

3 Marine Drive West,
Bognor Regis PO21

ENERGY STATEMENT
25 October 2013

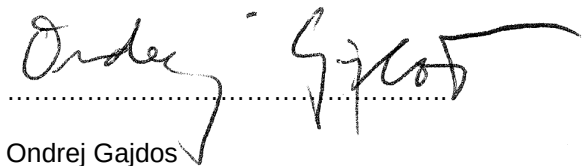


**3 Marine Drive West,
Bognor Regis**

ENERGY STATEMENT

This Document has been prepared to confirm the Energy and Sustainability solutions for the related M&E Building Services, as part of the Development Sustainability Appraisal.

For details of the proposed Development refer to Architect drawings and details.



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OG Energy Ltd are committed to providing Sustainable and
Environmental solutions for Building Engineering Services

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EXECUTIVE SUMMARY

OG Energy Ltd have been appointed by SGA Consulting Ltd to provide a site-wide Energy Statement for the proposed development.

This statement covers possible active and passive measures including renewable energy sources to make this development sustainable and environmentally friendly.

Specific requirement of planning appeal decision will be met through a combination of passive design features and on-site renewable energy sources. The target is to demonstrate that minimum 10% reduction in CO2 emissions will be achieved through the incorporation of on-site renewable energy sources and that at least 10% of the energy supply of the development will be secured from decentralised and renewable or low carbon energy sources.

All predicted energy requirements have been calculated using full SAP 2009 and SBEM assessment of the proposed development in accordance with 2010 Part L1 procedures.

The table below shows a summary of energy requirements and portion of energy proposed to be supplied by on-site renewable energy sources.

Energy Consumption Breakdown										
Unit	Space heating provided by gas boiler (kWh/a)	Space heating provided by ASHP (kWh/a)	Electricity consumed by the ASHP for space heating (kWh/a)	DHW heated by gas boiler (kWh/a)	DHW heated by electric immersion (kWh/a)	DHW heated by ASHP (kWh/a)	Electricity consumed by the ASHP for DHW (kWh/a)	Lighting (kWh/a)	Pumps and fans (kWh/a)	Un-Regulated energy (kWh/a)
Plot 1		3,305	984		433	1,324	676	236	175	2,021
Plot 2		3,125	934		417	1,283	654	215	175	1,866
Plot 3		3,378	1,019		402	1,242	634	195	175	1,713
Plot 4		3,339	1,009		399	1,235	630	191	175	1,683
Plot 5	1,773			1,672				224	175	1,928
Plot 6	1,924			1,672				224	175	1,928
Plot 7	1,888			1,507				184	175	1,594
Plot 8	1,620			1,433				160	175	1,424
Plot 9	2,020			1,564				195	175	1,713
Plot 10	2,140			1,564				195	175	1,713
Plot 11	2,292			1,507				192	175	1,594
Plot 12	1,952			1,444				174	175	1,452
	15,607	13,147	3,946	12,362	1,651	5,084	2,594	2,385	2,100	20,629

Total energy demand: 72,966 kWh/a
 Amount of heat energy from the ASHP: 18,231 kWh/a
 Electricity consumed by the ASHP: 6,540 kWh/a
 Renewable heat from the ASHP: 11,692 kWh/a
 Percentage of energy supplied from renewable sources: 16.0 %

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16% energy through on-site renewable energy sources will be achieved by installation of air source heat pump systems to Plots 1-4. Heat pumps will be suitably sized to maximize their efficiency (e.g. 6 kW Kingspan Aeromax Plus). The heat pumps will serve as the only space heating system for these flats and will provide all space heating through wet radiator system suitably sized for low temperature water. The heat pumps will also supply approximately 76% of DHW requirement through suitably sized indirect cylinder designed for use with air source heat pumps (e.g. Albion Aerocyl). The proposed heat pumps achieve average seasonal energy efficiency ratio of 3.33 for space heating and 1.96 for DHW. These figures are used in SAP calculation and are taken from SAP Appendix Q product efficiency database for the specific heat pump model.

1. INTRODUCTION

1.1 Background

OG Energy Ltd have been appointed by SGA Consulting Ltd to provide site-wide Energy Statement for the proposed development.

This statement covers possible active and passive measures including renewable energy sources to make this development sustainable and environmentally friendly.

1.2 Description of the Site

The site comprises proposed conversion of existing care home to form 12 No one-bedroom flats. The building is arranged over ground, first and second floor.

2. PLANNING FRAMEWORK

2.1 National Policy

Joining over 170 other nations the UK has committed to reduction of carbon dioxide emissions, with consequent constraints to its energy policy. The UK produced four percent of the world's greenhouse gases as of 2003. The long term reduction goal for carbon emissions is 60 percent decrease by the year 2050. According to Energy Review issued by Government in 2002 it was recommended that renewable sources should contribute 20% of energy generation by 2020. These figures were incorporated in Planning Policy Statement Note 22: Renewable Energy (2004) which became a base for local planning policies.

