SYNTEGRA CONSULTING

18 Pield Heath Road, London, UB8 3NF

Energy Strategy Report

April 2022

Ref: 22-8959

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Revision	*Initial*	*Rev A*	*Rev B*	*Rev C*
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Abbreviations

ASHP: Air Source Heat Pump
BER: Building Emission Rate
BREEAM: Building Research Establishment Environmental Assessment Method
BRUKL: Building Regulation United Kingdom Part L
CO_2: Carbon Dioxide
CHP: Combined Heat and Power
CSH: Code for Sustainable Homes
DHW: Domestic Hot Water
ESR: Energy Strategy Report
GHG: Green House Gas
GSHP: Ground Source Heat Pump
GLA: Great London Authority
HVAC: Heating, Ventilation, and Air Conditioning
IES VE: Integrated Environmental Solutions Virtual Environment
KWp: Kilo Watt Power
KWh: Kilo Watt Hour
LZC: Low Zero Carbon
LETI: London Energy Transformation Initiative
MVHR: Mechanical Ventilation Heat Recovery
MCS: Microgeneration Certification Scheme
NCM: National Calculation Methodology
OSM: Open Street Map
PV: Photovoltaic
SBEM: Simplified Building Energy Modelling
SFP: Specific Fan Power
TER: Target Emission Rate
WWHR: Waste Water Heat Recovery

1.0 Statement Summary

This Energy Strategy Report demonstrates the predicted energy performance and carbon emissions of the proposed development located in a **18 Pield Heath Road, Uxbridge, London, UB8 3NF**. The presented figures in this study are based on the most updated information provided by the design team (i.e. **the Architect**). The development will comprise of a **60 Bed Care home rooms and other communal and amenity facilities.** The overall analysis took into consideration the national building regulations (i.e. **Part L2A**) and the local policy requirements. Based on the study assumptions, the project shall comply with the council local polices and buildings regulations.

1.1 Buildings Policy Requirements

The national building regulations require buildings to comply with the energy efficiency requirements. This shall be accomplished through capping the project carbon emissions below the regulated target. In addition to the above, **London Bourgh of Hillingdon** requires new developments to incorporate sustainable design and construction measures. The table below summarises the best practice building regulations and local policy requirements for the assigned development.

Policy:	Requirement	Compliance Check
Part L2A (Criterion 1)	*The calculated CO_2 emissions rate for the buildings (i.e. BER) must not be greater than the Target CO_2 Emissions Rate (i.e. TER).*	*The project achieved criterion 1 through the Be-Lean stage, by measures of improving fabric thermal performance and efficient building services.*
GLA Best Practice requirements (for new buildings)	*Major developments meet the carbon emission reduction requirements a **35%** carbon reduction against Building Regulations Part L 2013 with the remaining emissions, up to 100%, to be offset through a contribution to the Council's Carbon Offset facilities.*	*The proposed development is considered as a major development (non-domestic > 2500 m^2).* *The proposed scheme has achieved a **35%** carbon reduction over Building Regulation **Part L2 A** 2013 TER via efficient energy measures and improved envelope thermal performance.*
	Monitor, verify and report on energy performance at be Seen Stage.	*The Smart Meters are recommended to be installed to monitor the actual in-use energy consumption to minimize the performance gap.*
London Bourgh of Hillingdon Local plans for climate change	*The council Local Plan will promote sustainable, high-quality design and construction and alternative energy supplies.*	*The project makes the best use of improved thermal performance fabric materials. In addition to incorporating energy efficiency measures.*

Table 2: New Building National and Local Policy Requirements.

1.2 Assessment Methodology and Strategies

The adopted methodology to mitigate the development CO_2 emissions is in alignment with the best practice existing Efficient Energy Hierarchy Guidance. Models and simulation assumptions have been carried out using IES VE simulation software which complies with the National Calculation Methodologies. The development building has been assessed using the best practice energy hierarchy strategies (i.e. GLA minimum 35% energy category improvement) which by default demonstrates Part L2A compliance.

Table 2 below explains the Energy Hierarchy stages and the suggested taken strategies to help the proposed development achieve the required carbon targets.

Stages	Strategies
BE LEAN Carbon Efficient Design (minimising energy demand)	• Improved fabric U-values and air permeability beyond PL2A requirements. • Accredited Construction Details for all thermal bridging junctions. • Energy efficient lighting. • Low water consumption + WWHR units
BE CLEAN (Availability of Communal and district heating systems)	• Analysis for local CHPs and communal heating systems has been assessed. Further info could be found in Be Clean Section.
BE GREEN On-site renewable technologies (i.e. ASHPs, PVs. etc)	• Efficient Building services by using ASHPs. Further information is presented in Section 7 below. • **4.0** kWp PV array, 320 watt per panel. Further details can be found in the Be-Green section.
BE SEEN In-use monitoring	• The Smart Meters are recommended to be installed to monitor the actual operational energy use, to manage it effectively and mitigate the performance gap.

Table 2: Best practice Energy Hierarchy to achieve 35% reductions over PL2A.

1.3 Assessment Results

The new build development has been simulated under four stages to analyse the improvements' hierarchy. The first simulation assessed the building model under the notional building requirements (i.e. PL2A specs). The function of this first analysis (i.e. Baseline) is to generate and compare the regulated carbon targets (TER) to the actual building emission rate (BER). The second simulation (i.e. Be Lean) analysed the required **15%** carbon reductions through improving the building fabric thermal performance, efficient lighting fittings, and efficient building services. The third stage (i.e. Be Clean) analysed the development potential connectivity to a communal or a district heating system. The fourth stage (i.e. Be Green) analysed the carbon reductions after considering renewable technologies as an effective design measure to achieve the **35%** reductions beyond Part L 2A requirements. Efficient DHW systems (i.e. WWHR) and heating systems (i.e. ASHP) proved to be major keys boosting the care home efficiency and improve the energy ratings. Chart 1 below shows the carbon improvements after each stage of simulation.

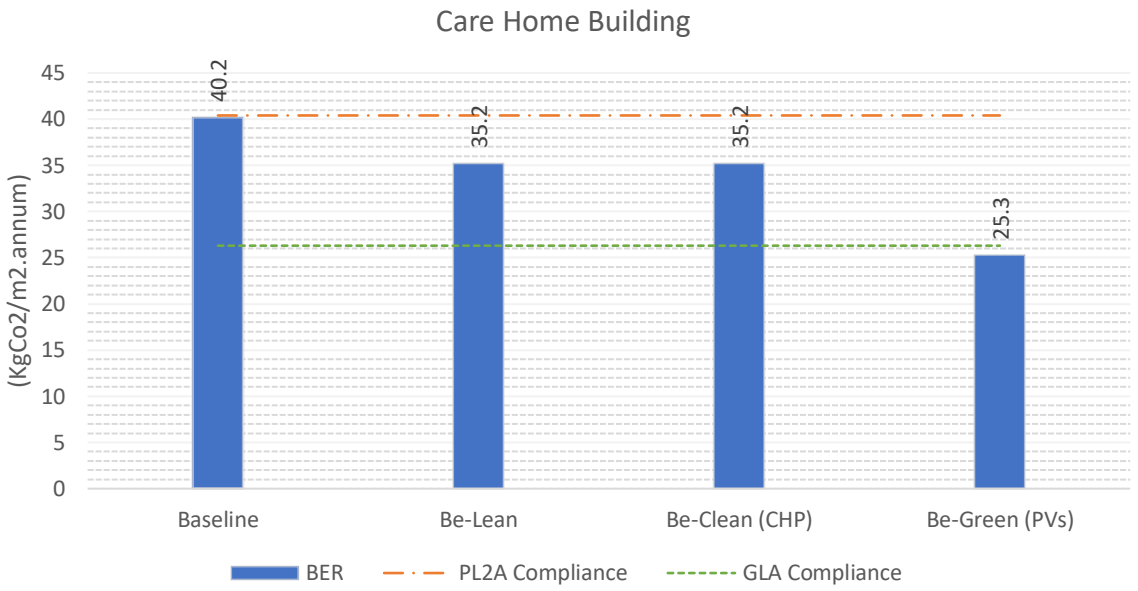


Chart 1: New Build Care Home Carbon Emissions after each stage of the proposed strategy

Results show that the actual building BER is complying with the regulated target emissions rate TER (i.e. PL2A Compliance), please refer to appendix A for detailed BRUKL reports calculations. Following to achieve the required 15% CO2 reductions through passive measures, LETI requirements improving the fabric thermal performance (i.e. U-values) and applying efficient building services (i.e. efficient gas boiler and lighting fittings) are analysed in the following next stage of simulation. Results of the revised simulation showed significant reductions in the actual building BER. However, it wasn't possible to achieve the 35% reductions with a 91% boiler, therefore an ASHP examined in the following stage. Studying the impact of applying renewable technologies (i.e. WWHR, ASHP and PVs) examined in the third and fourth stages of simulations. Implementing the former technologies managed to leverage the project level to meet GLA reduction (i.e. 35%). Please refer to appendix A for further BRUKL report detailed calculations.

