

Roundstone Lane, Angmering BN16

Renewable Energy Statement

Issue 1.0

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Bedaro Ltd



Document Issue Register

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Table of Contents	Page
1 Introduction	4
2 Executive Summary	5
3 Discussion	6
3.1 Baseline Energy Demand and CO2 Emissions	6
3.2 'Be Lean' – Reducing Energy Demand	7
3.3 'Be Clean' – Supplying Energy Efficiently	8
3.4 'Be Green' – Renewable Energy	9
3.5 Conclusion	11

1 Introduction

This report details an Renewable Energy Statement for the proposed development at Roundstone Lane, Angmering BN16. The proposed development consists of a 30no. residential units (22no. houses and 8no. apartments). Various energy saving measures have been incorporated into the design of the dwellings, including high thermal-efficiency building fabric, and low energy LED lighting. The pitched roofs will allow for a site-wide 13kWp Solar PV array to be installed, with most panels being south-facing.

The purpose of this report is to indicate the baseline energy demand and to elaborate on various energy saving measures that will be implemented, according to the energy hierarchy (be lean, be clean, be green). Additionally, the report details how the renewable energy strategy will accomplish the local council objectives. The report demonstrates how the building will comply with national Building Regulations, in addition to local Arun District Council Policy ECC SP2.

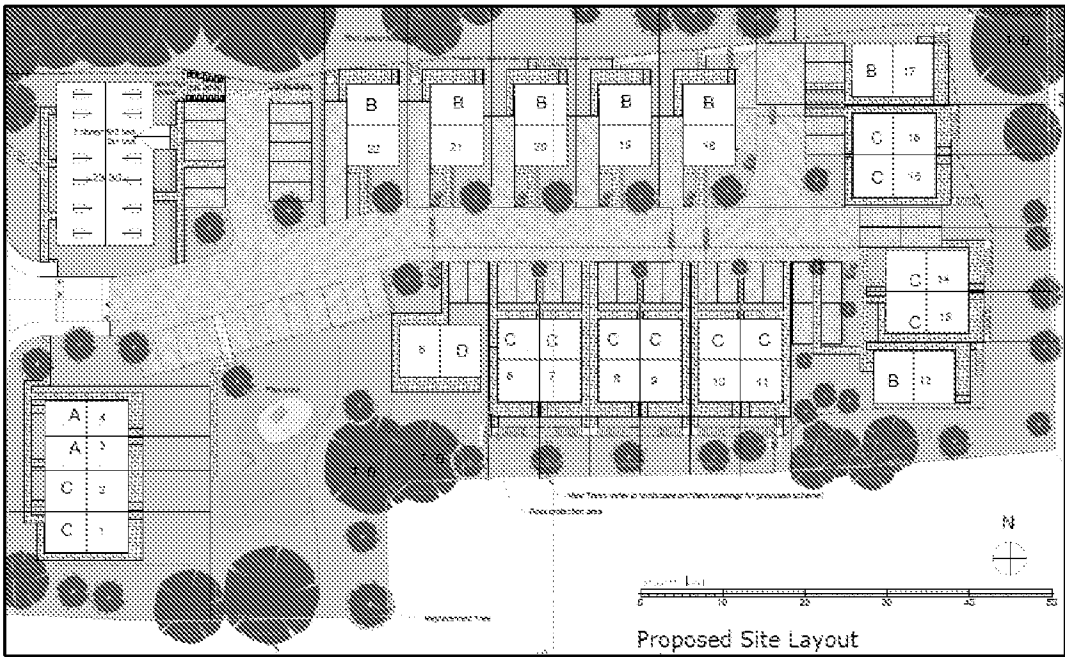


Figure 1: Proposed Site Layout

2 Executive Summary

The development has been shown to meet the energy consumption and CO2 emissions requirements. These include the national Building Regulations Part L requirements, and the Arun District Council requirement for at least 10% of the energy requirements of the development from decentralised and renewable or low carbon sources.

