Melin

Energy Statement

Former Lamorbey Swimming Centre, 155-159 Station Road, Sidcup

Prepared for Montreaux Station Road Sidcup Ltd

28th May 2021

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All information within this document is based on evidence provided in the form of drawings and specifications.

CPD (Continual Professional Development) records are kept and all technical staff are required to complete a minimum 20 hours per year in training activities.

This document contains the following information:

1. Energy Statement
2. Building Regulations Reports and Predicted Energy Assessment

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EXECUTIVE SUMMARY

1. This Energy Statement has been prepared by Melin Consultants on behalf of Montreaux Station Road Sidcup Ltd (The Applicant) and is submitted to support a planning application seeking full consent for the demolition of the existing building at the former Lamorbey Swimming Centre and redevelopment of the Site to provide a part five, part four-storey building with a 1,239 sqm gym (Use Class D2) at ground floor level and 31 residential dwellings on the upper floors.

2. The primary purpose of this document to explain how the scheme can meet with London Borough of Bexley energy policies, along with those found within the London Plan, incorporating January 2019 updates.

3. Melin Consultants has undertaken a review of the relevant policies and worked with the design team to determine and agree the relevance and approach that should be taken to fulfil each policy.

4. This report additionally illustrates how the scheme complies with the London Plan Energy Hierarchy and follows passive and efficiency improvements before the application of any Low or Zero Carbon (LZC) sources.

5. Envision has produced Part L1A compliant SAP calculations and Part L2a compliant SBEMs to determine the energy and CO_2 emissions for the proposed development, which have been calculated using SAP 10 emission factors.

6. To reduce the energy consumption of the development and to assist in achieving a Building Regulation Part L 2013 compliant development, the following measures are recommended and will need to be incorporated into the detailed design;

   - Building fabric construction U-values significantly improved compared with standard Building Regulations U-values;
   - Reduced Air Permeability, lower than standard Buildings Regulations, and in accordance with prospective development building occupiers;
   - High-efficient Air-Source Heat Pumps providing efficient space and water heating to the residential portion;
   - High-efficient Air-Source Heat Pumps providing efficient heating, cooling and hot water to the D2 use;
   - HVAC system controls ensure installed equipment will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values;
   - High efficiency LED lighting utilizing low-energy control systems such as daylight dimming and occupancy sensing;
   - Reduction in solar gain through the use of lower g-values;
   - Mechanical Extract Ventilation (MEV) to all apartments.

7. The figures used as the basis for this assessment are discussed further in Section 4 of this report.

8. In line with the requirements of the October 2018 update to the 'GLA Guidance on preparing Energy Assessments', the predicted CO_2 emissions and energy demand presented in this report have been calculated using SAP 10 figures. The GLA 'Carbon Emission Reporting Spreadsheet', to be provided with referable planning applications is set up for residential development proposing communal heating systems and for non-residential uses. As the residential portion of the development proposes individual heating systems (not compatible with the GLA Carbon Emission Reporting Spreadsheet) the consumption figures have been manually converted with SAP 10 emission factors and provided in Appendix III. The D2 use has been calculated via the GLA 'Carbon Emission Reporting Spreadsheet' in Appendix II.

Carbon Savings Predicted

9. The regulated site-wide baseline for the development (Part L 2013 compliant using SAP 10 carbon factors) has been calculated as being **84.12 tonnes.CO_2.year**.

10. The site-wide CO_2 emissions following reductions at the 'Be-Lean' Stage, i.e. energy-efficient stage, have been calculated at **75.88 tonnes.CO_2.year**. This represents a **9.80%** reduction in carbon emissions beyond the Part L 2013 compliant baseline;

11. At the 'Be-Clean' stage, district heating and communal heating solutions were assessed for their viability on site. Analysis showed that owing to the development's location, size and servicing strategy, neither were viable for inclusion. Therefore, there are no CO_2 or Energy Demand savings to be shown at this stage.

12. The 'Be-Green' stage, i.e. on-site renewables/low carbon technology accounted for the proposed installation of:

    - VRF Air-Source Heat Pumps (ASHP), with low refrigerant charge, and high efficiency inverter driven compressors, providing heating and cooling to the D2 use;
    - Heat pumps providing hot water to the D2 use; and
    - High-efficient Air-Source Heat Pumps providing efficient space and water heating to the residential portion.

13. The site-wide CO_2 emissions following reductions at the 'Be-Green' Stage, i.e. on-site renewables/low carbon technology, have been calculated at **44.26 tonnes.CO_2.year**.

14. Therefore, in total the development reduces CO_2 emissions by **39.86 tonnes.CO2.year**, equal to a **47.38%** saving beyond the Part L 2013 baseline (using SAP 10 emission factors), thereby complying with London Borough of Bexley

and London Plan energy policy with regards to minimum CO_2 emission reductions for major residential and non-residential developments.

15. As the non-residential areas met with the 35% reduction target, only residential areas are subject to the GLA and London Borough of Bexley carbon offset payment.

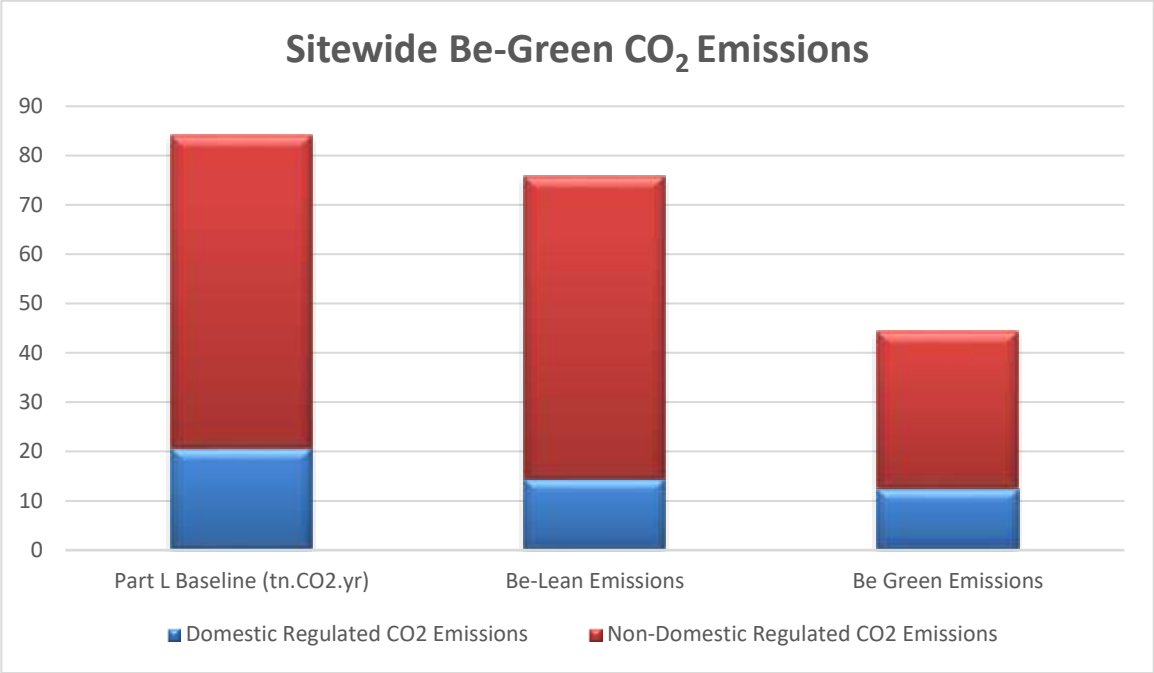
16. In order to bring the residential carbon savings up to 100%, the remaining residential carbon emissions are to be offset through a carbon offset payment. As detailed below, the carbon offset payment, priced at £60 per tonne of CO_2 per year (over 30 years) to be paid via a S106 to LB Bexley is **£22,320.**

