

Barrington Road, Durrington **Bellway Homes South London**

Energy and Sustainability Statement

AES Sustainability Consultants Ltd

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This statement has been commissioned by Bellway Homes South London to detail the approach to energy and CO₂ reduction employed in development of the site known as Barrington Road, Durrington. It should be noted the report has been based on detailed as designed and as built calculations undertaken for this development.

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1. Introduction

Preface

- 1.1. This Energy and Sustainability Statement has been prepared on behalf of Bellway Homes South London to discharge as built conditions relating to carbon reductions, energy from renewables and water usage.

Development Description

- 1.2. The development site is located in West Sussex and falls under the jurisdiction of Worthing Borough Council.
- 1.3. The site comprises of 287 dwellings ranging from one to four bed occupancy. The site layout is shown in Figure 1.

Purpose and Scope of the Statement

- 1.4. This statement has been prepared to address relevant national and local policies relating to sustainable development, including policies within the Worthing Borough Council Core Strategy adopted in April 2011 and the emerging local plan which has since been adopted Submission Draft Local Plan 2020-2036.
- 1.5. The statement demonstrates that the development has incorporated sustainable design considerations and ensured that a significant proportion of the energy demand of the development is met through renewable energy provision, exceeding the requirements of Policy DM16 & DM17. This statement also demonstrates that the development has met the water targets required in DM21 of the Draft Local Plan.
- 1.6. This statement has been produced to discharge the condition below.

'Prior to occupation of an individual apartment block or each house, details shall be submitted to the Local Planning Authority and approved in writing which verify how the house or apartment accords with the sustainability measures outlined in the approved Sustainability Plan, prepared by Abbey Consultants, DC-ES-BWSLDN-22-03 and the Agent's email of 8th November 2022. Including the target of 31 percent CO2 reduction below the baseline model including 24 percent renewable energy generation, as identified in the submitted Energy Assessment and confirming the installation of water goods and fixtures to achieve a target of <110L/Person usage/day and the design of heating systems with lower flow temperatures larger radiators (as described in the Agent's email of 8th November 2022). Unless otherwise approved in writing by the Local Planning Authority the verification document shall include proposed and timetabled remedial measures if any of these targets have not been met and, the remedial measures thereby approved shall be implemented in accordance with that timetable.'



Figure 1. Proposed Site Layout

2. Planning Policy

Local Planning Policy

- 2.1. Local policy relating to the sustainable design and construction of buildings at the time of planning was contained within the Worthing Borough Council core Strategy adopted in April 2011 and the emerging local plan Submission Draft Local Plan 2020-2036 which was adopted in March 2023.

Policy DM16 – Sustainable Design

a) All development (excluding householder applications) will be required to achieve the relevant minimum standards below unless superseded by national planning policy, Building Regulations or it can be demonstrated that it is not practicable, feasible or viable (in which case the minimum standard should be met as far as is possible). Applications for major development must be supported by a Sustainability Statement demonstrating that the minimum standards are met and where possible exceeded. All development is encouraged to exceed these minimum standards where possible.

Towards Zero Carbon Development

b) All new build housing will achieve a minimum 20% CO₂ reduction compared to the Building Regulations Part L 2013 standard through energy efficiency measures, unless superseded by national policy or Building Regulations. Developers will be expected to provide evidence of the level of carbon reduction achieved in the dwellings through submission of SAP calculation reports at the design and built stages.

c) New non-domestic buildings will achieve a 27% reduction in CO₂ on average per building compared to the Building Regulations Part L 2013 standard unless superseded by national policy or Building Regulations. Applications for major development should demonstrate how the design and layout of the development has sought to maximise reductions in carbon emissions in line with the energy hierarchy.

d) All new build housing should seek to achieve an A rating (with a minimum expectation of B rating) Energy Performance Certificate. New housing should achieve a minimum of a 'C' rating Energy Performance Certificate.

e) All non-domestic properties (including those created through conversions) should achieve a 'B' rating Energy Performance Certificate.

f) Non residential development of at least 1,000 sqm floorspace should achieve BREEAM New Construction 'Very Good' as a minimum rating based on the latest BREEAM scheme.

