

Energy & Sustainability Statement

Westholme Clinic Ltd., Clive Avenue, Goring, Worthing BN12 4SG

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1.0 Executive Summary

This report provides a detailed analysis of the energy & sustainability strategy for the proposed development at Westholme Clinic Ltd., Clive Avenue, Goring, Worthing BN12 4SG, showing alignment with the required local and national planning policies. The proposal is for the development of new-build 2-storey office space.

This report outlines how the proposal has achieved a significant reduction in CO₂ emissions from the Part L 2021 baseline, which demonstrates the client and the design team's commitment to sustainability in the built environment.

The reduction in consumption and CO₂ emissions presented in this report have been achieved by following the energy hierarchy:

- Be Lean – Use less energy, by adopting sustainable design and construction measures
- Be Clean – Supply energy efficiently, in particular by prioritising decentralised energy generation
- Be Green – Using renewable and low/zero carbon technology

Energy modelling utilising approved compliance software for Part L 2021 has been undertaken to produce the figures outlined in table 1.1. This shows the reductions achieved at each step of the energy hierarchy, which is summarised as:

- Be Lean:
 - High levels of insulation to achieve low fabric U-Values
 - Low air permeability to reduce unwanted infiltration and exfiltration
 - Low energy lighting in all outlets
 - Time & temperature zone control
- Be Clean:
 - No 'Be Clean' strategies deemed feasible for this development
- Be Green:
 - High-efficiency air-to-air heat pumps to provide space heating and hot water
 - Array of photovoltaic (PV) panels

Table 1.1: Three-Step Hierarchy – Site-wide energy consumption and CO ₂ emissions				
	Energy Consumption [kWh/year]	Energy Consumption Savings [%]	CO ₂ Emissions [Tonnes CO ₂ /Year]	CO ₂ Emissions Savings [%]
Baseline	14,070		1.30	
Be Lean	13,744	2.32%	1.26	3.24%
Be Clean	13,744	0.00%	1.26	0.00%
Be Green	9,389	30.95%	0.88	28.94%
Total Reduction		33.27%		32.18%

The incorporation of the three step energy hierarchy results in a **32.18%** reduction in CO₂ emissions over the baseline, improving on the targets laid out in the relevant planning policy guidelines.

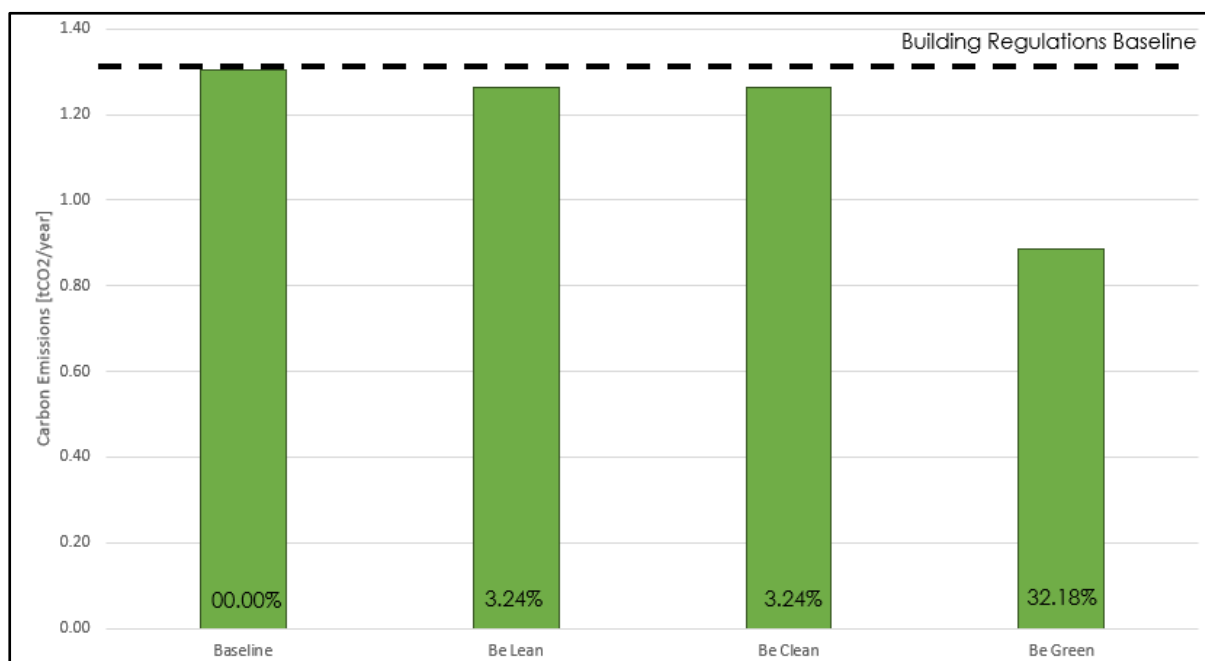


Figure 1.1: CO₂ Emission Reductions

2.0 Introduction

2.1 Site Location and Proposal

ERS Consultants Ltd has been appointed to prepare an Energy & Sustainability Statement and develop an energy strategy which supports the appropriate planning policies for the site located at **Westholme Clinic Ltd., Clive Avenue, Goring, Worthing BN12 4SG**.

The proposal is for the development of a new-build 2-storey office space. This Energy & Sustainability Statement will demonstrate the sustainable measures implemented in order to lower energy demand and reduce CO₂ emissions in line with the applicable planning and regulation requirements.

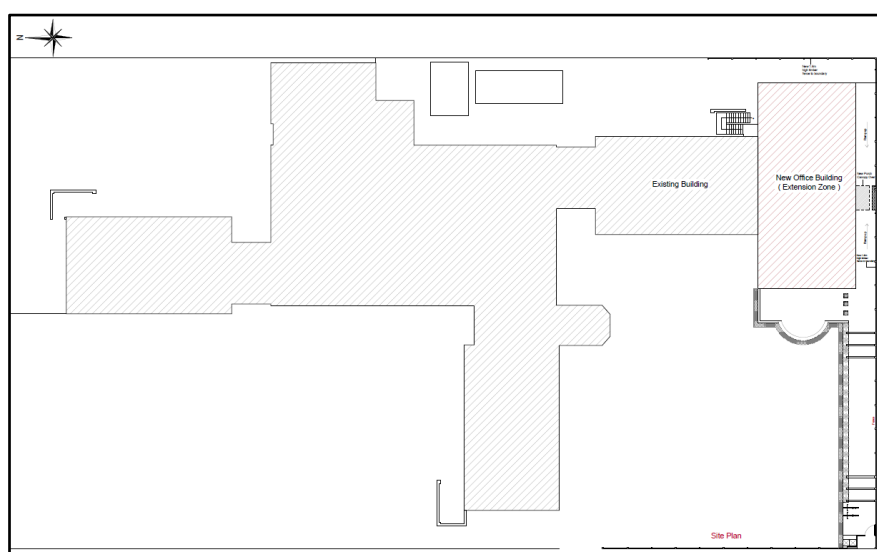


Figure 2.1: Site Location Plan

Proposed schedules of accommodation is provided in Table 2.1 below:

Table 2.1 Accommodation Schedule	
Space	Gross Internal Area [GIA - m ²]
Office Area Development	302

2.2 Methodology

The methodology used within this energy statement to determine the regulated CO₂ emissions is in accordance with the recognised three-step energy hierarchy (Figure 2.2).

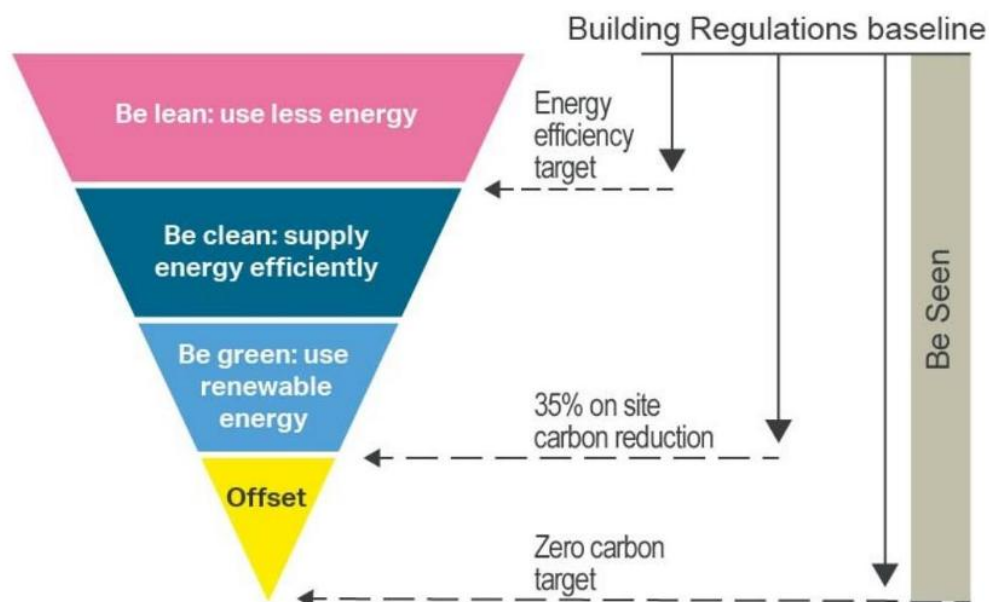


Figure 2.1: Three-step energy hierarchy

2.2.1 Be Lean – Reducing Demand

The first step of the energy hierarchy requires developments to use less energy and manage operational demand through fabric (passive) and servicing (active) improvements.

