LOW CARBON STATEMENT

146 BRECK HILL ROAD, NOTTINGHAM, NG3 5JP

OG ENERGY LTD
5 Brayford Square
London E1 0SG

ASSESSMENT INFORMATION

Prepared by:
Ondrej Gajdos

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CONTENT

Gedling Borough low carbon energy hierarchy is fully adopted by implementing:

- Passive measures (low U-values, air permeability, avoidance of thermal bridging by accredited details)
- High efficiency services, i.e., high efficiency lighting, low flow showers
- Renewable sources: solar PV

Excluded renewable sources are:

- Solar hot water
- Heat pumps
- Biomass
- Wind turbines

The proposed development will achieve:

- 55% domestic regulated CO2 reduction against 2021 Part L compliant baseline

- 52% domestic regulated CO2 reduction by renewable sources

- 3.0% domestic regulated CO2 reduction by efficiency measures ("Be Lean" stage of the energy hierarchy)

ABOUT THE ENERGY STATEMENT

OG Energy Ltd have been appointed to provide an 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 requirements of Gedling Borough Low Carbon Planning Guidance on Energy Efficiency and Renewable Energy will be met through a combination of passive design features, energy efficient building services and renewable energy sources. This is to comply fully with the Gedling Borough Local Plan Policies and ensure they are following the "Energy Hierarchy".

Baseline and all estimated energy consumptions have been calculated using a SAP 10.2 assessment of all proposed units in accordance with 2021 Part L procedures.

The table below shows a summary of energy requirements for baseline scheme and reduction proposed to be achieved by passive measures, efficient services and on-site renewable energy sources.

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	3.4	2.2
After energy demand reduction (be lean)	3.3	2.2
After renewable energy (be green)	1.5	2.2

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	0.1	3.0%
Be green: savings from renewable energy	1.8	52%
Cumulative on site savings	**1.9**	**55%**

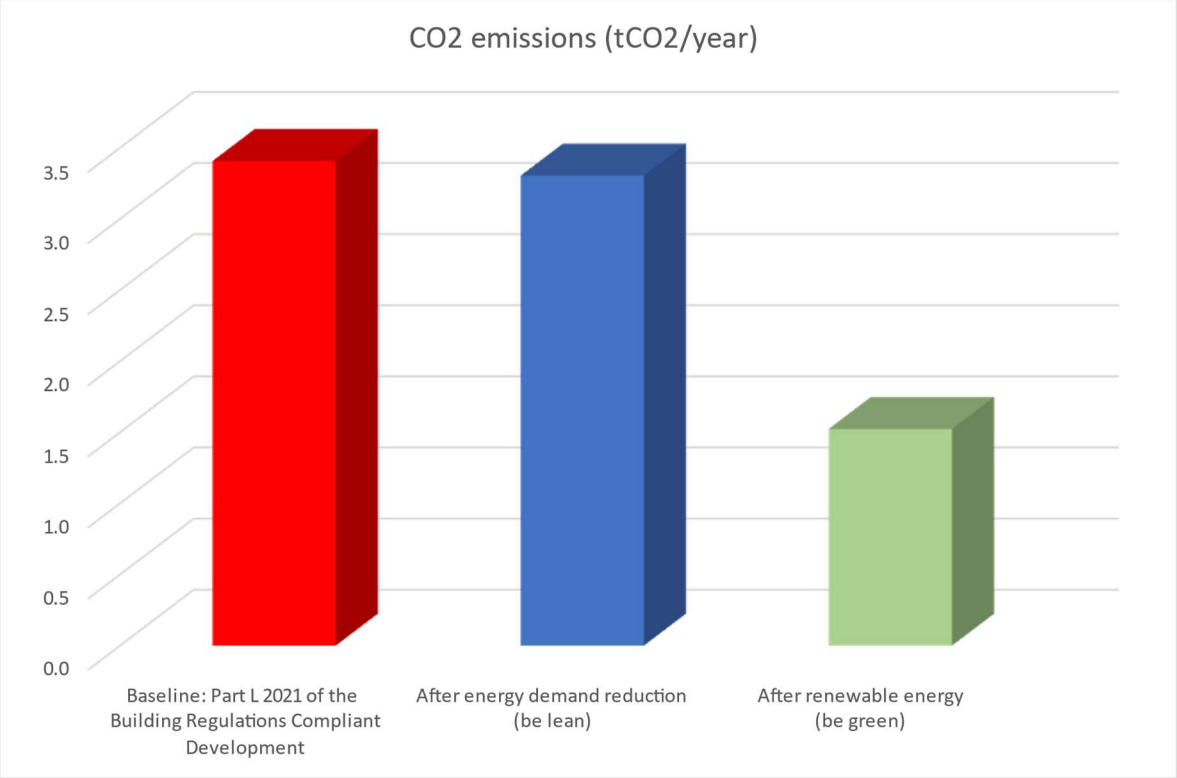

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Table 3: SAP calculation specification for each stage of the energy hierarchy