Preventing Overheating

g) All new development should incorporate design measures where appropriate to minimise excessive solar gain and maximise opportunities for passive cooling through natural ventilation and other passive means to avoid contributing to the urban heat island effect and reduce vulnerability to overheating. Multifunctional green infrastructure should be integrated into public spaces to provide urban cooling and access to shady outdoor space.

h) Major development proposals should reduce potential overheating and reliance on energy intensive air conditioning systems and demonstrate this in accordance with the cooling hierarchy.

Minimising Waste

i) All development will be required to follow the waste hierarchy to minimise the amount of waste disposed to landfill and incorporate facilities that enable and encourage high rates of recycling and re-use of waste and materials.

Policy DM17 – Energy

a) All new housing and major non-residential development should incorporate renewable and low carbon energy production equipment to meet at least 10% of predicted total energy requirements (after CO₂ reductions from energy efficiency measures).

b) All proposals for major development must demonstrate that the heating and cooling systems have been selected in accordance with the heating and cooling hierarchy and that the lowest carbon solution that is feasible is used. Applicants will be required to submit a feasibility assessment to provide a rationale for the chosen heating/cooling system.

c) Applicants for major development within areas identified as heat network opportunity clusters should demonstrate how they have considered connecting to district heating networks where:

i) they exist at the time of permission being granted;

ii) the heat network route lies adjacent to the site; and

iii) otherwise it is feasible and viable to do so. Alternatively, where a heat network route is planned but has not been delivered, sites adjacent to the planned heat network routes should consider being heat network ready to enable a future connection.

d) The development of renewable, low carbon, or decentralised energy schemes will be supported and community initiatives encouraged where proposals:

i) are located appropriately and do not cause an unacceptable impact on surrounding uses or the local environment, landscape character or visual appearance of the area (including the South Downs National Park), taking into account the cumulative impact of other energy generation schemes; and

ii) mitigate any potential noise, odour, traffic or other impacts of the development so as not to cause an unacceptable impact on the environment or local amenity.

Policy DM21 – Water Quality and Protection

a) Development should protect and enhance groundwater, surface water features and control aquatic pollution. Development will be permitted provided that it does not have an unacceptable impact on the quality and potential yield of local water resources, the water environment and its ecology.

b) The Council will support proposals to replace existing traditional drainage systems with suitable Sustainable Drainage Systems to further reduce water pollution and improve water quality.

c) Potentially polluting development should be steered away from the most sensitive areas. As a minimum a preliminary risk assessment will be required for any development where there is potential risk of contamination of controlled waters. New development within Groundwater Source Protection Zones will only be permitted provided that it has no adverse impact on the quality of the groundwater source or a risk to its ability to maintain a public water supply.

d) Development must be phased to take into account the timing of any water and/or wastewater infrastructure required which must be in place prior to the occupation of development.

e) All new residential development must achieve as a minimum the optional requirement set through Building Regulations for water efficiency that requires an estimated water use of no more than 110 litres per person per day.

National Planning Policy Framework

- 2.2 In December 2024, the Government published the updated National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England and how these are expected to be applied.
- 2.3 The planning process has been identified as a system to support the transition to a low carbon future in response to climate change by assisting in the reduction of greenhouse gas emissions and supporting renewable and low carbon energy.
- 2.4 Paragraph 164 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

164. New development should be planned for in ways that:

- a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaption measures, including through the planning of green infrastructure; and
- b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

Current National Policy Standards

- 2.5 The Government introduced the latest revision in building Regulations, known as Part L 2021 in December 2021, coming into effect for buildings where construction commenced after the 15th June 2023. The new standards provide a 31% reduction in CO₂ emissions compared with the previous Building Regulations standard., alongside improvements to fabric standards and a focus on primary energy usage as a new compliance metric.

Adopted Strategy

- 2.2. The development is designed to incorporate all applicable guidance contained within DM16, DM17 and DM21 relating to renewable energy provision and the construction of highly efficient buildings which seek to minimise energy demand and CO₂ emissions.
- 2.3. Homes have been constructed under Part L1a 2013 and Part L 2021, any plots built to meet Part L 2021 will achieve 31% reduction over Part L1a 2013.
- 2.4. In addition, low carbon and renewable energy technologies have been installed to meet the required percentage of energy demand and reduce the development's impact on carbon emissions.
- 2.5. The following sections of this document set out the specific measures incorporated and an assessment of appropriate technologies and methods in meeting the requirements of the relevant policies.