Table A.1 – Residential Carbon Offset Payment

Site Total	
Annual offset (residential areas only)	12.40 Tonnes.CO_2
Offset Payment	**£22,320**

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2013 of the Building Regulations Compliant Development	84.12	62.83
After energy demand reduction	74.88	62.83
After heat network / CHP	n/a	n/a
After renewable energy	44.26	62.83

	Regulated domestic carbon dioxide savings	
	(Tonnes CO2 per annum)	**(%)**
Savings from energy demand reduction	9.24	10.98%
Savings from heat network / CHP	n/a	n/a
Savings from renewable energy	30.62	36.40%
Cumulative on-site savings	39.86	47.38%


Sitewide Be-Green CO_2 Emissions
90
80
70
60
50
40
30
20
10
0
Part L Baseline (tn.CO2.yr)
Be-Lean Emissions
Be Green Emissions
Domestic Regulated CO2 Emissions
Non-Domestic Regulated CO2 Emissions

1 INTRODUCTION

1.1 Envision is a dynamic building services, energy and sustainability consultancy, dedicated to providing strategic and technical advice to clients through all phases of planning and development.

1.2 Envision has been appointed by Montreaux Station Road Sidcup Ltd (The Applicant) to produce an Energy Statement to support a planning application seeking full consent for the demolition of the existing building at the former Lamorbey Swimming Centre and redevelopment of the Site to provide a part five, part four-storey building with a 1,239 sqm gym (Use Class D2) at ground floor level and 31 residential dwellings on the upper floors.

Scope

1.3 This Energy Statement provides information on the predicted carbon emissions of the development and includes an analysis of the potential contribution that renewable and low carbon technologies could contribute towards reducing the energy and associated CO_2 emissions for the scheme.

1.4 This Energy Statement sets the parameters of detailed design, but remains at a strategic level. The calculations in this document are an indication of system size and carbon emissions based on guidance documents, approved software and practical experience. They are not design calculations but establish the viability and feasibility of various technologies for the proposed development.

1.5 This statement is structured as follows:

- Section 2 provides a description of the site and the development proposals;
- Section 3 provides a description of the main energy policies relevant to the application;
- Section 4 provides an energy assessment, structured against the requirements of the policies examined in Section 3;
- Section 5 provides a concluding summary.

2 CONTEXT AND PROPOSALS

Location

2.1 The application site is located on Station Road and comprises the frontage of the former Lamorbey Swimming Centre, up to three storeys in height. Extending to the rear of the frontage is derelict, brownfield land. To the rear of the brownfield land, on the western boundary, is an area of paved hardstanding, currently used as a pedestrian surface for the Old Farm Avenue Public Car Park.

2.2 The Site is bordered to the north and south by town centre retail units at ground floor level and residential uses on the upper floors. There is a consistent architectural style to the south, with a more varied selection of building styles to the north of the Site. Generally, the buildings extend up to three storeys in height. To the east is Station Road, beyond which lies Hurst Road, Holy Trinity Church and a range of town centre retail units. On the western boundary is the Old Farm Avenue Car Park. Further afield to the north and west is an area of residential dwellings with gardens typically two storeys in height.

2.3 The Site lies opposite the Halfway Street Conservation Area and there are also Listed Buildings further north along this stretch of Halfway Street.

Figure 2.1 – Site Location Plan

The Proposed Development

2.4 The planning application seeks consent for the demolition of existing building at the former Lamorbey Swimming Centre and construction of a mixed use scheme comprising 31 apartments and 1239 sq m of gym use. The proposed development is split over two blocks. Along Station Road the scheme proposes a 4 storey building with an additional set back penthouse storey, in total housing 17no apartments. The rear building would be a total of 4 storeys housing 14no apartments. The rear building also has its own entrance and core and the undercroft parking for 11no cars.

2.5 Both of the buildings sit on a single storey podium housing the gymnasium along with bin and bike stores. On top of this podium is a mix of private garden terraces and a 385sqm landscaped communal terrace accessible to all tenants.

Figure 2.2 – Proposed Ground Floor

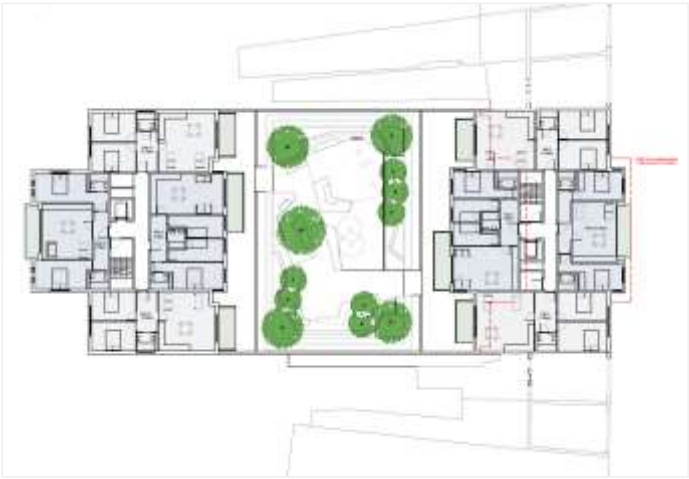


Figure 2.3 – Proposed Upper Floor

3 ENERGY POLICY CONTEXT

3.1 A key mechanism for delivering the principles of low-carbon development lies within the UK planning system, which is implemented through national guidance along with regional and local planning policies. A review of all the relevant policy documents was undertaken in order to gain an understanding of the guiding policies for energy and CO_2 reduction.