A review of the predicted building energy consumption and energy generation has been conducted, based on SAP calculations for representative house types and apartments. The following table shows a summary of the site emissions compared with the Building Regulations target emissions, and demonstrates the reduction in CO2 emissions with a 13kW Solar PV array implemented:

	Total Regulated emissions (Tonnes CO2 per annum)	CO2 Savings (Tonnes CO2 per annum)	Percentage Saving (%)
Part L 2013 Baseline	55.6		
Be Lean	54.6	0.9	1.69%
Be Clean	54.6	0.0	0.00%
Be Green	48.7	5.9	10.61%

The dwellings achieve a 'Pass' without any renewable technologies implemented. This is due to the high thermal-efficiency of the building fabric, and low energy LED lighting specified throughout.

With the addition of a Solar PV array to supplement efficient fabric and services, the CO2 emissions would be reduced by 10.61% (compared to the TER), bringing the total CO2 emissions to 48.7 kgCO2/m2yr. This equates to a 10.8% reduction, after the 'Be Lean' measures are taken into consideration.

Policy	Requirement	Actual Building	Achieved?
Arun District Council Policy ECC SP2	10% of energy requirements through renewable technologies	10.8% CO2 reduction compared to 'Be Lean' emissions	YES

3 Discussion

3.1 Baseline Energy Demand and CO2 Emissions

The baseline energy demand and CO2 emissions for the building has been calculated using approved FSAP 2012 software, which implements SAP 2012 v9.92. The dwellings exhibit a well-insulated fabric along with energy efficient services, to enable a low emission rate prior to the addition of renewable energy. This satisfies the energy hierarchy set out in the London Plan Policy 5.2:

1. Be Lean (use less energy)

2. Be Clean (supply energy efficiently)

3. Be Green (use renewable energy)

The following fabric U-values have been included in the Baseline model:

Envelope Element	U-Value (W/m ² K)	Limit (W/m ² K)
External Wall	0.18 (notional)	0.30
Floor	0.13 (notional)	0.25
Roof	0.13 (notional)	0.20
Windows	1.40 (notional)	2.0
Doors	1.0 (notional)	2.0
Air Permeability	5.0 m ³ /h.m ² @50Pa	10 m ³ /h.m ² @50Pa

The following table displays the 'Baseline' Target Emission Rate (TER) for the whole site:

	Total Regulated emissions (Tonnes CO2 per annum)	CO2 Savings (Tonnes CO2 per annum)	Percentage Saving (%)
Part L 2013 Baseline	55.6	N/A	N/A

3.2 'Be Lean' – Reducing Energy Demand

Reduction of energy demand has been achieved initially through passive measures, by specifying high performing building fabric to reduce heat losses. In addition, building services have been specified which are beyond the Domestic Building Services Guide requirements, whilst low energy lighting systems have been specified throughout. The various systems are detailed in the table below:

System	Specifications
Lighting	100% Low Energy LED fittings
Heating/Cooling Equipment	Natural Gas boiler, LTHW central heating (Baseline option) Zoned time and temperature control (programmer, room thermostat & TRVs), with delayed start thermostat
Ventilation Equipment	Natural Ventilation to all rooms (System 1 extract)
Building Fabric	Double glazed windows, low g-value (0.4) Building Air Permeability – 3m ³ /(h.m ²) @ 50Pa

The following fabric U-values have been included in the 'Be Lean' design model:

Envelope Element	U-Value (W/m ² K)	Limit (W/m ² K)
External Wall	0.15	0.30
Floor	0.12	0.25
Roof	0.12	0.20
Windows	1.20	2.0
Doors	1.0	2.0
Air Permeability	3.0 m ³ /h.m ² @50Pa	10 m ³ /h.m ² @50Pa

The following table displays the Total Emissions, with 'Demand Reduction' measures included:

	Total Regulated emissions (Tonnes CO ₂ per annum)	CO ₂ Savings (Tonnes CO ₂ per annum)	Percentage Saving (%)
Part L 2013 Baseline	55.6		
Be Lean	54.6	0.9	1.69%

3.3 'Be Clean' – Supplying Energy Efficiently

There are no known district heating networks in the vicinity of the development, and the cost of implementing such a system has been deemed prohibitive given the minor scale of the development. However, consideration has been given to onsite distribution of energy in an efficient manner.