3. Climate Change Resilience

- 3.1. Dwellings constructed today may be operating in a substantially different climate over the coming decades and therefore should be designed to ensure that they are resilient to future climate change impacts such as increases in temperature, rainfall, wind and sea level. Climate resilience is important to home owners against a backdrop of increasingly extraordinary weather events.
- 3.2. Passive design measures have been considered and incorporated to enhance resilience to climate change impacts throughout the lifetime of the development.

Rising Temperatures and Overheating

- 3.3. With the risk of potentially higher summer temperatures and longer hot spells in the future, it is important to consider the thermal comfort of the dwelling. Passive design measures are included to mitigate future overheating.

Approved Document O

- 3.4. In order to more robustly address overheating risk, the Government has introduced a new Approved Document, Part O', into the Part L 2021 Building Regulations, therefore overheating assessments have been completed for the 56 2021 plots on this site.
- 3.5. This document requires a more in-depth assessment of the risk of overheating, considering site location, dwelling orientation, glazing proportions and openable window areas for natural ventilation.
- 3.6. This assessment was undertaken at the start of detailed design and any mitigation measures that were required have been built in.

Addressing overheating risk

- 3.7. The development uses traditional masonry construction, which has a relatively high thermal mass, compared with timber or steel construction. A construction with a high thermal mass can help to reduce overheating risk as it absorbs heat during the day and slowly releases it during cooler night-time hours, effectively smoothing out temperature fluctuations within the property.
- 3.8. Within the development layout, orientation and massing have been considered to maximize useful passive solar gain. Glazing will be specified with a solar transmittance value (g-value) to strike the balance between useful solar gain in the winter and unwanted solar gain in the summer.
- 3.9. Where possible, dwellings benefit from cross-ventilation to effectively purge warm air from the properties during periods of hot weather. Window opening areas have been considered and guided by the Part O assessment, with increased opening areas being designed in as required.

4. Energy & CO₂ Reduction Strategy – Fabric First

Overview

- 4.1. The construction specification and sustainable design principles to be applied to the development will ensure that each dwelling meets the CO₂ reductions mandated by Part L1 of the Building Regulations through fabric measures alone.
- 4.2. The CO₂ reduction strategy for the development incorporates further improvements beyond a Part L compliant specification and initially concentrates finance and efforts on reducing energy demand as the first stage of the Energy Hierarchy (Figure 2).

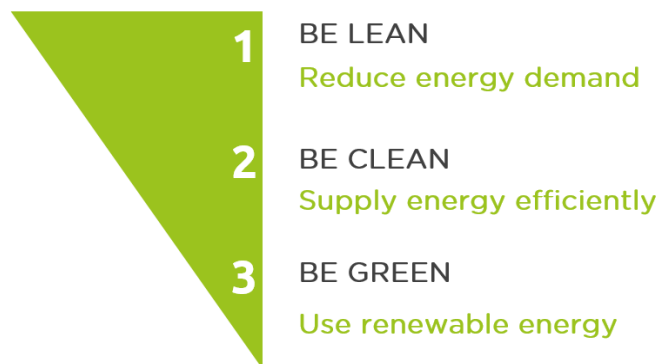


Figure 2. The Energy Hierarchy

Be Lean – reduce energy demand

- 4.3. The design of a development - from the masterplan to individual building design - will assist in reducing energy demand in a variety of ways, with a focus on minimising heating, cooling and lighting loads. Key considerations include:
 - Building orientation – maximise passive solar gain and daylight
 - Building placement – control overshading and wind sheltering
 - Landscaping – control daylight, glare and mitigate heat island effects
 - Building design – minimise energy demand through fabric specification

Be Clean – supply energy efficiently

- 4.4. The design and specification of building services to utilise energy efficiently is the next stage of the hierarchy, taking into account:
 - High efficiency heating and cooling systems
 - Ventilation systems (with heat recovery where applicable)
 - Low energy lighting
 - High efficiency appliances and ancillary equipment

Be Green – use low carbon / renewable energy

- 4.5. Low carbon and renewable energy systems form the final stage of the energy hierarchy and can be used to directly supply energy to buildings, or offset energy carbon emissions arising from unavoidable demand. This may be in the form of:
 - Low carbon fuel sources – e.g. biomass
 - Heat pump technologies
 - Building scale renewable energy systems
 - Small-scale heat networks
 - Development-scale heat networks
- 4.6. As this hierarchy demonstrates, designing out energy use is weighted more highly than the generation of low-carbon or renewable energy to offset unnecessary demand. Applied to the development, this approach is referred to as 'fabric first' and concentrates finance and efforts on improving U-values, reducing thermal bridging, improving airtightness, and installing energy efficient ventilation and heating services.
- 4.7. The benefits to prospective homeowners of following the Fabric First approach are summarised in Table 1.

