Energy Statement

11 – 15 Kings Terrace, London NW1 0JP

April 2021

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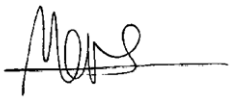
Contents

Document Control

Prepared By:	Marcus Eves	Signed:	
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Revision History

Revision	Date	Details
-	08/04/2021	First Issue

Disclaimer

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This report has been produced to demonstrate compliance with Part L of the Building Regulations and Local/regional policies relating to sustainability. How this impacts upon other aspects of the Building Regulations will need to be checked and confirmed by a suitably qualified professional.

1. Executive Summary

1.1 This Energy Statement has been prepared in support of a planning application 11 – 15 Kings Terrace, London NW1 0JP. The application consists of the Partial demolition of no 11-13 and demolition and rebuilding of no 15 King's Terrace, creation of a basement across the whole site and change of use from office to three separate residential properties plus office.

1.2 This sustainability and energy statement has been produced to show compliance with the relevant sections of Policy CC1 Climate Change Mitigation contained within the Camden Local Plan 2017. This is achieved by outlining the predicted energy demand and resultant carbon emissions of the development. It also shows how the proposals have incorporated energy efficiency measures, low carbon and renewable technologies in order to mitigate the effects of climate change.

1.3 In order to meet the requirements, the energy hierarchy has been followed. The regulations for refurbishments has been followed; Part L1B (Dwellings) and Part 2LB (Non-Domestic) compliant SAP and SBEM Calculations have been prepared for the site using the methodology set out in the core strategy. Calculations have been carried out following the energy hierarchy, Be Lean, Be Clean and Be Green to maximise onsite energy savings.

1.4 The development has improved upon the building regulation requirements through passive design and a fabric first approach. High levels of insulation and energy efficient services and fixings have been specified.

1.5 At the Be Lean stage it has been demonstrated that a 14.50% improvement in emissions has been achieved over the baseline through energy efficient design and the specification of high efficiency building services.

1.6 District or community heating has not been considered as the site lies outside of a Heat Network Priority Area, and there are no existing or proposed networks in the vicinity of the development.

1.7 For the third stage, Be Green, Solar PV Panels and an air source heat pump (ASHP) has been included into the design proposals to meet a 20% saving in CO_2 emissions as required by Policy CC1.

1.8 The introduction of the ASHP for heating and cooling in the office spaces and PV Panels to the dwellings has resulted in a 32.18% reduction in CO_2 emissions over the Baseline assessment with a 20.68% improvement over the Be Lean stage achieved directly through low carbon/renewable technologies.

1.9 The CO_2 savings achieved are deemed adequate to satisfy Part L1B and Part L2B of the Building Regulations, Camden Local Plan Policy CC1 and the London Plan emissions reduction targets. A summary of the emissions at each stage of the energy hierarchy is shown below.

1.10 Site Wide regulated carbon dioxide emissions

	Regulated carbon dioxide Emissions kg/CO_2/Year
Baseline: Target Emission Rate	16,665.97
Be lean: After Energy Demand Reduction	14,249.25
Be Clean: After Heat Network or Community Heating	14,249.25
Be Green: After Renewable Technologies	11,302.32

1.11 Site Wide regulated carbon dioxide savings

	Regulated carbon dioxide Savings	
	kg/CO_2/Year	**%**
Be lean: After Energy Demand Reduction	2,416.72	14.50%
Be Clean: After Heat Network or Community Heating	0	0.00%
Be Green: After Renewable Technologies	2,946.93	20.68%
Cumulative On-Site Savings	5,363.65	32.18%