Specification	Notional Baseline	Efficient Baseline	Proposed Development
Ground floor U-value (W/m2K)	0.12	0.12	0.12
External Wall U-value (W/m2K)	0.18	0.20	0.20
Roof U-value (W/m2K)	0.11	0.13	0.13
Windows U-value (W/m2K)	1.2	0.9 (triple glazed)	0.9 (triple glazed)
Air Permeability	5	4	4
Thermal bridging y-value	0.05	0.05; **Detailed thermal bridging calculations will be required at detailed design stage**	0.05; **Detailed thermal bridging calculations will be required at detailed design stage**
Space Heating and hot water System	Gas boiler, SEDBUK efficiency 89.5%, radiators, time and temperature zone control; indirect cylinder with 1.4 kWh/day heat loss	Gas boiler, SEDBUK efficiency 89.5%, radiators, time and temperature zone control; indirect cylinder with 1.4 kWh/day heat loss	Electric panel heaters with appliance thermostats and programmers; Direct electric cylinder Ariston Pro1 Eco 80L, heat loss 1.25 kWh/day
Ventilation System	Natural ventilation with intermittent mechanical extracts	dMEV Vent Axia Lo-Carbon NBR dMEV C 125 or equivalent approved by SAP assessor	dMEV Vent Axia Lo-Carbon NBR dMEV C 125 or equivalent approved by SAP assessor
Lighting	Lighting power 2.3 W/m2; Efficacy of all fixed lighting = 80 lm/W	Lighting power 2.3 W/m2; Efficacy of all fixed lighting = 80 lm/W	Lighting power 2.3 W/m2 or less; Efficacy of all fixed lighting = 80 lm/W or higher
Solar Photovoltaic	kWp = 40% of dwelling floor area / (6.5 x number of storeys in block) System facing SE/SW, 45° pitch.	kWp = 40% of dwelling floor area / (6.5 x number of storeys in block) System facing SE/SW, 45° pitch.	PV system with a total peak output of 12.3 kWp, panels installed horizontally (less than 15° pitch) or on SE/SW facing pitched roofs PV panels have to be connected in a way that the required kWp output can be allocated to individual flats (refer to PV Output.xlsx), using Allume Energy SolShare or equivalent PV distribution system
% Improvement in CO2 over Building regulations compliant baseline	**0.0%**	**3.0%**	**55%**

SAP results summary of the proposed development

RESIDENTIAL CO_2 ANALYSIS (PART L1)														
		Baseline		'Be Lean'	'Be Green'	Fabric Energy Efficiency (FEE)		Baseline		'Be Lean'			'Be Green'	
Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area	TER	Energy saving/generation technologies (-)	DER	DER	Target Fabric Energy Efficiency	Dwelling Fabric Energy Efficiency	Part L 2021 CO_2 emissions	Energy saving/generation technologies	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO_2 emissions	'Be Green' savings
	(m^2)	($kgCO_2$ / m^2)	($kgCO_2$ p.a.)	($kgCO_2$ / m^2)	($kgCO_2$ / m^2)	(kWh/m^2)	(kWh/m^2)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)	($kgCO_2$ p.a.)
UNIT 01	*19.19*	15.74	-74.13	18.38	6.60	N/A	N/A	302	-74	353	279	23	127	152
UNIT 02	*20.10*	15.97	-67.30	19.35	6.98	N/A	N/A	321	-67	389	322	-1	140	181
UNIT 03	*20.26*	16.32	-71.36	19.49	6.63	N/A	N/A	331	-71	395	324	7	134	189
UNIT 04	*19.62*	15.72	-74.13	18.75	6.61	N/A	N/A	308	-74	368	294	15	130	164
UNIT 05	*17.76*	13.91	-74.13	17.02	6.69	N/A	N/A	247	-74	302	228	19	119	109
UNIT 06	*18.20*	14.11	-67.30	17.57	7.16	N/A	N/A	257	-67	320	252	4	130	122
UNIT 07	*18.21*	14.33	-71.36	17.55	6.89	N/A	N/A	261	-71	320	248	13	125	123
UNIT 08	*17.71*	13.97	-74.13	16.98	6.64	N/A	N/A	247	-74	301	227	21	118	109
UNIT 09	*19.07*	14.75	-74.13	18.18	6.33	N/A	N/A	281	-74	347	273	9	121	152
UNIT 10	*19.38*	14.83	-67.30	18.68	6.70	N/A	N/A	287	-67	362	295	-7	130	165
UNIT 11	*19.72*	15.18	-64.96	18.96	6.70	N/A	N/A	299	-65	374	309	-10	132	177
UNIT 12	*18.53*	14.27	-74.13	17.77	6.34	N/A	N/A	264	-74	329	255	9	117	138
Sum		0.0	0.0	0.0	0.0	0.0	0.0	*3,407*	*-854*	*4,159*	*3,304*	*103*	*1,523*	*1,781*