National Planning Policy Framework

3.2 The revised National Planning Policy Framework (NPPF) was published on February 2019. It sets out the framework for all planning policy in England and how these are expected to be applied. The NPPF sets out a presumption in favour of sustainable development, and the need to support economic growth through the planning system.

3.3 Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives:

- an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
- a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
- an environmental objective – to contribute 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, including moving to a low carbon economy.

3.4 Planning plays a key role in helping shape places to radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development. The NPPF does not include detailed measures on sustainable design codes and standards to apply, although expects that when setting any local requirement for a building's sustainability, local

planning authorities should do so in a way consistent with the national technical standards.

London Plan

3.5 The London Plan (2016) sets out the Mayor's vision for London. In accord with the NPPF, it promotes economic development, and endorses the principles of sustainable development. It is the main vehicle for strategic decision-making on London's development, including development decisions.

3.6 In May 2015, the Mayor published Minor Alterations to the London Plan (MALP) which explores amendments required as a result of recent Government changes in policy with respect of progressing towards the zero-carbon standard.

3.7 The MALP was adopted after the statutory consultation period and therefore has direct bearing on the application to develop this site.

3.8 The Plan contains a number of policies directly related to a development's sustainable design and energy reduction, including:

- Policy 5.1 Climate change mitigation;
- Policy 5.2 Minimising carbon dioxide emissions;
- Policy 5.3 Sustainable design and construction;
- Policy 5.6 Decentralised energy in development proposals;
- Policy 5.7 Renewable energy;
- Policy 5.9 Overheating and cooling;
- Policy 5.10 Urban greening;
- Policy 5.11 Green roofs and development site environs;
- Policy 5.15 Water use and supplies, and
- Policy 7.2 An inclusive environment.

3.9 Of particular importance to the CO_2 and Energy reductions required for a development is *Policy 5.2: Minimising carbon dioxide emissions.*

3.10 Policy 5.2 requires that development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- Be lean: use less energy;
- Be clean: supply energy efficiently;
- Be green: use renewable energy.

3.11 The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in

buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations.

CO_2 Reduction Targets for Major Development

3.12 London Plan policy 5.2B sets a 'zero carbon' target for major residential development. The 'Zero Carbon Homes' requires the residential element of the application achieves at least a **35 per cent reduction** in regulated carbon dioxide emissions (beyond Part L1A 2013) on-site. The remaining regulated carbon dioxide emissions, to 100 per cent, are to be off-set through a cash in lieu contribution to the London Borough of Enfield to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

3.13 **Therefore, the CO_2 reduction targets for the residential portion of the development should achieve a reduction of 35% below Part L 2013.**

3.14 The remaining regulated carbon emissions, to 100%, are offset via the 'carbon offset fund'. The carbon off-set price has been determined at £60 per tonne of carbon dioxide for a period of 30 years, i.e. £1,800 per tonne of remaining carbon emissions.

3.15 **For major non-residential development, The CO_2 reductions must achieve a 35% reduction below Part L 2013.**

Draft New London Plan

3.16 The Mayor of London has consulted on a Draft New London Plan which was published for consultation in December 2017. The consultation period ended on Friday 2 March 2018. The Draft New London Plan showing Minor Suggested Changes, which includes clarifications, corrections and factual updates to the Consultation Draft Plan, was published on 13th August 2018. The Examination in Public commenced in January 2019 and ran to the end of May 2019. Whilst the current 2016 London Plan is still the adopted Development Plan, the Draft London Plan may be a material consideration in planning decisions. The significance given to it is a matter for the decision maker, but it gains more weight as it moves through the process to adoption. At this stage, limited weight is expected to be afforded to the draft New London Plan.

Greater London Authority guidance on preparing energy assessments as part of planning applications (October 2018)

3.17 In October 2018 the GLA published their new guidance on preparing energy assessments for all planning applications submitted within London. The new guidance encourages the use of SAP 10 carbon dioxide emissions factors, which reflect the decarbonisation of the grid since the last update of Building Regulations Part L in April 2014. Some of the other key considerations include:

1. Domestic developments should achieve at least a 10% improvement on Building Regulations from energy efficiency (Be-Lean stage) alone;
2. Non-domestic developments should achieve at least a 15% improvement on Building Regulations from energy efficiency (Be-Lean stage) alone;
3. Site-wide heat networks should be embedded into development proposals from the beginning of the design process to avoid significant redesign at a later stage (e.g. by allowing sufficient space for an energy centre). Developments should commit to a single energy centre to supply the site wide heat network;
4. Demonstrate that connection to existing or planned district heating networks has been prioritised and provide evidence to support this;
5. Maximise on-site renewable energy generation, regardless of whether the 35% target has been met at the first 2 stages of the Energy Hierarchy (Be Lean, Be Clean) and;
6. Carbon dioxide emissions reductions to be achieved as far as possible on-site. Cash in lieu contributions will only be considered acceptable in instances where it has been clearly demonstrated that no further savings can be achieved on-site;

3.18 The new guidance replaces the previous March 2016 version and should be used for any new applications, or where an application is at early enough stages to comply with the new guidance. The main change regarding the new carbon dioxide emission factors approach will apply from January 2019, and therefore these are stated in this report.

London Plan Supplementary Planning Guidance: Sustainable Design and Construction

3.19 The London Plan Supplementary Planning Guidance on Sustainable Design & Construction (SPG SDC) was adopted in June 2014. It provides specific guidance on a range of policies relating to energy and carbon emissions translated from Policy 5.3. In addition, it outlines the best practices that should be followed in addressing sustainable building design, energy and CO_2.

London Borough of Bexley Planning Policy

3.20 The most relevant policies which need to be considered when defining the sustainability of the scheme are those provided within local development documents. The London Borough of Bexley is currently working to its adopted Core Strategy (2012). Work is also underway to prepare a new Local Plan for the London Borough of Bexley. This is however at an early stage of development, with the draft Local Plan Review not due for publication until autumn 2019. The Core Strategy is therefore considered to be the most up to date plan.

Policy CC01 - Achieving Sustainable Development

3.21 The Council will seek to achieve sustainable development, in line with the vision set out in Bexley's Sustainable Community Strategy, to create a 'strong, sustainable and cohesive community', in order to provide people equal access to a better quality of life, protect the environment, promote the local economy and encourage an active and healthy lifestyle.

3.22 With regards to sustainable design and construction requirements, the policy recognises that sustainable development will be achieved by applying the following principles:

- adapting to and mitigating the effects of climate change, including sustainably retrofitting existing building stock where possible;
- maximising the effective and efficient use of natural and physical resources, including land, water and energy, whilst addressing pollution issues, such as contamination, noise and air quality, to contribute to the health and wellbeing of the community and the environment;
- ensuring existing or proposed infrastructure (including green infrastructure), services and facilities are safeguarded to help improve accessibility and address deficiencies, and that adverse impacts of development, including waste arisings, are mitigated.

