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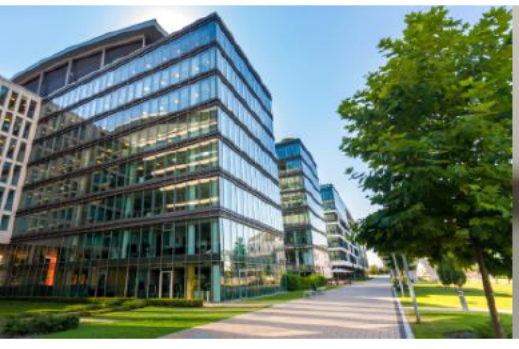
Energy and Sustainability Statement

Project: 43a Ambleside Avenue, Bristol, BS10 6HB

Full Planning Application

25 June 2024

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1. Introduction

Cook Brown Energy was commissioned to an Energy and Sustainability Statement for the proposed development of 43a Ambleside Avenue in Bristol. The purpose of this Statement is to demonstrate that climate change mitigation measures have been taken into account and it follows Bristol's Local Plan Core Strategy and the National Policy Framework including the designated energy hierarchy. It also ensures energy remains an integral part of the design and evolution of the development as documented in the revision table. The Statement sets out the Proposed Developments baseline energy consumption under Part L of the Building Regulations, it then outlines in detail the steps required to meet relevant planning requirements.

The resulting recommendations for the development follow the energy hierarchy of;

- Use Less Energy
- Use Renewable Energy

This Statement will also set out how the proposed development intends to address relevant planning policy requirements regarding wider sustainability issues. A set structure has been established to address multiple policy requirements under the same topic with specific detail on key issues as and where necessary.

2. Development Policies & Regulations

International and national bodies have set out broad principles of sustainable development. Resolution 42/187 of the United Nations General Assembly defined sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their own needs. The UK Sustainable Development Strategy Securing the Future set out five 'guiding principles of sustainable development: living within the planet's environmental limits; ensuring a strong, healthy and just society; achieving a sustainable economy; promoting good governance; and using sound science responsibly.[2]

The National Planning Policy Framework sets out the Government's planning policies for England and how these should be applied. The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs. Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):[2]

A Social Objective ...

To support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being

An Economic Objective ...

To help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;[2]

An Environmental Objective ...

To contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.[2]

[2]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

3. Local Plan Policy

2. Demonstrating compliance with BCS14

Local Plan policy BCS14 has four key parts:

- Developments should meet and exceed requirements of the Building Regulations through energy efficiency measures alone.
- Developments should follow the heat hierarchy to connect to district heat networks, or utilise communal or individual renewable heat systems where connection to a heat network is not available or planned at the time of commencement.
- Developments should provide renewable technologies to achieve a 20% reduction in regulated carbon emissions compared to residual emissions.
- Any carbon reduction requirements that can't be met on site should be offset – usually by paying into the BCC allowable solutions fund.

Setting the 20% carbon reduction relative to the Building Regulations in this way means that the minimum requirements of the policy step up each time the Building Regulations are updated. This approach was taken when Part L 2013 came into force.

Since the introduction of Part L 2021, this approach has been retained and development should continue to meet the requirements set out above, with energy efficiency remaining a vital first step of the energy hierarchy. However, some flexibility has been introduced for development that cannot meet Part L without the use of renewable technology[1]. This is due to the Part L 2021 Target Emissions Rate[2] including an assumption of renewable technologies being used.

In addition, if district heat networks include renewable technologies, an equivalent proportion of heat provided by the heat network can contribute to development meeting the BCS14 requirement for 20% carbon emissions reduction from renewables.

4. Utilise renewable energy technologies to reduce residual emissions by at least 20%. If connecting to a district heat network, any renewable portion of the heat to the development should be accounted for at this stage – see Section 3 for further details. 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', which sets out figures to enter into the calculations. If a heat pump is proposed, the proposed heat pump efficiency should be added at this stage.

2.2. Development that cannot meet the Building Regulations Target Emissions Rate through energy efficiency alone

BCS14 states that development in Bristol should minimise energy demand in accordance with the energy hierarchy. We expect development to achieve compliance with Part L through energy efficiency measures alone wherever possible, by demonstrating that CO2 emissions at step 2 are lower than at step 1 as calculated above.

