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**Complete Energy Consultancy – Complete Building Regulation compliance under one roof.**

**Sustainability Statement – New Dwelling at 172 Raleigh Road, Ashton, BS3 2AR**

The suite of policy BCS13, 14 and 15 do apply in this case

Policy BCS13 sets out that development should contribute to both mitigating and adapting to climate change, and to meeting targets to reduce carbon dioxide emissions.

Policy BCS14 sets out that development in Bristol should include measures to reduce carbon dioxide emissions from energy use by minimising energy requirements, incorporating renewable energy sources and low-energy carbon sources. Development will be expected to provide sufficient renewable energy generation to reduce carbon dioxide emissions from residual energy use in the buildings by at least 20%.

Policy BCS15 sets out that sustainable design and construction should be integral to new development in Bristol. Consideration of energy efficiency, recycling, flood adaption, material consumption and biodiversity should be included as part of a sustainability or energy statement.

The policy aspiration is to achieve a 20% reduction in C02 emissions.

**Sustainable Design and Construction**

**Waste and recycling**

- Suitable provision has been made externally for the storage of refuse and recycling containers.

**Materials**

- The scheme will show consideration of the need to use materials with a reduced energy input e.g. considering the re-use of existing onsite materials, recycled materials, or through reference to BRE Green Guide. BRE Green Guide A rated materials will be specified wherever possible.

**Flexibility and adaptability**

- The scheme shows consideration of the need to design buildings which will be adaptable in future in terms of their use and the future incorporation of energy saving technologies.

**ICT**

- The new residential unit will be provided with a connection for Internet usage.

**Reducing Surface Water Runoff**

- Soakaways will be utilised wherever ground conditions allow.

**Reducing Water Consumption**

- The potable water usage will be restricted to 110l per person per day

**Sustainable Energy**

Solar water heating systems are one of the more familiar renewable technologies used at the moment.
They use the energy from the sun to heat water, most commonly for hot water needs. Solar heating systems use a heat collector that is usually mounted on a roof in which a fluid is heated by the sun. This fluid is used to heat water that is stored in either a

separate hot water cylinder or in a twincoil hot water cylinder (the second coil is used to provide additional heating from a boiler or other heat source). Solar hot water panels could not provide the 20% target.

Wind turbines convert the kinetic energy in wind into mechanical energy that is then converted to electricity. Turbines are available in a range of sizes and designs and can either be free-standing, mounted on a building or integrated into a building structure. For a development in this location only a building mounted turbine could be considered however due to the character, aesthetics and location of the building it would not be feasible. In addition, the windspeed in the area is under the advised minimum.

Biomass Heating Biomass is any plant-derived organic material that renews itself over a short period. Biomass energy systems are based on either the direct or indirect combustion of fuels derived from those plant sources. The most common form of biomass is the direct combustion of wood in treated or untreated forms. The use of biomass is becoming increasingly common in some European countries (some countries such as Austria are heavily dependent on biomass). The environmental benefits relate to the significantly lower amounts of energy used in biomass production and processing compared to the energy released when they are burnt. This can range from a four-fold return for biodiesel to an approximate 20-fold energy return for woody biomass. Biomass-fuels can be used to produce energy on a continuous basis (unlike renewables such as wind or solar energy) and it can be an economic alternative to fossil fuels as it is a potential source of both heat and electricity. However Biomass systems have particular design management and maintenance requirements associated with sourcing, transportation and storage and are therefore more commonly used in commercial developments rather than domestic installations. It can be less convenient to operate than mains-supplied fuels such as natural gas and are more management intensive and require expertise in facilities management. Sources of biomass can also fluctuate, so boilers should be specified to operate on a variety of fuels without risk of overheating or tripping out. A communal biomass system would not be feasible for this development due to use, space and maintenance issues. The system would be quite large and there is very little space around the property to locate the boiler, hopper and fuel store that is suitable for deliveries but also appropriate for feeding the boiler.