BACKGROUND

OG Energy Ltd have been appointed to provide an 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.

DESCRIPTION OF THE SITE

The proposal is a demolition of existing house on site, and construction of a new residential block comprising 12 no studios.

South Elevation - Overlooking car park

NATIONAL POLICY

DCLG sets out basis for local policies in section 14 of National Planning Policy Framework. It requires new development to be planned in ways that can help to reduce greenhouse gas emissions, such as through its location, orientation and design. To help increase the use and supply of renewable and low carbon energy and heat, plans are encouraged to:
a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

GEDLING BOROUGH LOCAL PLAN

The Gedling Borough Local Plan consists of Part 1: The Aligned Core Strategy (2014); and Part 2: the Local Planning Document for Gedling Borough (2018).

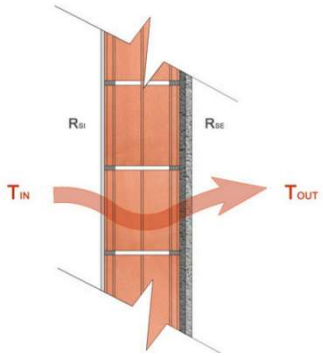
The key sustainability criteria of Climate Change Policy 1 are set out in Parts 1 to 4 of Aligned Core Strategy Policy 1: Climate Change

Part 3 deals with reducing carbon dioxide emissions. Although the policy doesn't set out any particular carbon reduction targets, it requires all new development to demonstrate how carbon dioxide emissions have been minimised in accordance with the following energy hierarchy:

a) Using less energy through energy efficient building design and construction, including thermal insulation, passive ventilation and cooling;
b) Utilising energy efficient supplies – including connecting to available heat and power networks; and
c) Maximising use of renewable and low carbon energy generation system.

Number of passive design measures and measures improving energy efficiency of building services have been included in the design to underline the "Passive first" approach in the scheme design. Implemented measures are summarised in Table 3 of this report and include:

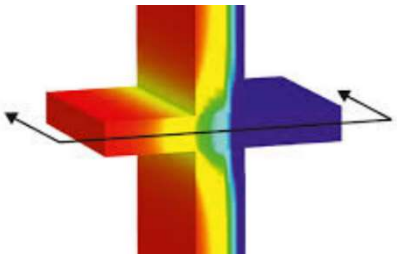
LOW U-VALUES OF BUILDING FABRIC



Thermal performance of fabric is the most important aspect of passive measures mosaic. Low U-values ensure, that the amount of heat transmitted through building external elements is minimised. This is achieved by using highly insulated building materials with low thermal conductivity.

Notional dwelling U-values as set out in 2021 Part L1 are generally followed with small variations in the proposed scheme. The current notional building U-values are already challenging in real world and making significant improvements over them is usually not practical from payback and technical point of view.

AVOIDANCE OF THERMAL BRIDGING



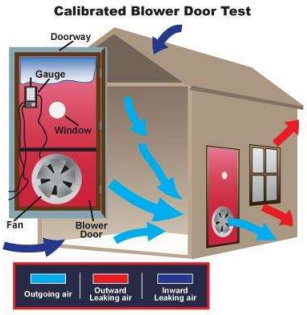
Thermal bridges occur at all junctions between building thermal elements, typically at junctions between wall/floor, wall/roof etc. Recent changes in the building regulations have emphasized the significance of thermal bridging in building design.