The following table displays the Total Emissions, with 'Supplying Energy Efficiently' measures included:

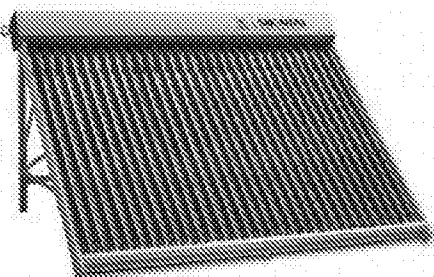
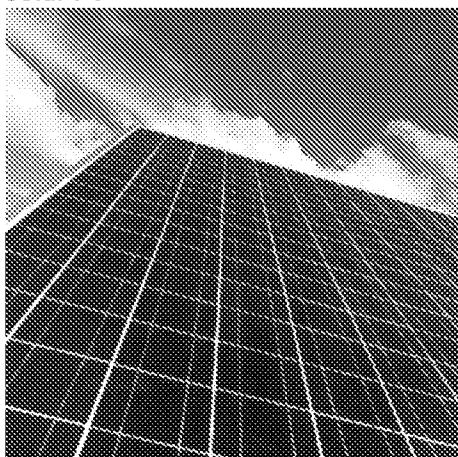
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Be Clean	54.6	0.0	0.00%

3.4 'Be Green' – Renewable Energy

The primary goal according to the Energy Hierarchy is to achieve a reduction in emissions prior to the implementation of renewable energy, which has been achieved. Further reduction in emissions can be achieved through the implementation of a suitable renewable energy system. Arun District Council expects at least 10% of the energy requirements of the development from decentralised and renewable or low carbon sources. In line with the London Plan methodology, which has largely been adopted throughout the south-east, the measure of reduction in energy requirements will be based on the site CO₂ emissions.

A range of renewable energy technologies have been considered, with Solar PV being the standout option for the residential units due to the good financial case and suitability of the site (pitched and largely unshaded roofs). With the addition of 52no. solar PV panels (13kWp) to the site, the CO₂ emissions are reduced by 10.8% (compared to the 'Be Lean' emissions).

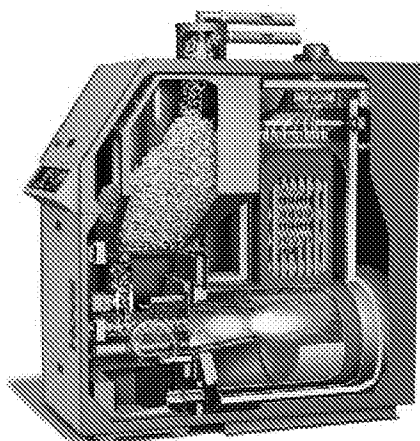
The following renewable technology overview shows the analysis that has been performed regarding the various options:

Technology	Description and Suitability	Recommendation
Solar Thermal 	The dwellings have pitched roofs, with space for a solar thermal array. Financial returns and CO ₂ reductions are not expected to be as high as solar PV.	Possible implementation
Solar PV 	The dwellings have pitched roofs (mostly south-facing, also east and west-facing), with space for a solar PV array. Financial returns and CO ₂ reductions are expected to be better than a solar thermal system of similar area. The proposed array comprises 0.5kWp per house, and 0.25kWp per apartment (13kWp total peak output).	Recommended implementation
Ground Source Heat Pump	There is significant outdoor space available for a potential ground source heat pump installation (boreholes).	Possible implementation

Air Source Heat Pump

An Air Source Heat Pump (air-to-water) offers an element of renewable energy, as the system extracts heat from the external air and raises the temperature for use indoors. The efficiency decreases in severe cold weather, thus care should be taken in sizing the system correctly.

Not recommended

Biomass Boiler

Whilst Biomass offers an attractive RHI payment, the benefit of such a system is primarily where an existing off-grid oil boiler system is being replaced, as the cost of the solid fuel struggles to compete with mains-supplied fuels.

Not recommended

Combined Heat and Power (CHP)

CHP systems are not truly renewable energy technologies, however they are classed as 'LZC' (Low or Zero Carbon). In the case of this proposal, a district heating network is not present, thus CHP has been discounted. Small scale CHP systems would be unfeasible from a financial perspective.

Not recommended

The following table displays the Total Emissions, with 'Renewable Energy' measures included:

	Total Regulated emissions (Tonnes CO ₂ per annum)	CO ₂ Savings (Tonnes CO ₂ per annum)	Percentage Saving (%)
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3.5 Conclusion

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