system benefits operationally from the variable load profiles of each asset (i.e. higher diversity factor) and thus does not need to be sized to operate on simultaneous peak cooling loads.

Scenario	Tower and Keats House - New Build (MJ/m²)	Georgian Terrace - Refurbishment (MJ/m²)	Whole project (MJ/m²)
Actual (proposed)	100.3	54.3	98.8
Notional (for new built) Baseline (for refurbishment)	144.0	44.6	140.8

Table 10 Cooling demand.

4.2.3 Heating

Low temperature heating water (LTHW) for heating is provided via 5 No. 650 kW boilers located on the roof level. The boilers are selected to have high combustion efficiencies. Domestic hot water (DHW) is provided via 2 direct gas-fired water heaters.

As described in the 'Cooling' section, each individual unit, is fitted with a combined heating and cooling interface unit providing the same benefits described for the heating system, i.e. quasi operational autonomy and facilitating monitoring. Variable speed pumps circulate low temperature hot water to suit the variable levels of demand, thereby minimising energy consumption. Hot water storage vessels will also assist in maximising the boiler operational efficiencies, by reducing rapid start/stop functions as well as rapid ramping up/down of peak loads in line with heating load fluctuations. Further detail on the plant layout is provided in appendix 5.

4.2.4 Georgian Terrace Retail Units VRF System

Variable refrigerant flow (VRF) systems are being installed within the retail units in the Georgian Terrace. This is to provide an independent system to the retail units to ensure a clear demarcation between the landlord and tenant system. Additionally, for a VRF system the flow and return pipe dimensions are smaller in comparison to LTHW and chilled water (CHW) pipework minimising impact on the Georgian listed buildings. Finally, an equivalent LTHW/CHW system will require a use of a heat interface unit which will take up additional space within the relatively small retail units whilst the VRF system condenser can be placed externally in the Lower Ground external passageway, between No's 8 and 10.

Please refer to Table 11 for other energy demand reduction measures

Item	
Electricity Power Factor	>0.95
Light metering warnings	Y
Lighting Daylight Control	Office areas and perimeter stairs
Lighting Occupancy Control	Office and toilet areas
Constant Illuminance Control	In the tower office areas
Heat Exchanger Efficiency	0.8
General Lighting Efficacy	80 - 120 lumens/circuit Watt
Fresh Air Demand Control	Yes (gas sensors)
Cooling SEER	>8
Boiler efficiency	92%

Table 11 Other demand reduction measures.

4.2.5 Additional Measures to Reduce the Environmental Impact of the Project

In addition to reducing regulated and unregulated carbon emissions, in line with the Draft London Plan aspirations, the Design Team is also including additional measures within the design process and construction to ensure a low environmental impact:

- the project sub-meters will have open-protocol communication outputs that can be connected to an energy monitoring and management system;
- the team is currently investigating further the potential of on-site energy storage;
- the energy used during construction will be monitored and recorded in kWh (and where relevant, in litres of fuel used). This is expected to provide data that will help the contractor to reduce the energy consumption;
- the team intends to carry out a BREEAM-compliant life-cycle impact assessment taking into account the embodied carbon of the main elements of the new-built part of the project;
- the design team has already carried out an initial workshop on operational energy and is aspiring to carry out this study in the next stages.

4.3 New-Build Part – (Be Lean)

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Notional Building Part L2A	847.6	1406.8
After Energy Demand Reduction (Be Lean)	529.3	1283.8
After CHP (Be Clean)		
After Renewable Energy (Be Green)		

Table 12 New-built part CO_2 emissions after demand reduction.

Case	Regulated CO_2 savings	
	Tonnes CO_2 per annum	%
After Energy Demand Reduction (Be Lean)	318.3	37.5%
After CHP (Be Clean)		
After Renewable Energy (Be Green)		
Total Cumulative Savings		

Table 13 New-built part CO_2 savings after demand reduction.

4.4 Refurbishment Part – (Be Lean)

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Existing Building	49.7	15
After Energy Demand Reduction (Be Lean)	35.4	15
After CHP (Be Clean)		
After Renewable Energy (Be Green)		

Table 14 Refurbishment part CO_2 emissions after demand reduction

Case	Regulated CO_2 savings	
	Tonnes CO_2 per annum	%
After Energy Demand Reduction (Be Lean)	318.3	37.5%
After CHP (Be Clean)		
After Renewable Energy (Be Green)		
Total Cumulative Savings		

Table 15 Refurbishment part CO_2 savings after demand reduction.

4.5 Whole Development – (Be Lean)

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Existing Building/ Notional Building Part L2A	897.2	1421.8
After Energy Demand Reduction (Be Lean)	564.7	1298.8
After CHP (Be Clean)		
After Renewable Energy (Be Green)		

Table 16 Whole development CO_2 emissions after demand reduction.

Case	Regulated CO_2 savings	
	Tonnes CO_2 per annum	%
After Energy Demand Reduction (Be Lean)	332.5	37.1%
After CHP (Be Clean)		
After Renewable Energy (Be Green)		
Total Cumulative Savings		

Table 17 Whole development CO_2 savings after demand reduction.

5 Heating Infrastructure

Due to the relatively low domestic hot water demand related to office and retail uses and the lack of a stable heating demand baseload, the use of a Combined Heat and Power (CHP) system was not deemed as an adequate strategy for this project. Indeed, a CHP needs to usually run for 3,500 – 4,500 hours/year in order to be considered practically and economically feasible.

Currently there are no district heating networks in the vicinity of the site area. The London Heat Map Tool indicates that the nearest network is located 1km from the site (Please refer to figure 5-1).

On the 'London Heat Map' there is a reference to an EU ETS site (at postcode SE1 9RT) and a 'Communal Boiler Study' that belong to the Guys & St Thomas' Hospital NHS Trust. We have approached Guy & St Thomas' Hospital NHS Trust to check whether they would consider and have capacity to supply heating/cooling to a nearby third party project. However, we had no response. Communication with the Guy & St Thomas' Hospital NHS Trust is shown in appendix 6.

The site is therefore not located within a viable distance to a heating network. However, the scheme will be made 'connection ready', by allowing the necessary space for the required heat exchanger (Figure 5-2) and pipework, so that connection can be made to the system at an appropriate point in the future, subject to a district heating network being installed adjacent to the site or availability is established by the NHS trust.

Figure 5-1 The site highlighted on the London Heat Map.

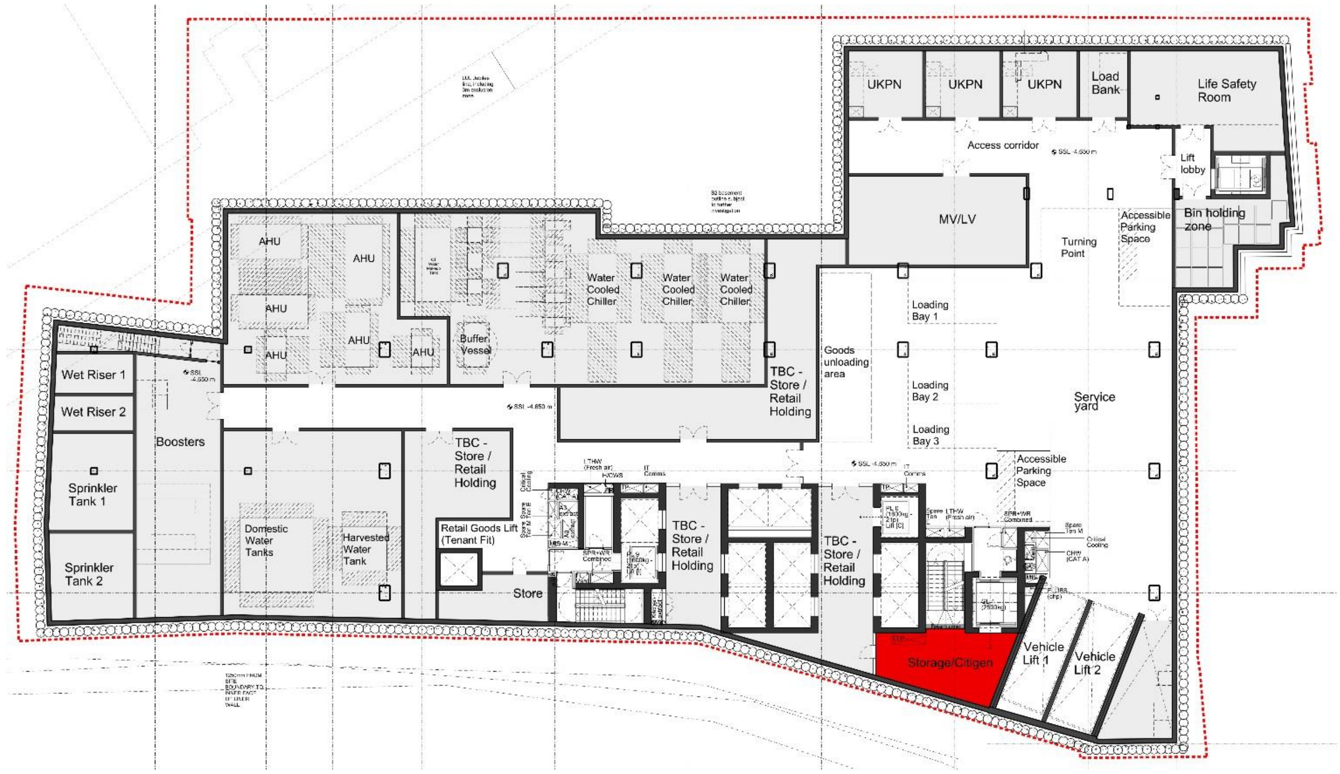


Figure 5-2 The location for connection with a potential district heating network is shown on Level B2.