	Gas *(Boiler)*	**Electric** *(ASHP)*
CO2 Fuel Factor *(KgCO2/KWh)*	***0.216***	***0.519***
Energy Stage CO2 Emission	*($KgCO_2/m^2.annum$)*	*($KgCO_2/m^2.annum$)*
Notional TER	*40.4*	*33.9*
Baseline BER	*40.2*	*30.0*
Be-Lean BER *(15% reduction)*	*34.34*	*28.82*
Be-Clean BER	*34.34*	*28.82*
Be-Green BER *(35% reduction)*	*26.26*	*22.04*
Shortfall *($tCO_2.annum$)*	*80.17*	*67.29*
Net Zero offset Fund *(Shortfall*95£/tCO_2*30 years)*	***£228,489***	***£191,776***

Introduction

This energy strategy report (ESR) focuses on the energy strategies studied for the proposed scheme. The report presents how the annual energy consumption and related carbon emissions will be minimised to meet the regulated targeted carbon emissions (i.e. PL2A TER). Furthermore, the report explains how to reach improved energy ratings to achieve 35% Carbon reductions over the Part L Baseline.

The assessed development is located in **London Bourgh of Hillingdon, West London, England.** The project is in a close proximity to West Drayton station (approximate one mile to Southwest) and from the north to Hillington station. The project location is quite convenient to its function as the good greenery view to the south will contribute to the occupants' health and wellbeing. The development proposal has a total built up area of a **3,053** m^2 **new-build care homes** and other communal spaces at **Uxbridge, UB8 3NF.**

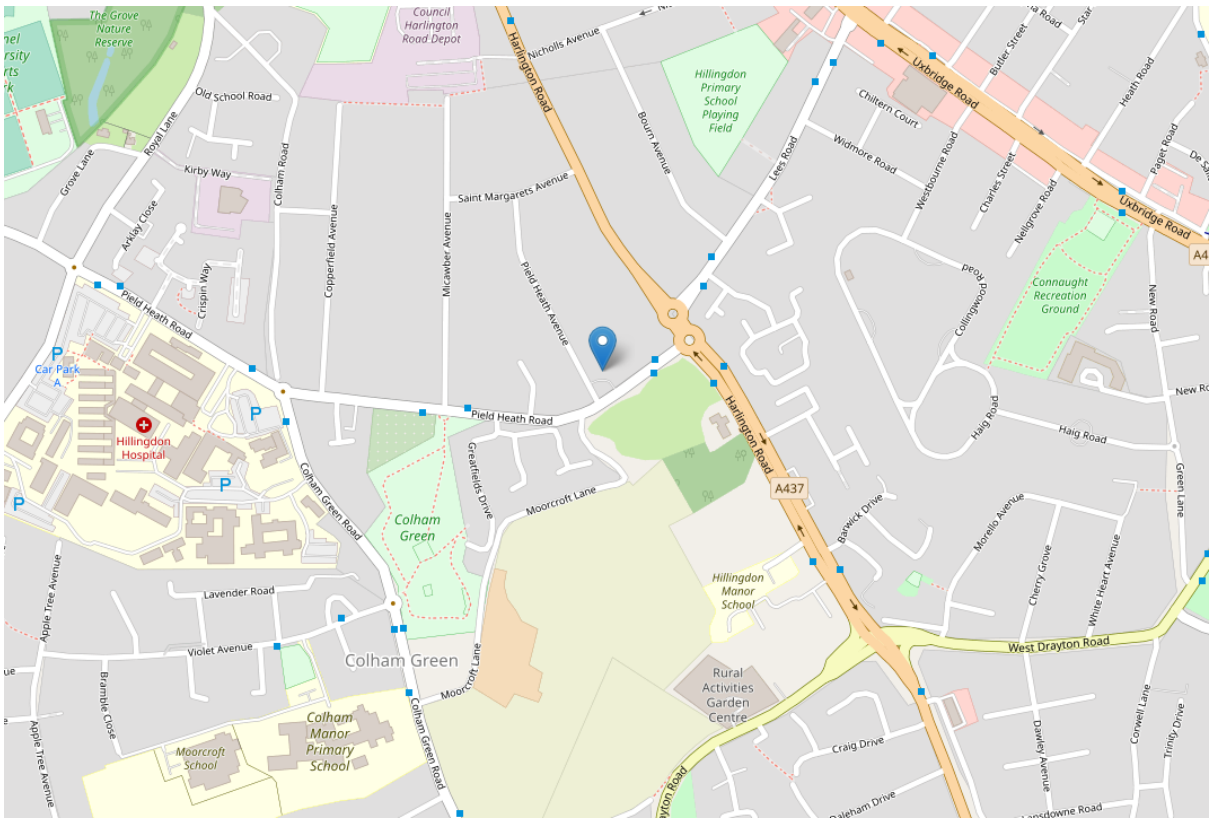


Figure 1: OSM urban view map of the Site Location (the blue marker)

Care home buildings plays an important role in the UK society social aspects. Through offering individuals requiring support a personalised choice of high quality and sustainable supported homes while promoting independence. This ESR report analyses the project using research and policies guidance to make sure this major development is built to achieve positive economic, social and environmental impacts.

Planning Policy

1.4 National Planning Policy Framework (NPPF, February 2021)

The National Planning Policy Framework is a key part of our reforms to make the planning system less complex and more accessible. These actions been taken for the purpose of protecting the environment and promoting a sustainable growth of the built environment.

1.5 The GLA Best Practice Energy Strategies for guidance only (e.g., London Plan 2021)

Policy SI 2 Minimising greenhouse gas emissions

Major developments should be net zero-carbon. This means reducing the overall embodied greenhouse gas emissions and operational carbon emissions. In addition to minimising both annual and peak energy demands in accordance with the following energy hierarchy:

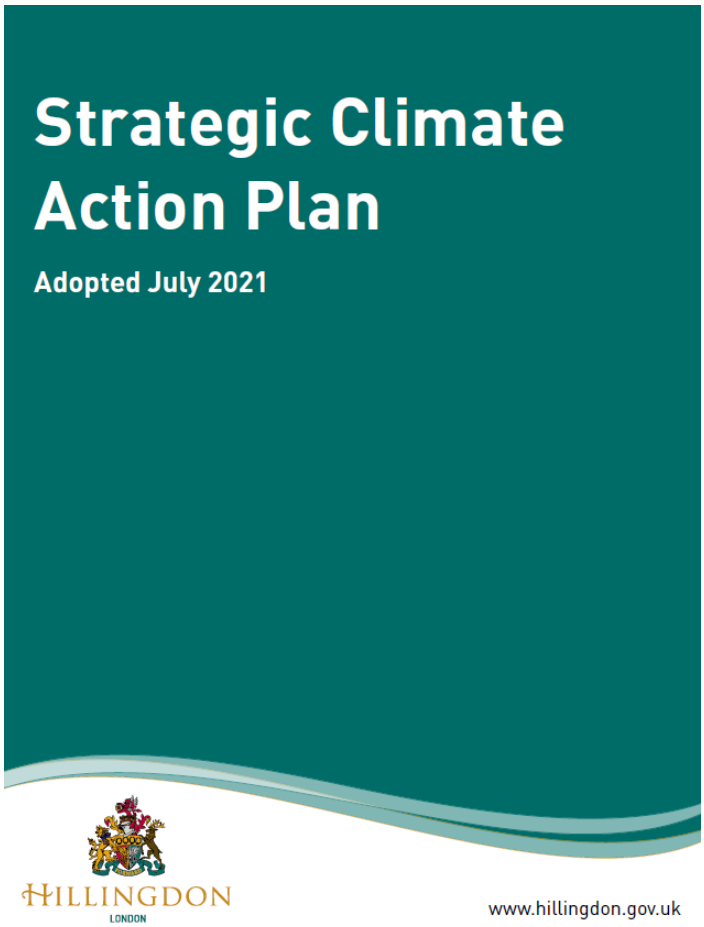
1) **Be Lean:** make buildings use less energy and manage demand during operational phases.
2) **Be Clean:** exploit local energy supply resources (i.e. District and communal heating) to deliver energy efficiently.
3) **Be Green:** exploring opportunities for renewable energy resources by producing, storing and using renewable energy on-site.
4) **Be Seen:** monitor, verify and report on energy performance (Part L Criteria 4 and 5).