2.6. Renewable technologies

Renewable technologies are defined in detail in Appendix 3 of the BCC Climate Change and Sustainability Practice Note, please also note the following:

- Air, water and ground source heat pumps are treated as renewable technologies for the purpose of BCS14. Only the generation of heat from these technologies counts towards the BCS14 carbon reduction through renewables requirements.
- Air, water or ground source VRF systems are treated as renewable technologies for the purpose of BCS14. Only the generation of heat from these technologies counts towards the BCS14 carbon reduction through renewables requirements i.e. energy for cooling cannot contribute to compliance with BCS14 carbon reduction through renewables requirements.
- In line with UK government guidance[5], to be considered a renewable technology a system must have a design seasonal performance factor (SPF) of at least 2.5. Applicants must provide confirmation of the system SPF. This should include manufacturer information and technical evidence within the energy statement that stated SPFs can be achieved in the proposed design.

2.1. Residential and non-residential major development

To demonstrate compliance with policy BCS14, an energy strategy must clearly identify the CO_2 emissions of the development for each stage of the energy hierarchy, addressing each of the following steps:

1. Model buildings following the current Part L of the Building Regulations and predict regulated CO_2 emissions using the Part L Target Emission Rate (TER)[3]. 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 baseline.

2. Reduce energy consumption by amending the design to include additional energy efficiency measures that exceed the energy requirements of Building Regulations.

3. Treatment of district heat networks

If a proportion of the heat provided by a district heat network is provided by renewable technology this proportion can contribute to a development meeting the BCS14 requirement for 20% carbon emission reduction from renewables technologies.

Case study – Bristol heat network

Historically, the heat supply from the BCC district heat network (thereafter operated through the City Leap partnership) has been from low carbon sources with a minority of the annual heat generated from renewable sources. The construction and commissioning of the Castle Park Energy Centre in summer 2022, which is supplied by a water source heat pump, means that the majority of the heat supplied by the network will be from renewable sources. By 2024, it is projected that over 80% of the heat supplied will be from renewable sources.

Table 4.1.2. provides a template for calculating savings from renewable and non-renewable energy within district heat networks.

The renewable proportion of any district heat network should be provided by the heat network operator and included for reference in the detailed energy tables (see table 4.2.4 below). 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', which sets out figures to enter into the calculations.

Due to the way that the Part L methodology calculates the TER for buildings connected to an existing heat network, additional flexibility in the application of BCS14 may be needed for these developments. For buildings connecting to a heat network owned by Bristol Heat Networks Ltd, the recommended approach has been set out within section 2.1 above. For buildings connecting to any other existing heat network, the applicant should contact the Sustainable City team to agree the approach for the development (sustainable.city@bristol.gov.uk).

District heating

Policy BCS14 requires that within Heat Priority Areas (as identified in the Core Strategy), major developments connect to existing heat networks where available. Where a network is not available major developments within Heat Priority Areas should incorporate infrastructure to connect to district heating networks in the future where feasible. Within central Bristol these requirements are further emphasised by policy BCAP21.

5. Flood Risk and Water Management

Policy BCS16 requires development on sites at risk of flooding to be resilient to flooding through design and layout.

Policy BCS16 also includes requirements that are applicable to all new development, not just development on sites at risk of flooding. This includes a requirement for a water management strategy as part of the Sustainability Statement for minor developments, or a Sustainable Drainage Strategy for major developments. Details of how to undertake an adequate Sustainable Drainage Strategy is set out in the West of England Sustainable Drainage Developers Guide[21]. Guidance for completing the water management strategy is covered in the minor development section of the West of England Guide Bristol Section 2[22].

https://www.bristol.gov.uk/files/documents/2690-climate-change-and-sustainability-practice-note/file#:~:text=The%20council%20has%20declared%20a,projected%20impacts%20of%20climate%20change.

4. Delivery

The council has recently updated the BCS14 methodology, setting baseline emissions targets within buildings regulations to be based on solar PV and/or heat pumps to be included with new developments. The council adopted this adaptation of the plan in 2024. In order to demonstrate compliance with BCS14, the design of 43a Ambleside Avenue has included an air source heat pump and photovoltaic.

Bristol City Council is currently expanding the Bristol heat district network. Although there are no current plans to extend into Southmead, if this were to occur, provision would be put in place to ensure that 43a Ambleside Avenue is connected. This demonstrates compliance with BCS14 requirement 'Treatment of District Networks'. If the property was to be connected to the district heat network, the renewable portions of the heat to the development will be accounted for.