6 Renewable Energy (Be Green)

In order to further enhance the CO_2 emissions reductions of the proposed design, various renewable energy technologies have been considered. Please see below a summary of reasons for discounting or selecting renewable technologies for the scheme.

6.1 Wind

A vertical Axis wind turbine (VAWT) may be more easily integrated with the architectural intent; rather than a horizontal axis wind turbine. The wind turbine would have to be located on a mast (typically tilt down masts) since the area immediately above the terrace is an area which is relatively protected due to the façade edge updraft resulting in a point of air separation.

Normally small wind turbines contribute to a limited amount of energy and in addition, architecturally, these are difficult to integrate visually. A 5.5m tall VAWT with a 3.1m diameter, located on a 6m mast is expected to generate less than 1.0 % of the building regulated energy. As a very preliminary overview the actual cost of the turbine would be £25,000 with an additional £10,000 for installation, therefore making the technology not feasible.

In addition, there is also the concern of potential noise generated by such systems as was the case of the Strata project in Southwark.

6.2 Biofuel CHP

The benefit of incorporating a biofuel/liquid CHP unit, in lieu of a gas engine, would primarily be driven by the very low carbon emissions of such a machine – 1/40th lower than equivalent gas CHP unit. A CHP unit utilising biofuel has an increased cost when compared to conventional gas CHP. The engine would also require regular maintenance; the engine is serviced every 250 to 400 hours dependent on operating regime and is overhauled every 8000 hours to ensure maximum efficiency in operation. However, due to the lack of a stable heating baseload a CHP system was not considered viable for the scheme. In addition, this would also have required frequent fuel deliveries to the site.

6.3 Solar Thermal

Due to the very low domestic hot water demand related with non-domestic uses provided, solar thermal systems were not considered as a suitable strategy.

6.4 Photovoltaic Panels

A well-designed installation in an optimum location can generate around 150kWh annually per m^2 installed, but this can be significantly lower depending on the efficiency of the modules. For this project this strategy shows a significant potential particularly due to the high unobstructed rooftop of the main building and the careful design of plant to create an available installation area.

6.5 Air Sources Heat Pumps With VRF

Tower and Keats House

While the technology may provide carbon reduction benefits, the issue with this solution however is the lack of external space, since the solution requires a bigger volume for the plant. Furthermore, this solution is not easily compatible with district heating system if in the future an opportunity to connect to a network arises.

Georgian Terrace

On the other hand, due to the available external space, the technology is viable for the retail areas of the Georgian Terrace. An equivalent LTHW/CHW system will require a use of a heat interface unit which will take up additional space within the relatively small retail units, whilst the VRF system condenser can be placed externally in the Lower Ground external passageway between No's 8 and 10.

Furthermore, the flow and return pipe dimensions of the VRF system are smaller in comparison to LTHW and CHW pipework making the intervention more suitable for the refurbishment.

6.6 Ground Source Heat Pump

Two options – (1) open & (2) closed loop:

6.6.1 Open loop

Open loops are inherently risky since the actual yield is unknown until the borehole(s) are tested and may be less than the hydro-geographical study predicted, so it is normal to require a fall-back strategy. This technology requires advice from an independent hydrologist, however locating boreholes optimally and predicting yields (i.e. flow rates in l/s) via desk studies is extremely difficult. Licences/permits for abstraction and re-injection/discharge are required for both testing and operation from the Environmental Agency (including monitoring not just of boreholes on site but neighbouring boreholes). The boreholes are also at risk of collapse during their lifetime.

There can be very significant variations between yields from boreholes even in relatively close proximity –which may require boreholes to be 'developed' to increase yields. Yields can be significantly lower than anticipated by the original desk studies, which can have major implications for the design of MEP heating and cooling systems (if they have been reduced in size based on over-optimistic yields).

Maximum reinjection temperatures (c.20°C) and temperature differences between supply and extract (c.6°C or 6K) are limited to protect the ground resource.

The Environmental Agency asks that a balance of heat abstraction and heat rejection is met. The functions (offices and retail) that will operate in the development are expected to have a high cooling demand resulting in a higher heat discharge rather than heat abstraction from the aquifer resulting in a heat exchange imbalance. This makes the development less adequate for this strategy.

6.6.2 Closed loop

The yield for closed loop GSHP is much less per borehole than that for open loop. This requires additional site investigation surveys (thermal conductivity, temperature profiles, etc.). Furthermore, the integration of the horizontal and vertical boreholes can be difficult for a tight urban site; vertical boreholes require approximately 6m spacing's (resulting in circa 45-50 boreholes). The installation can be expensive due to drilling of boreholes. There are limitations of existing design methods and software for properly assessing performance.

Due to the offices and retail uses of the project, both functions with high internal gains, the development is expected to have a high cooling demand and a rather lower heating demand. This heat imbalance is expected to increase due to climate change as warmer summers and longer heat spells are expected. The heat imbalance would result in more heat being rejected into the ground, rather than extracted (similar to the open loop scenario). This would reduce the effectiveness of the GSHP system in the long run and therefore this is not a recommended strategy.

6.7 Selected Renewable Technology

For New City Court the photovoltaic panels shows a significant potential as a renewable due to the high unobstructed rooftop of the main building. Hence this was selected as the main renewable source for the project. Further detail on the photovoltaics strategy is provided in appendix 3.

Air source heat pumps may also show a significant benefit however this system would require a larger volume of external plant space which may not be incorporated in the new-built part of the project. However due to the available space this technology is being applied for the Georgian Terrace. Further detail on the VRF system is provided in appendix 4.

Other renewables have not been included in the design proposal for the reasons explained in sections 6.1 to 6.6.

6.8 New-Built Part – (Be Green)

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Existing Building/ Notional Building Part L2A	847.6	1406.8
After Energy Demand Reduction (Be Lean)	529.3	1283.8
After CHP (Be Clean)	529.3	1283.8
After Renewable Energy (Be Green)	502.5	1283.8

Table 18 New-built part CO_2 emissions after renewable energy.

Case	Regulated CO_2 savings	
	Tonnes CO_2 per annum	%
After Energy Demand Reduction (Be Lean)	318.3	37.5%
After CHP (Be Clean)	0.0	0.0%
After Renewable Energy (Be Green)	26.8	3.2%
Total Cumulative Savings	**345.1**	**40.7%**

Table 19 New-built part CO_2 savings after renewable energy.

6.9 Refurbishment Part – (Be Green)

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Existing Building/ Notional Building Part L2A	49.7	15
After Energy Demand Reduction (Be Lean)	35.4	15
After CHP (Be Clean)	35.4	15
After Renewable Energy (Be Green)	29.3	15

Table 20 Refurbishment part CO_2 emissions after renewable energy.

Case	Regulated CO_2 savings	
	Tonnes CO_2 per annum	%
After Energy Demand Reduction (Be Lean)	14.3	28.7%
After CHP (Be Clean)	0.0	0.0%
After Renewable Energy (Be Green)	6.1	12.3%
Total Cumulative Savings	**20.4**	**41.0%**

Table 21 Refurbishment part CO_2 savings after renewable energy.

6.10 Whole Development – (Be Green)

Case	Regulated Tonnes CO_2 per annum	Unregulated Tonnes CO_2 per annum
Baseline: Existing Building/ Notional Building Part L2A	897.2	1421.8
After Energy Demand Reduction (Be Lean)	564.7	1298.8
After CHP (Be Clean)	564.7	1298.8
After Renewable Energy (Be Green)	531.8	1298.8

Table 22 Whole development CO_2 emissions after renewable energy

Case	Regulated CO_2 savings	
	Tonnes CO_2 per annum	%
After Energy Demand Reduction (Be Lean)	332.5	37.1%
After CHP (Be Clean)	0.0	0.0%
After Renewable Energy (Be Green)	32.9	3.7%
Total Cumulative Savings	**365.4**	**40.7%**

Table 23 Whole development CO_2 savings after renewable energy

7 Conclusion

The design proposal for New City Court is supported by a robust energy strategy which demonstrates a firm commitment to the London Plan policies whilst providing both new and refurbished offices and retail spaces.