Policy SI 2 Minimising greenhouse gas emissions

A. Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

B. A minimum on-site reduction of at least **35 per cent** beyond Building Regulations is required for major development. **Residential development** should achieve **10 per cent**, and **non-residential** development should achieve **15 per cent** through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:
1) through a cash in lieu contribution to the borough's carbon offset fund, or
2) off-site provided that an alternative proposal is identified and delivery is certain.

1.6 London Borough of Hillingdon.



Core Strategy (Updated and adopted July 2021)

CLIMATE CHANGE LOCAL TARGET: Delivering net zero carbon major development.

C3 Building Better Places

C3.1	To use the development plan system to ensure all new major development will be zero carbon.
C3.2	To consider new planning policies to ensure all non major new development is also zero carbon.
C3.3	To ensure no new development is built in high and medium flood risk areas unless absolutely necessary and only then when flood risk management is properly understood and mitigated in accordance with council flood policy.
C3.4	To ensure all new development is environmentally responsible, including protecting existing designations and sites of interest.
C3.5	To ensure all new development contributes and supports the goal of sustainable transportation, such as the promotion of public transport, cycling or EV charging.
C3.6	To ensure that wherever possible during development, existing trees are retained. Where they cannot be retained, new trees should be planted to facilitate carbon gain.
C3.7	To identify and promote opportunities for the increased provision of allotments.

Theme 3 Commentary

Building better places

Our planning policies stem from national and regional policies. The London Plan takes a firm stance on new development with regards to climate change.

Many of the policies outlined above are therefore already part of the planning framework which developers must respond to; however, they are reproduced here to ensure this strategic plan is comprehensive in identifying the principal issues concerning climate action.

Innovative approaches to new development mean it doesn't just have to be zero carbon but can assist with providing a net reduction.

Helping to avoid unwanted impacts

Another recurring theme in the consultation response related to the constant change to the built environment, in particular the loss of gardens and green space in residential properties.

An example raised repeatedly by residents related to the widespread paving over gardens to create parking spaces or driveways.

This type of activity can cause water to enter the drainage system more quickly, which can lead to an increase local flooding.

We want to use our leadership role to assist residents in making sustainable choices on their own properties. We will use the planning system to deliver sustainable solutions but where planning permission is not required, we want people to understand the implications for their choices and to seek out more suitable forms of solutions; for example, this could involve using certain types of permeable paving, collecting rainwater and allowing water to be stored in natural spaces.

Some of these solutions can have added benefits, for example the use of water butts can help recycle water to be reused in water the garden or increased areas of green space can promote and support wildlife.

C6	Climate change adaptation and mitigation
C6.1	To develop a climate change adaptation and mitigation action plan.
C6.2	To put in place a water efficiency strategy for all Council operations (such as green space watering, depot operations and corporate buildings) then monitor, record and report year on year savings.
C6.3	To ensure the council's flood resilience and management work incorporates a changing climate and that the council's own land and property decisions consider the need to make space for water.
C6.4	To run a campaign to get residents involved and sharing ideas with the council to find solutions for climate mitigation and adaptation in the community.
C6.5	To investigate opportunities to integrate environmental improvements into existing buildings for example, living walls, green roofs, habitat walls, bird, and bat boxes.
C6.6	To run an annual campaign to raise awareness of the impacts of reducing green spaces, paving over gardens and increasing hardstanding.

C7	Carbon offsetting
C7.1	To develop an offset strategy to develop local solutions to any remaining residual carbon emissions from council operations.
C7.2	To develop a tree and green space management strategy that supports and accounts for the offsetting objectives and commitments.
C7.3	To promote carbon reduction practices and carbon offsetting opportunities for businesses and communities, linked to measures to tackle climate change in Hillingdon.
C7.4	Understand and increase current carbon sequestration through increased planting and changes to green space management.
C7.5	Increase the number of trees, particularly in urban areas to complement objectives to improve air quality and promote urban wildlife.
C7.6	To exploit opportunities to increase carbon sequestration to maximise opportunities for biodiversity and flood risk management.

Assessment Methodology

1.7 The Energy Hierarchy

The energy hierarchy is a classification of different methods to improve energy performance in a parallel sequence. This includes primarily a focus on reducing energy use by avoiding unnecessary consumption, to then improving the efficiency of energy systems to minimise loss. This is followed by exploiting renewable energy sources and low carbon energy solutions for energy needs. Finally, any remaining demand can be catered for by conventional fuel sources and carbon offsetting solutions.

The Energy Strategy adopts a set of principles to guide design development and decisions regarding energy, balanced with the need to optimise environmental and economic benefits. The following hierarchy should be used to assess applications:

- **BE LEAN** – By using less energy and considering the further energy efficiency measure in comparison to the baseline building.
- **BE CLEAN** – By supplying energy efficiently. Clean energy use looks at further carbon dioxide emission savings over the lean building by taking into consideration the use of decentralise energy (e.g. CHP, District Heat Networks).
- **BE GREEN** – By integrating renewable energy into the scheme which can further reduce the carbon dioxide emission rate.
- **BE SEEN –** By monitoring, verifying, and reporting on energy performance to use energy mode effectively.

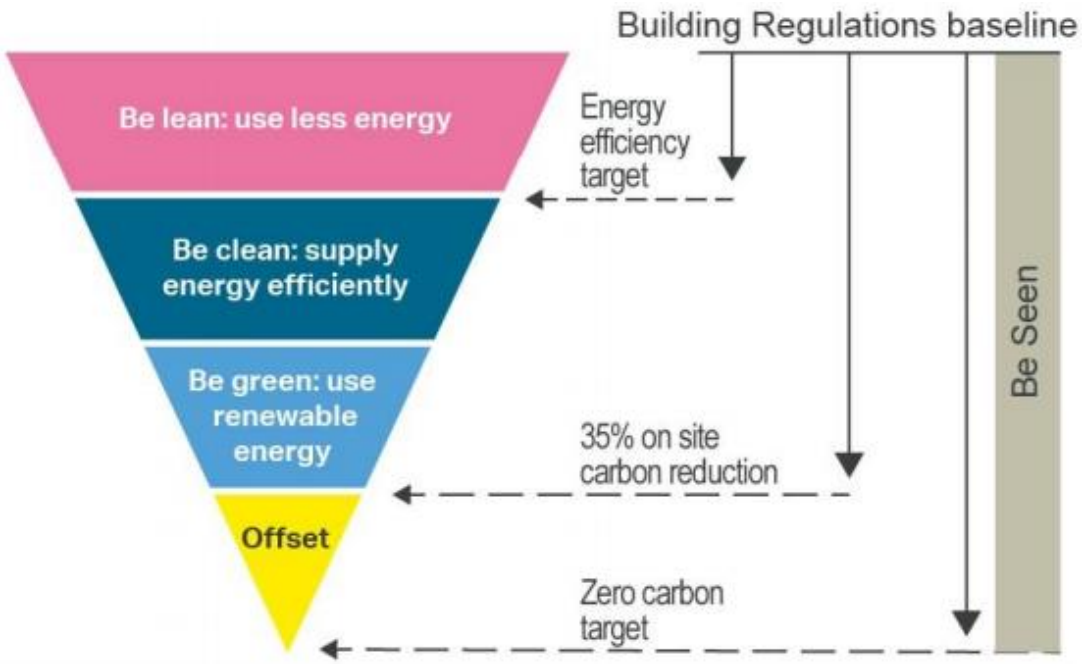


Figure 2: Best Practice Energy Hierarchy

1.8 Modelling strategy.

The Government approved software, **IES VE 2021,** has been utilised to carry out the project compliance simulations **(i.e., SBEM)** according to the National Calculation Methodology (NCM). Simulated Models are built to assess the actual building BER against the notional building TER. The notional building used to determine carbon dioxide targets (TER) is the same size and shape as the actual buildings, constructed to concurrent regulated specifications (i.e. Part L2).

The actual building has been modelled entirely to the notional building specifications in order to meet the carbon targets and the limiting fabric and buildings services parameters. However, for the differences in glazing areas, actual buildings sometimes might exceed the notional TER. Therefore, further improvements to the actual building parameters (e.g. fabric, HVAC, lightings, renewables) are investigated to meet the required compliance targets. The approved document (i.e. Part L2) however encourages developers to vary the specification provided the same overall level of carbon dioxide emissions is achieved or bettered. It's important to note that **SBEM** is not intended to be used a building design tool but to inform the designers design decisions.

Syntegra received architectural drawings and project relevant documents. Received information is used to undertake the ultimate energy assessments and supporting the modelling assumptions. The document references are listed in the table below.