4.1. Statutory Requirements

The proposed development will be required to comply with the statutory requirements of the applicable Building Regulations. This statement will address those regulations associated with Part L of the Building Regulations, specifically.

- Part L Volume 1 2021 Edition – Conservation of fuel and power in buildings other than dwellings

Building Regulations Part L defines the energy efficiency standards required for buildings. This regulation controls insulation values of thermal elements, areas of glazing, doors and other openings in the façade, efficiency, insulation and controls of heating appliances and systems as well as lighting and hot water storage efficiencies

5. The proposed 43a Ambleside Avenue, BS10 6HB Development

5.1. Existing Site

The current site, Aerial Image.

Figure 1: Site Location Plan

5.2. Proposed Development Floor Plans

Ground Floor, First Floor, and Second Floor

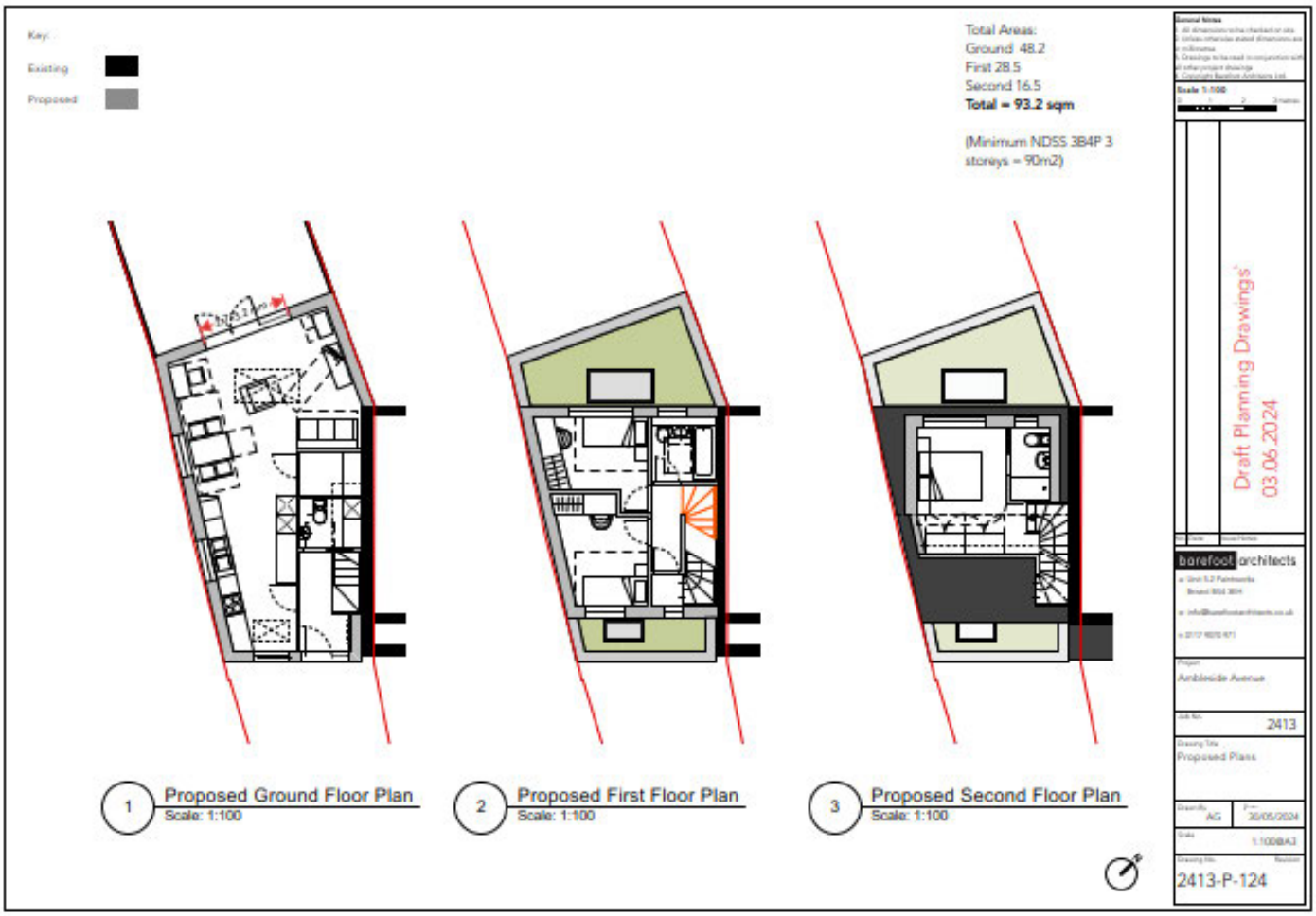

Figure 3: Proposed Development Ground Floor, First Floor, and Second Floor

5.3. Proposed Development Elevations

Front, Side, and Rear Elevation

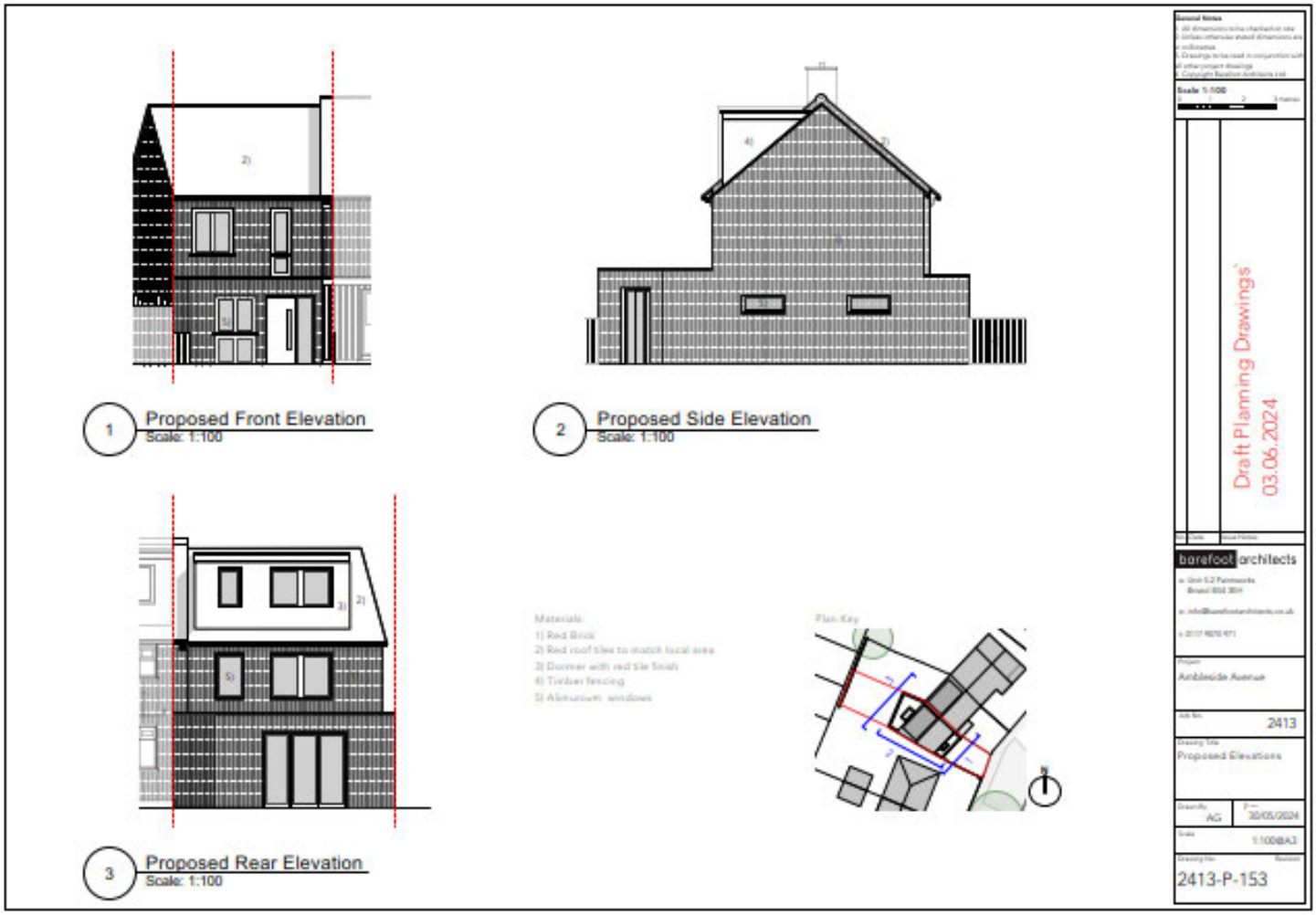

Figure 4: Proposed Development Elevations

6. National Policy Compliance

6.1. Waste And Recycling

In line with policies **BCS15** and **DM32** the development will include storage space for refuse and recyclable materials. Where applicable, a percentage of the construction materials which are recycled will be specified to The Bristol Wood Recycling Project.