2.2 Condition 6 of planning decision appeal

The planning decision appeal decision ref. APP/C3810/A/13/2189866 dated 10/6/2013 requires an energy statement to be submitted identifying how at least 10% of the energy supply of the development will be secured from decentralised and renewable or low carbon energy sources.

3. ON-SITE RENEWABLE ENERGY SOURCES

Following systems have been considered:

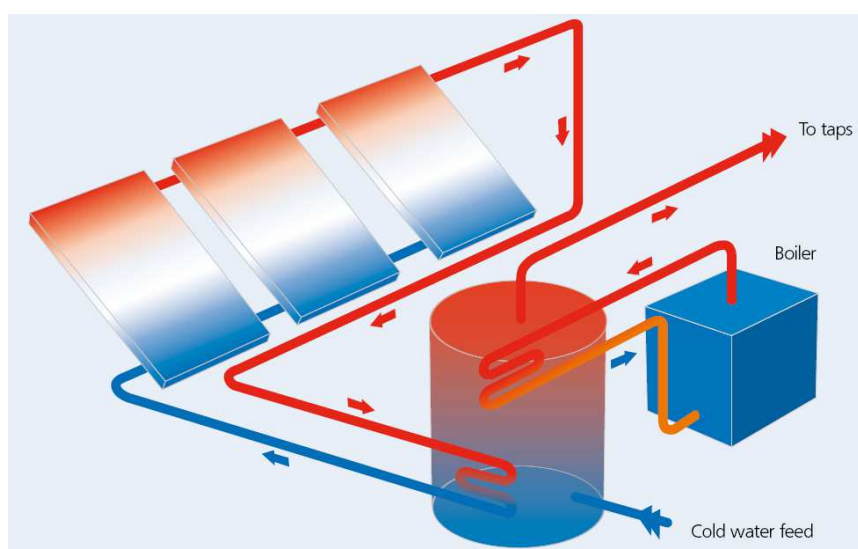
4.1 SOLAR HOT WATER (SHW)

- **General information**

Solar hot water systems for dwellings use collector which provides a separate heating circle for hot water cylinder. This is usually backed up by electric immersion heater or other source of heat.

Two types of collectors are available:

- Flat Plate – less expensive, less efficient
- Evacuated Tube – more expensive and more efficient



- **Recommendations specific to this development**

Solar hot water system has been considered for the top floor flats, however it would be possible to supply only approximately 6% of the site energy requirement. Routing the solar hot water pipework to lower level flats would be impractical.

4.2 SOLAR PHOTOVOLTAICS (PV)

- **General information**

This system uses semi-conductor cells to convert solar energy into electricity. Two main types of PV panels are available:

- Monocrystalline – More expensive and more efficient
- Polycrystalline – Less expensive and less efficient

Depending on type, the output of 1 kWp (kilowatt peak) can be achieved by panels with area between 8 and 20 m².

The use of PV panels generally requires relatively large unshaded roof area where they can be mounted facing south, ideally having between 30° and 40° inclination.

The cost per tonne of CO₂ saved would be between £550 and £1,100

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- **Recommendations specific to this development**

Photovoltaic system located on the west facing pitched roof has been considered. In order to achieve the 10% target, it would be necessary to install a PV system with minimum output of 10 kWp. Approximately 65 m² of roof area would be required.

4.3 AIR SOURCE HEAT PUMPS (ASHP)

- **General information**

An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can extract heat from the air even when the outside temperature is as low as minus 15° C.

On 17 December 2008, the European Parliament adopted the EU Directive on promoting the use of energy from renewable sources. In addition to geothermal energy, aerothermal and hydrothermal energy are now also recognised as renewable energy sources.

There are two main types of ASHP:

- **Air-to-water system** uses the heat to warm water. Heat pumps heat water to a lower temperature than a standard boiler system would, so they are more suitable for underfloor heating systems than radiator systems. Although some ASHP systems are capable of heating the water to the higher temperature, the efficiency is higher when using low temperature underfloor heating.
- **Air-to-air system** uses the heat to warm the indoor air. The air is heated through individual fan-coils or centrally and then distributed to rooms via ductwork

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- **Recommendations specific to this development**

It is recommended to install air source heat pump system for the space heating and DHW in Plots 1-4. These plots have been selected due to suitable outside space for placing the outdoor units. The heat pumps will be suitably sized to maximize their efficiency (e.g. 6 kW Kingspan Aeromax Plus). The heat pumps will provide all space heating and approximately 76% of DHW requirement for Plots 1-4. This way they will provide a renewable energy which will account for 16% of the whole site energy requirement (after accounting for the electricity consumed by the heat pumps).