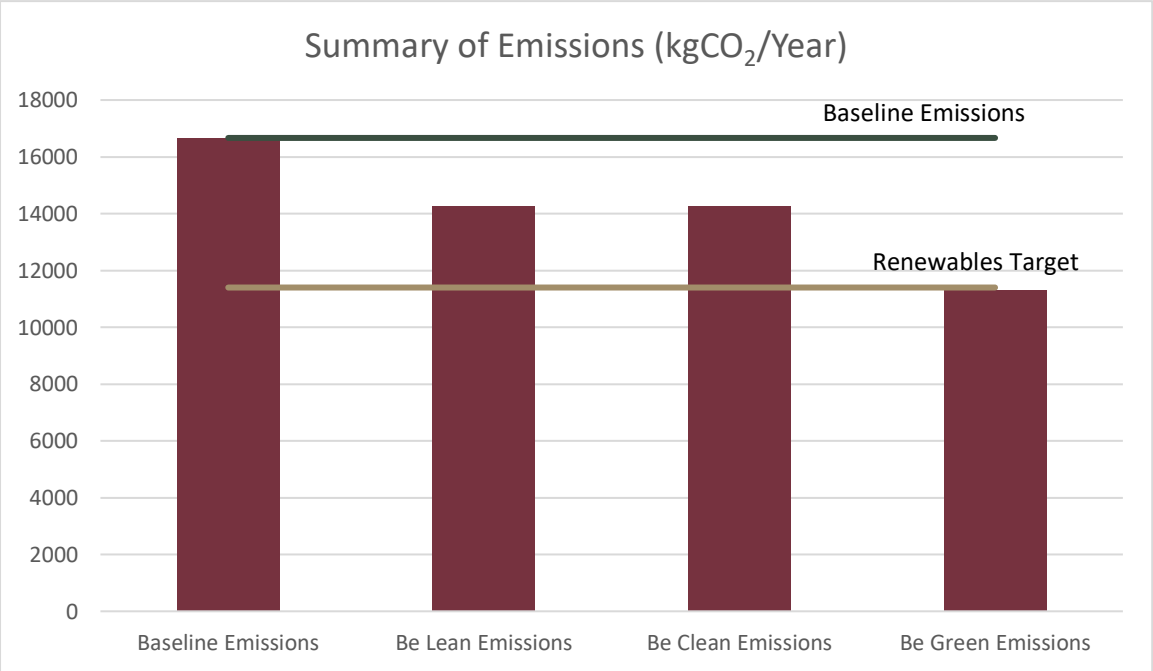

Figure 1: Summary of emissions

2. Introduction

2.1 E & S Bristol have prepared this energy statement on behalf of Carnell Warren Associates Ltd in support of a planning application at 11 – 15 Kings Terrace, London NW1 0JP. The application consists of the Partial demolition of no 11-13 and demolition and rebuilding of no 15 King's Terrace, creation of a basement across the whole site and change of use from office to three separate residential properties.

2.2 The statement outlines how the proposed development complies with the National Planning Policy Framework with regards to achieving a sustainable development. The objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own need.

2.3 In particular this statement sets out the approach to satisfying the environmental objectives of Camden Council planning policy. This will be achieved by contributing to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change.

2.4 This report has been designed to show compliance with the relevant policies of Sustainable Infrastructure contained within Chapter 9 of the London Plan 2021 and Policy CC1 of the Camden Local Plan. This report has been produced following the London Plan Energy Assessment Guidance, April 2020 and Camden Planning Guidance Energy Efficiency and Adaptation, January 2021.

2.5 The following documents have been used and referred to in this statement in order to deliver compliance with National, Regional and Local Policy;

- The National Planning Policy Framework (February 2019)
- The London Plan (March 2021)
- Camden Local Plan (July 2017)
- Camden Planning Guidance Energy efficiency and Adaptation (January 2021)
- Approved Document L1B: Conservation of fuel and power in existing dwellings (2010 Edition, 2018 Amendments)
- Approved Document L2B: Conservation of fuel and power in existing buildings other than dwellings (2010 Edition, 2018 Amendments)

2.6 Consideration has been given to the current and future intentions of the building regulations and planning policy for sustainable development.

3. Policy Review

London Plan Chapter 9 Sustainable Infrastructure

3.1 The core policy which this document relates to is Policy SI 2 Minimising greenhouse gas emissions which is detailed below;

A. Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

1) *be lean: use less energy and manage demand during operation*
2) *be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly*
3) *be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site*
4) *be seen: monitor, verify and report on energy performance.*

B. Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

C. A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:*

1) *through a cash in lieu contribution to the borough's carbon offset fund, or*
2) *off-site provided that an alternative proposal is identified and delivery is certain.*

D. Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.

E. Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.

F. Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

Camden Local Plan (2017) Policy CC1 Climate change mitigation

3.2 Camden Local Plan (2017) Policy CC1 Climate change mitigation is outlined below;

The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

We will:

a. promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
b. require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
c. ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
d. support and encourage sensitive energy efficiency improvements to existing buildings;
e. require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and
f. expect all developments to optimise resource efficiency.

For decentralised energy networks, we will promote decentralised energy by:

g. working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;
h. protecting existing decentralised energy networks (e.g. at Gower Street, Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and
i. requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network.

To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment.

3.3 The energy hierarchy as referenced in the Camden Local Plan (2017) is outlined below;

Be lean

8.9 Proposals should demonstrate how passive design measures including the development orientation, form, mass, and window sizes and positions have been taken into consideration to reduce energy demand, demonstrating that the minimum energy efficiency requirements required under building regulations will be met and where possible exceeded. This is in line with stage one of the energy hierarchy 'Be lean'.

Be clean

8.10 The second stage of the energy hierarchy 'Be clean' should demonstrate how the development will supply energy efficiently through decentralised energy. Please refer to the section below on decentralised energy generation.

Be green

8.11 The Council will expect developments of five or more dwellings and/or more than 500 sqm of any gross internal floorspace to achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation (which can include sources of site related decentralised renewable energy), unless it can be demonstrated that such provision is not feasible. This is in line with stage three of the energy hierarchy 'Be green'. The 20% reduction should be calculated from the regulated CO2 emissions of the development after all proposed energy efficiency measures and any CO2 reduction from non-renewable decentralised energy (e.g. CHP) have been incorporated.