Passive Design Measures

The passive design of the building should aim to reduce energy demand through architectural and non-system measures, with an emphasis on a 'fabric-first' approach. This can include optimising orientation, site massing, fabric efficiency, maximising daylight and ventilation.

Active Design Measures

By implementing systems and services of higher efficiency and lower energy consumption, overall energy demand, CO₂ emissions and environmental impact can be reduced.

Ways of reducing energy consumption include installing A-Rated white goods, using sanitaryware that consumes less water, highly efficient lighting, careful planning of heating controls and heat recovery.

To ensure sufficient ventilation is provided, system specific guidance should be referred to. This is so an appropriate air permeability is targeted depending on the mechanical ventilation system type (continuous or intermittent). This guidance can be found in Section 1.45-1.73 in Part F, Volume 1, of the 2021 building regulations.

2.2.2 Be Clean – Heating Infrastructure

The second step of the energy hierarchy requires all planning applications to consider and demonstrate how local energy resources are to be exploited. This is to ensure the remaining energy demand is supplied as cleanly as possible to reduce CO₂ emissions and further reduce demand.

This includes assessing the feasibility of connecting to existing and planned heat networks, the provision of site-wide heat networks, the use of secondary heat, gas-engine Combined Heat & Power (CHP) and ultra-low NO_x gas boilers, and the provision of site wide heat networks.

2.2.3 Be Green – Renewable Energy

The final step of the energy hierarchy asks that the remaining energy demand and CO₂ reductions are made using renewable energy sources. Typically, this includes Photovoltaic panels (PV), solar thermal water heating, wind turbines and biomass boilers. Also, while not strictly in the category of renewable technology, decentralised low/zero carbon technologies such as heat pumps should be considered at the 'Be Green' stage.

Worthing Borough Council Local Plan 2020-2036, as adopted on the 23rd of March 2023, follows the National Planning Policy Framework (NPPF) and planning practice guidance. Policy DM17, regarding Energy, mentions that all new housing and major non-residential development should incorporate renewable and low carbon energy production equipment to meet at least 10% of predicted total energy requirements (after CO₂ reductions from energy efficiency measures). However, a major development is defined as the provision of a building or buildings where the floorspace to be created is 1,000 sqm or more or development on sites of 1 hectare or more, which is not the applicable for the current development.

Proposals should seek to maximise on-site renewable energy. This is regardless of whether the specific reduction targets of the planning policies have been met previously. The intention of this is to ensure proposals do not pass up opportunities to integrate renewable technology into the design.

3.0 Regulation and Policy Guidance

This section presents the key relevant planning requirements and guidance which have been followed to produce the energy strategy. The most relevant applicable energy policies in the context of the proposed development are presented below.

3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was updated December 2024 as a response to the Levelling-up and Regeneration Bill. This Policy sets out the Governments planning policies for the whole of England to meet sustainable developments. This framework influences local planning policies and guidance.

The NPPF has three core objectives to sustainable development; Economic, Social, and Environmental. These objectives should be accounted for simultaneously.

The Framework details positive improvements that planning policies should aim towards. These include:

- Delivering a sufficient supply of homes
- Building a strong, competitive economy
- Ensuring the vitality of town centre
- Promoting healthy and safe communities
- Promoting sustainable transport
- Supporting high quality communications
- Making effective use of land
- Achieving well-designed and beautiful places
- Protecting Green Belt land
- Meeting the challenge of climate change, flooding and coastal change
- Conserving and enhancing the natural and historic environment
- Facilitating the sustainable use of minerals.

3.2 Local Borough Planning Policy

Worthing Borough Council's Local Plan 2020–2036, adopted on 23 March 2023, is aligned with the National Planning Policy Framework and planning practice guidance. Policies DM16, DM17 and SP2 are setting a comprehensive and integrated approach to addressing climate change. Policy DM17 on energy states that all new housing and major non-residential development should include renewable and low-carbon energy systems to meet at least 10% of predicted total energy demand, after carbon reductions from energy efficiency measures. However, a major development is defined as development creating 1,000 sqm or more of floorspace, or development on a site of 1 hectare or more, which does not apply to the current proposal.

3.3 Part L 2021

The Approved Document Part L, 2021, details the conservation of fuel and power in; Volume 1 – Dwellings, and Volume 2 – Buildings other than dwellings.

Guidance is provided within these documents that outline how to comply with the minimum regulatory standards surrounding energy efficiency.

Compliance is then defined by the following metrics:

- Domestic (Part L, Volume 1)
 - o Emission Rate (TER>DER)
 - o Primary Energy Rate (TPER>DPER)
 - o Fabric Energy Efficiency (TFEE>DFEE)
- Non-Domestic (Part L, Volume 2)
 - o Emission Rate (TER>BER)
 - o Primary Energy Rate (TPER>BPER)

In these metrics, domestic compliance refers to dwellings (D), where non-domestic refers to buildings (B).

There are also minimum standards that relate to individual elements within a property's specification. The following are examples of elements where a minimum standard for compliance applies irrespective of whether compliance on the main three metrics is achieved:

- U-Values of building constructions
 - o Constructions in new builds
 - o New constructions in existing buildings
 - o Existing constructions requiring improvement
- Efficiency of building services
 - o Heating system coefficient of performance (COP)
 - o Cooling system energy efficiency ratio (EER)
 - o Ventilation system specific fan power (SFP)
 - o Heat recovery efficiency
- Air permeability
 - o Maximum permissible score for all new builds
 - o Requirement for testing of all new builds

3.4 Part F 2021

Approved Document Part F 2021 details the regulations relating to ventilation in; Volume 1 – Dwellings, and Volume 2 – Buildings other than dwellings.

These documents provide guidance on the means of providing adequate ventilation for people in buildings, and specifically applies to occupied areas.

With regards to sustainability, Part F offers guidance on providing sufficient mechanical ventilation in properties that aim to be air tight. As sustainability targets are tightened, the design of buildings tends toward passive standards that seeks to reduce infiltration and exfiltration.

In cases where low air permeability is targeted, system specific guidance should be sought in order to ensure sustainability targets don't compromise comfort and, as with Part O, occupants' comfort isn't compromised.

3.5 Emission Factors

These factors assist in calculating a property regulated emissions, and are used in all calculations in this document. They assume that for every kWh consumed, that a specified number of emissions are released in order to produce that energy. These differ depending on the fuel type. These are presented in Table 3.1 below:

Table 3.1 Carbon Emission Factors for selected fuel type		
Fuel	Carbon Factor	Primary Energy Factor
Mains Gas	0.210	1.130
Bulk/Bottled LPG	0.241	1.141
Liquid Fuels	0.024	1.286
Heating Oil	0.298	1.180
Wood Pellets	0.053	1.325
Grid Electricity	0.136	1.501
<i>* Table extracted from the document SAP Version 10.2 (21-04-2022). Table 12: Fuel prices, emission factors and primary energy factors, Page 182. this can be found in the appendix of the report.</i>		

3.5 Approved Compliance Software

For non-residential properties, the CO₂ emissions and energy consumption has been calculated in IES VE 2025.2.0.0, which is an approved software for Simplified Building Energy Modelling (SBEM).

4.0 The Energy Hierarchy

The following section details the reductions in CO₂ emissions and energy consumption at each stage of the energy hierarchy, and the strategies implemented at each stage to achieve those figures.

4.1 Baseline CO₂ Emissions

Before the three-step energy hierarchy is implemented, the notional CO₂ emissions must be established. This figure forms the baseline, which all further steps will be compared against to quantify the reduction in CO₂ emissions.

For new-build developments, the baseline is equivalent to the Target Emission Rate (TER), which is calculated using the notional specification outlined in Table 1.1 of The Approved Part L 2021 Document for residential properties, and by the *National Calculation Methodology Modelling Guide* for non-residential properties.

The baseline figures can be seen in Table 4.1 for the combined site-wide results:

Table 4.1: Baseline energy consumption and CO ₂ emissions – Site-Wide				
	Energy Consumption [kWh/year]	Energy Consumption Savings [%]	CO ₂ Emissions [Tonnes CO ₂ /Year]	CO ₂ Emissions Savings [%]
Baseline	14,070	-	1.30	-

5.0 Be Lean – Reducing Demand

At the 'Be Lean' stage, passive and active measures are proposed to reduce the energy consumption of the dwelling as a way of lowering CO₂ emissions.