As illustrated in the sections above, the energy strategy targets the following for the whole development:

- 'Be Lean': 37.1 % lower regulated CO_2 emissions when compared to the baseline building;
- 'Be Green': 3.7 % lower regulated CO_2 emissions when compared to the baseline building;
- Total Cumulative CO_2 emissions reduction ('Be Lean' + 'Be Clean'): 40.7 %.

The scheme therefore exceeds the carbon reduction targets set for new buildings required by the London Plan (London Plan Policy 5.2); 35% reduction in CO_2 emissions when compared to Part L 2013 (equivalent to 40% reduction in CO_2 emissions when compared to Part L 2010).

Figure 7-1 indicates the Energy Hierarchy for the proposed development and the CO_2 emissions savings in line with the GLA guidance.

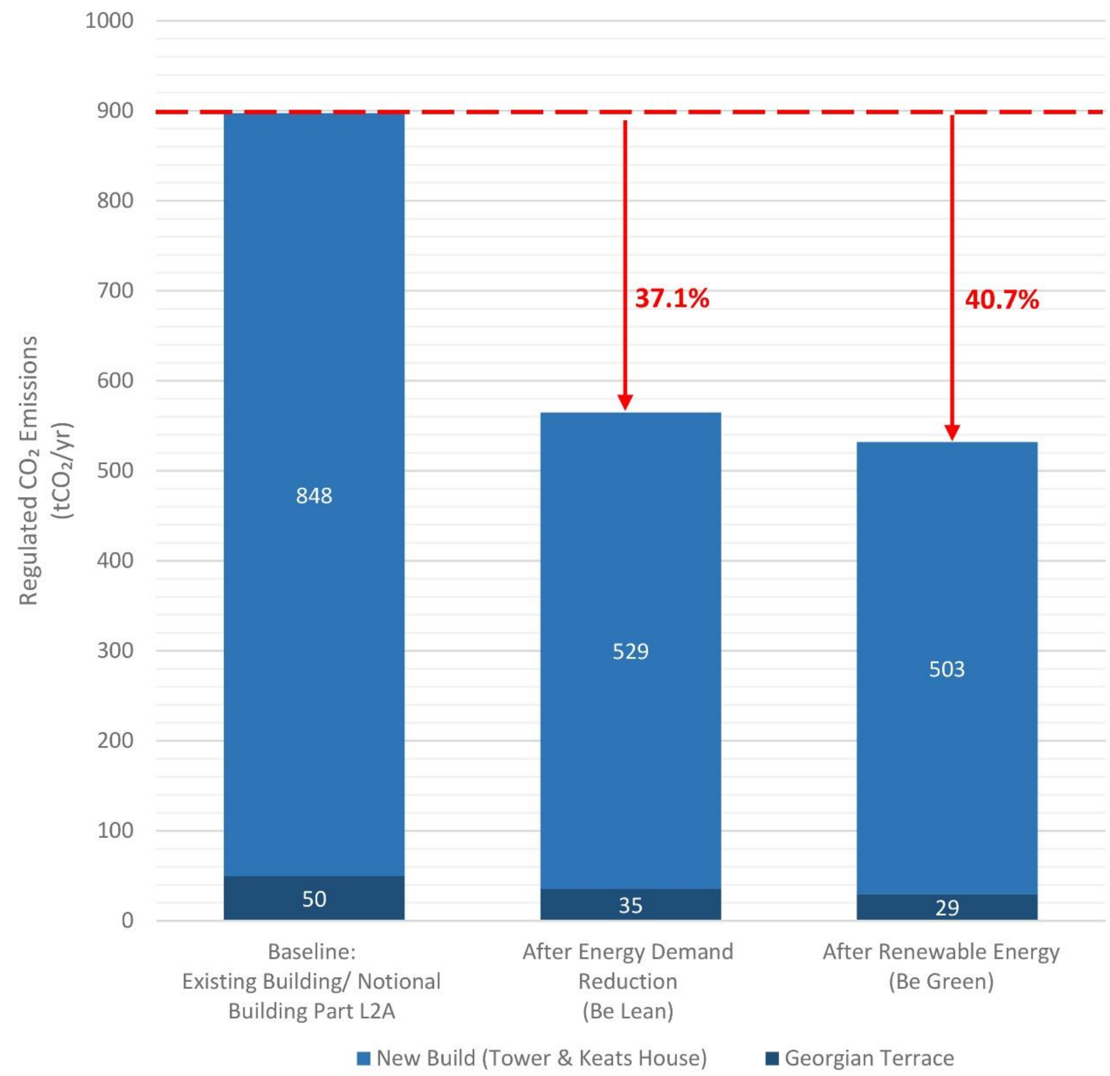


Figure 7-1 The Energy Hierarchy for the proposed development.

8 Appendices

8.1 Appendix 1 – Unregulated Carbon Emissions

New-Build	
Baseline	**Proposed**
Lifts without energy saving measures kWh	Lifts with energy saving measures kWh
717000	480000
Equipment kWh	Equipment kWh
1959044	1959044
External lighting 5W/m² x area x hrs 5W/m² x 1455 x 13hrs x 365 kWh	External lighting 5W/m² x area x hrs 5W/m² x 1455 x 13hrs x 365 kWh
34520	34520
Total Unregulated kWh	Total Unregulated kWh
2710564	2473564
MWh/yr	MWh/yr
2710.564	2473.564
CO_2/yr	CO_2/yr
1406.8	1283.8

Figure 8-1 New-build part unregulated carbon emissions.

Refurbishment	
Baseline	**Proposed**
Equipment kWh	Equipment kWh
28877.3	28877.3
Total Unregulated kWh	Total Unregulated kWh
28877.3	28877.3
MWh/yr	MWh/yr
28.9	28.9
CO_2/yr	CO_2/yr
15.0	15.0

Figure 8-2 Refurbishment part unregulated carbon emissions.

Identification	Reference	No. Of Lifts	Capacity	Speed	Type	Consumption with Energy Efficiency	Consumption
			Kg	m/s		kWh	kWh
High Rise	PL7-10	4	1600	6	Double Deck (MR)	255000	390500
Mid Rise	PL3-6	4	1600	3.5	Double Deck (MR)	151000	204000
Low Rise	PL1-2	2	1600	2	Double Deck (MR)	31500	51200
Goods lift	GL1	1	2500	2.5	Single deck (MR)	22500	36000
Garden lift	SL1	1	3200	1	Single deck (MR)	6000	9300
Shuttle lift (High rise)	SL0	1	1600	1	Single deck (MRL)	2380	4260
Cycle lift	CL1	1	1600	1	Single deck (MRL)	2380	4260
Keats house	PL12	1	630	1	Single deck (MRL)	1990	3870
Keats house	RL1	1	2000	1	Single deck (MRL)	2580	4450
Basement lift	PL0	1	1600	1	Single deck (MRL)	2380	4260
Goods only lift	GL2	1	2500	1	Single deck (MRL)	2580	4450
Total MWh/year						480	717

Figure 8-3 Lifts unregulated energy demand.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

New City Court — As designed

Date: Mon Nov 19 12:47:47 2018

Administrative information

Building Details

Address: London,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.4.3"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.4.3

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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

CO_2 emission rate from the notional building, $kgCO_2/m^2$.annum	25.3
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	25.3
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	15.8
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	14_Tower_Basement_External_Wall_U_0.2
Floor	0.25	0.2	0.21	16_Tower_Basement_Floor_U_0.2
Roof	0.25	0.13	0.18	08_Tower_Exposed terrace roof (small)_U-0.18/05_Tov
Windows***, roof windows, and rooflights	2.2	1.3	1.51	11_Keats_Fixed_window_B_1.5_10%
Personnel doors	2.2	1.49	1.49	08_Keats_door_A_tbc
Vehicle access & similar large doors	1.5	1.49	1.49	02_vehicle_door_1.5
High usage entrance doors	3.5	2.79	2.79	03_high_usage_door_U-3.5

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* 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
m³/(h.m²) at 50 Pa	10	3

Page 1 of 26

Figure 8-4 New-Build part BRUKL: Be Lean.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

New City Court — As designed

Date: Tue Nov 20 11:22:26 2018

Administrative information

Building Details

Address: London,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.4.3"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.4.3

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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

CO_2 emission rate from the notional building, $kgCO_2/m^2$.annum	25.3
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	25.3
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	15
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