Policy CS08 - Adapting to and mitigating the effects of climate change, including flood risk management

3.23 All development should contribute to the delivery of sustainable development by planning for, adapting to, and mitigating the impacts of climate change, by reducing the carbon emissions related to the construction and operation of all development.

3.24 The Council will achieve this by applying the requirements and targets outlined in national and regional planning policy and guidance to new development. In particular, this will encompass the requirements of the Mayor's London Plan with regard to environment policies such as: reducing CO_2 emissions; the Mayor's energy hierarchy; integrating energy efficiency; decentralised energy (in particular district heating where appropriate); site-wide communal heat networks supported by CHP; adopting on-site renewable energy technologies; sustainable transport (in particular public transport, cycling and walking); green infrastructure; flood risk management; and sustainable urban drainage systems (SUDS), including supporting the Mayor's drainage hierarchy.

3.25 In addition, this will comprise:

- monitoring and setting improvement targets for the energy efficiency of Council buildings and developments;
- requiring the use of sustainable design and construction techniques in new built development, including exceeding current Building Regulations requirements

through energy efficiency alone, and sustainably retrofitting existing building stock where possible;

- investigating opportunities within the borough for the location of zero carbon developments, prioritising those areas being investigated for decentralised energy networks;
- following the sequential approach to flood risk management advocated in national planning policy and its associated practice guidance;
- applying the recommendations of Bexley's Strategic Flood Risk Assessment;
- supporting green infrastructure (e.g. green and brown roofs) and the contribution it can make, to managing flood risk and surface water, and to the mitigation of the urban heat island effect;
- supporting the protection of key infrastructure assets, such as Crossness Sewage Treatment Works, from the risks of flooding; and
- working with partners to prepare a joint urban drainage strategy for London, as well as a local Surface Water Management Plan (SWMP) for Bexley, to address surface.

Bexley Sustainable Design and Construction Guide (2007)

3.26 This Sustainable Design & Construction Guide is a Supplementary Planning Document (SPD) within Bexley's Local Development Framework (LDF). It was prepared to supplement the policies and proposals of the adopted Bexley Unitary Development Plan (UDP) 2004 and the London Plan 2004, which together form the development plan for the area. It is a material consideration when the Council considers planning applications. Whilst this is now an old document, and the only document that enforces a BREEAM requirement, this is still considered a material consideration in the determination of the application.

4 ENERGY STATEMENT

17. In line with the requirements of the October 2018 update to the 'GLA Guidance on preparing Energy Assessments', the predicted CO_2 emissions and energy demand presented in this report have been calculated using SAP 10 figures. The GLA 'Carbon Emission Reporting Spreadsheet', to be provided with referable planning applications is set up for residential development proposing communal heating systems and for non-residential uses.

18. As the residential portion of the development proposes individual heating systems (not compatible with the GLA Carbon Emission Reporting Spreadsheet) the consumption figures have been manually converted with SAP 10 emission factors and provided in Appendix III. The D2 use has been calculated via the GLA 'Carbon Emission Reporting Spreadsheet' in Appendix II.

4.1 Compliance with Part L1a & L2a of Building Regulations is provided via the BRUKL and SAP worksheets in Appendix IV onwards.

Domestic Modelling Methodology

4.2 In accordance with NCM guidance, the appropriate methodology for calculating the energy performance of the domestic portion is "The Government's Standard Assessment Procedure for Energy Rating of Dwellings". This procedure was undertaken using Stroma FSAP 2012 version 1.0.4.16 which is a Department of Communities and Local Government (DCLG) approved methodology and software for undertaking SAP assessments.

4.3 For the purposes of this assessment, the following apartment typologies were selected for analysis;

Table 4.1 – Apartment Typologies

Front Block	Rear Block
Mid Floor 2-Bed	Mid Floor 2-Bed
Mid Floor 3-Bed	Mid Floor 3-Bed
Top Floor 1-Bed	Top Floor 2-Bed
Top Floor 2-Bed	Top Floor 3-Bed
Top Floor 3-Bed	

4.4 To provide a level of analysis reflecting the various orientations of the scheme, on each block apartments were selected from each elevation.

Non-Domestic Modelling Methodology

4.5 The appropriate methodology for calculating the energy performance of the non-domestic portion is through a Simplified Building Energy Model (SBEM). The SBEM was produced using DesignBuilder software version 6.1.0.006, which is a DCLG approved software and methodology for undertaking SBEM.

4.6 For the purposes of this assessment, the entire of the D2 Gym was modelled through SBEM.

Establishing the Target Emission Rate (TER)

4.7 The total emissions savings calculated in this report are expressed against a Building Regulation 2013 Target Emission Rate. This is the baseline against which the measures implemented must show an improvement.

4.8 The Target Emission Rate for the buildings has been established using DCLG approved methodology and software.

4.9 The calculated carbon emissions and total energy demand for the Target Emission Rate are illustrated below. The calculated figures demonstrate a Part L1A and L2A Building Regulations 2013 compliant model – arrived at using SAP 10 carbon factors.

Table 4.2 – Target CO_2 emissions for Domestic Portion (SAP 10 Performance)

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated CO_2 Emissions	Unregulated CO_2 Emissions
Baseline: Part L1a 2013 of the Building Regulations Compliant Development	20.63	14.10

Table 4.3 – Target CO_2 emissions for Non-Domestic Portion (SAP 10 Performance)

	Carbon Dioxide Emissions for nondomestic buildings (Tonnes CO_2 per annum)	
	Regulated CO_2 Emissions	Unregulated CO_2 Emissions
Baseline: Part L2a 2013 of the Building Regulations Compliant Development	63.49	43

Table 4.4 – Target CO_2 emissions for Site

	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2013 baseline	84.12		

4.10 The site-wide figure of **84.12 tonnes.CO_2.year** is the target that must be reached and improved upon by the proposals in this Energy Assessment in order to comply with Building Regulations Part L, along with energy policies contained within GLA and Bexley plans.

4.11 This will be achieved through the implementation of fabric efficiency, energy-reduction and carbon-saving measures as outlined in the ensuing sections.