Continuity of insulation has to be maximised in order to minimise thermal bridging. Calculations presented in this energy statement and current proposal are based on thermal bridging Psi-values set out in SAP table R2 as reference Psi-values representing a good practice level of thermal bridging. Psi-values of all applicable junctions will be assessed by a suitably qualified assessor at the detailed design stage by either:

- Custom Psi-value calculation by 2D thermal modelling
- Psi value from database of approved details

PASSIVE DESIGN MEASURES AND EFFICIENT SERVICES

AIR TIGHTNESS



Air tight buildings minimise their heat loss through infiltration of cold air through gaps and cracks in building envelope. Air tightness of buildings is expressed as air permeability rate. Air permeability rate of 5.0 m3/h.m2 is set out as a reference value for the current building regulations notional dwelling. Proposed target for this development is 4.0 m3/h.m2. This value has to be confirmed by post-construction air tightness testing.

HIGH EFFICIENCY LIGHTING

While previous versions of Part L1 recognised low energy lighting to certain degree, the impact of low energy lighting is more accurate and more significant in the new 2021 Part L. All installed light fittings need to be included in detail in the assessment. To meet the efficiency level of notional reference dwelling, the installed power density shouldn't exceed 2.3 W/m2 and all light fittings should achieve a luminaire efficacy of at least 80 lm/W

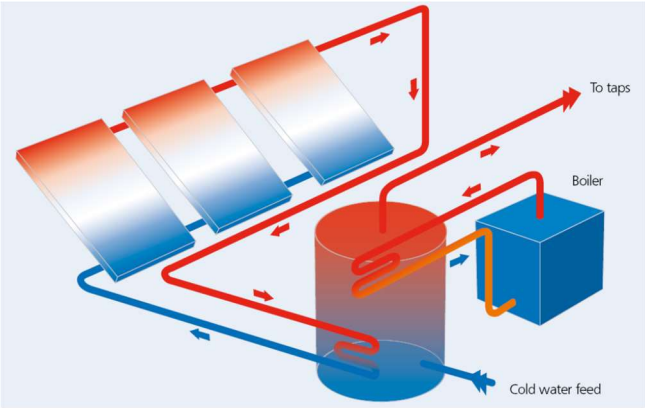
WATER EFFICIENCY

Reducing general water consumption in dwellings also reduces amount of energy needed to provide hot water. New Part L1 notional building therefore allows for overall water consumption of 125 l/person.day and more specifically, showers with flow rate of 8 l/min.

ON-SITE RENEWABLE ENERGY SOURCES – SOLAR HOT WATER

GENERAL INFORMATION

Solar hot water systems for dwellings use collector which provides a separate heating circuit 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 ruled out due to high installation cost maintenance requirements space requirement. Other renewable technology Solar PV is preferred proposed.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - AIR SOURCE HEAT PUMPS

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. For the first time however, in addition to geothermal energy, aerothermal and hydrothermal energy are also recognised as renewable energy sources.

There are two main types of ASHP:

AIR-TO-WATER SYSTEM

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 or low temperature fan convectors.

AIR-TO-AIR SYSTEM

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.

RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

Air source heat pumps have been ruled out due to higher installation and maintenance cost. Space heating and hot water will be provided by direct electric heaters, using grid electricity which is considered a low carbon source due to its recent significant de-carbonisation.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - SOLAR PHOTOVOLTAICS

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 6 and 20 m2.

RECOMMENDATIONS SPECIFIC TO THIS DEVELOPMENT

It is proposed to install a PV system on flat roof with a peak output of 12.3 kWp. Panels will be installed horizontally (less than 15° pitch) or on SE/SW facing pitched roofs. In order to achieve EPC rating B in all flats, PV panels have to be connected in a way that the required kWp output can be allocated to individual flats, using Allume Energy SolShare or equivalent PV distribution system