No.	Document Name	Format	Received Date
1	WRD098 - 10D 11C Proposed Plans	dwg	*20-03-2022*
2	WRD098 - 12A Proposed Elevations	dwg	*20-03-2022*
3	WRD098 - Proposed Site Plan Overlay	dwg	*20-03-2022*

Table 3: SBEM assessment document list

BASELINE - Target Emission Rate (TER) & Actual Building Rate (BER)

The baseline (known as Target Emission Rate), as calculated in line with the Building Regulation 2013, is the maximum amount of carbon dioxide a non-residential development is allowed to emit. The Target Emission Rate (TER) includes carbon dioxide emissions which are covered by Part L of the Building Regulations, known as regulated emissions (space and water heating, ventilation, lighting, pumps, fans & controls). The baseline energy uses and resulting CO_2 emissions rates of the development have been assessed using the Government approved software (**IES VE 2021**). This run of simulation assessed the development IES model under the same notional building specifications. The function of this first run is to generate the regulated carbon target (TER) and the actual building emission rate (BER). Part L2A specifications are used for the first run of simulation and are stated by the NCM modelling guide to limit the fabric thermal heat loses.

The baseline regulated CO_2 emissions for the development are presented in the tables below:

❖ BASELINE

Model Name	**CO_2 Emissions** ($KgCO_2/m^2.annum$)	
	TER	*BER*
New Build Care Home	*40.4*	*40.2*

Table 4: Regulated Energy Use and Carbon Emissions TER at Baseline

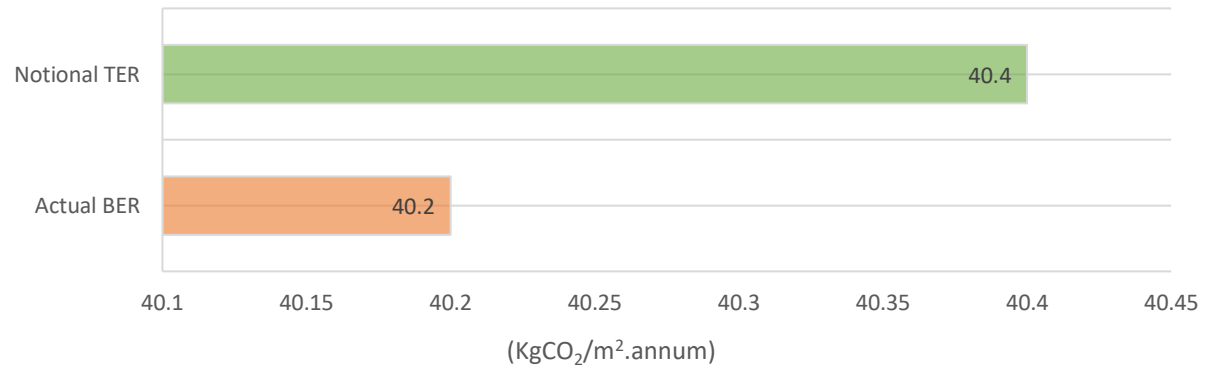


Chart 2: Notional Building TERs for the new build and the existing structure

The results of the first run showed that, actual building BER is complying with the regulated target emissions rate (TER), Chart 2. Therefore, further improvements to the model assumptions are carried out in the following stages (i.e. Be-lean, Be-Clean, and Be-Green) to achieve the remaining 35% reductions.

BE LEAN - Energy Efficient Passive Design Measures

This section outlines the project condition analysis and energy efficient measures taken in order to minimise the building's energy demand. The analysis helps reducing the energy use and CO_2 emissions further than the Baseline results and achieving TER compliance (Building Regulations 2013 **Part L2 A** compliance).

1. Site location

Figure 3: 3D urban view map of the site location (@ambigram architects)

The proposed project site is located in **UB8 3NF, Uxbridge** in the London borough of Hillingdon. A commercial and residential mix is currently occupying the site. The local surrounding areas are currently being developed into residential developments. The surrounding urban buildings are generally medium-rising lying with a two to three storeys residential buildings in the vicinity.

2. Site weather and Microclimate

The local weather microclimate usually influences buildings' energy performance. A development close to a public park. Urban parks and green spaces provide various ecosystem services such as air and water purification, runoff reduction and noise reduction. They have also been considered an ecological solution for regulating the microclimate and alleviating UHI through the process of cooling. The cooling effect of green spaces has been attributed to the processes of evapotranspiration and shading. Extensive studies based on field measurements have shown that urban parks are usually 0.5–4 °C cooler than their adjacent built-up area, and even 5–7 °C cooler, although there is evidence of a non-significant cooling effect of parks or even a warming effect.

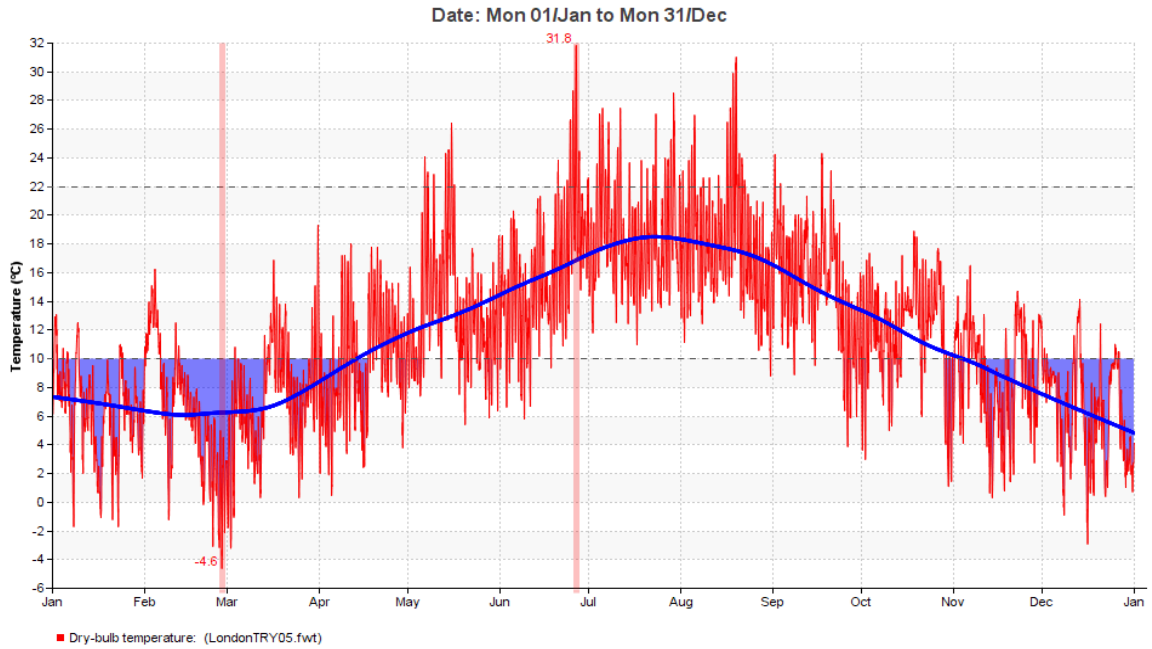


Figure 4: IES Annual Dry Bulb Temperature according to London weather file TRY05.fwt

The nearest weather station is in London (approx. 3.9 miles away), and this will be used for thermal and energy simulations. Figure 4 represents the annual dry bulb temperature in London City. Maximum temperatures can reach up to 31.8 C in late Jun, and minimum temperatures can reach down to -4.6C in late Feb. The buildings in this location are generally low rise, and the site is not expected to suffer from the Urban Heat Island effects.

The site's landscape also affects the energy demand of a building. Vegetation, landform, and any existing buildings can provide shade to a new development. For instance, if located to the south of the building, deciduous trees can be advantageous, providing shade in the summer but allowing sunshine through in the winter when they lose their leaves. However, any tree used for energy conservation should be considered as part of a much larger landscape.

3. Building Orientation, layout, and form

Building layout, orientation and form can influence many key features of the development. The design should provide for an effective use of space and appealing layout, with opportunities to benefit from natural daylight balanced with achieving solar gain without overheating.

It should be noted that where the building footprint is extremely tight, for example in a city centre location, then the building form and orientation may have to be dictated by the available space and not by implementation of best practice measures. Invariably, planning constraints and/or the functional relationships of specific areas will result in some measure of deep planning, thus reducing the opportunity for natural ventilation.

Planning the internal layout of buildings and space to maximise the benefits of solar gain and minimise the disadvantages is essential. Spaces where overheating would be critical can be placed on the north side of the building or overhangs used to protect from excessive solar gain.

Figure 5: Proposed Building site.

The primary length of the building runs roughly from North-West to South-East; with the largest elevations facing North-East and South-West. The spaces on the southern-west exposure (i.e. reception, dining, and bedrooms) expected to benefit from natural daylight and sun exposure. The Northeast facing rooms although not fully facing east, might benefit from some pre-heating that may occur in the early hours of the morning as the sun rises. The floor features communal spaces and comprise the care home rooms.