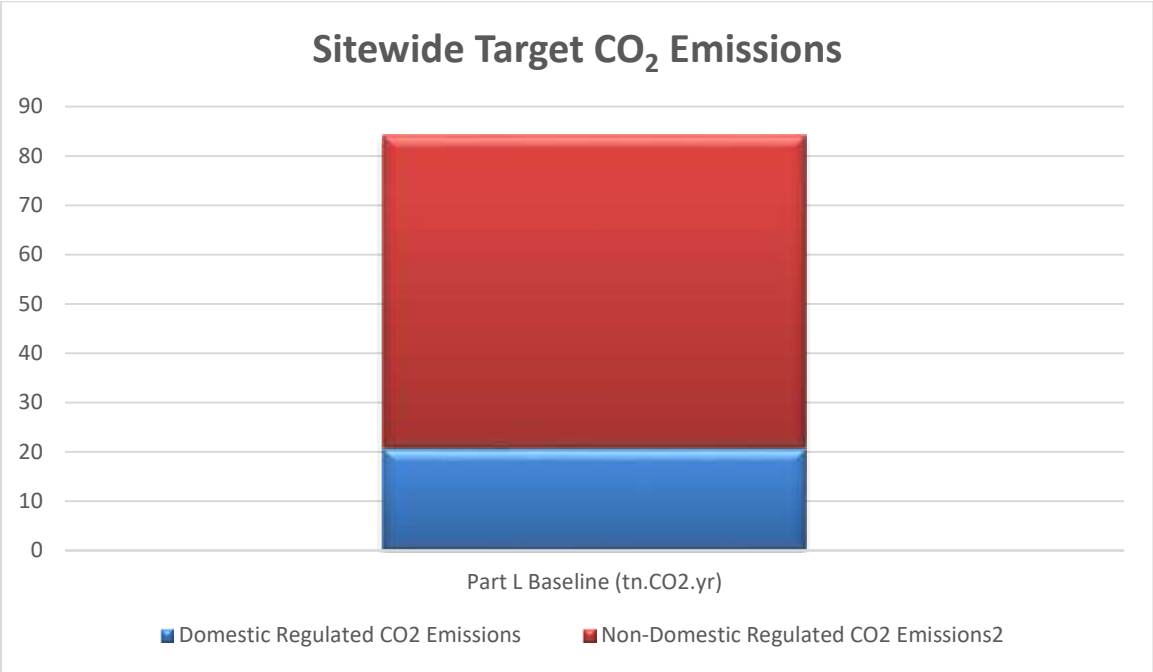


Fig 4.1 – Baseline CO_2 emissions for Development

Applying the London Plan Energy Hierarchy: Stage 1 – Be Lean

4.12 The Greater London Authority seeks a 'fabric first' approach to reducing the carbon footprint of London's built environment. This is achieved through buildings using less energy by improving u-values, air-tightness and lighting efficiency amongst others. This is the first step to consider in reducing a building's carbon emissions before the efficient delivery of power, heat or renewables are considered by a design-team.

Fabric Efficiency

4.13 U-Values, are used to measure how effective elements of a building's fabric are as insulators. That is, how effective they are at preventing heat from transmitting between the inside and the outside of a building. The lower the U-value of an element of a building's fabric, the more slowly heat is able to transmit through it, and so the better it performs as an insulator. Very broadly, the better (i.e. lower) the U-value of a buildings fabric, the less energy is required to maintain comfortable conditions inside the building.

Table 4.5 Proposed U-Values

Elements	Residential U-Values – W/m^2 K	Commercial U-Values – W/m^2 K	Comment
External Wall	0.17	0.14	-
Wall to unheated corridor/stair core	0.17	n/a	Corridors assumed as unheated
Ground/Exposed Floor	n/a	0.14	n/a
External Roof	0.13	0.11	n/a
Standard Window Units	1.3 (g-value 0.6)	1.4 (g-value 0.5 and LT value 0.75)	n/a
External Solid Doors	1.8	1.4	n/a
Party Walls	0	0	Assumed as fully-filled cavity with effective edge sealing an insulation in line with layers in abutting elements.

Air Permeability

4.14 The designed Air Permeability Rate (APR) has been set at 3 $m^3/h.m^2$ @ 50Pa for the entire development

Lighting – Residential

4.1 The SAP calculation software used for assessing the development does not allow for the specification of lighting elements. However, it is assumed that the light fittings will be specified as LED, low-energy with local manual switching and if appropriate, occupancy sensing.

Lighting Strategy: D2 Gym

4.15 This energy demand will be limited by the application of more efficient lighting, photocell daylight control and use of LED lighting throughout. The following lighting design requirements are therefore stipulated;

Table 4.7 – Non-Residential Lighting Datasheet

Lighting zone	Luminaire Lumens / Circuit Watt	Light Output Ratio	Photocell Dimming (Parasitic Power – W/m²)	Occupancy Sensing – On/Off (Parasitic Power – w/m²)
Fitness/Gym Areas	100	1	Yes	No
BOH (WC/Changing)	100	1	No	Yes (0.3 W/m²)

Space & Water Heating – Residential

4.16 In line with the 'GLA guidance on preparing Energy Assessments', the heating system assumed at 'Be-Lean' stage is a gas fired system boiler, with an efficiency of 89.7%

4.17 Each dwelling will be supplied with a 200 litre DHW cylinder, with a maximum standing heat loss of 1.8 kWh/24 hours. The pipework is assumed to be fully insulated with the water heating timed separately.

Space & Water Heating: Non-Residential

4.18 In accordance with the 'GLA Guidance on preparing energy assessments', the 'Be-Lean' stage heating system serving all areas in the D2 use has been assumed as a dual-system with the heating specified as a 91% efficient gas-fired boiler with cooling efficiencies entered as per the inputs detailed in the 'Be-Green' section.

4.19 The 'Be-Lean' stage hot water system is assumed to be from the main heating system with a 200-litre cylinder. The hot water storage vessel to have a standing loss of 1.63 kWh/day.

Ventilation Strategy: Residential

4.20 The ventilation strategy has been designed to meet with occupant and client requirements across the varied activity zones in the development, whilst maintaining the energy efficiency needed to lower carbon emissions. A balanced whole-house mechanical ventilation system with heat recovery is proposed for every dwelling. The model number of the ventilation system in all residential spaces is the Vectaire MBOX 125.

Ventilation Strategy: Non-Residential

4.21 The ventilation strategy in the non-residential areas has been designed to meet with occupant and client requirements across the varied activity zones in the development, whilst maintaining the energy efficiency needed to lower carbon emissions. The following strategy is proposed;

Table 4.8 – Summary of Non-Residential Ventilation Strategy

Ventilation Zone	System	Specific Fan Power	Heat Recovery (Efficiency)
Fitness Areas / Changing Rooms / Office	Air-Handling Unit	1.1	Yes (75%)
WCs & Changing Block	Extract Fan Remote from Zone	0.3	No

4.22 The Air-Handling unit is assumed to be specified with occupancy-based demand control ventilation, which would require inverter control.