8.12 All major developments will also be expected to demonstrate how relevant London Plan targets for CO2 reduction, including targets for renewable energy, have been met. Where it is demonstrated that the required London Plan reductions in carbon dioxide emissions cannot be met on site, the Council will require a financial contribution to an agreed borough wide programme to provide for local low carbon projects. The borough wide programme will be connected to key projects identified in the Council's Green Action for Change

Camden Planning Guidance I Energy efficiency and adaptation

3.4 *Section 6. Energy Statements*

KEY MESSAGES

- *Energy statements are required for all developments involving 5 or more dwellings and/or more than 500sqm of any (gross internal) floorspace.*
- *Energy statements should demonstrate how a development has been designed following the steps in the energy hierarchy.*
- *The energy reductions should accord with those set out in the Chapter below 'Energy reduction'.*

Table 1a: Energy statement information, residential

Key: ✓*Development should comply with these standards/provide this information*	***Residential Refurbishment (assessed under L1B)***		
	Major *(10+ units or >1,000 sqm)*	***Medium*** *(5-9 units, >500sq.m and <1,000 sqm)*	***Minor*** *(up to 4 units and <500 sqm)*
Energy and carbon reduction targets			
Energy Statement required (Local Plan CC1, London Plan 5.2, 5.3) follow GLA Guidance on Preparing Energy Assessments.	✓	✓	*Not required – however, performance against carbon reduction targets should be included in a Sustainability Statement following the methodology below*
Energy assessment methodology	*Calculated through the Part L 2013 of the Building Regulations methodology Standard Assessment Procedure (SAP) 2012* *Non regulated emissions (i.e. cooking, appliances) should also be included in the report but included in the overall carbon reduction figures. The total non-regulated emissions can be established by using BREDEM (BRE Domestic Energy Model) or similar methodology*		
Baseline calculation	*Dwelling Emissions Rate (DER) for the existing dwelling, as well as a Building Regulations Compliant baseline (i.e. inputting the minimum building specification according to Part L1B following application of the usual Part L1B "payback test" methodology)*		

Table 1b: Energy statement information, non-domestic

Key: ✓*Development should comply with these standards/provide this information*	***Non-domestic Refurbishment (assessed under L2B)***		
	Major *(10+ units or >1,000 sqm)*	***Medium*** *(5-9 units, >500sq.m and <1,000 sqm)*	***Minor*** *(up to 4 units and <500 sqm)*
Energy and carbon reduction targets			
Energy Statement required (Local Plan CC1, London Plan 5.2, 5.3) follow GLA Guidance on Preparing Energy Assessments.	✓	✓	*Not required*
Energy assessment methodology	*National Calculation Methodology (NCM) and implemented through Simplified Building Energy Model (SBEM) v5.2d or later or equivalent software – presented in the BRUKL.* *Non regulated emissions (i.e. catering and computing) should also be included in the report but included in the overall carbon reduction figures. The total non-regulated emissions can be established from individual end use figures from CIBSE guide baselines (e.g. CIBSE Guide F) or through evidence established through previous development work*		
Baseline calculation	*Building Emissions Rate (BER) for the existing building, as well as a Building Compliant baseline (i.e. inputting the minimum building specification according to Part L2B following application of the usual Part L1B "payback test" methodology)*		

3.5 *Section 7. Energy Reduction*

KEY MESSAGES

- *All development in Camden is expected to reduce carbon dioxide emissions through the application of the energy hierarchy.*
- *All new build major development to demonstrate compliance with London Plan targets for carbon dioxide emissions.*
- *Deep refurbishments (i.e. refurbishments assessed under Building Regulations Part L1A/L2A) should also meet the London Plan carbon reduction targets for new buildings.*
- *All new build residential development (of 1 – 9 dwellings) must meet 19% carbon dioxide reduction; and*
- *Developments of five or more dwellings and/or more than 500sqm of any gross internal floorspace to achieve 20% reduction in carbon dioxide emissions from on-site renewable energy generation*

Table 2a: Energy reduction targets, domestic

Development should comply with these standards/provide this information	***Residential Refurbishment (assessed under L1B)***		
	Major *(10+ units or >1,000 sqm)*	***Medium*** *(5-9 units, >500sq.m and <1,000 sqm)*	***Minor*** *(up to 4 units and <500 sqm)*
Energy and carbon reduction targets			
Overall carbon reduction targets:	*Greatest possible reduction - meeting Part L1B for retained thermal elements (London Plan 5.4, Local Plan CC1)*	*Greatest possible reduction - meeting Part L1B for retained thermal elements (London Plan 5.4, Local Plan CC1)*	*Greatest possible reduction - meeting Part L1B for retained thermal elements (London Plan 5.4, Local Plan CC1)*
Reduction in CO2 from onsite renewables (after all other energy efficiency measures have been incorporated)	*20% (London Plan 5.4, 5.7, Local Plan CC1)*	*20% (London Plan 5.4, 5.7, Local Plan CC1)*	*Incorporate renewables where feasible*

Table 2b: Energy reduction targets, non-domestic

Development should comply with these standards/provide this information	***Residential Refurbishment (assessed under L1B)***		
	Major *(10+ units or >1,000 sqm)*	***Medium*** *(5-9 units, >500sq.m and <1,000 sqm)*	***Minor*** *(up to 4 units and <500 sqm)*
Energy and carbon reduction targets			
Overall carbon reduction targets:	*Greatest possible reduction, meeting Part L2B for retained thermal elements. (London Plan 5.4, Local Plan CC1)*	*Greatest possible reduction below Part L of 2013 Building Regulations (Local Plan CC1)*	*Greatest possible reduction below Part L of 2013 Building Regulations (Local Plan CC1)*
Reduction in CO2 from onsite renewables (after all other energy efficiency measures have been incorporated)	*20% (London Plan, Local Plan CC1)*	*20% (London Plan, Local Plan CC1)*	*Incorporate renewables where feasible*

Policy Summary

3.6 As the development has more than 500m^2 of gross internal floorspace, the target is to a achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation. The baseline emission rate will be calculated using Part L1B and Part L2B methodology due to the development consisting of refurbishment and change of use works. There is no target reduction in energy demand or CO_2 emissions above the Part L complaint Baseline.