5.1 Fabric Improvements

At this stage, a fabric first approach is taken to ensure energy consumption is reduced. The key elements of the specification are outlined in Table 5.1 below.

This includes proposals for U-Values beyond notional standards where practicably possible, as well as ultra-low air permeability targets and enhanced thermal bridging.

Table 5.1: Fabric Performance for Non-Residential Areas			
	Part L 2021 Minimum Standard	Part L 2021 Notional Standard	Proposed Figures
Floor U-Values	0.18 W/m ² K	0.15 W/m ² K	0.10 W/m ² K
Wall U-Values	0.26 W/m ² K	0.18 W/m ² K	0.16 W/m ² K
Roof (Flat) U-Values	0.16 W/m ² K	0.15 W/m ² K	0.15 W/m ² K
Window U-Values	1.60 W/m ² K	1.40 W/m ² K	1.30 W/m ² K
Roof Window/Light U-Values	2.20 W/m ² K	2.10 W/m ² K	1.30 W/m ² K
Pedestrian Doors	1.60 W/m ² K	1.60 W/m ² K	1.30 W/m ² K
Vehicle Access and Similar Large Doors U-Values	1.30 W/m ² K	1.30 W/m ² K	N/A
High-Usage Entrance Doors	3.00 W/m ² K	1.90 W/m ² K	N/A
Air Permeability	8.00 m ³ /m ² /hr @ 50Pa	3.00 m ³ /m ² /hr @ 50Pa	5.00 m ³ /m ² /hr @ 50Pa

5.2 Building Services

Once fabric first measures are implemented, the 'Be Lean' stage looks to reduce energy demand through the use of efficient services. This includes heating, ventilation & air conditioning (HVAC) systems as well as lighting. Heating also includes provision for space and hot water requirements across the residential and non-residential

5.2.1 Non-Residential Building Services

The non-residential areas are defined as office commercial spaces.

Table 5.2 sets out the recommended specification for achieving compliance in the non-residential unit.

Table 5.2: Non-Residential Building Services			
Heating System. 1			
Location and Type	Variable Refrigerant Flow System; Throughout the property;		
Efficiency	COP: 5.00 EER: 6.50	Controls	Time and Temperature Zone Control;
Water Heating System			
Location	Throughout the property;	Type	Electric Instantaneous Water Heating;
Ventilation			
Location and Type	Intermittent Fans to Wet Rooms; Throughout the property;		
Specific Fan Power [SFP]	1.50	Heat Recovery Efficiency	N/A
Lighting			
Location	Throughout the property;		
Lamp Type	N/A	Lighting Controls	N/A
Luminous Efficacy (Lm/W)	130.00		

5.3 Lean Reduction

With the implementation of all lean measures, there have been measurable reductions in energy demand and carbon emissions. This can be seen in table 5.1-5.2. In addition to this, table 5.3 reports the site-wide reduction. These have been achieved by incorporating the following into the proposal:

- Passive Measures:
 - o Low U-Values
 - o Low air permeability targets
- Active Measures:
 - o Time & temperature zone control

Table 5.3: 'Be Lean' energy consumption and CO₂ emissions – Site-Wide

	Energy Consumption [kWh/year]	Energy Consumption Savings [%]	CO ₂ Emissions [Tonnes CO ₂ /Year]	CO ₂ Emissions Savings [%]
Baseline	14,070		1.30	
Be Lean	13,744	2.32	1.26	3.24
Total Reduction		2.32		3.24

6.0 Be Clean – Heating Infrastructure

The second step of the energy hierarchy seeks a reduction in CO₂ emissions by improving the energy heating infrastructure. This includes heat networks (existing and proposed), secondary heat, combined heat & power (CHP) and heating systems with low local emissions of pollutants such as NO_x.

6.1 Connection to Local Existing or Planned Heat Networks

Within the 'Be Clean' stage, connection to heat networks must be considered. This includes existing networks, or planned ones, with the facility to connect in the future incorporated.

Currently there are no heat networks in the Worthing Area, and there is limited room on site to incorporate the necessary plant equipment to facilitate such a connection. This means that this option is not feasible, and will not form part of the proposal.

6.2 Use of Zero-emission and/or Local Secondary Heat Sources

In addition to heat networks, secondary heat sources should be reviewed at the 'Be Clean' stage. Secondary heat can be taken from the following sources:

- Environmental sources:
 - o Ground source
 - o Air source
 - o Water source
- Process sources:
 - o Power station rejection
 - o Building cooling system heat rejection
 - o Industrial sources (e.g., incinerators)
 - o Commercial buildings non-HVAC (e.g., data centres)
 - o Water treatment works (e.g., sewage plants)
- Infrastructure sources:
 - o Metro tunnels (e.g., London underground and Crossrail)
 - o National Grid electrical infrastructure
 - o Sewer heat mining

Often these secondary heat sources are considered 'low-grade' (i.e., below 30°C), and can be 'upgraded' via heat pumps for use as main heating and hot water systems. The upgrade can happen either at source, before entering a network or at the direct point of use.

While secondary heat from the air could be utilised on site, due to lack of space for plant equipment, this is not possible on a communal scale. This means that no secondary heat is to be implemented at the 'Be Clean' stage.

6.3 Low-emission Combined Heat & Power (CHP)

CHP units have previously been the primary facilitator of communal and district heating networks in large scale developments. This was due to it producing fewer CO₂ emissions compared to tradition gas-fired boilers due to the favorable carbon factor of the electricity generated over that of the gas consumed.

However, changes to the carbon factor of grid electricity contained within the latest Building Regulations has meant that although still energy efficient the previously favoured system of CHP has become much less carbon efficient, with greater carbon emissions now seen compared with conventional gas-fired boilers due to their lower efficiency in heating and the reduced saving in CO₂ due to the electricity generation.

In addition to no longer providing CO₂ savings there are also concerns regarding local air quality. This is because gas-fired systems omit NO_x particulates, which is unwanted, especially in dense urban environments.

In light of this, CHP will not be incorporated into this proposal.

6.4 Use Ultra-low NO_x Gas Boilers

When selecting the main heating system at the 'Be Clean' stage, as well as considering savings in CO₂ emissions and reductions in overall consumption, it is important to consider local emissions.

All combustion processes where a fuel is burnt emit particulate matter potentially harmful to health. This can contribute to poor air quality in urban environments, where it is important to consider the impact of pollution on occupants of the development and the local area.

In this development, no fossil fuel-based systems are to be incorporated, such as mains gas CHPs or boilers, as they offer no benefit to the environmental and sustainable credentials of this proposal.

Gas-fired boilers would only become acceptable if used as a placeholder while connection to a heat network was facilitated, however as this is not the case in this development, they are not deemed feasible or beneficial.

6.5 The Be Clean Reduction

After the feasibility of 'Be Clean' measures in the second step of the energy hierarchy, no means of reducing CO₂ emissions were deemed suitable for this development.

The site is not in close proximity to either an existing or proposed district network, and is not large enough to implement secondary heat on a communal scale, the use of CHP and gas-fired boilers was also not considered suitable in terms of targeting a net zero carbon development and minimizing emissions of NO_x.

Therefore, no reduction in CO₂ emissions are recorded at this stage of the energy hierarchy.

7.0 Be Green – Renewable Energy

The third step of the energy hierarchy, 'Be Green', requires that renewable and LZC technology be incorporated in to the proposal. This requires that the feasibility of various technologies be assessed and, where reasonably practicable, be implemented into the proposal regardless of whether the required reduction in emissions has been achieved in the previous steps.

7.1 Types of Renewable Technology Considered

There is a wide range of renewable technology available for direct use in developments. These can all be scaled to suit single dwelling developments, all the way up to major multi-use residential/commercial developments.

The following renewable and decentralised Low/Zero Carbon (LZC) technologies have been considered:

- Biomass
- Heat pumps (ground, water and air source)
- Wind
- PV Panels
- Solar thermal panels
- Hydro-electric power

Selection of these technologies depends on various factors, typically:

- CO₂/energy savings
- Site constraints
- Payback period
- Visual impact
- Practicality
- Demand profiles

7.2 Demand Profiles

The balance of technologies chosen will depend on the development's energy demand patterns. Space heating patterns will change seasonally, as will cooling patterns depending on system selection due to overheating mitigation strategies.

Electrical demand is also likely to vary through the year, as well as through the day with demand for lighting likely to be higher in the evening.

The implementation of renewable technology should be made with demand profiles in mind. Additional storage technologies can be considered to supplement this, storing up energy in times of low-demand to be deployed in when demand exceeds supply.

7.3 Feasibility Assessment

At this stage, the feasibility of the available 'Be Green' technologies are assessed. As the design is in the early stages, the feasibility scores in Table 7.1 are only intended to provide an outline for the purpose of the energy statement.