Table 1. Benefits of the Fabric First approach

	Fabric energy efficiency measures	Bolt-on renewable energy technologies
Energy/CO ₂ /fuel bill savings applied to all dwellings	✓	✗
Savings built-in for life of dwelling	✓	✗
Highly cost-effective	✓	✗
Increases thermal comfort	✓	✗
Potential to promote energy conservation	✓	✓
Minimal ongoing maintenance / replacement costs	✓	✗
Significant disruption to retrofit post occupation	✓	✗

Building Regulations standards – Fabric Energy Efficiency

- 4.8. In addition to the CO₂ reduction targets, the importance of energy demand reduction was further supported by the introduction of a minimum fabric standard into Part L1A 2013, based on energy use for heating and cooling a dwelling. This is referred to as the 'Target Fabric Energy Efficiency' (TFEE), and expressed in kWh/m²/year.
- 4.9. This standard enables the decoupling of energy use from CO₂ emissions and serves as an acknowledgement of the importance of reducing demand, rather than simply offsetting CO₂ emissions through low carbon or renewable energy technologies.
- 4.10. The TFEE is calculated based on the specific dwelling being assessed with reference values for the fabric elements contained within Approved Document L1A. These reference values are described as 'statutory guidance' as opposed to mandatory requirements, allowing full flexibility in design approach and balances between different aspects of dwelling energy performance to be struck so that the ultimate goal of achieving the TFEE is met. The construction specifications are set out in the following sections of this Strategy.

Improved fabric specification

- 4.11. To ensure that the energy demand of the development is reduced, the dwellings have been designed to minimise heat loss through the fabric wherever possible. Table 2 details the fabric specification of the major building elements, with the first column in this table setting out the Part L1A 2013 limiting fabric parameters in order to demonstrate the improvements.

Table 2. Construction specification – main elements

	Part L1a 2013 Limiting Fabric Parameters	Specification Used
External wall – u-value	0.30 W/m ² K	0.24-0.29 W/m ² K
Party wall – u-value	0.20 W/m ² K	0.0 W/m ² K
Plane roof – u-value	0.20 W/m ² K	0.09-0.14 W/m ² K
Ground floor – u-value	0.25 W/m ² K	≤ 0.13 W/m ² K
Windows – u-value	2.00 W/m ² K	1.30 W/m ² K
Doors – u-value	2.00 W/m ² K	0.64-1.40 W/m ² K
Air Permeability	10 m ³ /h.m ² at 50 Pa	3.00-7.01 m ³ /h.m ² at 50 Pa
Thermal Bridging	Y = 0.150 (default)	Y = 0.036 (calculated)

Thermal bridging

- 4.12. The significance of thermal bridging as a potentially major source of fabric heat losses is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the thermal bridging will not achieve the desired energy and CO₂ reduction targets.
- 4.13. The specification seeks to minimise unnecessary bridging of the insulation layers, with avoidable heat loss therefore being reduced wherever possible. Accurate calculation of these heat losses forms an integral part of the SAP calculations undertaken to establish energy demand of the dwellings, and as such thermal modelling will be undertaken to assess the performance of all main building junctions. It is calculated that the average total Y value is around 0.036, against a SAP default figure of 0.150.

Air leakage

- 4.14. After conductive heat losses through building elements are reduced, convective losses through draughts are the next major source of energy wastage. The site adapts an airtightness standard of 3.00-7.01 m³/h.m² at 50Pa, with pressure testing of all dwellings to be undertaken on completion to confirm that the design figure has been met.

Passive design measures and overheating risk mitigation

- 4.15. Glazing has been specified with a solar transmittance value (g-value) to strike the balance between useful solar gain in the winter and unwanted solar gain in the summer.
- 4.16. Due to these measures to reduce internal heat gain, natural ventilation provided through window openings and the opportunity for cross ventilation allows for sufficient air exchange rates to purge any heat build-up. Active cooling systems are therefore not included.
- 4.17. By following these principles, the development has been designed to build in resilience to a potentially changing climate over the lifetime of the buildings and minimise overheating risk, which can be exacerbated by the drive to build better insulated, more airtight homes if not considered within the design and construction process.