4. Building Design – Energy Efficiency

a. Building fabric, thermal mass

The building is adopting the following measures for the fabric thermal performance:

- Enhanced envelope U-values - to reduce the building's heating loses and demand.
- Providing a well-sealed envelope to minimise the infiltration of cold winter air and warm air in summer - to reduce the building's heating and cooling requirement.
- Minimising thermal bridging by using accredited construction details to reduce the building's heating and cooling requirement.
- Adopting a window to wall ratio that prioritises daylight but controls solar gain and glare – to reduce electric lighting energy consumption while mitigating overheating.
- Providing exposed thermal mass to provide passive cooling – suppresses summertime overheating to acceptable levels without the need for high energy consuming and expensive to run and maintain mechanical cooling systems.

The application of thermal mass to provide passive cooling is well understood and is an excellent method of supressing the fluctuations of internal temperature without resorting to mechanical cooling systems, which are both expensive to install, consume significant amounts of energy in summer and have high maintenance costs. The thermal mass shall absorb room heat gains during the day allowing the spaces to remain comfortable and compliant with the CIBSE TM59 criteria. Stored heat will be released at night by means of the mixed mode ventilation philosophy. This will regenerate the thermal mass' ability to absorb heat the following day.

New Build Care home				
Category Specification		**Part L2A Notional Requirement**	**Architect targeted Values**	**Be Lean LETI Values**
U-value ($W/m^2 K$)	*Wall*	*0.26*	***0.17***	***0.13***
	Window	*1.60*	***1.20***	***1.00***
	Floor	*0.22*	***0.16***	***0.08***
	Roof	*0.18*	***0.16 Flat 0.14 Pitched***	***0.10***
	Doors	*1.60*	***1.00***	***1.00***
Air Permeability ($m^3/h.m^2$ at 50 Pa)		*3.00*	***5.00***	***1.00***

Table 5: Part L and Proposed Building Elements thermal performance

The table above shows the proposed building fabric thermal performance. Aligned with the Energy Hierarchy it promotes a thermally efficient building fabric in order to inherently reduce **15%** of the energy consumption through passive measures. This strategy optimises the building performance prior to the consideration of renewables (LZC) ensuring that all practical measure have been considered to reduce the carbon emission of the building.

5. Building occupancy type

The building occupancy type is dependent on the NCM building type. A **C1 class care home** building type has been identified for this development. Accordingly, the occupancy capacity and profiles, internal gains are following each space identified activity.

6. Daylighting and Solar Shading Strategy

The scheme benefits from the usage of solar performance glazing. The glazing specification is carefully selected to ensure the internal environment is pleasant on all orientations by varying the g-value. In addition, all spaces contain internal 50% translucent blinds to limit solar excess, improving the effective g-value further still. Further calculations are referred to in appendix A BRUKL baseline calculations.

7. Ventilation strategy

Natural Ventilation + Heat Recovery Ventilation

All spaces will utilise trickle and boost ventilation via heat recovery units that utilise the warm exhausted air to pre-heat the incoming supply air. This helps to significantly reduce the heat loss of the building where ventilation is the highest heat demand. The output from the building model confirms that upgrading the building fabric alone will result in the building meeting the Part L Notional Building Requirements as follows

❖ BE LEAN STAGE

Building Type	Notional TER ($KgCO_2/m^2.annum$)	BER at BE-LEAN ($KgCO_2/m^2.annum$)	Carbon Savings (%)
New build Care home	*40.4*	*35.2*	***13.5 %***

Table 5: Regulated Carbon Emissions (BER) at Be Lean Stage

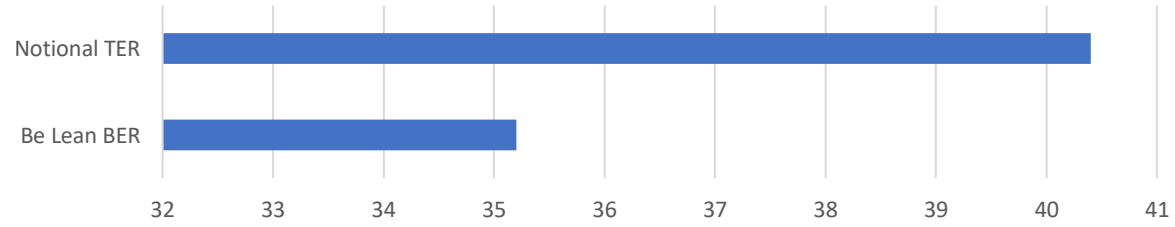


Chart 3: Care home Regulated Carbon Emissions (BER) at Be Lean Stage

At the BE LEAN stage of the energy hierarchy, energy efficient building elements have been incorporated into the model. The heat loss of different building element is dependent upon their U-value, air permeability, and thermal bridging Y-values.

Be Lean – Active Design Measures

The table below shows the applied 'Be Lean' active design measures incorporated within the design to demonstrate the energy strategy approach.

No.	Measure	Explanation
1	**Heat recovery ventilation**	The ventilation strategy utilises heat recovery ventilation as part of a mixed-mode ventilation strategy that is deployed to maximise energy efficiency. Duct insulated, Rigid duct, Specific Fan Power (SFP) 0.3 W/l/s, Heat Exchanger Efficiency 85% has been applied for this assessment.
2	**On-demand control to teaching spaces**	The room by room heating and lighting controls ensure that energy efficiency is maximised in almost all spaces where the amount of air delivered is variable to suit the space.
3	**Local heat network**	Heating for the building is provided by a building wide heat network which features reduced flow and return temperatures, reducing thermal losses and space heat gain as comparted to a traditional system. Due to the nature of the LTHW local heat network should a community heat network connection become available to the site in the future, the proposed system is compatible for connection and the connection points in place.
4	**Variable speed pumping**	Variable speed pumping on all secondary circuits reduces energy consumption associated with distribution significantly.
5	**Lighting Efficiency**	LED's have been appraised for their suitability as part of the design development and have been found to be a cost-effective measure to reduce lighting electrical energy use.

Table 6: Active Design Measures adopted at Be Lean Stage

7.0 BE-CLEAN – Decentralised Energy Networks

The Energy Hierarchy encourages the use of local CHP system and connection to District Heating systems to reduce CO_2 emissions further.

1.9 Decentralised Energy Network

District and community heating systems are favoured because they offer:

- Potential economies of scale in respect of efficiency and therefore reduced carbon emissions;
- And Greater potential for future replacement with Low or Zero Carbon (LZC) technologies.

The feasibility of connecting into an existing heating network or providing the building with its own combined heat and power plant has been assessed alongside the **London Heat Map,** see the figure 6 below, as part of this assessment. The map identifies that the site address is not located near an existing district heating network. The nearest proposed heat network is roughly 447 m away from the project site address. This has been demonstrated from the London Heat Map (http://www.londonheatmap.org.uk).

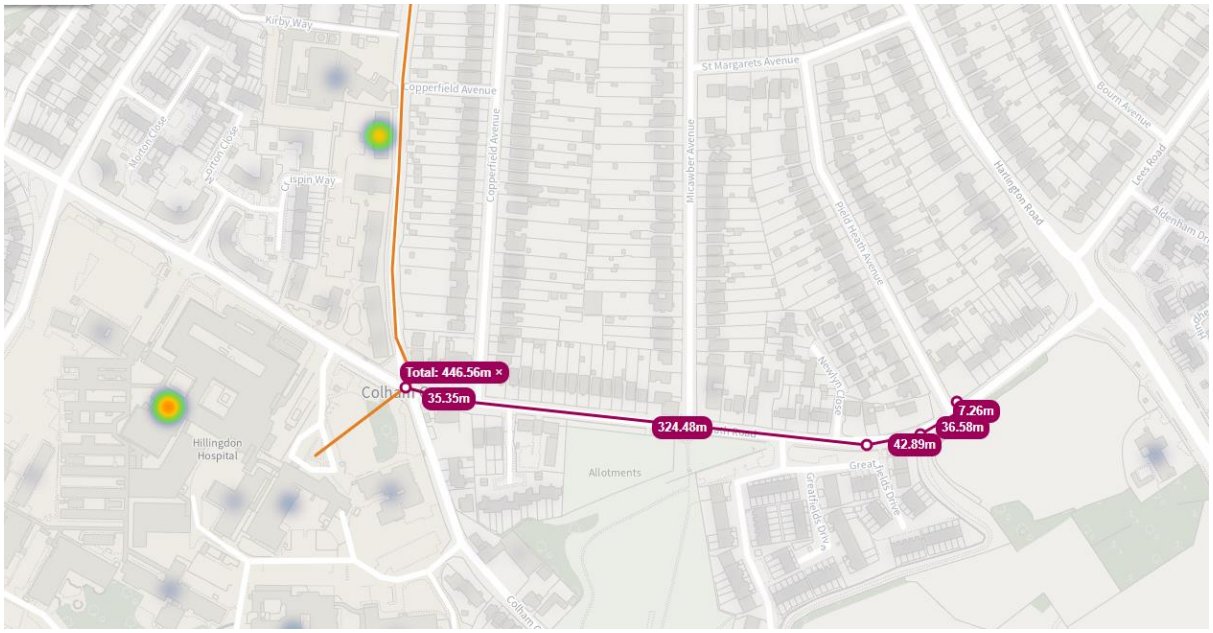


Figure 6: London Heat Map near the site

It is proposed for this development to utilise air source heat pump installations to provide a low temperature heating network within the building to be used for heating and hot water within the residential units. In order to further maximise efficiency, reduce energy losses associated with domestic hot water circulation and mitigate the inherent risk of corridor overheating associated with residential units, it is proposed to incorporate Heat Interface Units (HIUs) within each unit.

