Energy Assessment / Suitability Assessment

For the proposed development at:

Riefield Road, London, SE9 2QA

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Riefield Road, London, SE9 2QA
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1. SUMMARY

The Mayor has declared a climate emergency and has set a target for London to be net zero by 2030. This puts London at the forefront of global cities and UK action on climate change. The Mayor's London Plan ensures that the planning system is playing its part in achieving the net zero target.
On 15 June 2022, national building regulations were updated to enhance energy performance standards for new buildings through Part L 2021. A new Part O 2021 was also introduced, updating requirements to tackle overheating.
The Mayor's Energy Assessment Guidance1 has been updated to explain how London Plan policy should be applied now that these regulations have taken effect. This note summarises the key updates. An updated spreadsheet to report carbon emissions has also been published, which planning applicants should submit as part of the energy strategy2 when these are required.

Part L 2021 is a stepping-stone towards the Future Homes Standard and Future Buildings Standard which the Government is expected to consult on in 2023 and introduce in 2025. London's approach will be updated further once these standards are agreed.

The Mayor's net zero carbon target for major developments

The updated guidance confirms that all major developments in London must continue to meet the London Plan net zero carbon target by following the energy hierarchy (Policy SI 2), the heating hierarchy (Policy SI 3) and by maximising on-site carbon reductions. Planning applicants will be expected to demonstrate that at each stage of the energy hierarchy they have maximised opportunities for carbon reduction to achieve as close to zero as possible. An on-site carbon reduction of at least 35 per cent beyond Part L 2021 of building regulations should be achieved. Once it has been demonstrated that carbon reductions have been maximised, any remaining emissions to zero should be offset by a contribution to the relevant borough's carbon offset fund. Applicants should also continue to meet the energy efficiency targets (Policy SI 2) and undertake dynamic modelling as part their energy strategy to reduce the risk of overheating (Policy SI 4).

- **Achieving on-site carbon reductions:** the on-site carbon reductions that can normally be achieved over Part L 2021 will vary for different development types:

- Residential developments are expected to be able to achieve on-site savings beyond the minimum 35 per cent improvement, so we have introduced an additional percentage improvement benchmark of 50 per cent plus which these developments should be aiming to achieve. Meeting the energy efficiency target may now be more challenging initially, but it is essential that planning applicants reduce energy demand as far as possible to avoid high energy bills for occupants.

- Initially, non-residential developments may find it more challenging to achieve significant on-site carbon reductions beyond Part L 2021 to meet both the energy efficiency target and the minimum 35 per cent improvement. This is because the new Part L baseline now includes low carbon heating for non-residential developments but not for residential developments. However, planning applicants will still be expected to follow the energy hierarchy to maximise carbon savings before offsetting is considered.

• Developments connecting to gas-based district heat networks (DHNs) may also find it more challenging to achieve significant on-site carbon reductions beyond Part L 2021 until the decarbonisation strategies for these networks begin to take effect. Developments in Heat Network Priority Areas (HNPAs) are expected to connect to a network where possible to support London's decarbonisation provided the network has a decarbonisation strategy. Further detail on DHN connections is provided in the guidance.

Over time it is expected that performance against Part L 2021 will improve to enable these developments to achieve closer alignment with the energy efficiency targets and the minimum 35 per cent on-site improvement due to technological improvements and as costs come down. We will monitor this progress and may update the benchmarks to reflect these improvements as appropriate. In the intervening period applicants should continue to aim to maximise on-site carbon reductions as far as possible.

2. INTRODUCTION

This Energy Assessment relates to a planning application for a new development comprising a replacement dwelling at Riefield Road, London, SE9 2QA

The requirement for new developments to obtain a proportion of their energy needs from on-site renewable energy sources is now a well-established feature of planning policy.

This Energy Assessment sets out the applicable policies on energy and CO_2 emissions, and the methodology for and the results from an energy demand assessment.
It includes an overview of possible renewable energy technologies and identifies the technology most suitable for this development and reasons why other technologies have been excluded.

Finally, it shows that the selected renewable energy technology will reduce the development's predicted carbon dioxide emissions using SAP 10 software.

The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings. The annual remaining carbon emissions figure is multiplied by the assumed life time of the developments services (e.g. 30 years to give the cumulative shortfall. The cumulative shortfall is multiplied by the carbon dioxide offset price to determine the required cash in lieu contribution.

The Mayor's Housing Standards Viability Assessment assumed a carbon offset price of £95.00 per tonne of carbon dioxide offset price for a period of 30 years. Boroughs may use this price or set their own by undertaking a local specific viability assessment. Where the borough applies a carbon offset price of £95.00 per tonne, it is not considered necessary to carry out a further viability assessment of the policy approach. The GLA will regularly review the recommended carbon offset price.