	Proposed Building
New External Wall U-value:	0.25
Upgraded External Wall U-value:	0.25
Internal Heat Loss Wall U-value (between flats and unheated stairwell):	0.20
Party-Wall U-value	0 (solid or fully filled with insulation)
Ground Floor and Exposed Floor U-value	0.20
Roof U-value	0.15
Windows & External Doors U-values	1.50
DHW System Plots 1-4	6 kW Kingspan Aeromax Plus, 150 L Albion Aerocyl with immersion backup heater
DHW System all other plots	Gas condensing combi boiler in each flat SEDBUK 2009 efficiency 89%
Space Heating System Plots 1-4	6 kW Kingspan Aeromax Plus, radiators, programmer and at least two room thermostats
Space Heating System all other plots	Gas condensing combi boiler in each flat SEDBUK 2009 efficiency 89%, radiators, programmer, room thermostat and TRV's
Ventilation System	Natural with intermittent mechanical extracts
Energy Efficient Lighting	100%

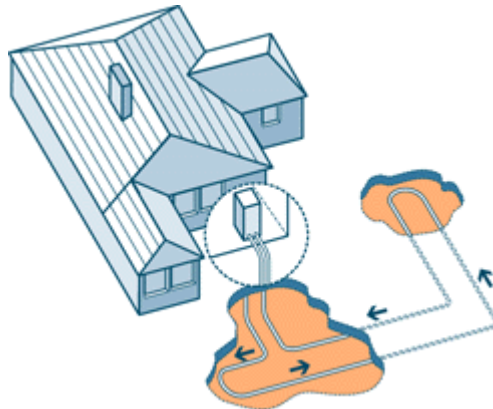
4.4 GROUND SOURCE HEAT PUMPS (GSHP)

- **General information**

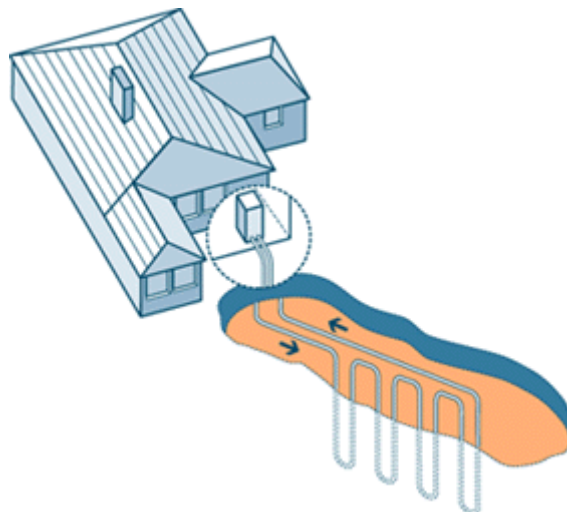
Ground source heat pumps use a buried ground loop which transfers heat from the ground into the building through heating distribution system. GSHP technology can be used both for heating and cooling. Two main types of GSHP are available:

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- Horizontal loop is suitable for applications where sufficient area is available to accommodate horizontally buried pipes.



- Vertical loop system can be used where ground space is limited, but will require boreholes typically 15-150m deep, and is consequently more expensive to install than horizontal systems.



- **Recommendations specific to this development**

Ground source heat pump can't be considered due to insufficient ground space.

4.5 BIOMASS

- **General information**

Producing energy from biomass has both environmental and economic advantages. It is a carbon neutral process as the CO₂ released when energy is generated from biomass is balanced by that absorbed during the fuel's production.

There are two main ways of using biomass to heat a domestic property:

- Stand alone stoves providing space heating for a room. These can be fuelled by logs or pellets but only pellets are suitable for automatic feed. Generally they are 6-12 kW in output, and some models can be fitted with a back boiler to provide water heating.

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- Boilers connected to central heating and hot water systems. These are suitable for pellets, logs or chips, and are generally larger than 15 kW.

- **Recommendations specific to this development**

Biomass heating has been ruled out due to potential negative impacts on air quality, problems with fuel delivery and insufficient space for fuel storage and central plant.

4.6 WIND ENERGY

- **General information**

Wind power is a clean, renewable source of energy which produces no carbon dioxide emissions or waste products. The turbines can have horizontal or vertical axis (Darrieus type). Wind turbines use the wind's lift forces to rotate aerodynamic blades that turn a rotor which creates electricity. Most small wind turbines generate direct current (DC) electricity and are not connected to the national grid. A special inverter and controller is required to convert DC electricity to AC at a quality and standard acceptable to the grid if the turbine is to be connected to national grid.

- **Recommendations specific to this development**

Wind energy system has not been considered due to negative visual impact, noise, flicker and vibrations.