1.10 Combined Heat and Power (CHP)

The Energy Hierarchy identifies the combined heat and power (CHP) as a method of producing heat and electricity with much lower emissions than separate heat and power. Also, it encourages the creation of district heating systems supplied by CHP. The implementation of a CHP strategy should be decided according to good practice design. Key factors for the efficient implementation of the CHP system are:

- Development with high heating load for most of the year.
- CHP operation based on maximum heat load for minimum 10 hours per day.
- CHP operation at maximum capacity of 90% of its operating period.

To ensure that CHP is financially viable it is essential that the unit is selected to meet the base heat load and that this load is maintained over a large proportion of the day (a figure of 14 – 17 hours per day is often quoted subject to the load profiles and gas and electricity prices) to ensure that the additional costs (maintenance) associated with running a CHP unit can be recovered. This needs to run the CHP plant, as far as possible continuously makes the building load profile of prime importance when reviewing the viability of such solutions and in particular the summertime heat load profile. To enable the CHP plant to run continuously when it is operating, a thermal store is often used so that excess CHP capacity can be used

Generally, developments consist of at least 50 residential units would obtain the benefits of the micro CHP system, however the new London air quality legislations discourage using CHPs for their air pollution impact. Therefore, the implementation of a CHP has not been considered of this development design strategy, see table 7 below. In addition, if the design team shall require installing this technology, further information regarding the local system storage space will be needed.

❖ BE CLEAN STAGE

Building Type	BER BASELINE ($KgCO_2/m^2.annum$)	BER at BE-CLEAN ($KgCO_2/m^2.annum$)	Carbon Savings at Be-Clean stage
New build Care homes	*40.4*	*35.2*	***0.0 %***

Table 7: Regulated Carbon Emissions at Be Clean Stage

- **Cooling Hierarchy**

Policy SI 4 of the London Plan outlines a hierarchy of measures which should be followed in order to reduce the demand for cooling within the development. These have been included as follows:

Multiple strategies have been considered for this development to reduce the cooling demand and the overheating risks.

- ✓ Firstly, **internal heat loses shall be reduced through energy efficient design** during design development. It will include minimising duct lengths and adopting pipe configurations which minimise heat loss (e.g., twin pipes).
- ✓ Minimising Internal Heat Gains – DHW circulation pipe recommended to been eliminated in the communal areas of the development.
- ✓ Reducing Solar Gains – As stated previously, low G-Values have been targeted and blinds have been implemented in order to minimise solar gains.
- ✓ Thermal Mass – Thermal mass is being incorporated though the floor slabs, external walls and roof however further investigation will be undertaken as to the design of these finishes to try to capitalise on the thermal massing wherever possible, so as to help regulate the internal temperature.
- ✓ Lastly, a **mix of passive ventilation and mechanical extraction strategies will be adopted with extract fans in wet rooms** (e.g., toilets, and food preparation) to remove the hot humid air and help free cooling.

Given all strategies above, the cooling demand and overheating risks shall be reduced, resulting in low cooling loads and respectively less CO_2 emissions.

8.0 BE GREEN – Appraisal of Renewable and Low Carbon Technology Energy

In this section the viable renewable energy technologies that could reduce the development's CO_2 emissions are examined. In accordance with Policy SI 2 of the London Plan, the technical feasibility and economic viability of installing each LZC technology at the development have been assessed, so as to discount any unsuitable options at an early stage.

In determining the appropriate renewable technology for the site, the following factors are considered.

- Renewable energy resource or fuel availability of the LZC technology on the site.
- Capital, operating and maintenance cost available for the project.
- Planning Permission form the local council.
- Implementation with regards the overall M&E design strategy for building type.
- Available Grants.

The table below summarises the various low zero carbon technologies considered for the projects, and we have identified that **Air Source Heat Pumps (ASHP) and Photovoltaic (PV)** would be the most appropriate option in this development.

The Government has outlined its ambitions for residential and non-domestic developments to be delivered to a zero-carbon standard. It is anticipated that zero carbon development will be realised predominantly through energy efficiency measures and the use of on-site low or zero carbon energy and connected heat. However, it is recognised that it will be difficult to deliver all the carbon savings necessary to meet zero carbon standards on site through these measures alone.

Technology Name:	Carbon Payback	Feasibility
Photovoltaic (PV)	High	**HIGH**
Air Source Heat Pumps (ASHP)	High	**HIGH**
Biomass	High	**Medium**
Wind Power	Low	**Medium**
Hydro Power	None	**Medium**
Solar Thermal	Low	**High**
Ground Source Heat Pumps (GSHP)	Medium	**LOW**

Table 8: Feasibility Study of LZC Technologies for 77 Mount Ephraim.

8.1 Less-feasible Technology

- **Ground Source Heat Pumps (GSHP)**

Ground source heat pump would be a feasible option to meet the space heating requirements, however, it requires ground space for bore holes to extract the ground heat in order to be utilized for space heating requirements. However, this has not been discounted due to unknown ground conditions/ contamination statues and expensive CAPEX cost for investigating.

- **Solar Thermal**

The use of solar thermal for this development would be limited to domestic hot water only. The use of solar thermal for space heating would not be practical as it is not required when solar thermal is at its most effective during the summer months. Moreover, according to the scheme scale the expected carbon offset from the system is generally lower compared to other LZC technologies.

- **Hydro power**

The project is not in a close connection to natural water resources.

- **Wind Power**

Wind turbines need extensive planning requirements, and they are only feasible at consistent wind speed. Moreover, there is no available wind grid located near the project location (http://www.renew-reuse-recycle.com/noabl.pl?n=503). Hence this option has been discounted.

Estimated average windspeeds around UB8 3..

Wind speed at 10m above ground level (m/s)		
4.8	4.8	4.9
4.8	**4.9**	4.9
4.8	4.8	4.9

Wind speed at 25m above ground level (m/s)		
5.5	5.6	5.7
5.6	**5.6**	5.7
5.6	5.6	5.7

Wind speed at 45m above ground level (m/s)		
6.1	6.1	6.2
6.1	**6.1**	6.2
6.1	6.1	6.2

Squares surrounding the central square correspond to wind speeds for surrounding grid squares. Power generated is related to windspeed by a cubic ratio. That means if you halve the windspeed, the power goes down by a factor of 8 (which is 2 x 2 x 2). A quarter of the windspeed gives you a 64th of the power (4 x 4 x 4). As a rough guide, if your turbine is rated at producing 1KW at 12m/s then it will produce 125W at 6m/s and 15W at 3m/s.

Please note that bear in mind that the NOABL windspeed dataset used here is a model of windspeeds across the country, assuming completely flat terrain. It isn't a database of measured windspeeds. Other factors such as hills, houses, trees and other obstructions in your vicinity need to be considered as well as they can have a significant effect. If you're thinking about installing a wind turbine, you

should perform your own windspeed measurements using an anemometer to determine what the actual figures are.

- **Biomass**

A biomass system designed for this development would be fueled by wood pellets which have a high energy content. However, a biomass system would not be an appropriate technology for the site for the following reasons:

A. The burning of wood pellets releases substantially more NOx emissions when compared to similar gas boilers. As the development is situated within an urban area, the installation of a biomass boiler would further impact on the air quality in this area.
B. Pellets would need to be transported from local pellet suppliers, which causes carbon emissions to the air.
C. Site doesn't have an adequate storage space impacting layout and logistics arrangements.

However, if a biomass system is considered at further detailed design stage, local suppliers can be found near the site as shown in the map below (http://biomass-suppliers-list.service.gov.uk).