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

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	14_Tower_Basement_External_Wall_U_0.2
Floor	0.25	0.2	0.21	16_Tower_Basement_Floor_U_0.2
Roof	0.25	0.13	0.18	08_Tower_Exposed terrace roof (small)_U-0.18/05_Tov
Windows***, roof windows, and rooflights	2.2	1.3	1.51	11_Keats_Fixed_window_B_1.5_10%
Personnel doors	2.2	1.49	1.49	08_Keats_door_A_tbc
Vehicle access & similar large doors	1.5	1.49	1.49	02_vehicle_door_1.5
High usage entrance doors	3.5	2.79	2.79	03_high_usage_door_U-3.5

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* 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
m³/(h.m²) at 50 Pa	10	3

Page 1 of 26

Figure 8-5 New-Build part BRUKL: Be Green.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

As designed

Date: Thu Oct 04 12:05:35 2018

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.4.2"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.4.2

BRUKL compliance check version: v5.4.a.1

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2$.annum	20.1
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	20.1
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	43.9
Are emissions from the building less than or equal to the target?	BER > TER
Are as built details the same as used in the BER calculations?	Separate submission

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

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	1.05	1.42	Externall Wall_Type2_240
Floor	0.25	0.71	1.68	Internal Floor_0.05
Roof	0.25	1.62	2.13	Internal Ceiling_0.15
Windows***, roof windows, and rooflights	2.2	4.64	5.09	Type A-South
Personnel doors	2.2	4.99	5.31	Door - North_LG
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* 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	25

Page 1 of 9

Figure 8-6 Existing building BRUKL.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

As designed

Date: Thu Oct 04 12:09:37 2018

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.4.3"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.4.3

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2$.annum	23.7
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	23.7
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	31.3
Are emissions from the building less than or equal to the target?	BER > TER
Are as built details the same as used in the BER calculations?	Separate submission

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

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.5	0.85	External Wall_Existing_1_retained_East
Floor	0.25	0.91	0.94	Exposed Floor_LG
Roof	0.25	0.18	0.18	Roof
Windows***, roof windows, and rooflights	2.2	4.66	5.87	steel
Personnel doors	2.2	5.31	5.31	Door - North_LG
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	5.13	5.13	Type D - South-HFDoor

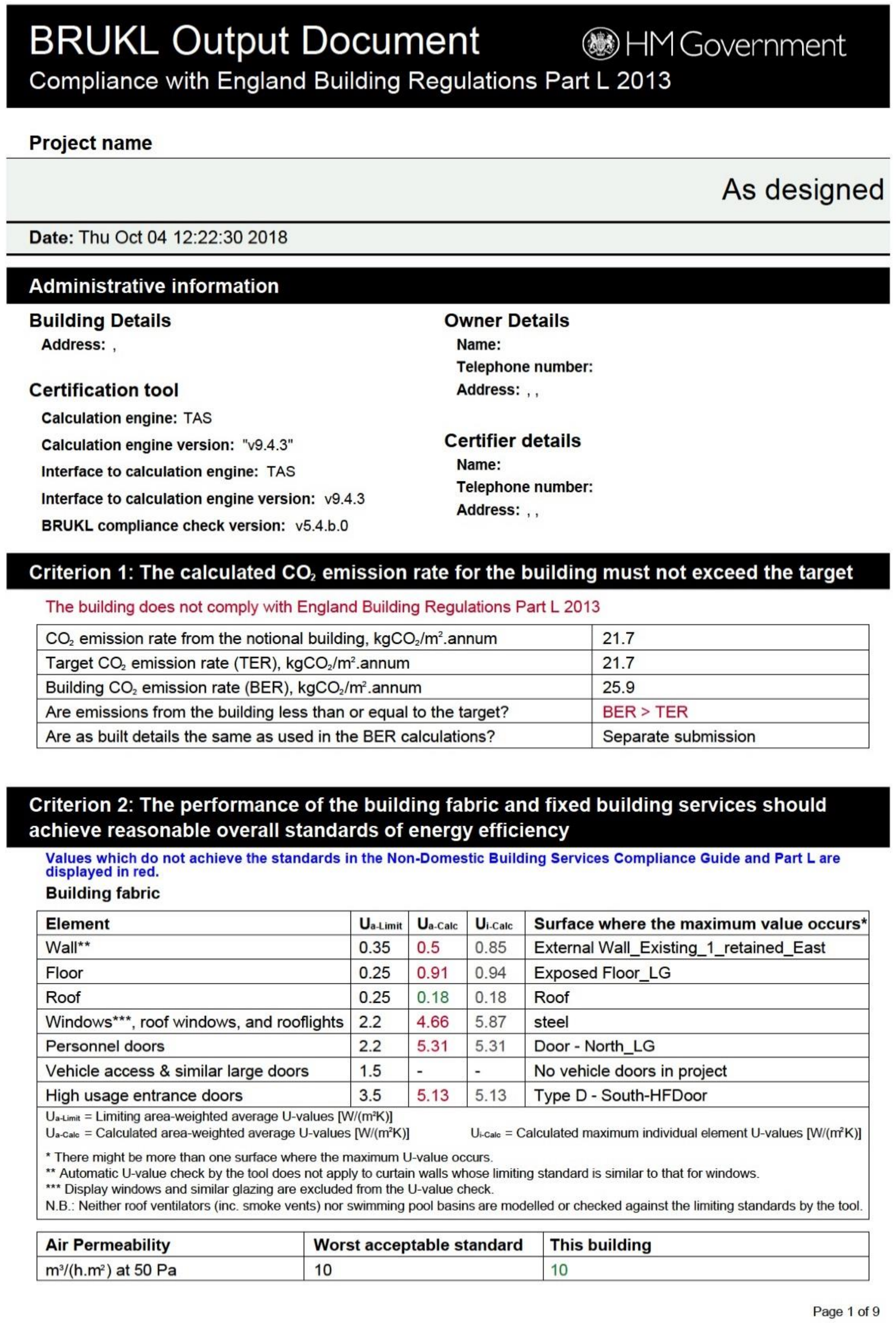
$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* 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	10

Page 1 of 10

Figure 8-7 Refurbishment part BRUKL: Be Lean.



BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

As designed

Date: Thu Oct 04 12:22:30 2018

Administrative information

Building Details

Address: ,

Owner Details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.4.3"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.4.3

BRUKL compliance check version: v5.4.b.0

Certifier details

Name:

Telephone number:

Address: , ,

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

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2$.annum	21.7
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	21.7
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	25.9
Are emissions from the building less than or equal to the target?	BER > TER
Are as built details the same as used in the BER calculations?	Separate submission

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

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.5	0.85	External Wall_Existing_1_retained_East
Floor	0.25	0.91	0.94	Exposed Floor_LG
Roof	0.25	0.18	0.18	Roof
Windows***, roof windows, and rooflights	2.2	4.66	5.87	steel
Personnel doors	2.2	5.31	5.31	Door - North_LG
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	5.13	5.13	Type D - South-HFDoor

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* 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	10

Page 1 of 9

Figure 8-8 Refurbishment part BRUKL: Be Green.

8.3 Appendix 3 – Additional Photovoltaic Panels Information

As highlighted in the sixth chapter (6.4 and 6.7), 438m² of photovoltaic panels are being proposed for the roofs of the levels 35 and 36. This area was selected as it unobstructed from any neighbouring building or self-shading. The electricity displaced through the use of these photovoltaic panels is expected to be approximately 63MWh per annum.

The option to select East-West facing photovoltaic panels (Figure 8-11) has multiple benefits:

- The continuous PV layout reduces the risk of overshadowing from an adjacent PV array;
- The configuration allows for a higher PV density on a given area;
- The configuration will result in a slight improvement over a south-facing PV layout fitted on the same area. Furthermore, the system would allow the PVs to capture more solar energy earlier during the day and later during the afternoon than a conventional south-facing system. Hence the maximum output of the system avoids the energy 'spikes' available via the grid at midday smoothening the energy demand.

Figure 8-9 indicates the PV layout and figure 8-10 indicates the approximate heights of the surroundings and the roof levels. The surroundings height are approximate.