4. Methodology and the Energy Hierarchy

4.1 This energy assessment will be calculated in line with the methodologies as outlined in The Greater London Authority Energy Assessment Guidance (April 2020). In order to calculate the CO_2 emissions, the dwellings have been modelled using Stroma FSAP 2012 software and the office area in IES Virtual Environment 2021.

4.2 As required by the London Borough of Camden and the London Plan 2021 the development has been designed in line with the principles of the energy hierarchy.

4.3 Subsequently the regulated emissions will be calculated at the Be Lean, Be Clean, Be Green stages of the energy Hierarchy following the outcome of investigation at these stages.

4.4 At the Be Lean stage sustainable design principles will be implemented to go beyond the Part L Building Regulations using efficient design and building services. At the Be Clean stage the feasibility of decentralised energy supply will be examined, including districting heating and CHP. Finally, at the Be Green stage a feasibility study for renewable technologies will be undertaken and depending upon the results renewable technologies will be implemented.

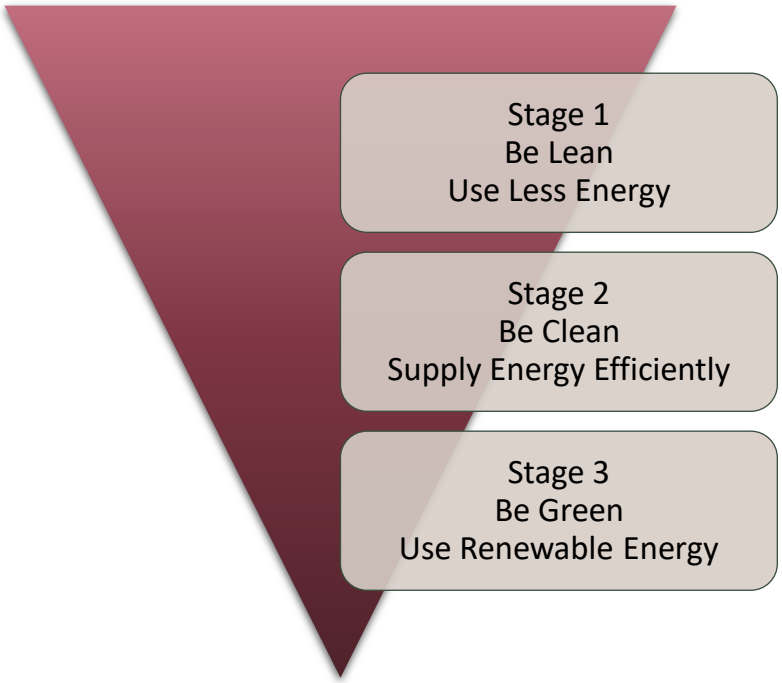

Figure 2: The Energy Hierarchy

5. Baseline Assessment

5.1 This energy assessment will first establish the developments baseline energy demand. The assessment will be split up into two parts to reflect the residential and non-domestic areas.

5.2 Following the Camden Planning Guidance on Energy efficiency and adaptation (January 2021) conventions, the Baseline Emissions Rate for the existing dwellings and office will be based on inputting the minimum building specification according to Part L1B and Part L2B following application of the usual Part L "payback test" methodology.

5.3 In line with the requirements of the London Plan Energy Assessment Guidance when determining the baseline for the new build areas, it is assumed that the heating would be provided by gas boilers and that any active cooling would be provided by electrically powered equipment, therefore a gas fired boiler serving radiators and electric cooling has been specified. The efficiencies of the system are based on the minimum standards outlined in the Domestic/Non-Domestic Building Services Compliance Guide.

5.4 Please note, 11, 13 and 15 Kings Terrace are all dwellings, the non-domestic area is referred to as 'Office Area'.

5.5 Baseline Summary

	Total Floor Area (m2)	Baseline Emission Rate $kgCO_2/m^2/Year$	Total Emissions $kgCO_2/Year$
11 Kings Terrace (Dwelling)	101.89	24.25	2,470.83
13 Kings Terrace (Dwelling)	107.20	23.43	2,511.70
15 Kings Terrace (Dwelling)	206.23	19.36	3,992.61
Office Area	207.30	37.10	7,690.83
		Total	**16,665.97**

Table 1: Summary of emissions (regulated) of Building Regulations baseline assessment