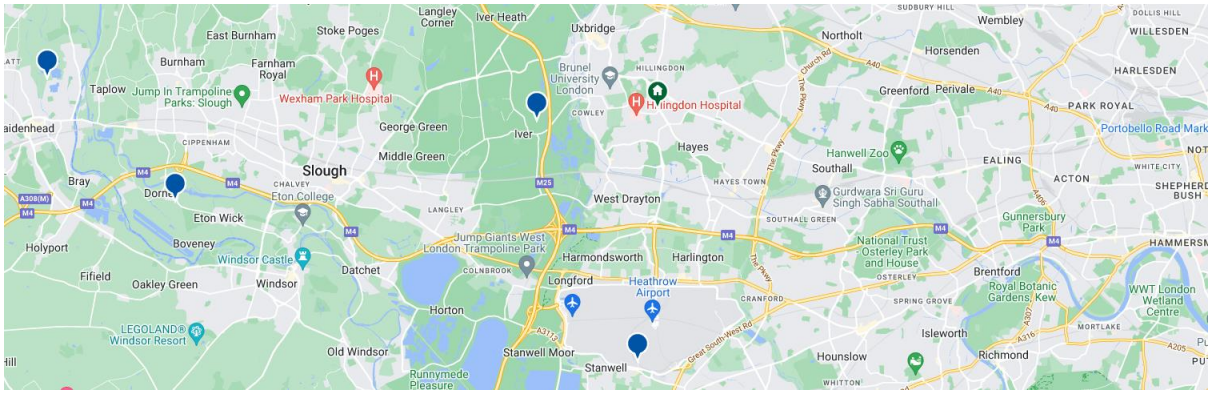


Figure 6: Biomass suppliers locations proximity to the project location.

Company name	Postcode	Contact	Fuel Supplied	Telephone
Fuel Chip Ltd	SL0 9LA	www.fuelchip.co.uk sales@fuelchip.co.uk	Chip	1753657280
Practicality Brown Ltd	SL0 9LA	www.pracbrown.co.uk sales@pracbrown.co.uk	Chip	01753 652022
LC Energy Ltd	TW6 3FD	www.lcenergy.co.uk info@lcenergy.co.uk	Chip	8448751320
Maydencroft Limited	SL4 6QB	www.maydencroft.co.uk info@maydencroft.co.uk	Chip	1462420851
Balcas Timber Ltd	SL6 8SP	www.balcasenergy.com energy@balcas.com	Pellets	1628509609
Balcas Timber Ltd	SL6 8SP	www.balcasenergy.com energy@balcas.com	Pellets	1628509690

Table 9: Local Biomass suppliers contact details

8.2 Proposed Technologies

- **Air Source Heat Pumps**

An ASHP, specified **BS EN 14511-3,** can meet the space heating demands on site efficiently in comparison with gas boilers. Although this low carbon technology consumes electricity to operate, due to higher efficiency the heat output is much greater. Therefore, it has been suggested for the space heating, and hot water demand. The design stage specifications used for energy calculations are in the table below. However, the ASHP was proposed only for simulation, detailed ASHP specifications will be provided by a mechanical engineer during the design development. The system must be certified under the Microgeneration Certification Scheme (MCS).

ASHP Air Distribution system recommended minimum standards.

In order to limit air leakage, ventilation ductwork should be made and assembled so as to be reasonably airtight. Ways of meeting this requirement would be to comply with the specifications given in:

i. B&ES DW/144[43]. Membership of the B&ES specialist ductwork group or the Association of Ductwork Contractors and Allied Services is one way of demonstrating suitable qualifications, or

ii. British Standards such as BS EN 1507:2006[44], BS EN 12237:2003[45] and BS EN 13403:2003[46].

In order to limit air leakage, air handling units should be made and assembled so as to be reasonably airtight. Ways of meeting this requirement would be to comply with Class L2 air leakage given in BS EN 1886:2007[47].

The specific fan power of air distribution systems at the design air flow rate should be no worse than in Table 35 for new and existing buildings. Specific fan power is a function of the system resistance that the fan has to overcome to provide the required flow rate. BS EN 13779 Table A8 provides guidance on system pressure drop. To minimise specific fan power it is recommended that the 'low range' is used as a design target.

Where the primary air and cooling is provided by central plant and by an air distribution system that includes the additional components listed in Table 36, the allowed specific fan powers may be increased by the amounts shown in Table 36 to account for the additional resistance.

A minimum controls package should be provided in new and existing buildings as in Table 37.

Ventilation fans driven by electric motors should comply with European Commission Regulation No 327/2011 implementing Directive 2009/125/EC with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW.

Figure 4, Air Distribution System Specs (Non-Domestic Building Services Compliance Guide: 2013 Edition)

- **Photovoltaic (PV)**

Based on the feasibility study above, PV is an additional renewable Technology proposed for the scheme for the following reasons:

i. The installation of PV is much simpler when compared to other renewable technologies
ii. The warehouse has sufficient roof space available to install enough PV modules to have a significant impact on carbon emissions of the development.
iii. PV panels sited on the roof within an urban area are less visually intrusive when compared to wind turbines.

The PV system capacity for the whole development depends upon the heating system selected. Therefore, the amount of PV relating to the proposed heating system option is outlined below:

- **ASHP + 4.0 kWp PV array.**

The tables below illustrate the indicative PV panel's detail, should it be feasible to implement:

Orientation	South	Numbers of Panels	15 panels
Inclination	30°	**Power Output**	340 watts per panel
Overshading	Very little (> 20%)	**PV Area**	Approx. 1.7 m^2 per panel
Annual Output	Approx. 1.7 kWh/m^2		

Table 10: Suggested PV details

In summary, **15** high efficiency 340W monocrystalline PV panels could be installed at 30° inclination, facing South to go beyond the 35% carbon reductions on-site, table 11. The proposed PV panels are subject to further consideration at detailed design stages. In order to qualify both the installer and the equipment, the system must be certified under the Microgeneration Certification Scheme (MCS).

Given the proposed LZC technologies on the site (i.e., **ASHP + PVs**), the overall CO2 reduction at BE GREEN stage can be calculated as shown below.

❖ BE GREEN stage

Building	TER ($KgCO_2/m^2$.annum)	BER at BE-GREEN ($KgCO_2/m^2$.annum)	Carbon Savings at Be-Green
New build Care home	*40.4*	*25.3*	***36%***

Table 11: Regulated Carbon Reduction at Be-Green Stage

Energy Strategy Summary

This Energy Statement have been produced to predict the energy performance and carbon dioxide emissions of the proposed development at **18 Pield Heath Road, Uxbridge, UB8 3NF.**

Based on the information provided by the design team, the study has been done on the **new build 60 bed care homes**. The study results showed improving the building fabric thermal performance is a key to achieve building regulations compliance. Moreover, WWHR units, ASHP, and PV proved to be an efficient measure for the new build to achieve a **35%** beyond **Part L2** requirements. In addition to that, if PVs are desired to be included in the design specification, it could leverage the project status even beyond GLA requirements. The carbon savings from each stage are shown in the chart below. Given the total cumulative carbon savings, the proposed development shall meet the planning requirements on the site.

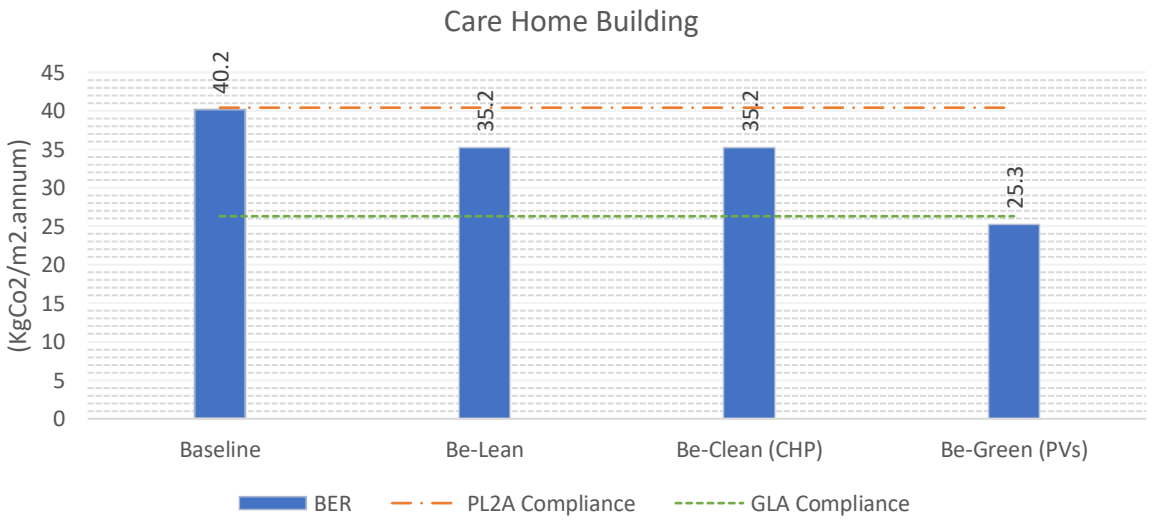


Chart 4: Carbon Emissions Reductions after each stage of the Energy Hierarchy

❖ Development Overall Carbon Savings

Building	Baseline ($KgCO_2/m^2.annum$)	BER at BE-GREEN ($KgCO_2/m^2.annum$)	Overall Carbon Savings *(%)*
New build Care home	*40.4*	*25.3*	***36%***