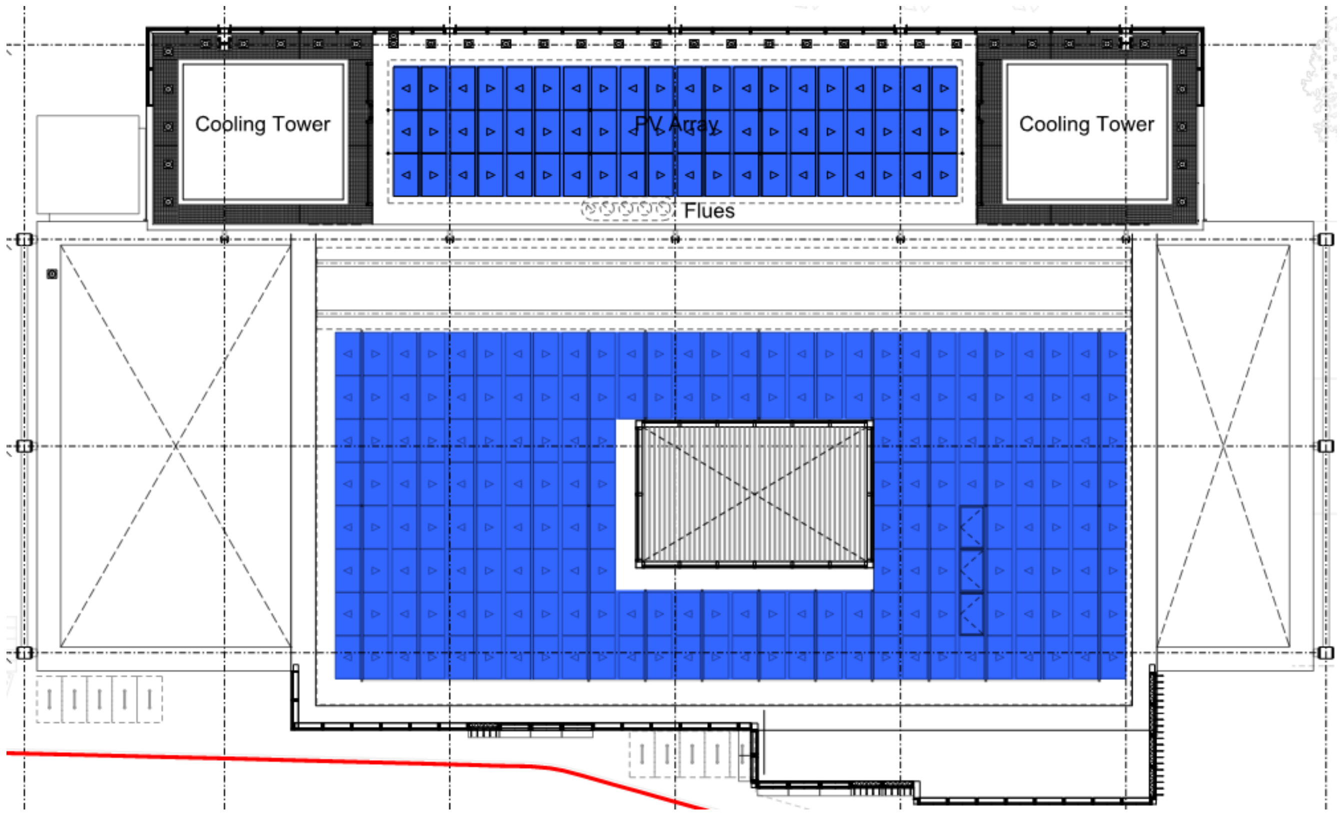


Figure 8-9 Photovoltaic panels layout.

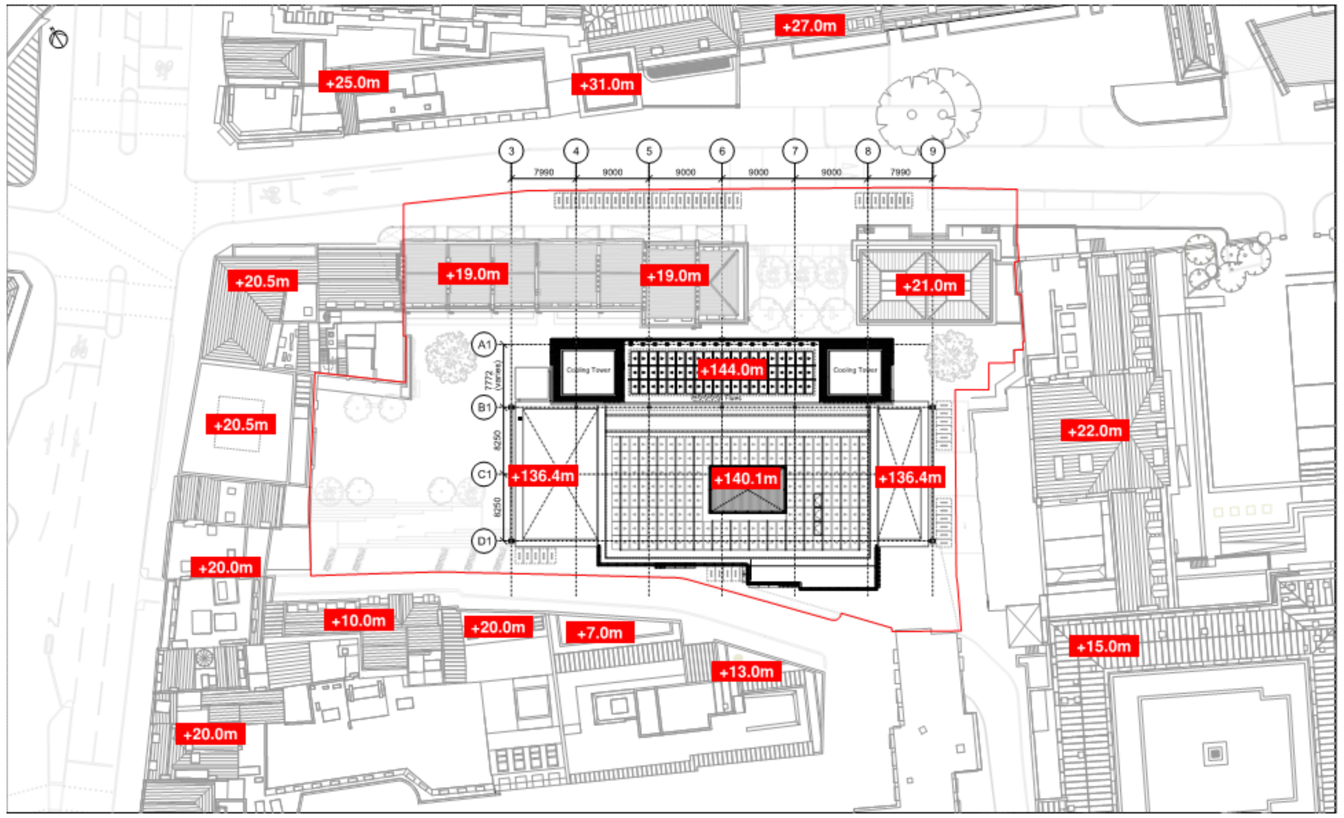


Figure 8-10 Approximate building heights above AOD.

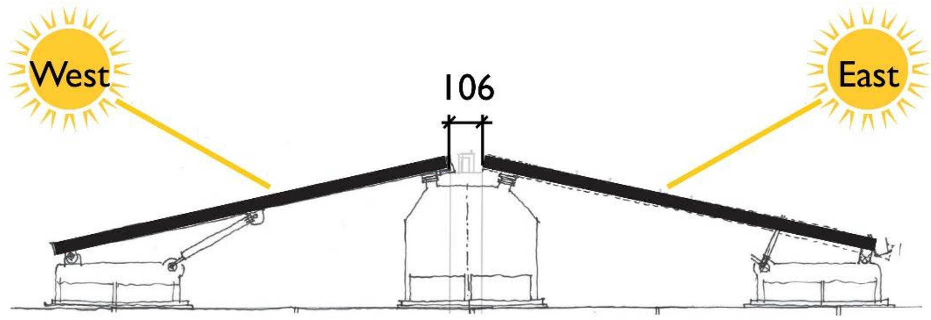


Figure 8-11 East-West PV layout concept.

8.4 Appendix 4 – Additional Air Source Heat Pumps Information

As highlighted in the fifth chapter, air-source heat pumps are being used for the retail units of the Georgian Terrace.

Where the use of air source heat pumps (ASHPs) is considered appropriate the following information will also be required:

1. Clarification as to how the ASHP will operate alongside any other heating/cooling technologies being specified for the development (i.e. how will the ASHP operate alongside communal heating systems, and/or combined heat and power plant, solar thermal, etc. if they are also being proposed by the applicant).

VRF is only used within the retail units in the Georgian Terrace. This is to provide an independent system to the retail units to ensure a clear demarcation between the landlord and tenant systems and also aid with metering purposes. Additionally, flow and return pipe dimensions are smaller in comparison to LTHW and CHW pipework which makes the system more attractive for the refurbishment. Finally, an equivalent LTHW/CHW system will require a use of a heat interface unit which will take up some space within the retail units whilst the VRF system condenser can be placed externally in the LB1 external passageway.

2. An estimate of the heating and/or cooling energy the ASHP would provide to the development and the electricity the heat pump would require for this purpose.