5. Low Carbon and Renewable Energy Systems

- 5.1. A range of technologies have been incorporated into the scheme in to meet 31% carbon reduction over Part L1a 2013 and 10% energy from renewables in line with policies DM16 & DM17.

Combined Heat and Power (CHP) and District Energy Networks

- 5.2. A CHP unit is capable of generating heat and electricity from a single fuel source. The electricity generated by the CHP unit is used to displace electricity that would otherwise be supplied from the national grid, with the heat generated as effectively a by-product utilised for space and water heating.
- 5.3. The economic and technical viability of a CHP system is largely reliant on a consistent demand for heat throughout the day to ensure that it operates for over 5000 hours per year. Heat demand from mainly residential schemes is not conducive to efficient system operation, with a defined heating season and intermittent daily profile, with peaks in the morning and the evening. For this reason, the use of a CHP system is considered unfeasible for this development.
- 5.4. Heat Networks have high network heat losses associated with distribution to individual houses, as opposed to large high-rise apartment blocks and commercial developments mean that a new heat network to serve the area is not considered viable or an environmentally preferred option. Due to these reasons, the provision for future connection to a district heating system is also not proposed.

Wind Power

- 5.5. Locating wind turbines adjacent to areas with buildings presents a number of potential obstacles to deployment. These include the area of land onsite required for effective operation, installation and maintenance access, environmental impact from noise and vibration, visual impact on landscape amenity and potential turbulence caused by adjacent obstacles, including the significant amount of woodland on and around the development.
- 5.6. A preliminary examination of the BERR wind speed database indicates that average wind speeds at 10m above ground level are around 5.3m/s¹. Wind turbines at this site are therefore

unlikely to generate sufficient quantities of electrical energy to be cost effective². For these reasons wind power is not considered feasible.

Building Scale Systems

- 5.7. The remaining renewable or low carbon energy systems considered potentially feasible are at a building scale. These are as follows;
- Individual biomass heating
 - Solar thermal
 - Solar photo-voltaic (PV)
 - Air Source Heat Pumps (ASHPs)
 - Ground Source Heat Pump (GSHPs)
- 5.8. The advantages and disadvantages of these technologies are evaluated in Tables 3-7.

¹ NOABL Wind Map (<http://www.rensmart.com/Weather/BERR>)

² CIBSE TM38:2006. Renewable energy sources for buildings.

Table 3. Individual Biomass Heating feasibility appraisal

Potential Advantages	Risks & Disadvantages
- Potential to significantly reduce CO₂ emissions as the majority of space and water heating will be supplied by a renewable fuel - Decreased dependence on fossil fuel supply	- A local fuel supply is required to avoid increased transport emissions - Fuel delivery, management and security of supply are critical - Space is required to store fuel, a thermal store and plant - A maintenance regime would be required even though modern systems are relatively low maintenance - Building users or a management company must be able to ensure fuel is supplied to the boiler as required. Local environmental impacts potentially include increased NO_x and particulate emissions
Estimated costs and benefits	
- Cost £2,000 upwards for a wood-pellet boiler, not including cost of fuel - Not eligible for RHI payments as new-build properties	
Conclusions	
Biomass heating is considered technically feasible in large dwellings provided sufficient space can be accommodated for fuel supply, delivery and management.	

Table 4. Solar Thermal systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
- Mature and reliable technology offsetting the fuel required for heating water (typically gas) - Solar thermal systems require relatively low maintenance - Typically, ~50% of hot water demand in dwellings can be met annually	- Installation is restricted to favourable orientations on an individual building basis - The benefit of installation is limited to the water heating demand of the building - Safe access must be considered for maintenance and service checks - Buildings need to be able to accommodate a large solar hot water cylinder - Distribution losses can be high if long runs of hot water pipes are required - Visual impact may be a concern in special landscape designations (e.g. AONB)
Estimated costs and benefits	
- Cost £2,000 - 5,000 for standard installation - Not eligible for RHI payments as new-build properties - Ongoing offset of heating fuel, minimal maintenance requirements	
Conclusions	
Solar thermal systems are considered technically feasible on all buildings with suitable roof orientations, however the contribution to carbon reduction is expected to be low and therefore it is not a preferred technology.	