Confirmation is required as the calculations produced has been calculated using non communal heating scheme as the development is a single dwelling.

3. PLANNING REQUIREMENTS

3.1. THE LONDON PLAN, MAYOR OF LONDON,

This report has been prepared in accompaniment to a planning application for new development comprising of a single new dwellings at Riefield Road, London, SE9 2QA.

Detailed energy statements should be submitted as part of major applications. This should demonstrate the predicted energy and associated carbon dioxide emission savings achieved through the incorporated of energy efficiency measures, decentralised energy and low/zero carbon technologies. This should be demonstrated in line with policy 5.2 of the London Plan, which requires a 35% reduction in CO_2 emissions above 2021 Building Regulations.

The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2022.

The GLA has decided that from January 2022 and until central Government updates Part L with the latest carbon emission factors, planning applicants are encouraged to use the SAP 10 emission factors for referable applications when estimating CO_2 emission performance against London Plan policies.

The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

4. CALCULATION METHODOLOGY

This Energy Assessment takes a standard hierarchical approach as follows:

4.1 Base Line

A calculation of baseline energy demand, demonstrates the projected annual heating, cooling and electricity demand of the development. The assessment shows the carbon dioxide emissions resulting from the predicted energy use (target emission rate).

4.2 Lean – Energy demand reduction

Exceeding building regulations requirements (Part L 2021) through reduction measures alone, over the baseline calculations.

4.3 Clean – Heating infrastructure

Further reductions from Be Lean are demonstrated by using community / district heating networks. (non-available)

4.4 Green

Further reduction for Be Clean are achieved by using low carbon and/ or renewable technologies to be incorporated in the development, demonstrating how much carbon dioxide emissions from expected energy use will be reduced through on-site renewable energy generation, a minimum of 35% reduction over the baseline to be achieved.

4.5 Carbon off Set

A carbon offset payment is required to the local authority based on the CO_2 shortfall. The Mayor's Housing Standards Viability Assessment assumed a carbon offset price of £95.00 per tonne of carbon dioxide offset price for a period of 30 years. Boroughs may use this price or set their own by undertaking a local specific viability assessment. Where the borough applies a carbon offset price of £95.00 per tonne, it is not considered necessary to carry out a further viability assessment of the policy approach. The GLA will regularly review the recommended carbon offset price.

Confirmation is required as the calculations produced has been calculated using non communal heating scheme as the development is a single dwelling

5. CONSIDERATION OF Renewable and low carbon technologies

Consideration of Heat and power:
Combined Heat and Power (CHP) and Combined Cooling Heat and Power (CCHP) or Tri-generation Systems are recognised as a very desirable way of reducing energy wastage and resulting carbon dioxide emissions.
While generally operating on fossil fuel, mainly natural gas, their advantage is that the waste heat normally associated with electricity generation is put to good use providing space heating and hot water. This means that the overall fuel efficiency can be increased significantly — typically to above 80% compared to 30-40% for grid electricity. The main effect is to approximately halve the carbon dioxide emissions associated with electricity use on the development for all the electricity produced by the CHP plant. However, space and water heating for the development is provided by mains gas and so a CHP unit would only reduce emissions associated with lighting, fans, pumps and domestic appliances. As such, the reduction in CO_2 would not be that great.
Generally CHP and CCHP are most suited to community heating systems particularly where there is a constant demand for heat throughout the year and therefore they are not considered to be viable on developments of less than approximately 50 units.

As the electricity grid decarbonised the carbon saving from the gas engine CHP will decrease and with growing concerns of the impact of the technology on air quality – for this reason CHP is not considered suitable for this development.

5.1 OVERVIEW OF RENEWABLE ENERGY

Energy from renewable sources has been defined in Article 2 of EU Directive 2010/13/EU ‘*on the energy performance of buildings*’ and includes wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. For the purposes of this energy Assessment and the use of renewable energy on a domestic scale these can be summarised as follows:

- Bio-fuels — combustion of solid or liquid bio-fuels to produce heat or electricity.
- Decentralised energy.
- Heat pumps — extraction of heat from the earth, atmosphere or water bodies.
- Hydroelectricity — use of water cycle driven flows to generate electricity.
- Photovoltaic — direct generation of electricity from sunlight.
- Solar thermal — direct heating of water for space heating or domestic hot water.
- Wind turbines — use of solar driven air movement to generate electricity.