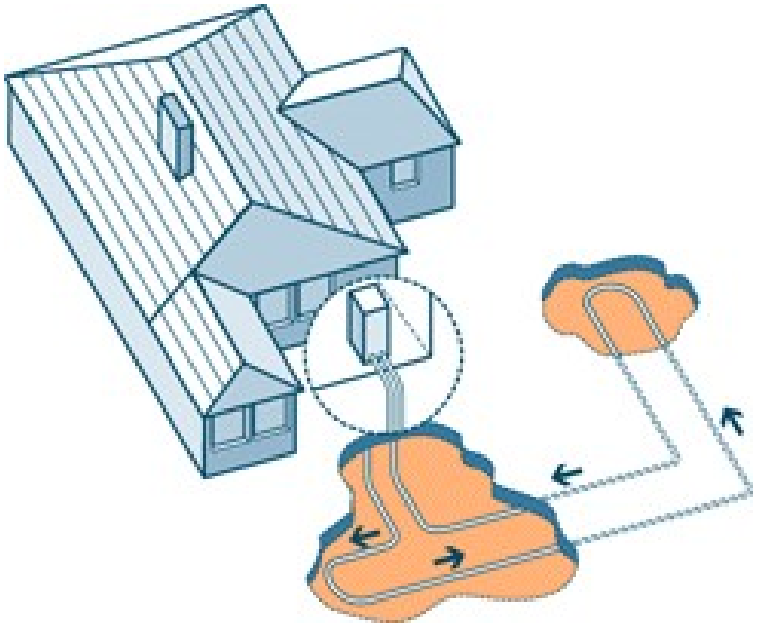
Dwelling	Allocated PV output (kWp)
UNIT 1	1.2
UNIT 2	1.1
UNIT 3	1.4
UNIT 4	1.3
UNIT 5	0.8
UNIT 6	0.6
UNIT 7	0.8
UNIT 8	0.8
UNIT 9	1.2
UNIT 10	1
UNIT 11	1
UNIT 12	1.1

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - GROUND SOURCE HEAT PUMP

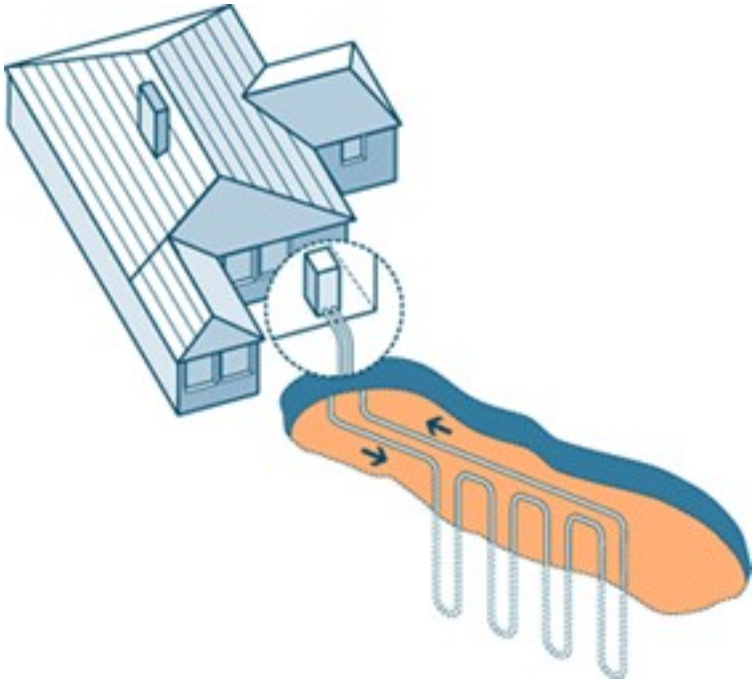
GENERAL INFORMATION

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:

- 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 pumps have been ruled out due to higher installation cost and relatively small CO2 savings compared to ASHP.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - BIOMASS / BIOFUELS

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:

- Standalone 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.

- 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

Biofuels are ruled out due to negative impact on air quality and environmental issues surrounding liquid biofuels as currently there are no established standards relating to the sustainability of biofuels.

BE GREEN: ON-SITE RENEWABLE ENERGY SOURCE - 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 systems will not be considered due to negative visual effects, interference, flicker and noise risk. Exposure to wind would be limited by surrounding buildings.

Internal Water consumption will be reduced by specification of water efficient fittings. The water consumption in the proposed flats will be reduced to 105 litres per person per day or less by specifying water fittings with the following parameters:

WC's: All dual flush capacity 3/6 Litres or less
Kitchen taps flow rate: 8 l/min or less
Bathroom taps flow rate: 6 l/min or less
Bath capacity to overflow: 140 l or less
Showers flow rate: 8 l/min or less
Dishwasher consumption: 0.5 Litres per place setting or less
Washing machine consumption: 6 litres per kg dry load or less

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The proposed development will achieve:

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