A heat pump is a device that takes up heat at a certain temperature and releases it at a higher temperature. The essential components of a heat pump are heat exchangers (through which energy is extracted and emitted) and a means of pumping heat between the exchangers. The effectiveness of the heat pump is measured by the ratio of the heating capacity to the effective power input, usually known as the coefficient of performance (COP).

Ground-source heat pumps (GSHP) extract heat from the ground. They are classified as either water to-air or water-to-water units depending on whether the heat distribution system in the building uses air or water. Ground source heat pumps either use long shallow trenches or deep vertical boreholes to take low grade heat from the ground and then compress it to create higher temperatures. Ground source heat pumps would not be suitable due to the lack of land space around the property.

Air Source Heat pumps Air source heat pumps absorb heat from the outside air. This is usually used to heat radiators, under floor heating systems, or warm air convectors and hot water in your home. An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. The system performs down to air temperatures of -20°c which means that they are more than suitable for installations within the UK. Hot water and Heating can be provided 365 days a year. The hot water is produced without the aid of electrical immersions and at 55°c is more than hot enough for baths and showers.

There are two main types of air source heat pump system:  An air-to-water system distributes heat via your wet central heating system. Heat pumps work much more efficiently at a lower temperature than a standard boiler system would. So they are more suitable for under-floor heating systems or larger radiators, which give out heat at lower temperatures over longer periods of time.  An air-to-air system produces warm air which is circulated by fans to heat your home. They are unlikely to provide you with hot water as well.

An Air Source heat pump would be feasible.

Photovoltaic (PV) modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases of silicon. Through a process called doping, a very small amount of impurities are added to the semiconductor, which creates two different layers called n-type and p-type layers. Certain wavelengths of light are able to ionise the silicon atoms, which separates some of the positive charges (holes) from the negative charges (electrons). The holes move into the positive or p-layer and the electrons into the negative or n-layer. These opposite charges are attracted to each other, but most of them can only re-combine by the electrons passing through an external circuit, due to an internal potential energy barrier. This flow of electrons produces a DC current. PV panels could be mounted to roof slopes but would have an obvious visual impact.

In summary, only PV panels or an air source heat pump are suitable for installation on this site, air source heat pump has been selected.

| **NO DISTRICT HEAT CONNECTION** | **Regulated Energy Demand (MWh/yr)** | **Regulated CO2 emissions (tonnes/yr)** | **CO2 saved (tonnes/ yr)** | **% CO2 reduction** |
|---|---|---|---|---|
| Baseline - Part L TER<br>*See Note 1* | | 1146 | - | - |
| Proposed scheme after energy efficiency measures<br>*See Note 2* | | 1146 | 0 | 0 |
| **<u>Residual emissions</u>**<br>Proposed scheme after energy efficiency measures and CHP (if using) | | 1146 | 0 | 0 |
| Proposed scheme after on-site renewables<br>*See Note 4* | | 337 | 809 | 70%<br>**(NOTE: THIS SHOULD BE MIN. 20% TO COMPLY WITH BCS14)**<br>*See Note 5* |
| Total CO2 reduction beyond Part L TER<br>*See Note 5* | | | 809 | 70%<br>**(NOTE: THIS SHOULD ALSO BE 20% TO COMPLY WITH BCS14)** |

**Note 1**

The Part L TER figure should be used to calculate the baseline. For dwellings not connecting to an existing heat network, the Part L methodology sets the Notional Building heat source as gas boilers to calculate the TER. For buildings other than dwellings that are not connecting to an existing heat network, the Part L methodology sets the building heat source as the same type proposed in the design to calculate the TER with notional efficiencies.

**Note 1a**

The TER figure should be used to calculate the baseline. For buildings connecting to a heat network owned by Bristol Heat Networks Ltd. contact BristolBusDev@Vattenfall.com for a copy of 'Bristol Heat Networks Part L 2021 Guidance Note' for advice on how to calculate the TER figure for this step.

For buildings connecting to any other existing network, applicants should contact the Sustainable City team to agree the approach (sustainable.city@bristol.gov.uk).