	Heating Demand (kWh/year)	Cooling Demand (kWh/year)	Auxiliary Demand (kWh/year)	Lighting Demand (kWh/year)	Hot Water Demand (kWh/year)	Total Energy Demand (kWh/year)
11 Kings Terrace	7,510.98	0.00	75.00	430.46	2,713.21	10,729.65
13 Kings Terrace	7,653.53	0.00	75.00	442.83	2,730.85	10,902.21
15 Kings Terrace	13,938.94	0.00	75.00	650.00	2,806.69	17,470.63
Office Area	8,236.03	2,734.29	149.26	6,675.06	4,361.59	22,156.22
Total	**37,339.48**	**2,734.29**	**374.26**	**8,198.35**	**12,612.34**	**61,258.71**

Table 2: Summary of energy (regulated) of Building Regulations baseline assessment

5.6 The site wide Baseline Emissions and energy demand are summarised below:

Site Wide Baseline Emissions 16,665.97 $KgCO_2/Year$

Site Wide Baseline Energy Demand 61,258.71 kWh/Year

6. Energy Efficient Design

6.1 From the outset a high standard of sustainable design and construction has been incorporated into the design of the proposal. The building has been designed to maximise the potential for passive energy savings.

6.2 Part L Schedule 1 confirms:

"Reasonable provision shall be made for the conservation of fuel and power in buildings by:

a) Limiting heat gains and losses –

(i) Through thermal elements and other parts of the building fabric; and

(ii) From pipes, ducts and vessels used for space heating, space cooling and hot water services;

b) Providing fixed building services which –

(i) Are energy efficient;

(ii) Have efficient controls; and

(iii) Are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances"

6.3 To reduce CO_2 emissions throughout the development high levels and high-performance insulation will be specified. Through increased thickness and an improved thermal conductivity of the insulation the U-Values for the thermal elements will exceed the Building Regulations Part L standards. These high levels of insulation will help to contain heat within the dwellings and offices therefore reducing demand on the heating and the associated CO_2 emissions.

6.4 For the dwellings, the ventilation strategy consists of system 1 (trickle vents and intermittent extract fans). Mechanical extract fans will be installed in the kitchen and wet rooms with fresh air supplied via background ventilation in the habitable spaces. Fans with a low specific fan power will be selected, which means that the system requires reduced amounts of energy to run effectively.

6.5 The dwellings will also benefit from lighting which will be low energy LED fittings throughout defined as having an efficacy greater than 45 Lumens/circuit Watt.

6.6 In the office the ventilation will also be natural, with extract fans in the wet rooms only. The lighting used will be low energy LEDs throughout. All fittings will have a minimum efficacy of 100 lumens per circuit watt.

6.7 At this stage of the hierarchy a gas boiler has been specified to provide the heating and hot water.

6.8 The following Tables provides a summary of the energy efficient and carbon reducing design characteristics incorporated across the development.

Thermal Element/ Controlled Service	Specification	U-value
Basement Floors	Specification TBC	0.20 W/m²k
Exposed Upper Floors	Specification TBC	0.20 W/m²k
Floor Over Commercial	Specification TBC	0.20 W/m²k
Existing Brick Walls	Internally Insulated – Specification TBC	0.30 W/m²k
Existing Basement Walls	Internally Insulated – Specification TBC	0.30 W/m²k
Walls to Commercial	Specification TBC	0.25 W/m²k
New Top Floor Walls	Light Weight Frame – Specification TBC	0.25 W/m²k
Party Walls between Dwellings	Solid Walls	0.00 W/m²k
Flat Roof/Terrace (Existing)	Specification TBC	0.16 W/m²k
New Roof Slope	Specification TBC	0.16 W/m²k
New Main Flat roofs	Specification TBC	0.16 W/m²k
Windows	Double glazed Argon filled G-Value:0.63. Light Transmittance: 0.72	1.40 W/m²k
Rooflights	Double glazed Argon filled G Value: 0.63. Light Transmittance: 0.72	1.40 W/m²k
Solid Doors	Insulated Doors	1.40 W/m²k
Air Permeability	Score of 15.00 m^3/hm^2 Exempt from testing	
Thermal Bridging	Standard Construction Details	
Thermal Mass	Lightweight	
Ventilation	Local Intermittent Extract Only	
Heating System	Gas fired boiler to radiators. Vaillant ecoTEC plus 624 - Manufacturers declared Efficiency 89.4%	
Heating Controls	Time and temperature zone controls Vaillant VRT 50 Thermostat	
Hot Water	From Main Boiler - 210L Megaflo Eco. Standing Losses: 1.42 kWh/24	
Lighting	Low Energy throughout - Lighting efficiency greater than 45 Lumens per circuit Watt	

Table 3: Be Lean building specification of dwellings

Thermal Element/ Controlled Service	Specification	U-value
Basement Floors	Specification TBC	0.20 W/m²k
Exposed Upper Floors	Specification TBC	0.20 W/m²k
Floor Over Commercial	Specification TBC	0.20 W/m²k
Existing Brick Walls	Internally Insulated – Specification TBC	0.30 W/m²k
Existing Basement Walls	Internally Insulated – Specification TBC	0.30 W/m²k
Walls to Commercial	Specification TBC	0.25 W/m²k
New Top Floor Walls	Light Weight Frame – Specification TBC	0.25 W/m²k
Party Walls between Dwellings	Solid Walls	0.00 W/m²k
Flat Roof/Terrace (Existing)	Specification TBC	0.16 W/m²k
New Roof Slope	Specification TBC	0.16 W/m²k
New Main Flat roofs	Specification TBC	0.16 W/m²k
Windows	Double glazed Argon filled - G-Value:0.63. Light Transmittance: 0.72	1.40 W/m²k
Rooflights	Double glazed Argon filled - G-Value:0.63. Light Transmittance: 0.72	1.40 W/m²k
Solid Doors	Insulated Doors	1.40 W/m²k