Table 7.1: Indicative Feasibility Assessment			
Renewable Technology	Assessment	Indicative Feasibility	Adopted for the site
Biomass	Provided material (such as wood pellets) is source from sustainable suppliers, this is a good option. These fuels, however, do emit high levels of NOx pollutants, so in urban/suburban environments, this would contribute to poor local air quality. There would also be concerns surrounding delivery of the fuel within an urban environment.	Low	No
Photovoltaic (PV) Panels	An array of PV panels would generate significant savings in CO ₂ emissions and energy consumption for the proposal. There would also be a minimal impact on the external appearance, especially if integrated systems are used.	High	Yes
Solar Thermal	Similar to PV, these would be roof mounted, and can offer savings in energy consumption relating to hot water usage within the property. These do, however, reduce the available roof area for PV, which offer greater savings than this technology.	Med	No
Wind	These can offer significant on-site power generation, however are not suitable in urban/suburban environments. If the development were in a rural setting, then these could be considered, however there are significantly more system design requirements than with other technologies, as well as significantly higher initial costs.	Low	No
Air Source Heat Pump (VRF System)	Heat pumps can upgrade low-grade heat from the environment into high-grade heat for space heating and hot water. Heat pumps that take heat from the air, while less efficient than other sources, they still offer significant savings and run at a high COP. They also take up less space, and are more versatile with regards to installation requirements.	High	Yes

Ground Source Heat Pump	As ground temperatures are more stable (especially with deeper boreholes), this source for heat pumps can offer greater efficiency. There are, however, significantly higher initial costs, largely associated with the excavation/drilling required to install ground loops to the correct depth. These make them less suitable for a development of this size in an urban/suburban environment.	Med	No
Water Source Heat Pump	As with ground source, installing loops at a water-source can offer more stable temperatures compared to air-source. There are still high initial costs to consider, however, as well as proximity and access to an appropriate body of water. As this development is not situated near a body of water, this is not feasible.	Low	No

7.4 Detailed Assessment of Renewable Technologies

7.4.1 Air Source Heat Pumps

Air Source heat pumps (ASHP) use thermodynamic principles to convert heat from the air into useable heat within the building. Unlike some other sources of renewable energy, heat pumps do require input energy (typically mains electricity or gas) to pump and compress refrigerant through the system. However, under the renewable Energy Directive 2009/28/EC they are classified as renewable technologies provided that the final energy output significantly exceeds the primary energy input required to drive the heat pump.

In addition to being a renewable energy technology, heat pump systems offer the benefit of being future proofed against efforts to de-carbonise the UK's heating infrastructure.

When installing a heat pump, it is important to have it sized and installed correctly according to the system requirements. For residential properties, they should also be selected from the BRE-approved repository, the Product Characteristics Database (PCDB) in order for them to be used in SAP, and their effect maximized.

7.4.2 Photovoltaic (PV) Panels

Four types of solar cells are available on the market at present and these are mono-crystalline, polycrystalline, thin film and hybrid panels. Although mono-crystalline and hybrid cells are the most expensive, they are also the most efficient with an efficiency rate of 12-20%. Poly-crystalline cells are cheaper but they are less efficient (9-15%). Thin film cells are only 5-8% efficient but can be produced as thin and flexible sheets.

1.00 kWp of PV panels can produce approximately 850-900kWh/year of electricity in this region, reducing the grid energy requirement and CO₂ emissions.

There is roof area which is not otherwise utilised for external amenity, where photovoltaic panels could be located. From an initial assessment it is determined that a maximum of 8 panels (output 470 W could be located on the available roof area, taking into account safety restraints and allowing for maintenance (cleaning) access.

Table 7.2: Details of proposed PV system

No of panels	8
Array capacity	3.76 kW _p
Area of array	~16 m ²
Orientation/Tilt:	Horizontally installed on the flat roof;

7.5 Green Reduction

After all green measures were implemented, use of renewable technology on site has been maximised where practicably possible. The effects of these are outlined in Table 7.3. These reductions have been achieved using the following technologies:

- Solar PV array

Table 7.3: 'Be Green' energy consumption and CO₂ emissions – Site-Wide

	Energy Consumption [kWh/year]	Energy Consumption Savings [%]	CO ₂ Emissions [Tonnes CO ₂ /Year]	CO ₂ Emissions Savings [%]
Baseline	14,070		1.30	
Be Lean	13,744	2.32	1.26	3.24
Be Clean	13,744	0.00	1.26	0.00
Be Green	9,389	30.95	0.88	28.94
Total Reduction		33.27		32.18

8.0 Sustainable Design Measures

8.1 Waste Management

A Site Waste Management Plan will be developed for the site to outline the procedures for waste minimisation, sorting, reuse and recycling.

Sustainable waste management should follow the hierarchy described in BS 5906: *Waste management in buildings. Code of practice*. This outlines the following principles in decreasing order of desirability:

- Reuse land and buildings wherever feasible and consistent with maintaining and enhancing local character and distinctiveness.
- Reuse and recycle materials that arise through demolition and refurbishment, including the reuse of excavated soil and hardcore within the site.
- Prioritise the use of materials and construction techniques that have smaller ecological and carbon footprints, help to sustain or create good air quality, and improve resilience to a changing climate where appropriate.
- Incorporate green roofs and/or walls into the structure of buildings where technically feasible to improve water management in the built environment, provide space for biodiversity and aid resilience and adaptation to climate change.
- Consider the lifecycle of the building and public spaces, including how they can be easily adapted and modified to meet changing social and economic needs and how materials can be recycled at the end of their lifetime.

8.2 Materials

Material efficiency will be a priority for the design team and will be one of the key considerations during the detailed design. Potential measures for reducing the material demand and for designing out waste will be explored by all key design team disciplines at each design stage, according to the first stages of the Waste Hierarchy.

Specifically, the following notes have been made on the potential project materials:

- Timber Frame structure
- Off-site construction and Prefabrication
- Recycled Glass
- Recycled Tiles
- Locally sourced materials

Where there are suitable opportunities to recycle a proportion of the material recovered from the existing site it should always be done.

8.5 Flood Risk

The Environment Agency has developed a flood risk map for planning to identify the relative risk of flooding for proposed development planning locations. Flood zones

assume that no defences are present and so where these do exist, they are only indicative of the potential for flooding.



Figure 8.1. Environment Agency Flood Zone Interactive Map

The whole of the development lies within flood zone 1 of the Environment Agency's flood risk map as seen in figure 8.1. Land located within flood zone 1 is at low risk of flooding having an associated annual probability of flooding of less than 1 in 1000 (0.1%).

8.5.1 Study Approach

In accordance with Planning Practice Guidance for Flood Risk document, land within flood zone 1 is suitable for all uses. Assessment of this site has been based upon the Environment Agency's flood interactive map, the topographical site survey and the architect's proposed development layout.

8.5.2 Flood Vulnerability

Based on the Environment Agencies flood map, the development site is located within Flood Zone 1 and in accordance with Planning Practice Guidance for Flood Risk neither a sequential or exception test is required.

8.5.3 Sustainable Urban Drainage Systems (SuDS)

Sustainable Urban Drainage Systems are a method to manage excess water within urban environments. They are designed to work by allowing the water to be drained by infiltration allowing the excess water to positively impact the environment around. SuDS limit the volume and rate of surface water entering the public sewer system. They therefore have the potential to play an important role in helping to ensure the sewerage network has the capacity to cater for population growth and is resilient to the effects of climate change.

SuDs can offer multiple benefits such as;

- Managing Flood Risks
- Improving Biodiversity by creating new habitats
- Recharging groundwater supplies

- Possibilities for rainwater re-using
- Providing communities with open public spaces

The design of SuDS should explore fully the potential to deliver these benefits.

8.6 Water Efficiency

Policy RE1 requires water efficiency in new development to meet the highest national standard. For residential development, this is defined in the supporting text as the 'optional Building Regulation' for water efficiency in new dwellings, which is 110 litres per day per person, or a tighter standard if one becomes available nationally. If a new, tighter national standard is introduced, this will be adopted automatically by virtue of Policy RE1.

For all developments, the submitted information should set out an approach to water management that reduces water usage and waste and priorities demand reduction measures over supply measures.

8.6.1 Reducing Water Use

In order to reduce the proposals environmental impact, it is important to use efficient sanitaryware to lower water consumption.

The following methodology has enabled the following measures to be considered within this proposal;

- Low flow and flush volume sanitaryware
- Aerated washbasin/kitchen taps and shower heads,
- Tapered and low-capacity baths,
- Rainwater harvesting
- Greywater harvesting
- Choosing the best location for the main heating & hot water system

The methodology adopted will aim to keep the mains water consumption below 105 litres/person/day as required by the local policy. If a new, tighter national standard is introduced, this will be adopted automatically by virtue of this policy.

For all developments, the submitted information should set out an approach to water management that reduces water usage and waste and priorities demand reduction measures over supply measures.

Recycling systems should be backed up by mains supply or a sufficiently large reserve storage system to meet higher demands during dry spells. Storage tanks will need an overflow to allow excess water to be released which should be able to flow into a soakaway.