6.2. Water

In line with policies **BCS15** and **BCS16**, water use for the proposed development will conform to the 125 litres per person per day limit as set in Part G of the Building Regulations. For further water efficiency and management, low limiting fittings will be fitted along with dual flush toilets and the option of rain and greywater harvesting will be further explored at the detailed design stage.

6.3. Materials

All new materials will generally be from sustainable sources. For example, Knauf insulation which is manufactured with a focus towards zero harm. Also, emphasis will be put on the building contractor to source materials with low embodied carbon where appropriate and those materials from recycled or sustainable sources.

6.4. Flexibility And Adaptability

In line with **BCS15** and **BCS21**, the development will be compliant with Part M of the Building Regulations and has been designed considering future flexibility and adaptability. Internal walls can be reconfigured to form new spaces and the proposed air source pump allows for flexibility in heat pump distribution options. This provides adaptability as space heating can be delivered through any mixture of underfloor heating and low temperature radiators.

6.5. ICT

As policy **BCS15** requires, the proposed development will enable the provision of high-speed electronic communications (greater than 30Mbps) as outlined in Part R of the building regulations.

6.6. Green Infrastructure

In line with **BCS9**, **BCS15**, and **BCS21**, the proposed development will contribute towards the mitigation of the urban heat island effect in Bristol City. Helping combat climate change, the proposed air source heat pumps will rely on electricity, producing lower carbon dioxide emissions than the current burning of fossil fuels at the property. Also, the new renewable solar energy proposed at the property will reduce greenhouse gas emissions further, which is critical to protecting the biodiversity of wildlife.

7. Assessment Methodology

All assessments have been conducted using DCLG-approved software. For this proposal, the assessments were conducted using Standard Assessment Procedure (SAP 10).

The Carbon Dioxide Emissions expressed under 'Regulated' within this report reflect those emission targets set out by Part L and are made up of the total emissions for; Heating, Hot Water, Cooling, Controls, Fans, Pumps and Lighting. These have been calculated using DCLG-approved software. Furthermore, the Latest Carbon Figures through the SAP 10 Methodology have been used meaning that the amount of carbon emissions per KWh is accurate.

8. Energy Review

This section of the statement aims to address those policies concerned with the energy conservation/efficiency of the proposed scheme along with the considerations for using alternate and renewable technologies to achieve a reduction in Carbon Emissions.

As stated in section one this section of the statement will follow the energy hierarchy;

a. Use Less Energy
b. Use Renewable Energy

8.1. Predicted Energy Demand

A baseline energy consumption figure has been generated for the proposed development by assessing the proposed dwellings. This figure demonstrates the predicted energy consumption for the whole development against the minimum requirements of Building Regulations Part L 2013.

	Regulated CO_2 Emissions (Kg/Yr)
Baseline: Part L 2021 Edition (TER)	12 kgCO2/yr/m2

Table 1: Baseline Predicted Energy Consumption

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8.2. Low Zero Carbon Feasibility Study

A low zero carbon (LZC) feasibility study has been conducted to assess and determine the appropriateness of different technologies being integrated into the design of the proposed development. The list is not exhaustive but aims to highlight the most common and commercially viable solutions to alternate and renewable energy.