Table 5. Solar photovoltaic systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
- The technology offsets the carbon content and primary energy demand of grid supplied electricity used for lighting, pumps and fans, appliances and equipment - Mature and well proven technology that is relatively easily integrated into building fabric - Adaptable to future system expansion - Solar resource is not limited by energy loads of the dwelling as any excess generation can be transferred to the national grid - PV systems generally require very little maintenance - Occupiers could benefit from Feed in Tariff payments - Service and maintenance requirement minimal, and 2-3 storey buildings should not require significant additional safety measures (mansafe systems etc) for roof access.	- Poor design and installation can lead to lower-than-expected yields (e.g., from shaded locations) - Installation is restricted to favourable orientations - Feed in Tariff support mechanism has been discontinued - Safe access must be considered for maintenance and service checks - Visual impact may be a concern in special landscape designations (e.g. AONB) or conservation areas - Reflected light may be a concern in some locations - Efficiency of solar panels typically lower compared to other renewable energy technologies, meaning larger area required to produce the same amount of energy as other sources - Variability in solar energy production can lead to challenges in obtaining a consistent energy supply – additional energy storage solutions may be necessary to ensure a reliable and consistent power supply
Estimated costs and benefits	
- Cost £1,500 upwards (1kWp+) and scalable - Ongoing offset of electricity fuel costs, minimal maintenance requirements	
Conclusions	
PV panels are considered technically feasible for all buildings with suitable roof orientations.	

Table 6. Air Source Heat Pump systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
- Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle - Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 250% - Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings - With regular maintenance, ASHPs can last for up to 20 years, longer than a traditional gas boiler, making them a worthwhile long-term investment - By extracting heat from the air systems do not burn fossil fuels, leading to lower carbon emissions, reducing the homeowners carbon footprint, especially when powered by renewable electricity - Less disruptive than installing ground source heat pumps, with less outdoor space required	- Air source heat pumps are powered by electricity, potentially leading to higher fuel bills despite operational efficiency - It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved. Users must be educated in how heat pump systems should be operated for optimal efficiency - Air source heat pump plant should be integrated into the building design to mitigate concerns regarding the visual impact of bolt-on technology - Noise in operation may be an issue particularly when operating at high output
Estimated costs and benefits	
- Cost £3,000 - £5,000 - Not eligible for RHI payments as new-build properties	
Conclusions	
Air source heat pumps are technically feasible for the buildings in this scheme and due to their significant CO ₂ reduction capability, are a preferred low carbon renewable source for this development.	

Table 7. Ground Source Heat Pump systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
- Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle - Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 320% - Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings	- Low temperature heating circuits (underfloor heating) would be required to maximise the efficiency of heat pumps - A hot water cylinder would also be required for both space and water heating - Ground source heat pumps are powered by electricity, potentially leading to higher fuel bills despite operational efficiency It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved - Ground source heat pumps either require significant land to incorporate a horizontal looped system or significant expense to drill a bore hole for a vertical looped system
Estimated costs and benefits	
- Cost circa £8,000-10,000+ - Running cost linked to COP of heat pump, circa 3.0 equates to 66% reduction vs electricity or around 5-6p/kWh (higher than mains gas) - Additional costs to upgrade electricity infrastructure currently unknown	
Conclusions	
Ground source heat pumps are considered technically feasible for buildings in this scheme. However, the lack of space for horizontal heat exchangers and cost and difficulty associated with vertical boreholes at this site means that they are not considered a preferred low carbon technology at this stage.	

Renewable energy systems

5.9. Following this feasibility assessment, it is considered that there are a range of technically feasible low carbon renewable energy systems, however several of these have been discounted on the grounds of increased running costs for residents or other adverse effects;

- Biomass heating systems would require significant storage space for fuel as well as regular deliveries at different times to all dwellings. Local NOx and particulate pollution are also an increasing concern, and therefore they are not appropriate for this development.
- Ground source heat pump systems may be technically feasible; however, the ground conditions are unknown, and the capital cost is likely to be prohibitive.

5.10. There are two preferred technologies which have been utilised on this development:

- Air source heat pumps
- Solar Photovoltaic

5.11. The development utilises a mixture of highly efficient gas boilers, PV and ASHPs whilst the apartments utilise electric heating and hot water heat pumps.