The technologies and their potential application to this site are discussed in more detail in the following sections. However, one further pertinent point must be made. The reason for adopting renewable energy technologies is to reduce greenhouse gas emissions, mainly carbon dioxide, and none of the technologies are wholly “zero carbon”. This is because, when the whole life cycle is taken into account some energy has to be put into every systems to manufacture and maintain the equipment (which has a finite life) or to operate the equipment, and generally at present this energy is derived from non-renewable sources. Examples include the energy needed to refine and process the silicon used to manufacture photovoltaic panels, the diesel fuel used to transport wood pellets and to power the wood processing machinery for the production of wood fuel pellets.

Finally, due to the dynamic and innovative nature of the renewable energy technology industry even apparently similar products can differ in vital practical details which means that detailed design of installations must be undertaken by experts, often working closely with the product manufacturers, as virtually no two products are identical or interchangeable. The following sections contain a summary of each possibly applicable technology, and a comparison of the advantages and disadvantages of technologies relevant to this development.

5.2 DECENTRALISED ENERGY

In addition to addressing the well understood and widely accepted planning policy requirement to install systems that will deliver a proportion of the development's energy needs from renewable sources, a further consideration is the availability of decentralised energy. If it is feasible, new developments should incorporate community energy generating schemes so that future developments can be connected or where there are existing networks, the feasibility of connecting the subject development should be investigated. However in this case there are no such networks available locally.

5.3 BIO-FUELS

Key planning and design issues regarding the use of bio-fuels include the building space and organisation to accommodate and operate the plant. The equipment would plant space and access and maintenance. Facilities are required for fuel storage and must be provided along with loading access for the fuel to be safely and efficiently delivered and stored. Finally, systems utilising bio fuels, particularly biomass, are rarely available at the small scale that would be appropriate for use in a building where the heat loads are so low. For these reasons the use of bio-fuels is not considered suitable for this development.

5.4 HEAT PUMPS

Heat pumps collect low temperature heat from renewable sources and "concentrate" it to a usable temperature. Fossil fuel based (grid) electricity is generally required to operate the pumps and the renewable component of the output is therefore by convention taken as the difference between the output energy and the input energy. A typical heat pump can deliver 3 kWh of heat energy for every 1 kWh and has been chosen for this development.

5.5 HYDROELECTRICITY

There is no suitable source of water in the locality which could be utilised as an energy source.

5.6 PHOTOVOLTAIC

Photovoltaic (PV) systems use areas of semiconductor material that produce electricity when exposed to light. They are connected to the building electricity supply via an inverter which converts the output to a form which is compatible with the mains electricity voltage and frequency. This also allows excess electricity to be exported at times when the actual demand from the dwellings is less than that being produced by the PV system. This ensures that all the electricity produced is used and achieves a reduction in carbon dioxide emissions. For all purposes relating to planning, the exported electricity is by convention treated as if it were used on site.

The output of photovoltaic systems is generally specified as kW peak, or kWp with each 1kWp of system expected to produce an average 800 kWh of electricity per year, although this may be reduced depending on location, orientation and over shading, because the availability of sunlight, to produce electricity, will generally not align with demand, it is normal for the system to be connected to the electricity grid and excess production exported. The introduction of the feed-in-tariff has improved the economics of solar PV systems.

There are no direct environmental consequences from the installation of PV panels but the installation can have a visual impact that may require consideration, this has been chosen for the development

5.7 SOLAR THERMAL PANELS

Solar thermal panels harness solar energy to heat domestic hot water. They are usually used in conjunction with the main heating system as they can only provide a portion of the demand for hot water, depending on the time of year. Overall, it is estimated that a suitably sized system can provide up to 60% of the annual energy demand for providing hot water. These require the installation of a water cylinder in each dwelling. This is not currently planned for as it is proposed to use a combi boiler due to the small size of the dwellings. It is for this reason that solar thermal is not considered entirely suitable for the development.

5.8 WIND TURBINES

Micro wind turbines produce electricity and can be grid-connected in the same way as photovoltaic panels. Although wind turbines are one of the most cost effective renewable energy technologies, for smaller turbines the capital cost is relatively high compared to the amount of power generated. Adjacent trees and buildings create turbulence and the location affects wind speed and to be effective an average wind speed of no less than 5m/s is required. From the Energy Saving Trust’s wind prediction tool, the predicted average wind speed at the development site is 2.4 m/s, significantly less than 5 m/s. In addition noise and vibration from roof mounted turbines can prove unacceptable and wind turbines are less likely to meet with the approval of local residents and planners.

For these reasons wind turbines are not considered suitable for this development.