9.0 Conclusion

This report provides a detailed analysis of the proposed development at **Westholme Clinic Ltd., Clive Avenue, Goring, Worthing BN12 4SG**, showing alignment with the required local and national planning policies. The proposal has achieved a significant reduction in CO₂ emissions from the Part L 2021 baseline, which demonstrates the client and the design team's commitment to sustainability in the built environment.

This reduction in consumption and CO₂ emissions has been achieved by following the energy hierarchy. The measures taken at each stage are summarised in Table 9.1.

Table 9.1: Strategies implemented in the energy hierarchy	
Be Lean	Improved Fabric Lower Air tightness Low energy lighting
Be Clean	There are no existing or proposed heat networks in the proximity of the site which could be connected to.
Be Green	Use of high efficiency air source heat pumps 3.76 kWp of PV located on the roof areas
Be Seen	Suitable metering provided and management procedures put in place.

The energy consumption and CO₂ emissions savings made by implementing these measures across the site is summarised in Table 9.2:

Table 9.2: Summary of energy consumption and CO ₂ emissions – Site-Wide				
	Energy Consumption [kWh/year]	Energy Consumption Savings [%]	CO ₂ Emissions [Tonnes CO ₂ /Year]	CO ₂ Emissions Savings [%]
Baseline	14,070		1.30	
Be Lean	13,744	2.32	1.26	3.24
Be Clean	13,744	0.00	1.26	0.00
Be Green	9,389	30.95	0.88	28.94
Total Reduction		33.27		32.18

To ensure that the figures in this document are maintained post-occupancy, suitable measures will be taken to record and report operational energy use by the use of smart metering.

Appendices

The following Appendices are provided to support this energy statement:

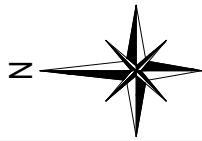
Appendix A Full set of drawings used for the calculations

Appendix B SBEM BRUKL output documents

Appendix C Flood Map for Planning

Appendix D Low & zero carbon technology review

Appendix A - Full set of drawings used for calculations



01246810m

Scale 1:200

KEY

Existing Building

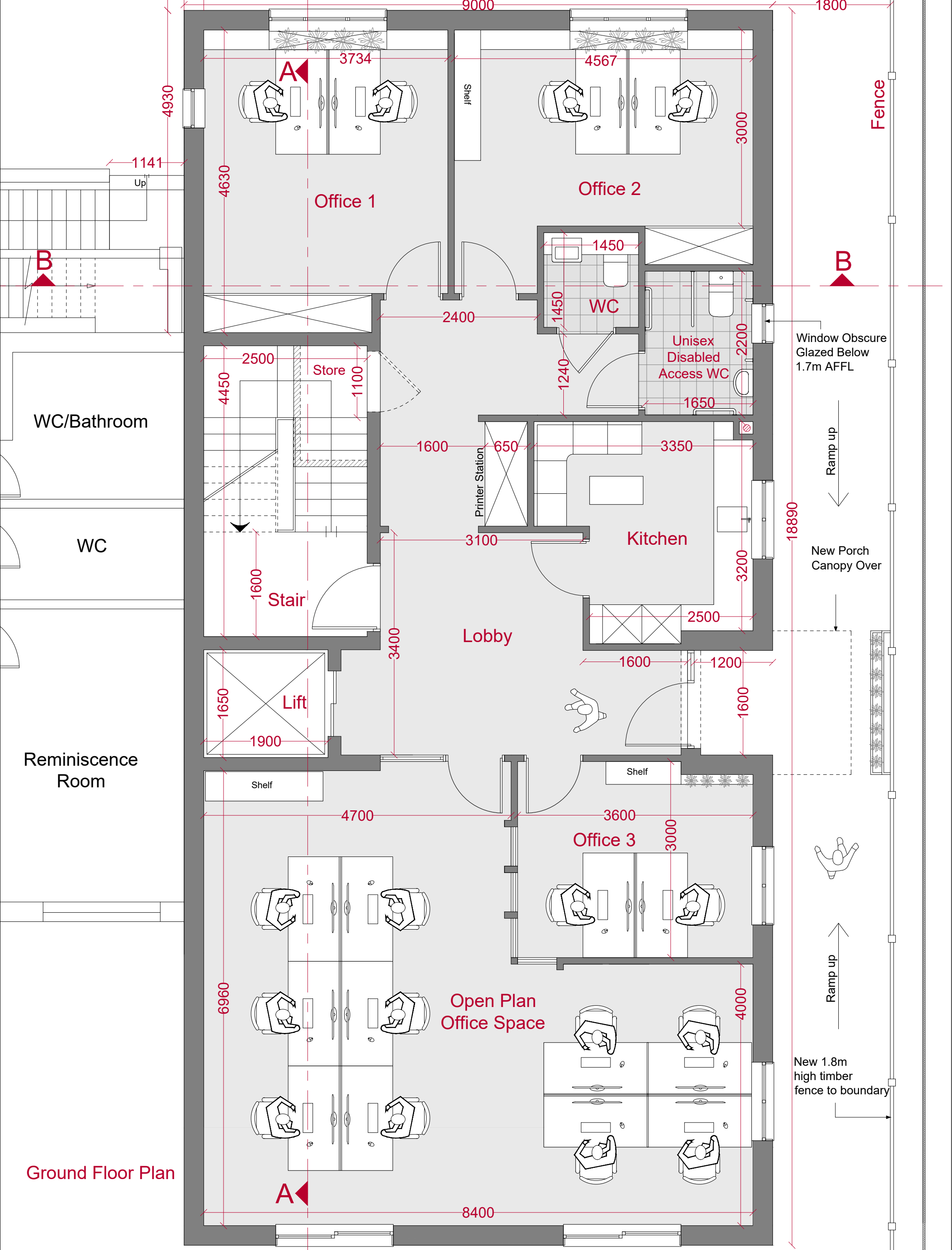
New Office Building
(Extension Zone)

						CLIENT	Westholme Clinic Ltd	
						PROJECT	Office Block, Westholme Clinic	
						Address	Westholme Clinic Ltd, Clive Ave, Goring, BN12 4SG, Worthing, West Sussex	
Rev	Date	Description	Dr	Ch				
B	24.9.25	Revised Site Plan	AK	AK				
A	17.7.25	General Agreement	AK	AK				

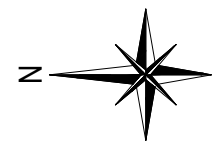
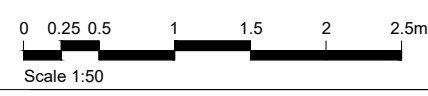
ARCIST

ARCHITECTS & ARTISTS IDEAS

DRAWING Title	DRAWN
Proposed Site Plan	A.K
DRAWING NO	DATE
Project Originator Level Drawing No Rev 107 - ARC - - 110 - B	24.9.25
SCALE	
SCALE 1:200 @ A3	B REVISION