Air Source Heat Pumps

5.12. An ASHP is a low carbon technology which can be used for heating in the winter and can be reversed for cooling in the summer months. ASHP's work by extracting latent heat from the outside air and passing it through a heat exchanger which increases its temperature. The heat is then fed to the required rooms (or in reverse for cooling).

5.13. An air-source heat pump with a heating efficiency of 3.5 will supply 3.5 kilowatts of heat energy for the consumption of 1 kilowatt of electricity and can therefore deliver significant carbon savings, as well as several environmental and operational advantages. The amount of heat being supplied to the building is greater than the amount of energy consumed by the heat pump.

6. As built Energy from renewables and CO₂ Emissions

- 6.1. The development has been constructed to meet the requirements of Part L1a 2013 and current Part L1 Building Regulations 2021 dependent on when foundations were laid. The site delivers 231 plots to meet Part L1a 2013 and the remaining 56 plots to meet Part L 2021 (by meeting Part L 2021 the dwellings already achieve a 31% reduction when compared to Part L1a 2013 standards).
- 6.2. Part L carbon compliance is assessed through the Standard Assessment Procedure (SAP), which uses the 'Target Emission Rate' (TER) – expressed in kilograms CO₂ per metre squared of total useful floor area, per annum – as the benchmark. The calculated performance of the dwelling as designed - the Dwelling Emission Rate (DER) – is required to be lower than this benchmark level.
- 6.3. The sites design SAP calculations have been completed along with a portion of as built calculations and the carbon reduction the site achieves is represented in table 8.

Table 8. Site-wide Carbon Reduction

CO ₂ emissions (kgCO ₂ /year)		
Part L baseline	483,632	
Annual representative after fabric measures, efficient gas boilers, PV and heat pumps	335,336	
Savings	148,296	31%

- 6.4. This demonstrates the site has achieved the 31% carbon reduction exceeding the 20% reduction requirements of Policy DM16.
- 6.5. In addition to achieving a 31% carbon reduction exceeding Policy DM16 requirements by 11% the site also delivers 22% of its energy from renewables through the use of PV and ASHPs which exceeds the requirements of Policy DM17 by 12% This is represented in Table 9.

Table 9. Site-wide Energy from renewables

Energy Demand (kWh/year)	
Total delivered Energy	1,259,160
Energy from renewables	274,180
Savings	22%

- 6.6. This demonstrates that the site has achieved 22% energy from renewables exceeding the 10% requirement in Policy DM17 by 12%.

7. Water Efficiency

- 7.1. The UK Climate Change Risk Assessment 2017 identified risks of shortages in water supply as a future climate change impact. Therefore, the efficient use of water is an important factor when considering future resilience to climate change.
- 7.2. As well as aiming to minimise water usage through the materials used, water consumption of the end user will be considered in line with current national policy. Building Regulations 2021 Part G require water efficiency measures for all new dwellings:

Water Efficiency

G2. Reasonable provision must be made by the installation of fittings and fixed appliances that use water efficiently for the prevention of undue consumption of water.

Water Efficiency of New Dwellings

36. (1) The potential consumption of wholesome water by persons occupying a new dwelling must not exceed the requirement in paragraph (2)

(2) The requirement referred to in paragraph (1) is either –

(a) 125 litres per person per day; or

(b) in a case to which paragraph (3) applies, the optional requirement of 110 litres per person per day,

As measured in either case in accordance with a methodology approved by the Secretary of State.

- 7.3. Water efficiency measures are met under Part G if: The estimated consumption of wholesome water resulting from the design of cold and hot water systems (calculated in accordance with the methodology set out in Appendix A) is not greater than the standard set by the Secretary of State of 125/litres/person/day, or the optional standard of 110 litres/person/day.
- 7.4. Appendix A of Part G provides a water efficiency calculation methodology. This assesses the whole house potable water consumption in new dwellings. The calculation methodology is to be used to assess compliance against the water performance targets in Regulation 36 to ensure that all new dwellings meet the water efficiency requirement.

- 7.5. The references provided in Part G Table 2.1 have been considered to ensure that efficient fittings are installed in each dwelling to meet requirements set out in Policy DM21.

- 7.6. Water calculations have been completed for the development and are included in this report under Appendix A.