Be Lean Stage – Domestic CO_2 Reductions

4.23 The following tables and graphs represent the lean stage improvements for the domestic portion of the development over the Target Emission Rate;

Table 4.9 – Be-Lean CO_2 emissions for Domestic Portion (SAP 10 performance)

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated CO_2 Emissions	Unregulated CO_2 Emissions
Be-Lean CO_2 Emissions	14.28	14.10
Reduction over Part L Baseline	6.35	
% Reduction over Part L Baseline	30.78%	

Be Lean Stage – Non-Domestic CO_2 Reductions

4.24 The following tables and graphs represent the lean stage improvements for the non-domestic portion of the development over the Target Emission Rate;

Table 4.10– Be-Lean CO_2 emissions for Non-Domestic Portion

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated CO_2 Emissions	Unregulated CO_2 Emissions
Be-Lean CO_2 Emissions	61.60	43
Reduction over Part L Baseline	1.89	
% Reduction over Part L Baseline	2.97%	

Be Lean Stage – Sitewide CO_2 Reductions

4.25 The following tables and graphs represent the lean stage improvements for the whole development over the Target Emission Rate;

Table 4.11– Site-wide Be-Lean CO_2 emissions

	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2013 baseline	84.12		
Be-Lean	75.88	8.24	9.80%

4.26 As detailed above, the measures as taken at 'Be-Lean' stage would result in a **9.80%** reduction in site-wide regulated CO_2 emissions over the Part L 2013 Target Emission Rate (calculated using SAP 10 figures).

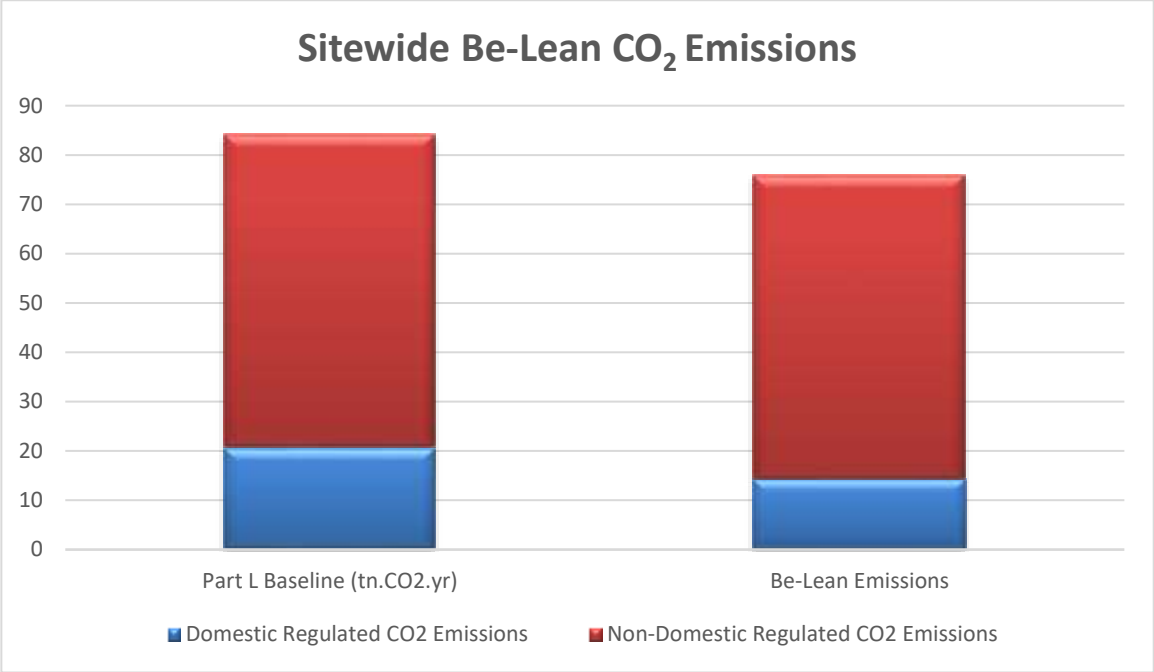


Fig 4.2 – Be-Lean CO_2 emissions for Development

Cooling & Overheating

4.27 Policy 5.9 of the London Plan (2016) seeks to reduce the impact of the urban heat island effect in London and encourages the design of places and spaces to avoid overheating and excessive heat generation, and to reduce overheating due to the impacts of climate change and the urban heat island effect on an area wide basis.

4.28 Applicants should apply the cooling hierarchy as detailed in Policy 5.9 with the development at the Station Road, Sidcup to incorporate the following measures:

Fig 4.2 Local Heat Map

Cooling Method	Measures Employed
Minimising internal heat generation through energy efficient design	No-on site heat distribution network is proposed and therefore internal heat gains in communal areas will be minimal. With regards to individual apartments, and as detailed on approved drawings, all bathrooms and kitchens adjoin the main apartment corridor, resulting in a short LTWH run, in addition to this pipework will be insulated to mitigate internal heat gains.
Reducing the amount of heat entering the building in summer	The staggered height of the development and two-block footprint affords some shading to lower level apartments. Internal blinds will be provided to all bedrooms and living areas to encourage occupants to limit solar gains.
Use of thermal mass and high ceilings to manage the heat within the building	All floor-to-ceiling heights are maintained at 2700mm. This relative increase in exposed surface will help to lower indoor air temperatures as there is more surface area to absorb internal heat gains.
Passive ventilation	Although Mechanical Extract Ventilation (MEV) is proposed, all dwellings will be provided with openable windows to allow for natural / purge ventilation and the majority allow for cross-flow ventilation.
Mechanical ventilation	MEV units are proposed for each apartment. These will facilitate a summer by-pass mode to make use of ‘free cooling’ when the outside air temperature is below that in the building during summer months

Applying the London Plan Energy Hierarchy: Stage 2 – Be Clean

4.29 The 'Be-Clean' stage requires that any energy supplied to major developments should be as efficient as possible by selecting energy systems in accordance with the following hierarchy:

1. Connection to existing heating or cooling networks (including potential networks);
2. Communal heating system;
3. Individual heating system.

Connection to existing heating or cooling networks

4.30 By referencing the London Heat Map, it is clear that there are no existing or proposed networks in the vicinity of the site.

Fig 4.2 Local Heat Map

Future Connection to District Heating

4.31 Opportunities have been considered during design development to provide a connection at boundary. However, the design will not include any connection to boundary to provide linkage to a decentralised energy network. The proposed

individual heat pump systems will not be compatible with any future district heating (DH) system.

4.32 In the event of a DH network becoming economically viable and accessible in the area, it would necessitate the removal of all of the individual heat pump systems to allow for a DH wet connection at the boundary of each apartment.