Technology	Pros	Cons	Comments	Feasible
Air Source Heat Pump (ASHP)	Can provide a significant proportion of heating and cooling for most building types Can generate heat and chilled water with good efficiency ratios	Can only produce heat up to 45°C thus delivered hot water temperatures can be low and result in an increase in electric immersion heating, increasing dependency on energy use from the national grid. Efficiencies in cold weather can be very low External condenser units can be unsightly and cause some noise issues	Good Heating Source for a well-insulated building.	Yes
Biomass Boiler	Can provide very low carbon heating and hot water Can be fitted in small and large-scale opportunities, giving the flexibility to use either a localized or district heating system Can form part or all of a Combined Heat And Power (CHP) System	Large plant room required to house boiler and fuel store Potentially more maintenance requirement, dependant on boiler type used Negative impact on local air quality from the emissions of the system	Could be challenging to source local fuel. Negative impact on local air quality	No
Combined Heat & Power (CHP)	Can provide both heat and power Can be an effective contributor to overall carbon emissions reduction	Requires a significant and consistent load to be efficient Only generates power when generating heat Plant room design is more complex	Small scale systems can be difficult to have service due to the limited number of trained service engineers	No
Ground Source Heat Pump (GSHP)	Can provide a significant proportion of heating and cooling for most building types Can generate heat and chilled water with good efficiency ratios	Can only produce heat up to 45°C thus delivered hot water temperatures can be low and result in an increase in electric immersion heating, increasing dependency on energy use from the national grid. Expensive to install via a borehole method Requires a large amount of land for shallow-depth loop systems	Not suitable for the location	No
Photovoltaics	High carbon emissions offset Relatively maintenance-free and low-cost installation Expected panel life in excess of 25 years. Multiple mounting and orientation options are available. Can be combined with a battery storage system to fully utilize free electricity generation	Shading impacts the generation of the system Inverter lifespan only expected to be 10 years	Will provide a considerable amount of regulated energy along with the unregulated energy demands of the proposed scheme	Yes
Solar Thermal Hot Water	Can provide a significant proportion of hot water demand Relatively low maintenance and installation cost	Does not produce enough heat during winter months to bring the cylinder up to temperature Restricted on mounting and orientation options	Maintenance and longevity issues make this technology ultimately more expensive	No
Wind Power	High carbon emissions offset Can be combined with a battery storage system to fully utilize free electricity	Produces noise and shadow flicker Need to be installed where they are free from turbulence caused by obstructions The system is reliant on a consistent wind speed to generate electricity Planning permission can be difficult to obtain	Would work but there could be local opposition due to unsightly nature of wind turbines	No
Hydroelectric	High carbon emissions offset Can produce electricity consistently Uses a naturally renewable source	Suitable locations can be difficult to find Restrictions from the Environment Agency and Fisheries can make the scheme unviable to install High installation and maintenance cost	No on-site water source	No
Community or District Heating	Allows a mixed use of fuel sources to be utilized Reduces space required in individual units for boilers and cylinders	Requires significant space for a local community network Internal heat gains can cause overheating in communal areas District connections require considerable planning to ensure ease of connection	The proposed development is not big enough to justify creating a new network and no existing network is in the local area	No

Table 2: Low Zero Carbon Feasibility Study

Following the results of the study and considering the opportunities on-site the client plans to use a an air source heat pump and photovoltaics. This is covered in section 5.4.

8.3. Use Less Energy

The client has chosen to specify materials for all thermal elements that meet the requirement of buildings regulations resulting in the following U-Values;

	Specified	Part L
Floors	0.10	0.18
Walls	0.14	0.18
Roofs	0.10/0.11	0.13/0.16
Windows	1.2	1.4

Table 3: Building Fabrics Standards

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	Regulated CO_2 Emissions (Kg/Yr)
Building Emission Rate: Part L 2021 Edition (DER)	4.72 kgCO2/yr/m2

Table 4: Predicted Energy Consumption After Renewable Energy

	No District heat connection				
No District Heat Connection	**Regulated Energy Demand (Mwh/yr)**	**Regulated CO2 emissions (tonnes/yr)**	**CO2 Saved (tonnes/yr)**	**% CO2 reduction**	
Baseline - emissions See note 1		1124.04	_	_	
Proposed Scheme after energy efficiency measures. See Note 2		442.1224	**681.9176**	60.67	
Residule Emmisions Proposed scheme after Energy Efficiency Measures and CHP(If Using)		0	**681.9176**	154.24	
Proposed scheme after On-Site renewables		369.0598	**73.0626**	16.53	
Total CO2 reduction beyond Part L TER baseline. See Note 5			**754.98**	67.17	

9. Conclusion

In conclusion, the proposal meets the requirements of both the National Policy Guidelines and Local Plan Policy BCS14. This has been demonstrated by modelling the proposed dwelling in SketchUp and providing calculated figures for the predicted energy demand, CO2 emissions, the reduced energy demand and CO2 emissions after renewables. As shown, assessing the proposed development with low carbon technologies, such as Solar PV Panels, provides a saving of 754.98 CO2 tonnes/year was achieved equating to a 67.17% decrease in CO2 beyond the baseline emissions. This has been supported through the installation of an air source heat pump and photovoltaic.