Air Permeability	Score of 15.00 m^3/hm^2 Exempt from testing	
Thermal Bridging	Standard Construction Details	
Thermal Mass	Lightweight	
Ventilation	Natural Ventilation	
	WCs	6L/s flow rate per WC & Specific Fan Power: 0.5W/l/s
	Shower	15L/s flow rate per WC & Specific Fan Power: 0.5W/l/s
Heating System	Gas Fired Boiler serving radiators Efficiency 91%	
Cooling System	Electric Cooling System –E.E.R: 2.6	
Heating Controls	Time and temperature zone controls	
Hot Water	From Gas Boiler	
Lighting	Low Energy LED Lighting throughout	
	Whole Building	Minimum efficacy 100 Lm/cW
Lighting Controls	Manual Switching only	
Metering	No BMS or separate end use metering	
Electric Power Factor	Less than 0.9	

Table 4: Be Lean building specification Commercial Unit

7. Be Lean Stage (Use Less Energy)

7.1 Incorporating the energy efficient design features results in the emissions outlined in Table 5, the resulting energy demand is shown in Tables 6.

	Total Floor Area (m2)	Be Lean Emission Rate $kgCO_2/m^2$/Year	Total Emissions $kgCO_2$/Year
11 Kings Terrace	101.89	21.13	2,152.94
13 Kings Terrace	107.20	20.64	2,212.61
15 Kings Terrace	206.23	17.77	3,664.71
Office Area	207.30	30.00	6,219.00
		Total	**14,249.25**

Table 5: Summary of emissions at the Be Lean Stage

	Heating Demand (kWh/year)	Cooling Demand (kWh/year)	Auxiliary Demand (kWh/year)	Lighting Demand (kWh/year)	Hot Water Demand (kWh/year)	Total Energy Demand (kWh/year)
11 Kings Terrace	6,272.41	0.00	75.00	430.46	2,713.21	9,491.08
13 Kings Terrace	6,498.33	0.00	75.00	442.83	2,730.85	9,747.01
15 Kings Terrace	12,655.98	0.00	75.00	650.00	2,806.69	16,187.67
Office Area	9,150.22	2,220.18	149.26	4,005.04	4,361.59	19,886.29
Total	**34,576.94**	**2,220.18**	**374.26**	**5,528.33**	**12,612.34**	**55,312.05**

Table 6: Summary of energy demand at the Be Lean Stage

7.2 The total site wide Be Lean emissions are summarised below:

Site Wide Building Baseline CO_2 emissions 16,665.97 $KgCO_2$/Year

Site Wide Building Be Lean CO_2 emissions 14,249.25 $KgCO_2$/Year

7.3 The Be Lean emissions improve upon the Baseline Emission Rate by 14.5**%**. This has been achieved through energy efficient design, including fabric insulation upgrades and the specification of high efficiency services.

7.4 The Be Lean energy demand improves upon the Baseline Energy demand by a margin of 9.71%.

8. Be Clean Stage

8.1 Community and District Heating

8.2 Policy SI 3 of the London Plan and Policy CC1 of the Camden Local Plan encourage developments to move to decentralised generation of heat and power seeking to reduce the losses and inefficiencies of reliance upon a centralised system. The mayor has set a target of 25% to be generated through localised decentralised energy systems by 2025.

8.3 The London heat map has been consulted to establish if there are any existing or proposed heating networks in the vicinity of the development. With the results shown in Figure 3 below.