8. Conclusions

- 8.1. This Energy and Sustainability Statement has been prepared on behalf of Bellway Homes South London to discharge carbon reduction, energy from renewables and water usage conditions at as built stage.
- 8.2. The development site is located in West Sussex and falls within the jurisdiction of Worthing Borough Council. The site delivers 287 dwellings.
- 8.3. This statement addresses Policy DM16 & DM17 of the Draft Local Plan 2020-2036, in relation to renewable energy provision, carbon reduction and the construction of highly efficient buildings which seek to minimise CO₂ emissions.
- 8.4. A fabric first approach to sustainable construction has been used, incorporating improvements in insulation specification, a reduction in thermal bridging and unwanted air leakage paths and further passive design measures to ensure that energy demand and consequent CO₂ emissions are minimised through the dwelling fabric as a priority.
- 8.5. Homes will be constructed under the energy efficiency requirements contained within Part L1a 2013 and Part L 2021, Part L 2021 when compared to Part L 2013 is a reduction of 31% reduction in CO₂ emissions.
- 8.6. A range of potential low carbon and renewable energy technologies have been assessed for feasibility in meeting the energy requirements of Policy DM16 & DM17, concluding that ASHPs and PV are the preferred technology for this site and have been installed.
- 8.7. Calculations establish with the implementation of efficient gas boilers, ASHPs and PV, have generated carbon reductions of 31% over a Part L 2013 compliant baseline, exceeding the requirement of 20% carbon reductions detailed within Policy DM16 by 11%.
- 8.8. In addition to the above calculations demonstrate the site delivers 22% energy from renewables exceeding the 10% requirement detailed within Policy DM17 by 12%.
- 8.9. The water calculations presented in appendix A show the development has meet the water targets of <= 110 litres/person/day set out in Policy DM21 of the Draft Local Plan.

Appendix A – Water calculations

CSH Wat tool May 09

breglobal

Job no: 6973
Date: 20.03.2024
Assessor name: AES Sustainability Consultants
Registration no:
Development name: Brington Road, Durrington

WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)											
House Type:		Type 1		Type 2		Type 3		Type 4		Type 5	
Description:		Private 1, 2 & 4 bed		Private 3 Bed		Private 1 & 2 bed Apartments		Affordable 1 & 2 bed		Shared Ownership	
Installation Type	Unit of measure	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day
Is a dual or single flush WC specified?		Dual		Dual		Dual		Dual		Dual	
WC	Full flush volume	4	5.84	4	5.84	4	5.84	6	8.76	4	5.84
	Part flush volume	2	5.92	2	5.92	2	5.92	3	8.88	2	5.92
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	5.4	10.11	5.4	10.11	5.4	10.11	5	9.48	5	9.48
Are both a Bath & Shower Present?		Bath & Shower		Bath & Shower		Bath & Shower		Bath & Shower		Bath & Shower	
Bath	Capacity to overflow	155	17.05	155	17.05	155	17.05	165	18.15	165	18.15
Shower	Flow rate (litres / minute)	8	34.96	6	26.22	6	26.22	6	26.22	6	26.22
Kitchen sink taps	Flow rate (litres / minute)	6	13.00	6	13.00	6	13.00	6	13.00	6	13.00
Has a washing machine been specified?		Yes		Yes		No		No		No	
Washing Machine	Litres / kg	7.57	15.90	7.57	15.90		17.16		17.16		17.16
Has a dishwasher been specified?		Yes		Yes		Yes		No		No	
Dishwasher	Litres / place setting	0.76	2.74	0.85	3.06	0.85	3.06		4.50		4.50
Has a waste disposal unit been specified?		No		No		Yes		Yes		Yes	
Water Softener	Litres / person / day		0.00		0.00		0.00		0.00		0.00
Calculated Use		105.5		97.1		101.4		109.2		103.3	
Normalisation factor		0.91		0.91		0.91		0.91		0.91	
Total Consumption		96.0		88.4		92.3		99.4		94.0	
Code for Sustainable Homes		Level 3/4		Level 3/4		Level 3/4		Level 3/4		Level 3/4	
External use		5.0		5.0		5.0		5.0		5.0	
Building Regulations 17.K		101.0		93.4		97.3		104.4		99.0	
17.K Compliance?		Yes		Yes		Yes		Yes		Yes	