For buildings connecting to a new heat network, the Part L methodology sets the Notional Building heat source as gas boilers to calculate the TER for dwellings, and as a heat network with notional carbon factor and primary energy factor for buildings other than dwellings.

**Note 2**

This is based on the Actual Building, including the proposed energy efficiency measures. It's understood that in some cases it may not be feasible for $CO_2$ emissions to meet or be lower than the Part L TER at this stage due to PV being included in the TER calculation. Energy efficiency measures will also be assessed through comparison of proposed measures to those set in the Notional Building specification and the information provided in the detailed energy tables.

See Note 5 below.

**Note 3**

Y = Proportion of heat network supplied heat classed as renewables. For buildings connecting to a heat network owned by Bristol Heat Networks Ltd. contact BristolBusDev@Vattenfall.com for a copy of 'Bristol Heat Networks Part L 2021 Guidance Note' for figures to enter into the calculations.

**Note 3a**

This is based on the Actual Building with a heat network as the heat source i.e. emissions after connecting to the network, including both renewable and non- renewable parts of the network. For buildings connecting to a heat network owned by Bristol Heat Networks Ltd. contact BristolBusDev@Vattenfall.com for a copy of 'Bristol Heat Networks Part L 2021 Guidance Note', for figures to enter into the calculations.

**Note 4**

This is based on the Actual Building for the proposed design, including all low carbon and renewable energy generation.

**Note 5**

In some cases where it can be demonstrated that it is not feasible for the 'residual emissions' to be lower than the TER, for the purpose of assessing compliance with BCS14, the 20% calculation will be assessed against the Part L TER.

## Detailed energy tables

The following tables should be completed based on energy information in the SAP Worksheets and BRUKL documents.

- **Residential energy efficiency table**

The following table will be used to assess the energy efficiency of residential development.

The Notional Building TER without PV can be calculated using the 'Energy Saving/generation technologies' figure provided in the Building Regulations England Part L Compliance Report[6].

| Notional Building TER without PV (kg/$CO_2$/$m^2$) | Emissions for the proposed building with energy efficiency alone (kg/$CO_2$/$m^2$) |
|---|---|
| 1146 | 1146 |
| **U-values and air permeability must be provided in table 4.2.3 below** | |

## Energy efficiency measures

Provide a summary table of U values taken from the SAP /SBEM calculations:

| | **Part L Values (2021 - or most current)** | | | | |
|---|---|---|---|---|---|
| Element or System | **Dwellings Limiting** | **Dwellings Notional** | **Non Dwellings Limiting** | **Non Dwellings Notional** | **Proposed** |
| **Wall** | 0.26 | 0.18 | 0.26 | 0.18 | 0.18 |
| **Roof** | 0.16 | 0.11 | 0.18 | 0.15 | 0.11 |
| **Floor** | 0.18 | 0.13 | 0.18 | 0.15 | 0.12 |
| **Windows** | 1.6 | 1.2 | 1.6 | 1.4 | 1.2 |
| **Doors** | 1.6 | 1.0 | 1.6 | 1.6 | 1.2 |
| **Rooflights** | 2.2 | 1.7 | 2.2 | 2.1 | 1.2 |
| **Air permeability** | 8 | 5 | 8 | 3 | 5 |

- **On-site renewables**

Set out what renewable energy sources have been incorporated into the proposed development and the resulting estimated annual yield (kWh).

This can include emission savings from the use of renewable fuels to power CHP.

| | |
|---|---|
| Renewable electricity – enter the total installed capacity (kW) | 0 |
| Renewable electricity – enter the estimated annual yield (kWh) from renewable measures generating electricity<br><br>(where available apply recognised standard methodologies such as the Microgeneration Certification Scheme (MCS) methodology for Solar PV) | 0 |
| Renewable heat – enter the total installed capacity (kW) | 6 kW |
| Renewable heat – enter the estimated annual yield (kWh) from renewable measures generating heat | 2125 kWh |

Report compiled by:

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