4.33 In this instance, given that no DH networks are available within the vicinity of the site, and given the reasons outlined above, it is suggested that a capped connection at boundary or other similar infrastructure is unnecessary and impractical.

4.34 In addition, it is noted that by pursuing an all-electric scheme the development is future-proofed for falling CO_2 emissions as the National Grid continues to decarbonise and therefore a future connection to a DH network would not necessarily result in the scheme having lower CO_2 emissions than an all-electric scheme.

Communal Heating network - CHP

4.35 Small-medium residential-led developments (e.g. containing fewer than 500 apartments) need not consider the installation of CHP[1]. At this scale, it is generally not economic to install CHP in residential led developments (and where CHP is installed it tends to have lower electrical efficiencies). Due to the small landlord electricity demand, CHP installed to meet the base heat load would require the export of electricity to the grid. In addition, emerging London Plan polices identify that CHP-led schemes are discouraged due to air quality concerns, unless they are of a scale to supply heat to surrounding areas.

[1] As outlined in outlined in the *'GLA guidance on preparing energy assessments'*

Applying the Energy Hierarchy: Stage 3 – Be Green

4.36 An analysis of low carbon/renewable technologies was undertaken to determine which would be suitable for application in a development of this size and nature. This analysis has been appended to this document in Appendix I.

4.37 During the design-development period for this scheme, multiple low carbon/renewable systems were examined for both their feasibility and ability to lower carbon emissions insofar as possible. As per the analysis contained in Appendix I, the renewable systems deemed to be the most viable for the development are;

1. **VRF Air-Source Heat Pumps (ASHP),** with low refrigerant charge, and high efficiency inverter driven compressors, providing heating and cooling to the D2 Gym;
2. **Air Source Heat Pump** providing efficient water heating to the D2 Gym;
3. **Individual Air Source Heat Pump** providing efficient space and water heating to all apartments
4. **Photovoltaic Panels** to each apartment providing electricity.

Low-Carbon/Renewable Technology System 1 – Air-Source Heat Pumps to D2 Gym

4.38 The first low-carbon/renewable energy proposed for the D2 Gym is an air-source heat pump (ASHP) providing space heating & cooling. ASHPs with the following specifications have been assumed:

- The proposed ASHP for the commercial units is a conventional VRF air source heat pump system. The ASHP will be selected to operate on R32 which is an F-Gas compliant refrigerant;
- Cooling plant will have a minimum Energy Efficiency Ratio (EER) of 3.24 and SEER of 7.34;
- The ASHP will have a minimum COP of 4.92 for heating;
- HVAC system controls installed will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values as well as local time and temperature control.

Low-Carbon/Renewable Technology System 2 – Air-Source Heat Pumps to D2 Gym for Hot Water

4.39 It is proposed that the hot water in the D2 gym will be provided via a heat pump with a minimum COP of 2.8 and hot water storage as per the details laid out in the 'Be-Lean' section.[2]

[2] D2 uses have a high hot water demand and operators traditionally utilise gas-fired and/or direct electric systems for hot

Low-Carbon/Renewable Technology System 3 – Heat Pumps to Residential Portion

4.40 The low-carbon/renewable energy proposed for the residential portion is an air-source heat pump (ASHP), with each apartment to have its own unit. ASHPs with the following specifications have been assumed for each portion of the development;

- The ASHP will have a minimum SCOP of 2.86 for heating[3];
- DHW storage will be as per the details laid out in the 'Be-Lean' section under Paragraph 5.20;
- HVAC system controls installed will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values as well as local time and temperature control.

Low-Carbon/Renewable Technology System 4 – PV to Residential Portion

4.41 Further reductions have been provided to the residential areas using Photovoltaic (PV) panels. A total of 21.10kWp has been allocated for the residential apartments to meet the requirements.

Be Green Stage – Domestic CO_2 Reductions

4.42 The following tables and graphs represent the green stage improvements for the domestic portion of the development over the Target Emission Rate;

Table 4.26 – Be-Green CO_2 emissions for Domestic Portion

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated CO_2 Emissions	**Unregulated CO_2 Emissions**
Be-Green CO_2 Emissions	12.40	14.10
Reduction over Part L Baseline	8.23	
% Reduction over Part L Baseline	**39.89%**	

water production to meet this demand. Heat pumps are not yet widely used for hot water generation in D2 uses as they generally have longer recovery times alongside potential concerns over pasteurisation due to the lower hot water delivery temperature. These issues will be further addressed at detailed design and during the Agreement for Lease (AfL). negotiations.

[3] Mitsubishi Ecodan QUHZ-W40 Air Source Heat Pump or similar assumed

Be Green Stage – Non-Domestic CO_2 Reductions

4.43 The following tables and graphs represent the green stage improvements for the non-domestic portion of the development over the Target Emission Rate;

Table 4.27 – Be-Green CO_2 emissions for Non-Domestic Portion

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated CO_2 Emissions	**Unregulated CO_2 Emissions**
Be-Green CO_2 Emissions	31.86	43
Reduction over Part L Baseline	**31.63**	
% Reduction over Part L Baseline	**49.81%**	

Final Residential CO_2 Reduction Charts & Carbon Offset Payment

4.44 In the case of the zero-carbon target for homes, a minimum of 35% carbon savings are expected to be delivered on site. The remaining savings to reach zero carbon can be achieved either via a cash in lieu contribution. The savings and offset payment are detailed below;

Table 4.28 – Final Residential CO_2 reductions

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2013 of the Building Regulations Compliant Development	20.63	14.10
After energy demand reduction	14.28	14.10
After heat network / CHP	0	0
After renewable energy	12.40	14.10
	Regulated domestic carbon dioxide savings	
	(Tonnes CO2 per annum)	**(%)**
Savings from energy demand reduction	6.35	30.78%
Savings from heat network / CHP	0	0
Savings from renewable energy	1.88	9.11%
Cumulative on-site savings	8.23	39.89%
Annual Savings from off-set payment	12.40	
	(Tonnes CO2)	
Cumulative savings for off-set payment (over 30 Years)	372	
Carbon offset Payment (£60 per tonne)	**£22,320**	