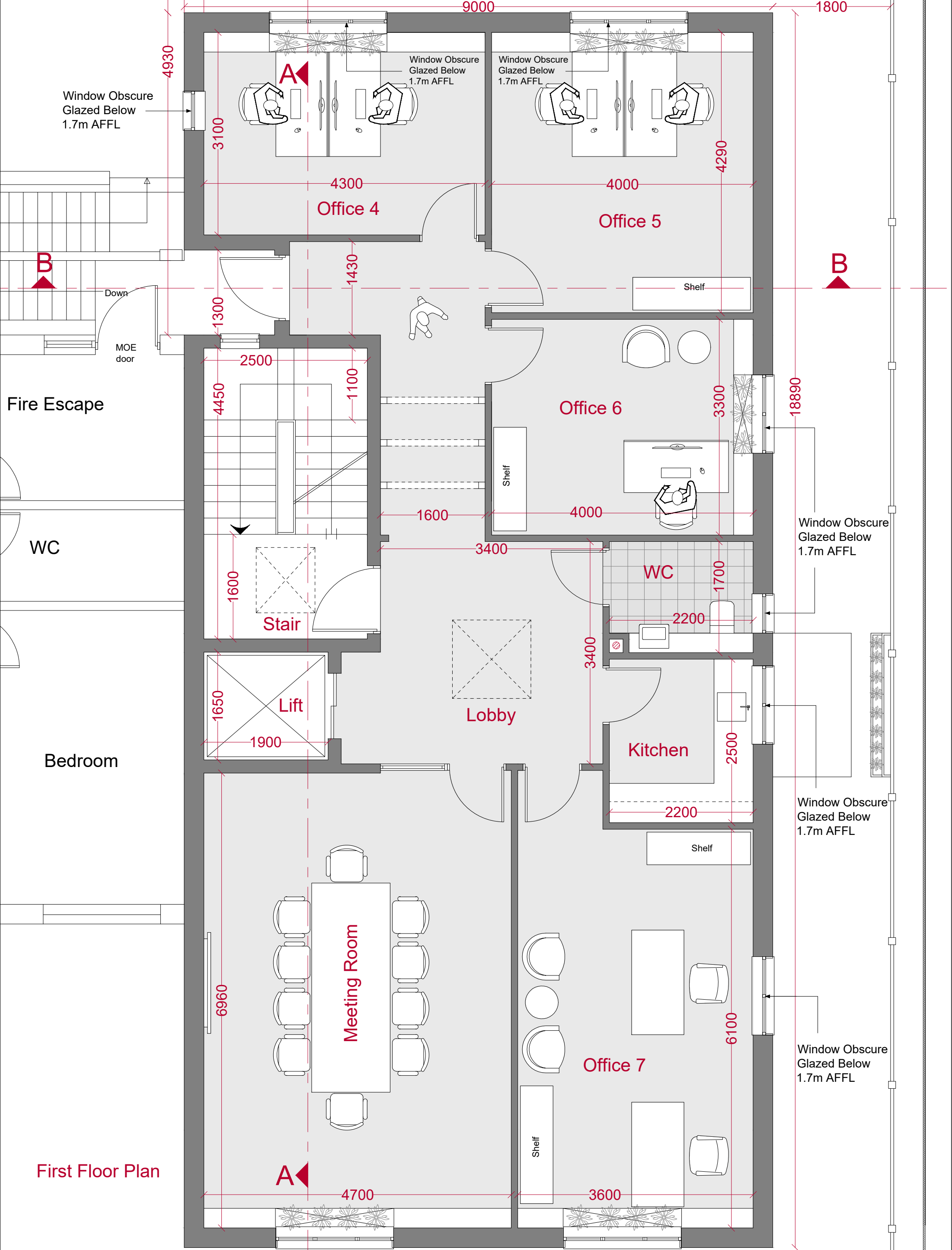
Ground Floor Plan



Rev	Date	Description	Dr	Ch	CLIENT
D	24.9.25	Revised Floor Plan	AK	AK	Westholme Clinic Ltd
C	17.7.25	Revised Floor Plan	AK	AK	PROJECT
B	29.6.25	Revised Floor Plan	AK	AK	Office Block, Westholme Clinic
A	27.5.25	General Agreement	AK	AK	Address
					Westholme Clinic Ltd, Clive Ave, Goring, BN12 4SG, Worthing, West Sussex



DRAWING Title	Proposed Ground Floor Plan Alternative AR- A	DRAWN	A.K
DRAWING NO	107 - ARC - 0 - 100 - D	DATE	24.9.25
SCALE	SCALE 1:50 @ A3	REVISION	D



00.250.511.522.5m

Scale 1:50

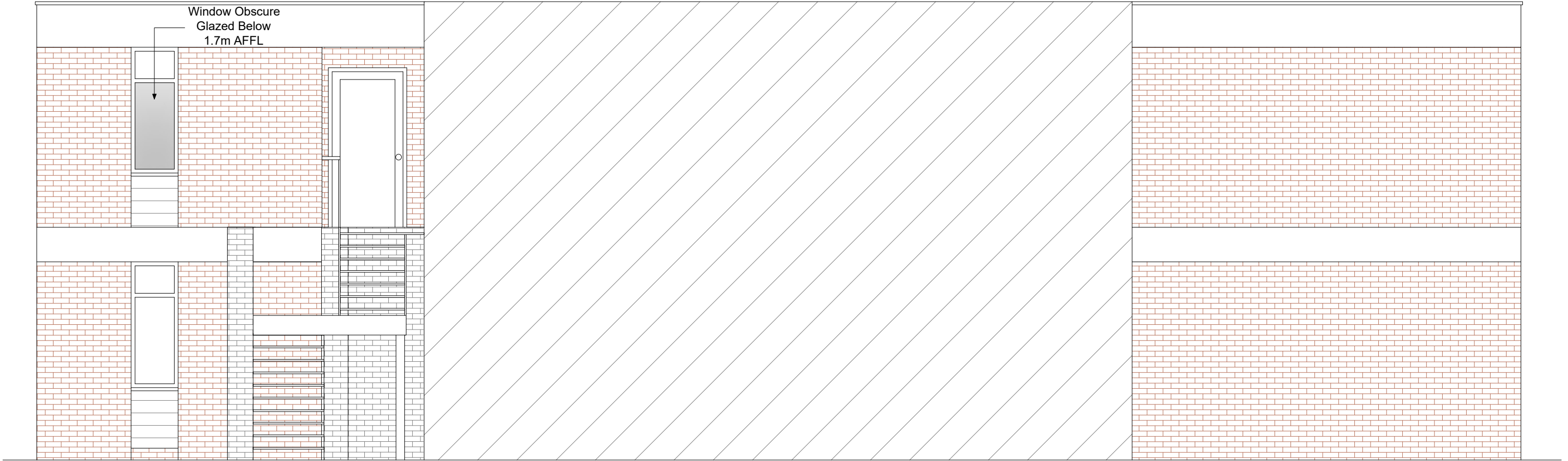
N

					CLIENT		DRAWING Title	DRAWN
D	24.9.25	Revised Floor Plan	AK	AK	Westholme Clinic Ltd		Proposed First Floor Plan Alternative AR- A	A.K
C	17.7.25	Revised Floor Plan	AK	AK	PROJECT		DRAWING NO	DATE
B	29.6.25	Revised Floor Plan	AK	AK	Office Block, Westholme Clinic		Project Originator Level Drawing No Rev 107 - ARC - +1 - 101 - D	24.9.25
A	27.5.25	General Agreement	AK	AK	Address		SCALE	D REVISION
Rev	Date	Description	Dr	Ch	Westholme Clinic Ltd, Clive Ave, Goring, BN12 4SG, Worthing, West Sussex		SCALE 1:50 @ A3	





Front Elevation



Rear Elevation

Proposed Front & Rear Elevations - Alt A

Rev	Date	Description	Dr	Ch
B	24.9.25	Revised Elevations	AK	AK
A	17.7.25	General Agreement	AK	AK

CLIENT	PROJECT	Address
Westholme Clinic Ltd	Office Block, Westholme Clinic	Westholme Clinic Ltd, Clive Ave, Goring, BN12 4SG, Worthing, West Sussex

DRAWING Title	DRAWN
Proposed Front & Rear Elevations Alternative AR- A	A.K
DRAWING NO	DATE
Project Originator Level Drawing No Rev 107 - ARC - - 104 - B	24.9.25
SCALE	REVISION
SCALE 1:50 @ A3	B

Appendix B - SBEM BRUKL output documents

Project name

be lean - Westholme Clinic

As designed

Date: Fri Mar 13 11:31:15 2026

Administrative information

Building Details

Address: Westholme Clinic Ltd. Clive Avenue, Goring,
Worthing, BN12 4SG

Certifier details

Name: Rajohn Ali

Telephone number: 01865 378885

Address: Suite L, The Kidlington Centre, Kidlington, OX5
2DL

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.2

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.30

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 151.17The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	4.32
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	4.18
Target primary energy rate (TPER), kWh _{PE} /m ² annum	46.59
Building primary energy rate (BPER), kWh _{PE} /m ² annum	45.51
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.16	0.16	GF000000_W1
Floors	0.18	0.1	0.1	GF000000_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.15	0.15	GF000000_C
Windows** and roof windows	1.6	1.3	1.3	GF000000_W1_O0
Rooflights***	2.2	1.3	1.3	FF000007_C_O0
Personnel doors^	1.6	1.3	1.3	FF000007_W1_O0
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	5

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- --VRF System

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5	6.5	-	1.5	-
Standard value	2.5*	5	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

1- SYST0001-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
GF- wc	0.3	-	-	-	-	-	-	-	-	-	-	N/A
GF- kitchen	0.3	-	-	-	-	-	-	-	-	-	-	N/A
FF-wc	0.3	-	-	-	-	-	-	-	-	-	-	N/A
FF-kitchen	0.3	-	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value		95	80	0.3
GF-office 1		130	-	-
GF-office 2		130	-	-
GF- wc		130	-	-
GF- kitchen		130	-	-
GF-office 3		130	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
GF-open plan office		130	-	-
GF-staircase		130	-	-
GF-lobby		130	-	-
GF-lift		130	-	-
FF-office 4		130	-	-
FF-office 5		130	-	-
FF-office 6		130	-	-
FF-wc		130	-	-
FF-kitchen		130	-	-
FF-office 7		130	-	-
FF-meeting room		130	-	-
FF-staircase		130	-	-
FF-circulation		130	-	-
FF-lift		130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF-office 1	NO (-59.4%)	NO
GF-office 2	NO (-65.1%)	NO
GF- wc	NO (-65%)	NO
GF- kitchen	NO (-65.2%)	NO
GF-office 3	NO (-56.1%)	NO
GF-open plan office	NO (-40.1%)	NO
GF-staircase	N/A	N/A
GF-lobby	YES (+101%)	NO
GF-lift	N/A	N/A
FF-office 4	NO (-60.2%)	NO
FF-office 5	NO (-65%)	NO
FF-office 6	NO (-45.3%)	NO
FF-wc	NO (-54.5%)	NO
FF-kitchen	NO (-37.1%)	NO
FF-office 7	NO (-50.8%)	NO
FF-meeting room	NO (-69.7%)	NO
FF-staircase	N/A	N/A
FF-circulation	YES (+36.3%)	NO
FF-lift	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	302.4	302.4
External area [m ²]	553.9	553.9
Weather	SOU	SOU
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	132.11	212.22
Average U-value [W/m ² K]	0.24	0.38
Alpha value* [%]	46.11	29.22