The annual estimate is as follows:

Electricity used by Air Source Heat Pump (MWhr)	Heating provided by Heat Pump (MWhr)	Cooling provided by Heat Pump (MWhr)
14.1	39.8	11.2

3. Details of the Coefficient of Performance (COP) and Energy Efficiency ratio (EER) of the proposed heat pump under test conditions.

COP (heating): 2.63
EER (cooling): 4.84

4. An indication of the seasonal COP and EER of the heat pumps:

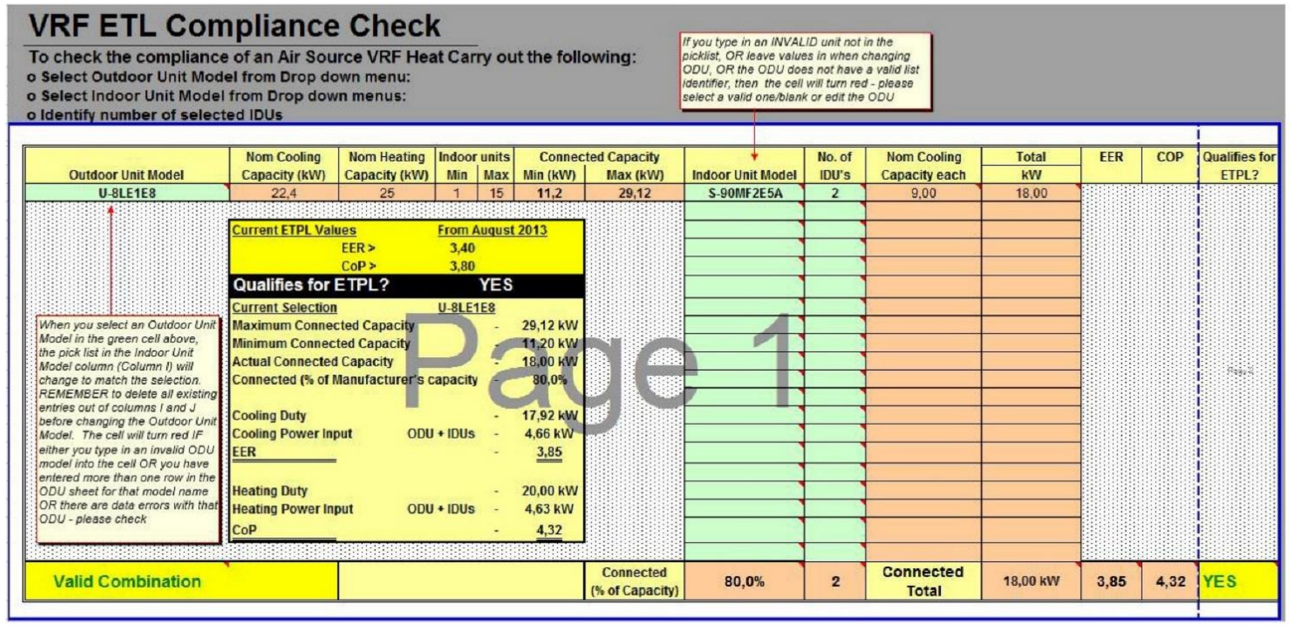
SCOP (heating): 3.49
SEER (cooling): 4.15

5. Evidence that the heat pump complies with other relevant issues as outlined in the Microgeneration Certification Scheme Heat Pump Product Certification Requirements document at: http://www.microgenerationcertification.org

It is understood that Mini VRF/Electric VRF are not covered by the Microgeneration Certification Scheme. This was confirmed by the manufacturer with whom the design is being developed. Similarly, for the other manufacturers, none of them have their VRF systems in this category/technology.

6. Evidence that the heat pump complies with the minimum performance standards as set out in the Enhanced Capital Allowances (ECA) product criteria for the relevant ASHP technology (http://etl.decc.gov.uk)

Retail Unit 4, 6, 8, 10, 12



Retail Unit 14 & 16

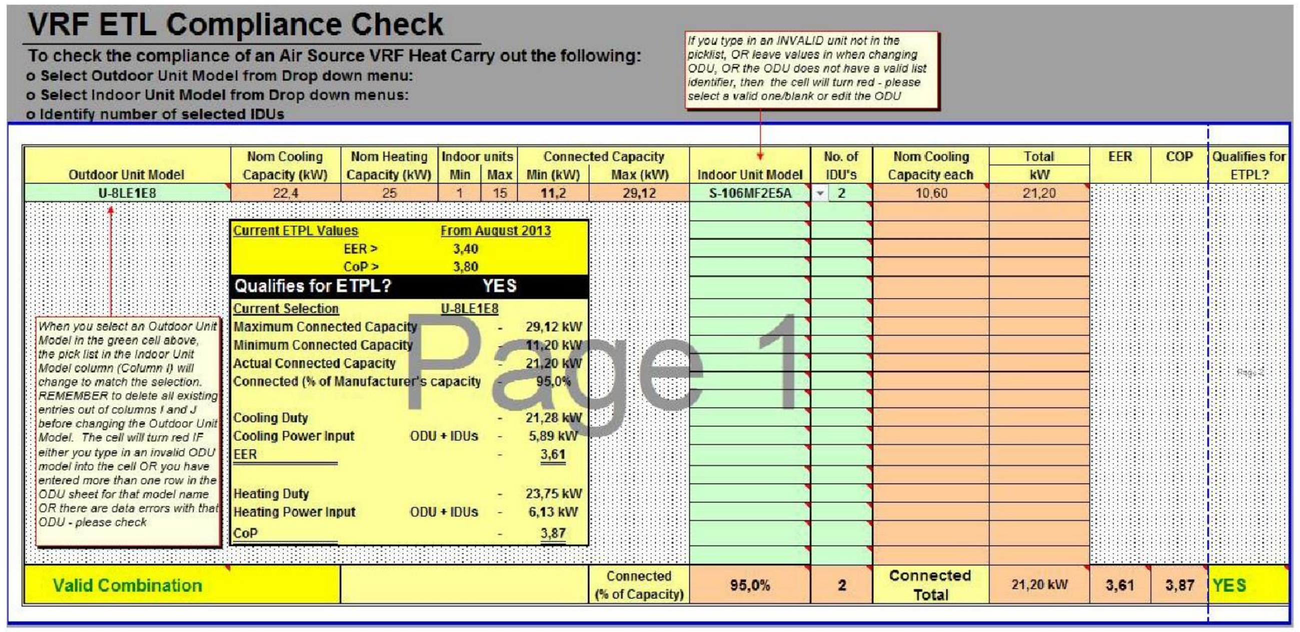


Figure 8-12 Tables showing compliance of the VRF systems for the retail units of the refurbished Georgian Terrace Retail units

7. A calculation of the CO2 savings that may be realised through the use of this technology

As indicated by the "Be Green" step of the Energy Assessment, the resulting reduction in CO2 due to the use of the heat pump technology is 6.1 Tonnes of CO_2 per annum, i.e. indicating a reduction of 12% in CO_2 emissions (of the Georgian Terrace).

8.5 Appendix 5 – Plant Room Layouts

The section below contains illustrated layouts of the plant rooms located in Basement Level 2 and Level 35. Each layout will have a corresponding equipment schedule which provides further details (Dimensions, Manufacturer, Model, etc) on the individual plants located within those floors. Additionally, Section 8.5.3 contains a typical layout of the air handling equipment housed within each office floor. Namely, the office air handling unit located within the 'AHU backpack' plant room and the ceiling mounted extract fan located within the toilets.