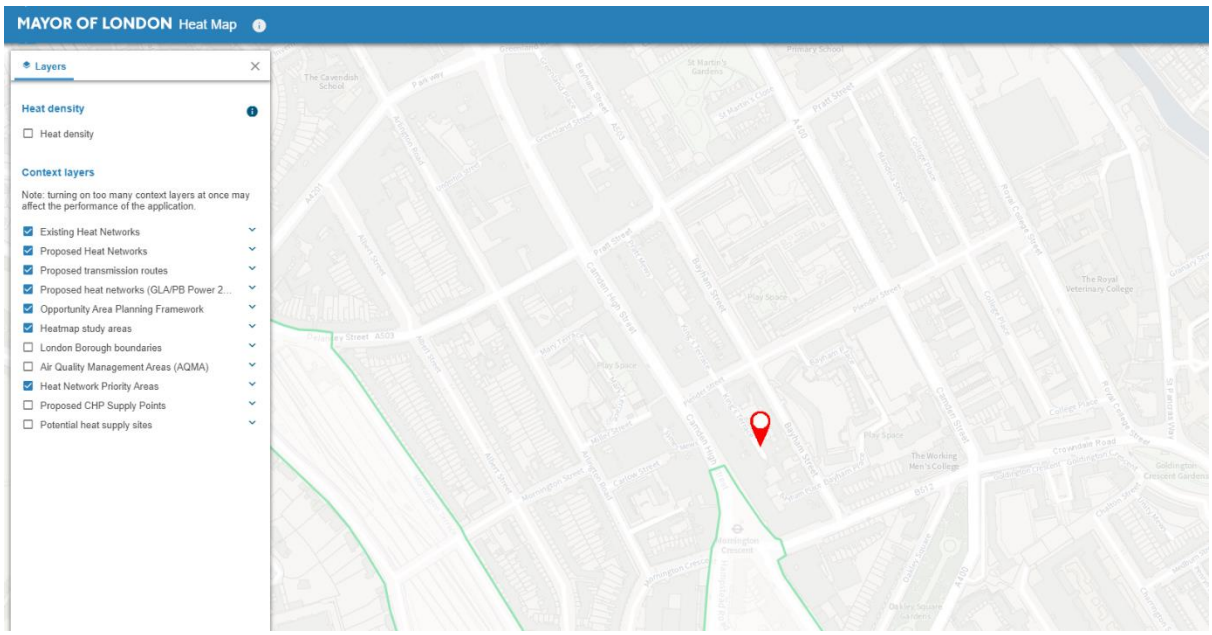

Figure 3: The Energy Hierarchy

8.4 After consulting the London heat map its evident that the site falls under scenario 3 In GLA energy statement guidance. This is development in areas where an area wide heat network is not proposed, and which is not within an area of decentralised potential.

8.5 Whilst the site lies inside of a Heat Network Priority Area, at present there are no nearby heat networks and no plans to extend any existing district heat networks to the vicinity of this development. Therefore, district heating is not appropriate and will not be considered for this application.

9. Be Green Stage

9.1 The following sections discuss the renewable energy generation measures that have been considered, and those which will be implemented at the development. Renewable technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available, however, not all of these are commercially viable and suitable to the site.

9.2 The feasibility of the renewable technologies has been undertaken with the results included in Table 7 below.

Technology	Suitable for the Proposal	Further Details
Solar Photovoltaics	Yes	The development has an area of flat roof which could accommodate a solar PV system. The panels can be located either horizontally or at a low inclination. However, consideration would need to be given to any visual impact and the technical aspects of mounting the panels on a flat roof. As PV systems have no moving parts, generate no noise or pollution, this is an attractive option. If designed and properly installed, they require minimal maintenance and have long service lifetimes.
Solar Water Heating (Solar Thermal)	No	As mentioned above there is adequate space on the roofs, although after PV, space may be restricted. Solar thermal would require the installation of a hot water cylinder. Solar thermal provides limited emissions savings as they can only cover a proportion of the hot water load. For higher emissions savings they would need to be linked with other low carbon or renewable systems to meet the emission reduction targets.
Air Source Heat Pumps (ASHP)	Yes	An air source heat pump (ASHP) would be suitable for the proposal as there is external space required for the outdoor units. ASHP has become more viable as higher coefficients of performance are achievable throughout the year. A VRV air source heat pump can provide highly efficient heating and cooling simultaneously, through air distribution, maximising comfort for the building users. Furthermore, with the decarbonisation of the grid the emissions associated with ASHPS is continually decreasing. For the residential unit ASHP would not be suitable for the proposal as there is limited external space required for the outdoor units owing to this being upper floor flats with limited amenity space. In addition, a mains gas supply is available to the proposal, the lower CO_2 emissions from gas heating as opposed to electric for ASHPs renders this technology less favourable.
Ground Source Heat Pump (GSHP)	No	The building is situated in a built-up area. There is limited available outside space needed to accommodate ground loop coils or a borehole required for the system. A GSHP would incur excessive infrastructure and excavation costs, disproportionate to the cost of the proposal.
Wind Turbines	No	Due to the suburban and sheltered nature of the site and the potential visual, flicker and noise impact wind turbines would not be suitable.
Biomass	No	A biomass boiler has been ruled out primarily due to the combustion in smaller scale systems and associated fuel transport are likely to have adverse impacts on air quality in an area. Also, the need for a solid fuel store and a plant room increases the space requirement on an already limited site.

Table 7: Renewables feasibility study

9.3 Within the above study, solar PV has been identified as suitable for the dwellings. As a result of this a 6.0 kWp solar PV system has been incorporated into the SAP calculations. The panels are to be located on the main flat roofs horizontally with no shading issues.

9.4 In addition to the solar PV, calculations will be carried out incorporating an air source heat pump as the primary heat source for the office space. A VRV air source heat pumps will specified to provide heating and cooling and will be designed to have a minimum coefficient of performance of 4.0 (Heating Efficiency 400%) and an Energy Efficiency ratio of 4.0 (Cooling Efficiency of 400%). Hot water for the office will be provided by local instantaneous/ standalone electric hot water heaters.

9.5 The resultant CO_2 emissions and energy demand after the incorporation of the air source heat pump are shown in the tables below.