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
100	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.15	6.97
Cooling	5.81	4.66
Auxiliary	7.37	10.24
Lighting	9.71	7.52
Hot water	2.02	2.02
Equipment*	31.78	31.78
TOTAL**	30.06	31.41

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	172.45	140.07
Primary energy [kWh _{PE} /m ²]	45.51	46.59
Total emissions [kg/m ²]	4.18	4.32

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	85.9	86.6	5.1	5.8	7.4	4.64	4.14	5	6.5
	Notional	66.3	73.8	7	4.7	10.2	2.64	4.4	----	----

Key to terms	
Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Project name

be green- Westholme Clinic

As designed

Date: Mon May 18 12:20:56 2026

Administrative information

Building Details

Address: Westholme Clinic Ltd. Clive Avenue, Goring,
Worthing, BN12 4SG

Certifier details

Name: Rajohn Ali

Telephone number: 01865 378885

Address: Suite L, The Kidlington Centre, Kidlington, OX5
2DL

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.2

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.31

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 151.17

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	4.32
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.93
Target primary energy rate (TPER), kWh _{PE} /m ² annum	46.59
Building primary energy rate (BPER), kWh _{PE} /m ² annum	31.09
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.16	0.16	GF000000_W1
Floors	0.18	0.1	0.1	GF000000_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.15	0.15	GF000000_C
Windows** and roof windows	1.6	1.3	1.3	GF000000_W1_O0
Rooflights***	2.2	1.3	1.3	FF000007_C_O0
Personnel doors^	1.6	1.3	1.3	FF000007_W1_O0
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]

U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	5

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- --VRF System

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5	6.5	-	1.5	-
Standard value	2.5*	5	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

1- SYST0001-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
GF- wc	0.3	-	-	-	-	-	-	-	-	-	-	N/A
GF- kitchen	0.3	-	-	-	-	-	-	-	-	-	-	N/A
FF-wc	0.3	-	-	-	-	-	-	-	-	-	-	N/A
FF-kitchen	0.3	-	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value		95	80	0.3
GF-office 1		130	-	-
GF-office 2		130	-	-
GF- wc		130	-	-
GF- kitchen		130	-	-
GF-office 3		130	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
GF-open plan office		130	-	-
GF-staircase		130	-	-
GF-lobby		130	-	-
GF-lift		130	-	-
FF-office 4		130	-	-
FF-office 5		130	-	-
FF-office 6		130	-	-
FF-wc		130	-	-
FF-kitchen		130	-	-
FF-office 7		130	-	-
FF-meeting room		130	-	-
FF-staircase		130	-	-
FF-circulation		130	-	-
FF-lift		130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF-office 1	NO (-59.4%)	NO
GF-office 2	NO (-65.1%)	NO
GF- wc	NO (-65%)	NO
GF- kitchen	NO (-65.2%)	NO
GF-office 3	NO (-56.1%)	NO
GF-open plan office	NO (-40.1%)	NO
GF-staircase	N/A	N/A
GF-lobby	YES (+101%)	NO
GF-lift	N/A	N/A
FF-office 4	NO (-60.2%)	NO
FF-office 5	NO (-65%)	NO
FF-office 6	NO (-45.3%)	NO
FF-wc	NO (-54.5%)	NO
FF-kitchen	NO (-37.1%)	NO
FF-office 7	NO (-50.8%)	NO
FF-meeting room	NO (-69.7%)	NO
FF-staircase	N/A	N/A
FF-circulation	YES (+36.3%)	NO
FF-lift	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	302.4	302.4
External area [m ²]	553.9	553.9
Weather	SOU	SOU
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	132.11	212.22
Average U-value [W/m ² K]	0.24	0.38
Alpha value* [%]	46.11	29.22

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
100	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.15	6.97
Cooling	5.81	4.66
Auxiliary	7.37	10.24
Lighting	9.71	7.52
Hot water	2.02	2.02
Equipment*	31.78	31.78
TOTAL **	30.06	31.41

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	9.85	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>9.85</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	172.45	140.07
Primary energy [kWh _{PE} /m ²]	31.09	46.59
Total emissions [kg/m ²]	2.93	4.32

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	85.9	86.6	5.1	5.8	7.4	4.64	4.14	5	6.5
	Notional	66.3	73.8	7	4.7	10.2	2.64	4.4	----	----

Key to terms	
Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Appendix C – Flood Map for Planning

Flood map for planning

Your reference
Unspecified

Location (easting/northing)
511645/102894

Created
18 May 2026 15:08

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2026 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

Unspecified

Location (easting/northing)
511645/102894

Scale
1:2,500

Created
18 May 2026 15:08

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



0 20 40 60m

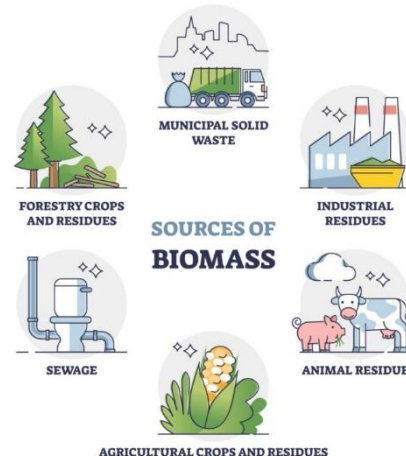
Appendix D - Low & zero carbon technology review

This appendix provides details of the renewable energy technologies discussed within the 'Be Green' section of this report.

D.1 - Biomass

Biomass is a energy source in which organic materials such as wood, plants, manure and household waste are burned as heating fuel. This is considered renewable as, providing sustainable sources are used (e.g., FSC certified forests) that can replenish the raw material.

While being a renewable, sustainable source of heating, when burned as fuel harmful CO₂ and NO_x emissions are emitted. There is also no centralized grid as there is with mains gas or electricity to deliver fuel to site. These factors mean that implementation in urban environments can be problematic. Emissions can contribute to already poor air quality in the cities around the UK, and delivery of large quantities of fuel raises issues regarding on-site storage and access for vehicles.



This being said, if the site sits in a more rural area, where the sources (such as farms with waste such as manure, etc) are more local and easier to deliver, then this renewable technology becomes feasible. Concerns surround emissions can also be addressed as the natural local environment can absorb and sequester some of the harmful pollutants.

D.2 - Geothermal Energy

Geothermal energy technologies use the heat energy stored beneath the surface of the ground. This can be through direct applications where the energy is used to defrost driveways, or, mor typically, indirectly when the low-grade heat is upgraded via a heat pump for use as a space heating and hot water system.

The utilisation of this can be more efficient than air-source equivalents as there are less extremes in temperature underground, than in the atmosphere. For example, the ground can have constant, stable temperatures from 11-13 °C at a depth of 50m.

The right choice of appropriate heat exchanger depends on several factors, including:

- Size of space heating/hot water system
- Available site area for the heat exchangers
- Local ground conditions

The different heat exchanger options are discussed below:

D.2.1 Closed Loop System

A frequently used and simple ground source heat exchanger, for a small to medium size project, is a closed loop system. The system comprises of a sealed network of pipes buried within the ground (Vertically or Horizontally), in which water is continuously pumped through the pipes to achieve the required heat exchange.

Vertically Closed Loop System

Vertically Closed Loop Systems, consists of multiple sets of two polyethylene pipes with a U-shape connector at the base of the hole – effectively providing a flow down to the bottom of the hole and return back up to the surface. These pipes usually are up to 100m deep into the ground and are connected to complete the heat exchange loop but should have enough distancing to prevent heat transfer between boreholes.

Horizontally Closed Loop System

Horizontal closed loop heat systems consist of horizontal trenches 1.5-2m deep, with either straight pipes or 'slinky' coiled pipes, these require significant excavation work and significant site area to achieve appreciable outputs as such are not normally suited to medium to large projects.

D.2.2 Open Loop Systems

A further Ground Source option is an open loop system. The system compromises of the abstraction of ground water as a direct energy source passing through the heat exchanged and injecting it back to the borehole (Two Well System) or into a nearby water source (Direct System). These systems are capable of providing very high rates of heat exchange for a relatively small number of boreholes, which makes it very efficient in terms of site area required. However, this depends greatly on the availability of ground water, which in turn varies according to location. A major downside of this system is that the extraction of water from deep boreholes via pumps consumes a lot of energy, as the water has to be physically lifted to the surface by the pump – this in effect reduces the carbon emissions saved by this system as a whole.