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6. Baseline TER

The total CO_2 emissions has been calculated taking full account of energy demands for space heating and hot water, and electricity for pumps, fans, lights.. The baseline was determined by using the typical orientation and the use of building elements (walls, windows etc.) with U-values and other reference values and in most cases consistent with achieving compliance with Approved Document Part LA: 2021. The tabulated calculations results are in appendix 2.

7.1 Baseline calculations

Applied Details: Domestic

Element	U – Value Element	Element	U – Value Element
Walls – external	0.13	Flat roof	0.13
Door	1.00	Windows – g values 0.40	1.20
Floor	0.10		

Services

- **Psi values – calculated to default and Recognised Construction Details.**
- **Air pressure test 4.00**
- **Intermittent extract fans**
- **100% Low energy lighting**
- **Ventilation – Intermittent extract fans**
- **Mains gas combi boiler 88% SEDBUK**
- **Controls – Programmer, TRVS, Room Stat**
- **Internal water use 105 ltr per person per day**

7. Be Lean calculations: Energy demand reduction

Exceeding building regulations requirements (Part L 2021) through reduction measures alone, over the baseline calculations, achieving a 20% reduction in Co2 over the baseline.

Applied Details: Domestic

Element	U – Value Element	Element	U – Value Element
Walls – external	0.13	Flat roof	0.13
Door	1.00	Windows – g values 0.40	1.20
Floor	0.10		

Services

- **Psi values – calculated to default and Recognised Construction Details.**
- **Air pressure test 3.00**
- **100% Low energy lighting**
- **Ventilation – MVHR SFP 0.85 efficiency 93%**
- **Mains gas combi 88 % SEDBUK**
- **Controls – Time & temperature zone controls**
- **Internal water use 105ltr per person per day**
- **Water cylinder – minimum heat loss**

With reference to the heat pump and MVHR these have been applied for the efficiency only and needs to be clarified that its suitable for use, if an alternative is used please inform us and we will check the efficiencies as an alternative could make the calculations fail L building regulations and planning conditions

With reference to the construction details a full specification / u – value calculations will be required before the As built SAP and EPC can be issued, including photograph evidence (date and location stamped - of construction, services, thermal bridging, and insulation levels and type. (see example)

8. Be Clean – Heating infrastructure

Further reductions from Be Lean are demonstrated by using community / district heating networks.

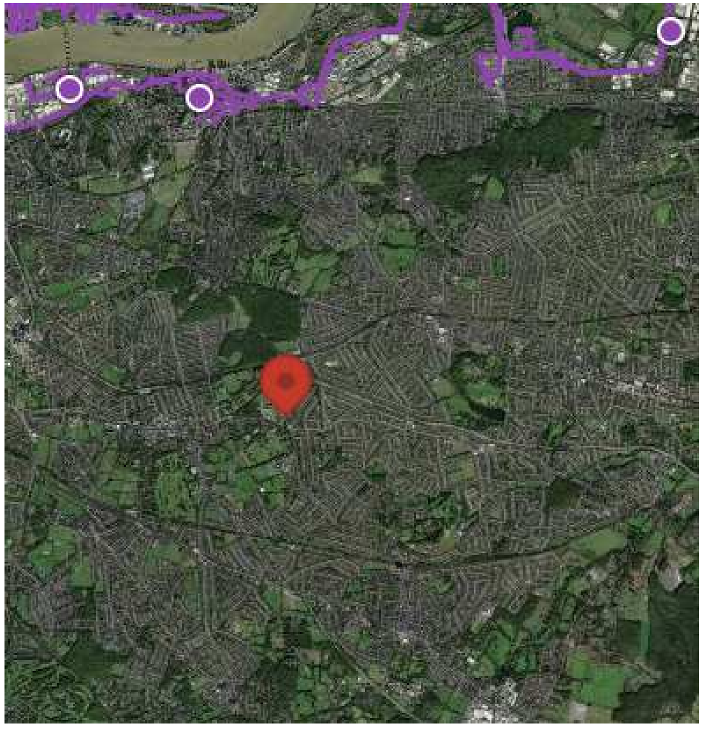
London Heat Map

Site location

Purple – Proposed

Red Existing

Pin Location



With reference to connecting to an existing or planned network, the map shows there is no there is no existing or potential HD networks close to the development, there for a centralised heat pump system is proposed which will facilitate later connection of the development to an area wide district heating network

9. Be Green calculations: Energy demand reduction

Exceeding building regulations requirements (Part L 2021) through reduction measures alone, over the baseline calculations, achieving a 20% reduction in Co2 over the baseline.