	Total Floor Area (m2)	Be Green Emission Rate $kgCO_2/m^2$/Year	Total Emissions $kgCO_2$/Year
11 Kings Terrace	101.89	13.39	1,364.31
13 Kings Terrace	107.20	13.27	1,422.54
15 Kings Terrace	206.23	13.95	2,876.91
Office Area	207.30	27.2	5,638.56
		Total	**11,302.32**

Table 8: Summary of emissions at the Be Green Stage

	Heating Demand (kWh/year)	Cooling Demand (kWh/year)	Auxiliary Demand (kWh/year)	Lighting Demand (kWh/year)	Hot Water Demand (kWh/year)	PV Energy Generation (kWh/year)	Total Energy Demand (kWh/year)
11 Kings Terrace	6,272.41	0.00	75.00	430.46	2,482.40	-1,520.99	7,739.28
13 Kings Terrace	6,498.33	0.00	75.00	442.83	2,499.10	-1,520.99	7,994.27
15 Kings Terrace	12,655.98	0.00	75.00	650.00	2,571.51	-1,520.99	14,431.50
Office Area	2,019.10	1,001.26	64.26	4,005.04	3,770.79	0.00	10,860.45
Total	**27,445.82**	**1,001.26**	**289.26**	**5,528.33**	**11,323.80**	**-4,562.97**	**41,025.50**

Table 9: Summary of energy demand at the Be Green Stage

9.6 The Site Wide Be Green emissions are summarised below:

Site Wide Be Lean CO_2 emissions 14,249.25 $KgCO_2$/Year

Site Wide Be Green CO_2 emissions 11,302.32 $KgCO_2$/Year

9.7 The Be Green emissions improve upon the Baseline Emission Rate by 32.18%. This equates to a reduction in energy demand of 33.03%.

9.8 This equates to a reduction in CO_2 emissions of 20.68% and a reduction in energy demand of 25.83%, achieved against directly through renewable technologies (compared to the Be Lean/Clean Stages).

9.9 The development has reduced its emissions and energy demand following the hierarchy in line with the Core Strategy requirements and is therefore compliant with the planning policy.

10. Conclusions

10.1 E & S Bristol has explored the options for reducing the energy demand and CO_2 emissions for the redevelopment at 11 – 15 Kings Terrace. This energy strategy has identified a set of deliverable energy strategy solutions that when adopted would ensure the development complied with relevant national planning policy, the London Plan and Camden Local Plan policies relating to energy and climate change.

10.2 Energy strategy options were assessed according to the energy hierarchy and the resulting savings calculated against a Building Regulations Part L 2013 baseline. The strategy meets the energy and CO_2 emission saving targets and other related policies applicable to the site and enable each step of the energy hierarchy to be addressed.

10.3 The energy hierarchy has been followed, improving upon the baseline and Building Regulation requirements at the Be Lean stage through high levels of insulation and energy efficient services and fixings. At the Be Clean stage district heating was not found to be favourable for this proposal due the lack of any existing or proposed future networks.

10.4 For the third stage, Be Green, a feasibility study evaluating the suitability of various renewable technologies was undertaken. Both PV panels and a VRV air source heat pump here found to be suitable and have been specified as part of the development.

10.5 The VRV air source heat pumps, has been incorporated into the office area and will be designed to have a minimum coefficient of performance (COP) of 4.0 and an Energy Efficiency Ratio (EER) of 4.0. Proposing air source heat pumps is in line with the future Building Regulations and Policy whereby the grid is becoming decarbonised and the emissions associated with electricity are considerably reduced.

10.6 The calculations have also incorporated a 6.0 kWp array of solar PV on the flat roof of the development, split equally as 2.0 kWp per dwelling. retail unit. Typically, this would equate to 8no. 250W panels on each building with an approximate area of 1.6m^2 each, giving a total area of approx. 12.8m^2 per dwelling.

10.7 To comply with Policy SI 2 of the London Plan and Policy CC1 of the Camden Local Plan, a reduction in CO_2 emissions of 32.18% has been achieved against the Baseline Emission Rate. Of this figure there is a 20.68% improvement in emissions directly through the use of on-site renewable technologies.

10.8 This energy and sustainability statement concludes that the proposed development at 11 – 15 Kings Terrace has met the requirements of Part L1B & L2B of the Building Regulations, the relevant parts of the London Plan and the London Borough of Camden Local Plan Policy CC1.

10.9 Further details are shown in the summary tables and graph overleaf.

11. Summary Tables

11.1 Site-wide regulated carbon dioxide emissions

	Regulated carbon dioxide Emissions kg/CO_2/Year
Baseline: Target Emission Rate	16,665.97
Be lean: After Energy Demand Reduction	14,249.25
Be Clean: After Heat Network or Community Heating	14,249.25
Be Green: After Renewable Technologies	11,302.32

11.2 Site-wide regulated carbon dioxide emission savings

	Regulated carbon dioxide Savings	
	kg/CO_2/Year	**%**
Be lean: After Energy Demand Reduction	2,416.72	14.50%
Be Clean: After Heat Network or Community Heating	0	0.00%
Be Green: After Renewable Technologies	2,946.93	20.68%
Cumulative On-Site Savings	5,363.65	32.18%