8.5.1 Basement Level 2

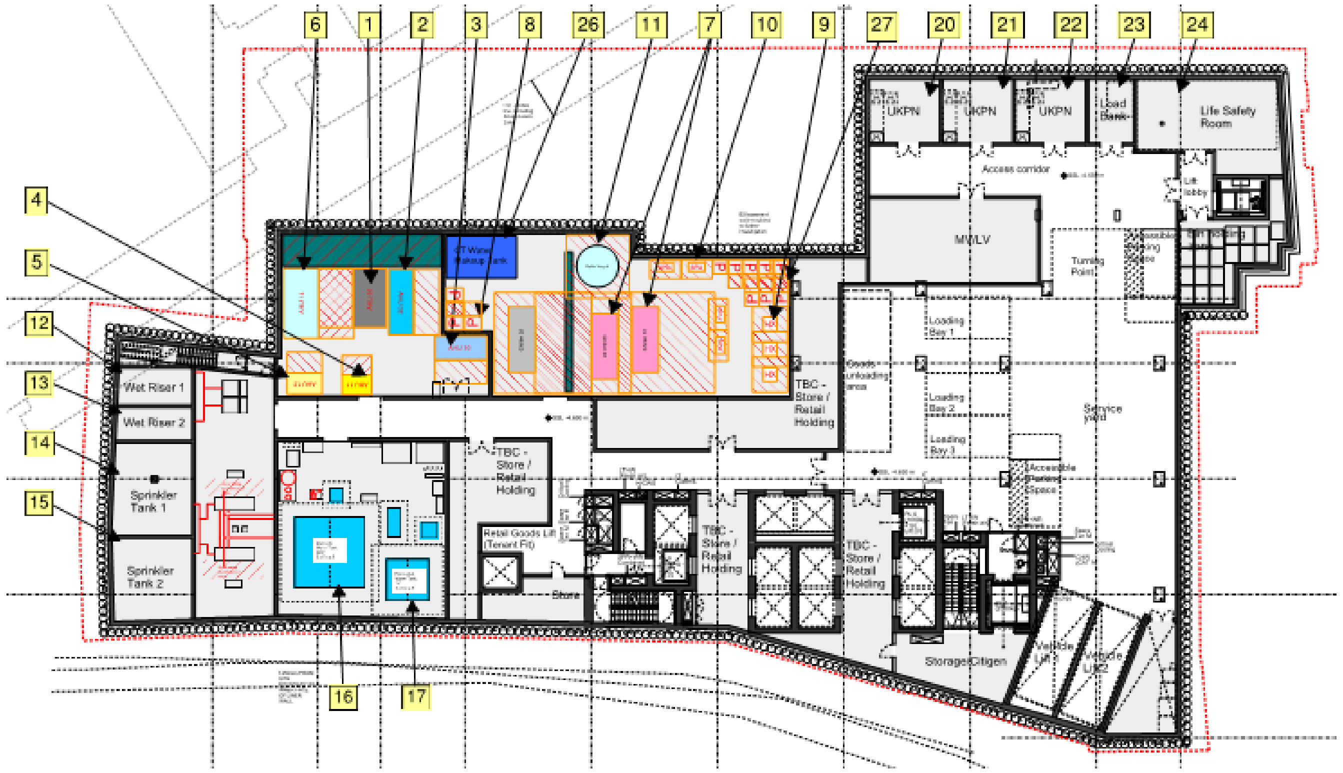


Figure 8-13 Basement Level 2 Plant Layout

Markup Number	Ref	System - Equipment	Level	Equipment - Dimensions			
				L(m)	W(m)	H(m)	Net Area (m^2)
1	Mech_AHU_01	AHU	LB2	4.2	2.4	3	10.08
2	Mech_AHU_02	AHU	LB2	4.7	1.8	3	8.46
3	Mech_AHU_10	AHU	LB2	3.7	1.7	1.7	6.29
4	Mech_AHU_11	AHU	LB2	2.1	1.4	1.3	2.94
5	Mech_AHU_12	AHU	LB2	2.5	1.5	1.5	3.75
6	Mech_AHU_14	AHU	LB2	5	2.5	3	12.5
7	Mech_CH_01	Water Cooled Chiller	LB2	4.7	1.9	2.4	8.93
	Mech_CH_02	Water Cooled Chiller	LB2	4.7	1.9	2.4	8.93
8	Mech_PUMP_01	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_02	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_03	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_04	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_05	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_06	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_07	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_08	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_09	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_10	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_11	Pumps	LB2	1	1	1.4	1
	Mech_PUMP_12	Pumps	LB2	1	1	1.4	1
9	Mech_HX_01	Heat Exchangers	LB2	1	1	2	1
	Mech_HX_02	Heat Exchangers	LB2	1	1	2	1
	Mech_HX_03	Heat Exchangers	LB2	1	1	2	1
10	Mech_PUNIT_01	System Pressurisation Unit	LB2	1.2	0.64	1.5	0.768
	Mech_PUNIT_02	System Pressurisation Unit	LB2	1.2	0.64	1.5	0.768
	Mech_PUNIT_03	System Pressurisation Unit	LB2	1.2	0.64	1.5	0.768
	Mech_PUNIT_04	System Pressurisation Unit	LB2	1.2	0.64	1.5	0.768
11	Mech_BV_01	Buffer Vessel	LB2	3	3	1.5	7.068583471
12	PH_TANK_01	Wet Riser Tank	LB2	4	3	3	12
13	PH_TANK_02	Wet Riser Tank	LB2	4	3	3	12
14	PH_TANK_03	Sprinkler Tank	LB2	6	5	3	30
15	PH_TANK_04	Sprinkler Tank	LB2	6	5	3	30
16	PH_TANK_05	Domestic Water Tank	LB2	5	5	3	25
17	PH_TANK_06	Harvested Water Tank	LB2	3	3	3	9
18	Elec_TRANS_01	MV/LV Room	LB2	12	6	8	72
20	Elec_UKPN_01	UKPN Room	LB2	5.43	4.72	4	25.63
21	Elec_UKPN_02	UKPN Room	LB2	5.43	4.72	4	25.63
22	Elec_UKPN_03	UKPN Room	LB2	5.43	4.72	4	25.63
23	Elec_LBANK_01	Load Bank	LB2	3.5	4.5	4	15.75
24	Elec_LSAFETY_01	Life Safety Room	LB2	10	5	4	50
26	Mech _CTW_01	Cooling Tower Water Makeup Tank	LB3	5	2.5	4	12.5
27	Mech _PUMP_09	Pumps	LB2	1	1	1.4	1
	Mech _PUMP_10	Pumps	LB2	1	1	1.4	1

Figure 8-14 Basement Level 2 Plant Schedule.