Open Loop Two Well System

Open Loop Two Well Systems, consists of using boreholes in which pumps are inserted. Each borehole pump abstracts ground water, circulates it around the heat pump and then discharges the water back to the ground via an absorbing well, some distance from the original abstraction borehole.

Open Loop Direct System

Open Loop Two Well Systems, consists of using boreholes in which pumps are inserted. Each borehole pump abstracts ground water, circulates it around the heat pump and then discharges the water back to a nearby watercourse or sewer.

D.3 Air Source Heat Pumps

Air Source Heat Pumps take heat from outside air and increases it to a higher temperature with a compressor. This heat then is transferred to the heating system. Effectively they work on the same principle as a refrigeration unit, just in reverse.

A heat pump consumes electrical power to drive the compressor and other ancillary elements. The ratio between total energy input and heat energy output of the heat pump is a measure of its efficiency – usually referred to as ‘Coefficient of Performance’ - COP. Air Source Heat Pumps run over 100% efficiently, meaning they produce more heat energy than they use to run. There are 2 common types of air source heat pumps; Air-to-Air and Air-to-Water.

D.3.1 Air-to-Air Heat Pump

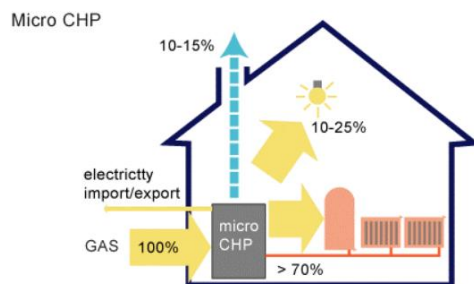
Air-to-Air heat pumps take air from outside and heat or cool it to then feed into the building through fans. These heat pumps can be used for heating and cooling but not heating hot water.

D.3.2 Air-to-Water Heat Pump

Air-to-Water heat pumps take air from outside and feeds it into a water based central heating system. These heat pumps produce a low heat which may require larger radiators or underfloor heating to work at its optimum. These heat pumps can be used for heating and heating hot water.

D.4 Combined Heat and Power (CHP)

Combined heat and power (CHP) is a process involving simultaneous generation of heat and electricity, where the heat generated in the process is harnessed via heat recovery equipment. CHP is fairly common at the large commercial size premises which have a simultaneous demand for heating and electricity for long periods, such as hospitals, recreational centres and hotels.

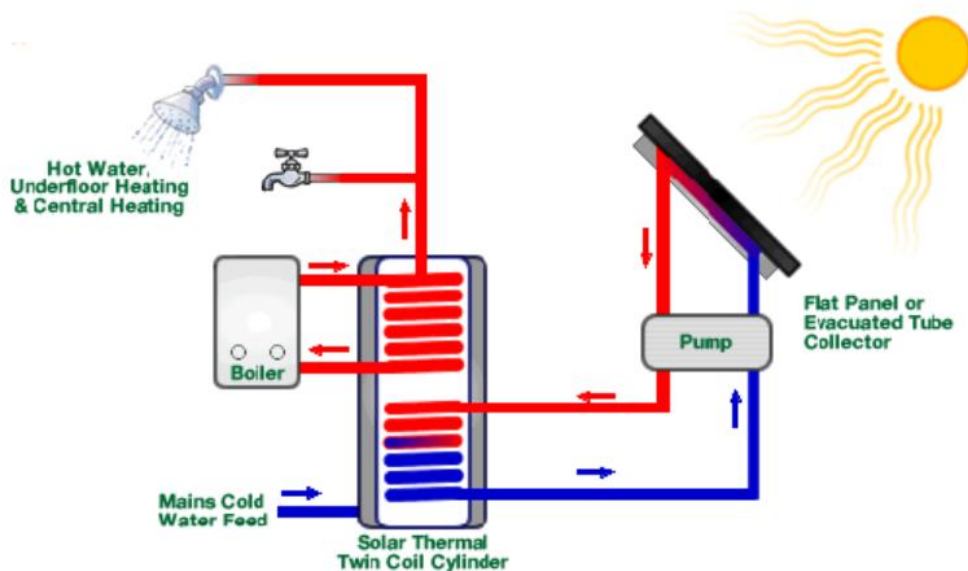


In addition, small CHP systems are available for individual houses, group residential units and small non-residential premises. Compared with using centrally generated electricity supplied via the grid, CHP can offer a more efficient and economic method of supplying energy demand, if installed and operated appropriately. This is due to the utilisation of heat which is normally rejected to the atmosphere from central generating stations, and by reducing network distribution losses due to local generation and use.

Heat generated can be used for space and water heating, and additional heat storage may be used to lengthen use periods, to assist in warm-up and to improve overall energy efficiency. For overall good energy efficiency, as with all CHP, usage must be heat-demand led. Thus, a sophisticated control system is required and users should be made aware of efficient operating practices.

D.5 Solar thermal collectors

Solar thermal collectors (flat plate or evacuated tubes) convert solar thermal energy into heat for hot water generation. These are usually located on a roof oriented at the south direction with an ideal slope of 45 degree. Solar collectors properly sized and designed provide can approximately 50% of annual hot water demand.



D.6 - Photovoltaic Arrays

Photovoltaic modules convert sunlight directly into DC electricity and can be integrated into buildings. Photovoltaics (PVs) are distinct from other renewable energy technologies since they have no moving parts to be maintained and are silent. PV systems can be incorporated into buildings in various ways: on sloped roofs and flat roofs, in façades, atria and shading devices. Modules can be mounted using frames or they can be fully incorporated into the actual building fabric; for example, PV roof tiles are now available which can be fitted in place of standard tiles.



Currently, a PV system will cost between £1,500 and £2,500 per kWp, and frequently part of this cost can be offset owing to the displacement of a conventional cladding material.

While single crystal silicon remains the most efficient flat plate technology (15–16% conversion efficiency); it also has the least potential for cost reduction. PV cells made from poly-crystalline silicon have become popular as they are less expensive to produce, although they have a slightly lower efficiency.

Thin film modules are constructed by depositing extremely thin layers of photosensitive materials on a low-cost backing such as glass, stainless steel or plastic. A material with much less semiconductor qualities is required as for crystalline silicon cells, material

costs are potentially much lower. Efficiencies are much lower, around 4–5%, although this can be boosted to 8–10% by depositing two or three layers of thin film material. Thin film production also requires less handling as the films are produced as large, complete modules and not as individual cells that have to be mounted in frames and wired together. Hence, there is the potential for significant cost reductions with volume production.

Since PVs generate DC output, an inverter and other equipment is needed to deliver the power to a building or the grid in an acceptable AC form. The cost of the inverter and these 'Balance of System' (BOS) components can approach 30% of the total cost of a PV system. Hence, simplification and cost reductions in these components over the coming years will also be necessary to make PV systems affordable.

D.7 Wind Energy

Wind power is the most successful and fastest spreading renewable energy technology in the UK with a number of individual and group installations of varying size, capacity and location.

All wind turbines depend and work from a central axis which turns from the impact of the wind, this motion produces electricity which can be fed into the grid or used individually. The output largely depends on the wind speed and the correlation between the two is a cube function. This means that in short periods of above-average wind speeds the generation increases exponentially. As a result, it is difficult to make precise calculations of the annual output of a turbine, but average figures can provide useful guidance to designers and architects. In reasonably windy areas (average wind speed of 6m/s) the expected output from 1kW installed is about 2500kWh annually.



The cost per kW installed varies considerably by manufacturer and size of machine with an indicative bracket of £2,500–£5,000. With a lifespan of more than 20 years, wind turbines can save money if design and planning are carried out in a robust way.

D.7.1 Vertical Axis Wind Turbines

Vertical Axis Wind Turbines are becoming increasingly popular as a renewable energy source. The benefit of the vertical axis means that the array does not need to be positioned directly in the wind's direction, and therefore can be installed closer to the ground or on roof tops. These turbines are often lighter and more accessible for domestic or urban environments.

D.7.2 Horizontal Axis Wind Turbines

Horizontal Axis Wind Turbines are the most common and usually used for offshore or rural wind farms. These turbines should be placed where the wind factor is high as they

are built to withstand large forces, the disadvantage of this is that they are require heavy construction process. A Horizontal axis Wind Turbine has a similar design to a traditional windmill with all the blades facing one direction on top of a high column.

D.7.3 Roof Mounted Wind Turbines

Roof Mounted Wind Turbines are often used to generate electricity directly to the building they are mounted onto. Whilst these turbines are drastically smaller than free standing wind turbines, therefore they may not provide enough power for your electricity. They are a lot cheaper to manufacturer, install and maintain.

D.7.4 Free Standing Wind Turbines

Free Standing Wind Turbines are usually located on top of a hill or in a large array of water. The height of these turbines allows for little turbulence or obstructions. Free Standing Turbines can produce a great amount of electricity however require a large amount of space.