Applied Details: Domestic

Element	U – Value Element	Element	U – Value Element
Walls – external	0.13	Flat roof	0.13
Door	1.00	Windows – g values 0.40	1.20
Floor	0.10		

Services

- **Psi values – calculated to default and Recognised Construction Details.**
- **Air pressure test 3.00**
- **100% Low energy lighting**
- **Ventilation – MVHR SFP 0.85 efficiency 93%**
- **Mains gas combi 88 % SEDBUK**
- **Controls – Time & temperature zone controls**
- **Internal water use 105ltr per person per day**
- **Water cylinder – minimum heat loss**
- **3.00 Kw peak PV for the bungalow and 5.00 kw peak of the house.**

9.0– Green

Photovoltaic Panel systems convert energy from the sun into electricity through semi-conductor cells mounted in collector panels. The panels are connected to an inverter to turn the DC output into AC for use in the building to which they are attached and to be fed back into the grid when not required. It has been calculated that a total 3.30 **kw peak** photovoltaic panels facing south for bungalow and 5.00 Kw Peak for the dwelling, would contribute to a reduction in carbon dioxide emissions of compared with the TER (target emissions rate) confirmation the photovoltaic panels can fit on the dwellings

10 Carbon off set payment

The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.
It has been calculated that the remaining regulated Carbon Emissions are to offset through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

The carbon off- set price of £95.00 per tonne of carbon dioxide for a period of 30 years is be applied £-302.00

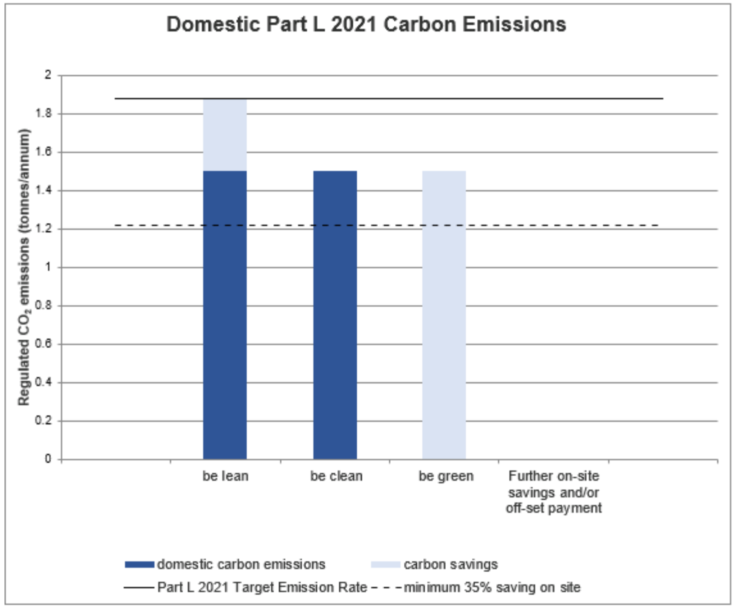


Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	0.4	20%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	1.6	86%
Cumulative on site savings	**2.0**	**106%**
Annual savings from off-set payment	-0.1	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**-3**	-
Cash in-lieu contribution (£)	**-302**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development

11.00 SAP Results

TER = Target Emission Rate kgCO2/yr/m2
DER = Dwelling Emission Rate kgCO2/yr/m2
TFEE = Target Fabric Energy Efficiency kWh/m2/yr
DFEE = Dwelling Fabric Energy Efficiency kWh/m2/yr
TPER = Target Primary Energy Rate kWh/m2/yr
DPER = Dwelling Primary Energy Rate kWh/m2/yr

Base Line

Plot	TER	DER	% Reduction	TFEE	DFEE	% Reduction	DPER	TPER	% Reduction	SAP Rating
Bungalow	14.31	19.92	-39.20	51.80	43.91	15.23	109.78	76.50	-43.50	83 B
House	12.18	15.67	-28.65	44.8	39.53	11.78	86.52	63.73	-35.76	84 B

Lean

Plot	TER	DER	% Reduction	TFEE	DFEE	% Reduction	DPER	TPER	% Reduction	SAP Rating
Bungalow	14.31	17.69	-23.62	51.80	43.14	16.72	99.09	76.50	-29.53	83 B
House	12.18	13.53	-11.08	44.80	38.85	13.28	76.36	63.73	-19.81	85 B

Green

Plot	TER	DER	% Reduction	TFEE	DFEE	% Reduction	DPER	TPER	% Reduction	SAP Rating
Bungalow	13.95	-0.21	101.51	51.80	43.14	16.72	3.94	74.54	94.72	100 A
House	11.95	-0.10	100.84	44.80	38.85	13.28	3.32	62.51	94.70	100 A