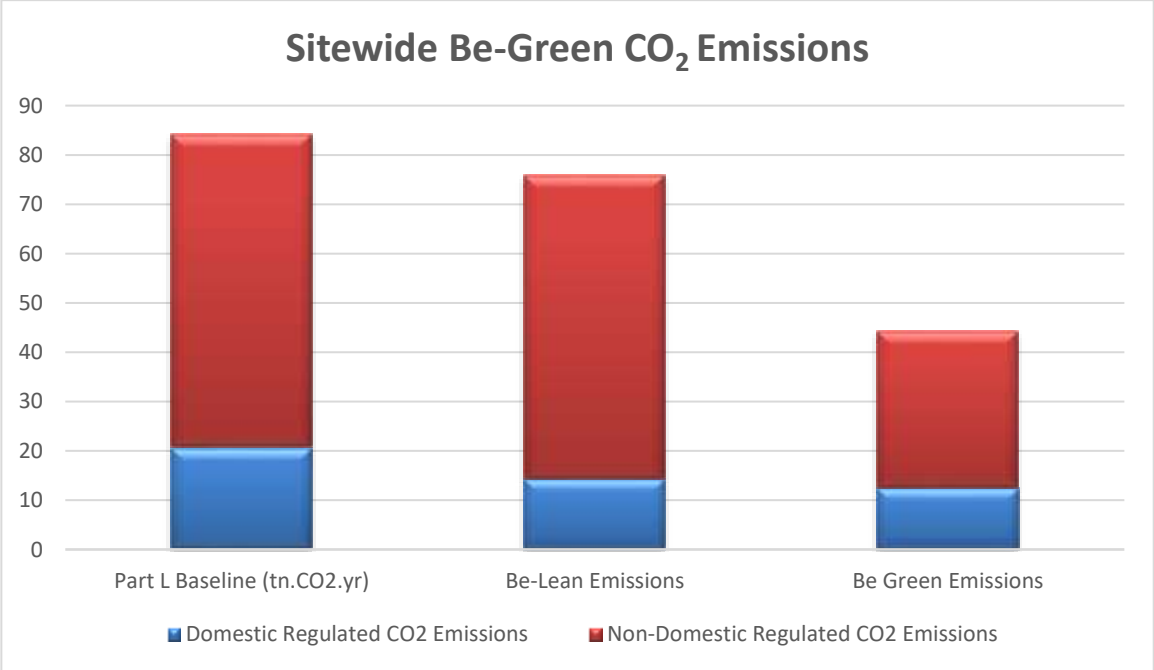
4.45 To bring the residential carbon savings up to 100%, the remaining residential carbon emissions are to be offset through a carbon offset payment. As detailed above, the carbon offset payment, priced at £60 per tonne of CO_2 per year (over 30 years) to be paid via a S106 to LB Bexley is **£22,320.**

Final CO_2 Reduction Charts

4.46 In accordance with the 'GLA guidance on preparing Energy Assessments', the final carbon emissions and predicted savings are presented below for the entire development. Also included is the predicted carbon offset payment for the development. The final table represents the site wide regulated carbon dioxide emissions and savings.

Table 4.29 – Final CO_2 reductions Chart

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	84.12	62.83
After energy demand reduction	74.88	62.83
After heat network / CHP	n/a	n/a
After renewable energy	44.26	62.83
	Regulated domestic carbon dioxide savings	
	(Tonnes CO2 per annum)	(%)
Savings from energy demand reduction	9.24	10.98%
Savings from heat network / CHP	n/a	n/a
Savings from renewable energy	30.62	36.40%
Cumulative on-site savings	39.86	47.38%



5 CONCLUSION

5.1 Analysis of the outline design using accepted approaches and the energy hierarchy have indicated the development can exceed the minimum performance requirement of 35% lower carbon emissions over 2013 Building Regulations.

5.2 The strategy proposed follows the three-step 'Energy Hierarchy' and meets all policies as outlined in Section 3 of the report. The developments overall reduction in carbon emissions over the Part L 2013 (using SAP 10 emission figures) baseline is **47.38%**, therefore complying with GLA and LB Bexley policy on CO_2 reductions in major developments.

5.3 To minimise energy consumption by the development and to assist in achieving a Building Regulation Part L1A/L2A 2013 compliant development, the following design measures are Building fabric construction U-values significantly improved compared with standard Building Regulations U-values;

- Building fabric construction U-values significantly improved compared with standard Building Regulations U-values;
- Reduced Air Permeability, lower than standard Buildings Regulations, and in accordance with prospective development building occupiers;
- High-efficient Air-Source Heat Pumps providing efficient space and water heating to the residential portion;
- Photovoltaic panels with a total of 21.10kWp on the residential portion;
- High-efficient Air-Source Heat Pumps providing efficient heating, cooling and hot water to the D2 use;
- HVAC system controls ensure installed equipment will be operating efficiently and to include automatic monitoring and targeting with alarms for out of range values;
- High efficiency LED lighting utilizing low-energy control systems such as daylight dimming and occupancy sensing.
- Reduction in solar gain through the use of lower g-values.

5.4 At this stage of the project timeline, the solutions proposed are technically and financially viable and will deliver the carbon emission reductions in accordance with policy. This Energy Statement sets the parameters of detailed design, but remains at a strategic level. The calculations in this document are an indication of system size and carbon emissions based on guidance documents, approved software and practical experience. Further optimising of the heat pump installations will be assessed at the detail-design phase, particularly for the gym's hot water generation.

For this Energy Report, the solutions have been optimised to suit the predicted energy consumption and carbon emissions as per the calculations provided.

APPENDIX I – LOW/ZERO CARBON/RENEWABLE ANALYSIS

Renewable Technology	Rating (out of 5)	Comment
Photovoltaics	***	PV arrays are a suitable solution for the development, depending on the size of the array used, significant savings are possible through using this technology.
Solar Thermal	**	The proposed DHW system (efficient heat pumps) will already provide hot water – the use of a solar thermal system would be an over-design.
Wind Turbine	*	The restricted nature of the site, coupled with the noise, aesthetic (planning) and building vibrations arising from their installation means this system is unviable.
Ground Source Heat Pump	**	Vertical ground loops set within the pile foundations are possible, but come with significant capital cost due to the ground heat exchanger and they add significant complexity to the thermal modelling of the building to ensure they are effectively serving the heating requirements of the building. These would require additional renewable services to achieve GLA and LB Bexley carbon emission targets.
Air Source Heat Pump	****	ASHPs are viable for the development and are capable of providing a significant portion of the building's energy from effectively a renewable source, as for each kW of electricity in excess of 2-3kW of heating will be extracted. This makes ASHPs the preferred renewable technology for the development.
Biomass Communal Boiler	**	The significant plant and in particular, storage space required for a biomass boiler is unsuitable for a development of this size. The site is also in an AQMA.

APPENDIX II – GLA CARBON REPORTING SHEET (COMMERCIAL UNIT)

APPENDIX III – SAP 10 CALCULATIONS (RESIDENTIAL PORTION)

APPENDIX IV – BRUKLS FOR DEVELOPMENT

APPENDIX V – SAP TER WORKSHEETS

APPENDIX V – SAP BE LEAN WORKSHEETS

APPENDIX V – SAP BE GREEN WORKSHEETS