8.5.2 Level 35

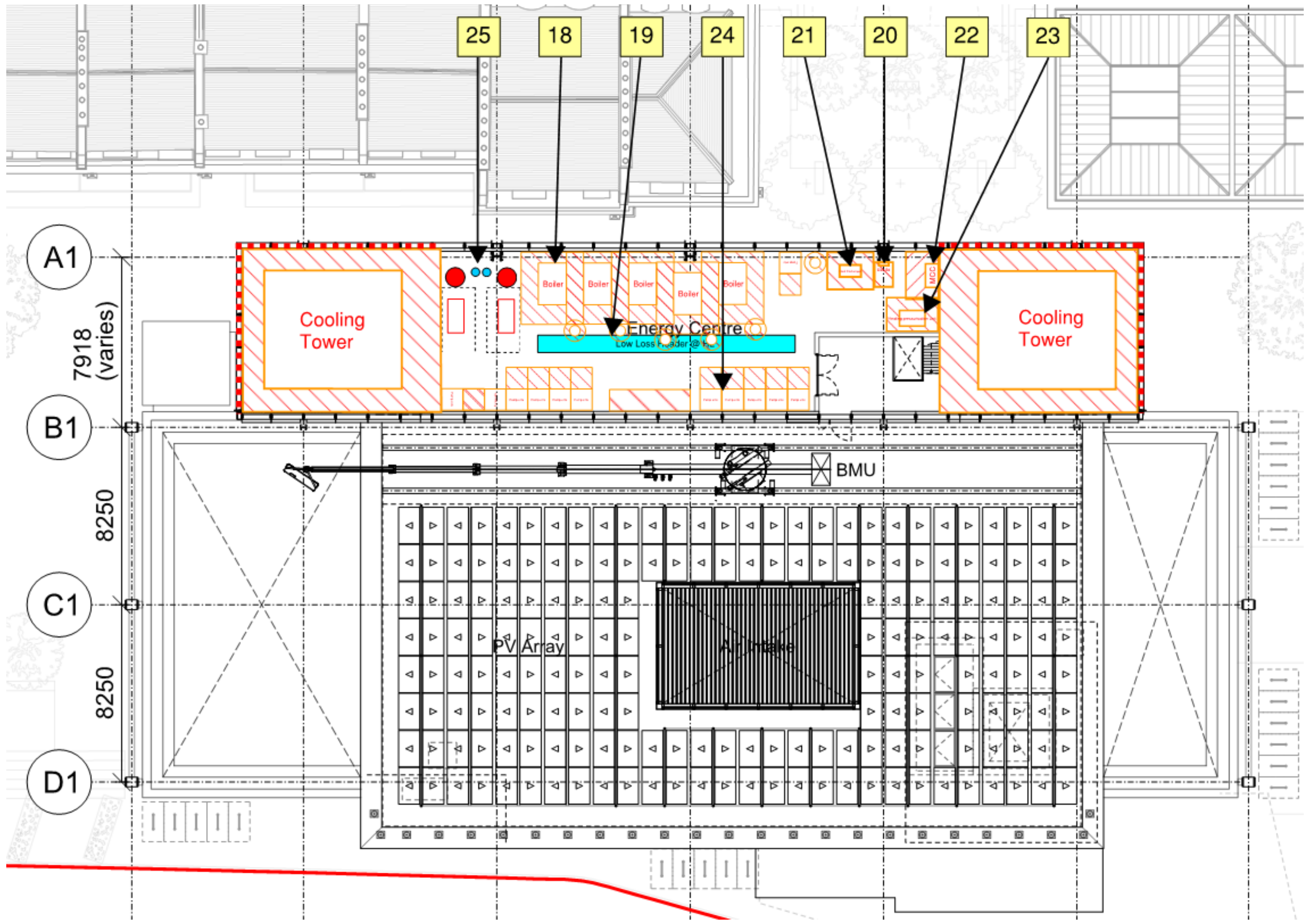


Figure 8-15 Level 35 Plant Layout

Markup Number	Ref	System - Equipment	Level	Equipment - Dimensions			
				L(m)	W(m)	H(m)	Net Area (m^2)
18	Mech_BLR_01	Boiler	35	1.95	1.3	2	2.535
	Mech_BLR_02	Boiler	35	1.95	1.3	2	2.535
	Mech_BLR_03	Boiler	35	1.95	1.3	2	2.535
	Mech_BLR_04	Boiler	35	1.95	1.3	2	2.535
	Mech_BLR_05	Boiler	35	1.95	1.3	2	2.535
19	Mech_LHDR_01	LTHW Header	35	12	0.8	0.8	9.6
20	Mech_EBOARD_01	Electrical Board	34	0.15	0.46	0.89	0.069
21	Mech_HEX_01	Heat Exchanger	34	0.94	0.53	1.99	0.4982
22	Mech_MCC_01	MCC	34	0.65	1.2	2.3	0.78
23	Mech_PUNIT_01	Pressurisation unit	34	1.2	0.64	1.5	0.768
24	Mech_PUMP_01	Pump	34	1	1	1.4	1
	Mech_PUMP_02	Pump	34	1	1	1.4	1
	Mech_PUMP_03	Pump	34	1	1	1.4	1
	Mech_PUMP_04	Pump	34	1	1	1.4	1
	Mech_PUMP_05	Pump	34	1	1	1.4	1
	Mech_PUMP_06	Pump	34	1	1	1.4	1
	Mech_PUMP_07	Pump	34	1	1	1.4	1
	Mech_PUMP_08	Pump	34	1	1	1.4	1
	Mech_PUMP_09	Pump	34	1	1	1.4	1
	Mech_PUMP_10	Pump	34	1	1	1.4	1
	Mech_PUMP_11	Pump	34	1	1	1.4	1
	Mech_PUMP_12	Pump	34	1	1	1.4	1
25	PH_HWC_01	Hot water calorifiers	34	1.6	1	3.8	1.6
	PH_HWC_02	Hot water calorifiers	34	1.6	1	3.8	1.6

Figure 8-16 Level 35 Plant Schedule

8.5.3 Office Air-Handling Equipment

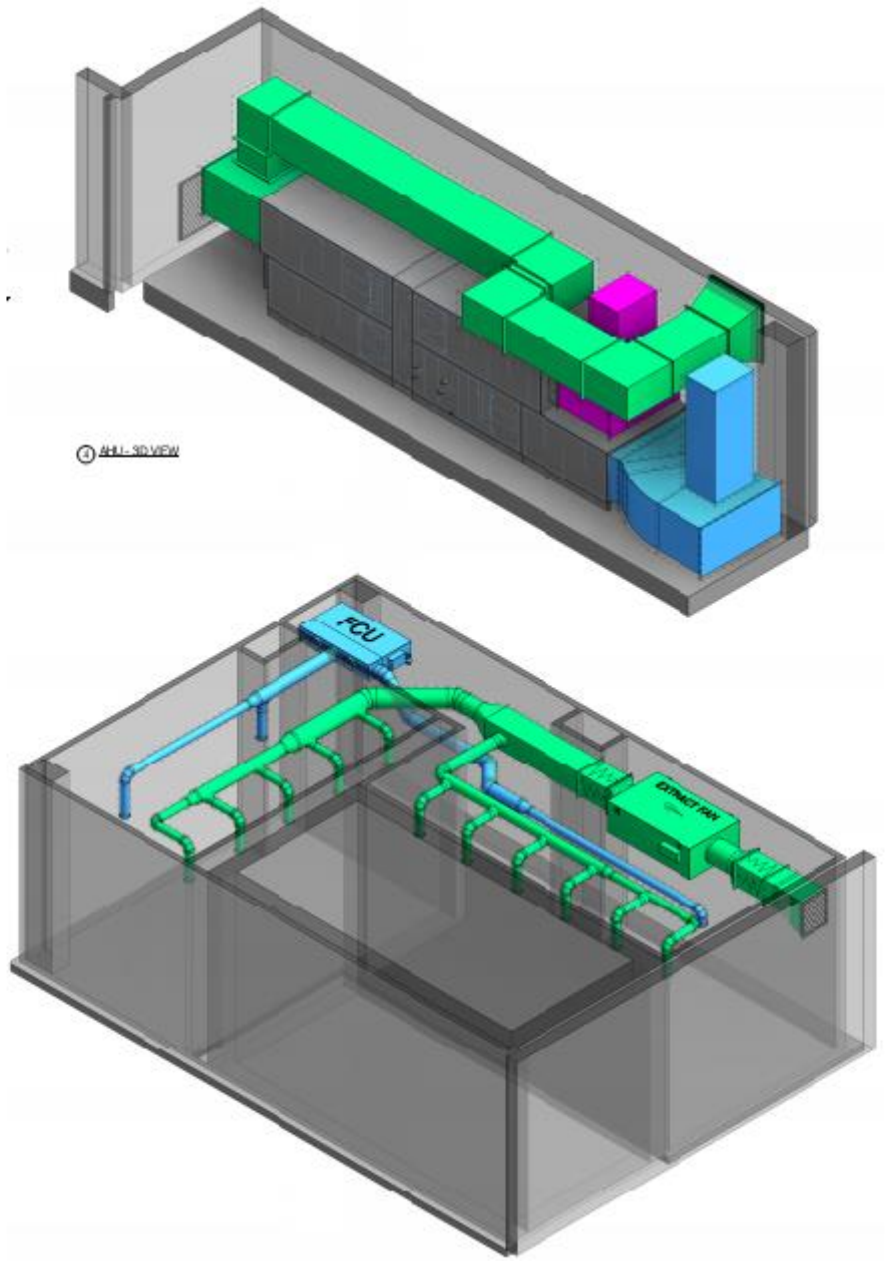


Figure 8-17 Typical Layouts of office air handling equipment.

8.6 Appendix 6 – Communication with Guy's and St. Thomas' Hospital NHS Trust

This appendix includes a copy of the communication with Guy's and St. Thomas' Hospital NHS trust and their subsidiary Essentia in August 2017 and in October 2018, with regards to investigating whether a connection to the NHS Trust heating and/or cooling system close to the site may be feasible.

Herman Calleja

From:	Herman Calleja
Sent:	24 October 2018 08:56
To:	'enquiries@essentia.uk.com'
Cc:	Lucy Vereenooghe; Matthew Thurston; Nitharshan Natarajan
Subject:	RE: Provision of heating/cooling to a nearby project

Dear sir/madam,

Good morning. On the 'London Heat Map' we found a reference to an EU ETS site (at postcode SE1 9RT) and a 'Communal Boiler Study' that belong to the Guys & St Thomas' Hospital NHS Trust.

Currently we are working on a project close to the site. Would you consider (and have capacity) of supplying heating/cooling from your network to a nearby third party project, or are your facilities dedicated exclusively for the use of the Guys & St Thomas' Hospital NHS Trust?

If you would be interested in sharing the facilities with a building nearby please let us know. In case that we do not receive any feedback we will be assuming that such connection and sharing of facilities is not available.

Kind regards,
Herman

From: Herman Calleja
Sent: 14 August 2017 12:54
To: steve.mcguire@gstt.nhs.uk
Cc: Lucy Vereenooghe <lucy.vereenooghe@chapmanbdsp.com>; Matthew Thurston <matthew.thurston@chapmanbdsp.com>; Shikha Bhardwaj <Shikha.Bhardwaj@chapmanbdsp.com>
Subject: Provision of heating/cooling to a nearby project

Dear Steve McGuire

Good afternoon. On the 'London Heat Map' there is a reference to an EU ETS site (at postcode SE1 9RT) and a 'Communal Boiler Study' that belong to the Guys & St Thomas' Hospital NHS Trust.

Currently we are working on a potential project close to this EU ETS site. Would you consider (and have capacity) of supplying heating/cooling from your network to a nearby third party project, or are your facilities dedicated exclusively for the use of the Guys & St Thomas' Hospital NHS Trust?

If you would be interested in sharing the facilities with a building nearby please let us know. In case that we do not receive any feedback we will be assuming that such connection and sharing of facilities is not available.

Kind regards,
Herman