Table 12: Overall Regulated Carbon Reductions

Appendix A – BRUKL Reports

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

18 Pield Heath-Baseline

As designed

Date: Fri Apr 01 16:24:48 2022

Administrative information

Building Details

Address: London, UB8 3NF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: SyntegraENG

Telephone number: 01184028520

Address: 63 Milford Rd, Reading, RG1 8LG

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	40.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	40.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	40.2
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.36	1.79	"FY000002_W17_A0"
Floor	0.25	0.22	0.22	"MN000000_F"
Roof	0.25	0.19	1.09	"LF000001_C_A0"
Windows***, roof windows, and rooflights	2.2	1.6	1.6	"SL000000_W4_O0"
Personnel doors	2.2	1.67	1.67	"ST000000_W3_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	3

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Gas Boiler

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.91	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

1- SYST0000-DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Ass Bath	0.4	-	-	-	-	-	-	-	-	-	N/A
wc	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_Br 014	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_ Br 015	0.4	-	-	-	-	-	-	-	-	-	N/A
GF_ Br 016	0.4	-	-	-	-	-	-	-	-	-	N/A
GF_BR 017	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR018	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 019	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 020	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR021	0.4	-	-	-	-	-	-	-	-	-	N/A
WC	0.4	-	-	-	-	-	-	-	-	-	N/A
Assisted Bath	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 013	0.4	-	-	-	-	-	-	-	-	-	N/A
GF _BR 012	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 011	0.4	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Gf_BR 01	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 02	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 03	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR04	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 05	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 06	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 07	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 08	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 010	0.4	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 09	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 022	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 023	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 024	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 025	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 026	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 027	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 028	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 031	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 030	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 033	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 034	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 035	0.4	-	-	-	-	-	-	-	-	-	N/A
1st f_Br 039	0.4	-	-	-	-	-	-	-	-	-	N/A
1st_ Br 040	0.4	-	-	-	-	-	-	-	-	-	N/A
1st f_ Br 041	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 042	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 043	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 044	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 045	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_Assisted Bath	0.4	-	-	-	-	-	-	-	-	-	N/A
1st f_BR 036	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR046	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 038	0.4	-	-	-	-	-	-	-	-	-	N/A
1st f _BR 037	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_WC	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 032	0.4	-	-	-	-	-	-	-	-	-	N/A
1st F_Assisted Bathroom	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 047	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 049	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 050	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 051	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 052	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 053	0.4	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
2nd F_BR 055	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 054	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 056	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_Assisted Bathroom	0.4	-	-	-	-	-	-	-	-	-	N/A
1st _BR 029	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 048	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 058	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 057	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 059	0.4	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 060	0.4	-	-	-	-	-	-	-	-	-	N/A
wc	0.4	-	-	-	-	-	-	-	-	-	N/A
wc	0.4	-	-	-	-	-	-	-	-	-	N/A
wc	0.4	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Sluice	-	60	-	25
Stairs	-	60	-	48
Ass Bath	-	60	-	46
Stairs	-	60	-	48
Manager office	60	-	-	144
Drugs Room	60	-	-	120
Foyer GF 6	-	60	-	56
Admin Room	60	-	-	206
wc	-	60	-	21
Foyer GF 4	-	60	-	109
Gf_BED 014	-	60	-	66
Gf_Br 014	-	60	-	24
Gf_ Br 015	-	60	-	24
Gf_BED 015	-	60	-	65
GF_ Br 016	-	60	-	24
GF_ BED 016	-	60	-	65
GF_BED 017	-	60	-	68
GF_BR 017	-	60	-	26
Gf_BR018	-	60	-	23
Gf_BED 018	-	60	-	67
Gf_BED 019	-	60	-	63
Gf_BR 019	-	60	-	24
Gf_BR 020	-	60	-	24
Gf_BED 020	-	60	-	62
Gf_BR021	-	60	-	25
Gf_BED 021	-	60	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
WC	-	60	-	19
Assisted Bath	-	60	-	59
LIFT	-	60	-	24
GF_Dining/ Lounge Room	-	60	-	304
Gf_BR 013	-	60	-	26
Gf_BED 013	-	60	-	61
Gf_BED 012	-	60	-	65
GF _BR 012	-	60	-	23
Gf_BED 011	-	60	-	65
Gf_BR 011	-	60	-	23
Gf_BED 01	-	60	-	65
Gf_BR 01	-	60	-	24
Gf_BR 02	-	60	-	24
Gf_BED 02	-	60	-	62
Gf_BR 03	-	60	-	24
Gf_BED 03	-	60	-	66
Gf_BR04	-	60	-	24
Gf_BED 04	-	60	-	65
Gf_BR 05	-	60	-	24
Gf_BED 05	-	60	-	65
Gf_BR 06	-	60	-	24
Gf_BED 06	-	60	-	63
Gf_BED 07	-	60	-	71
Gf_BR 07	-	60	-	24
Gf_BR 08	-	60	-	26
Gf_BED 08	-	60	-	66
Gf_BR 010	-	60	-	24
Gf_BED 010	-	60	-	63
Gf_BED 09	-	60	-	63
Gf_BR 09	-	60	-	24
Dining Room	-	60	-	187
Foyer GF 5	-	60	-	200
Foyer 1 & Sitting area	-	60	-	183
1st F_BED 022	-	60	-	65
1st F_BR 022	-	60	-	24
1st F_BR 023	-	60	-	24
1st F_BED 023	-	60	-	62
1st F_Sluice	-	60	-	31
1st F_BR 024	-	60	-	24
1st F_BED 024	-	60	-	66
1st F_BR 025	-	60	-	24
1st F_BED 025	-	60	-	65
1st F_BR 026	-	60	-	24

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st _BED 026	-	60	-	65
1st F_BR 027	-	60	-	24
1st F_BED 027	-	60	-	63
1st F_BED 028	-	60	-	71
1st F_BR 028	-	60	-	24
1st F_BED 029	-	60	-	66
1st F _Foyer 6	-	60	-	56
1st F_Stairs	-	60	-	48
1st F_BR 031	-	60	-	24
1st F_BED 031	-	60	-	63
1st F_BED 030	-	60	-	63
1st F_BR 030	-	60	-	24
1st F_Drugs Room	-	60	-	43
1st F_BR 033	-	60	-	21
1st F_BED 033	-	60	-	60
1st F_Stairs case	-	60	-	46
Stairs and Main entrance	-	60	-	80
1st F dining room extension	-	60	-	39
1st F_BR 034	-	60	-	25
1st F_ BED 034	-	60	-	60
1st F_BED 035	-	60	-	60
1st F_BR 035	-	60	-	25
1st F_Foyer 1 & Sitting area	-	60	-	183
1ST f_Stairs	-	60	-	48
1st f_BED 039	-	60	-	66
1st f_Br 039	-	60	-	24
1st_ Br 040	-	60	-	24
1st F_BED 040	-	60	-	65
1st f_ Br 041	-	60	-	24
1st f_ BED 041	-	60	-	65
1st F_BED 042	-	60	-	68
1st F_BR 042	-	60	-	26
1st F_BR 043	-	60	-	23
1st F_BED 043	-	60	-	67
1st_F 044	-	60	-	63
1st F_BR 044	-	60	-	24
1st F_BR 045	-	60	-	24
1st F_BED 045	-	60	-	62
1st F_Assisted Bath	-	60	-	59
1st F_LIFT	-	60	-	24
1st f_BR 036	-	60	-	23
1st F_BR046	-	60	-	25
1st F_BED 046	-	60	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st F_BR 038	-	60	-	26
1st F_BED 038	-	60	-	61
1st f_BED 037	-	60	-	65
1st f_BED 036	-	60	-	65
1st f _BR 037	-	60	-	23
1st F_WC	-	60	-	30
Foyer 3	-	60	-	50
Foyer 2	-	60	-	35
1st F_BR 032	-	60	-	23
1st F_BED 032	-	60	-	62
1st F_Assisted Bathroom	-	60	-	47
1st F_Foyer 5	-	60	-	200
1st F_Foyer 4	-	60	-	38
1st F_Dning / Lounge room	-	60	-	382
1st F_Foyer 3	-	60	-	41
1st F_Store	60	-	-	53
2nd F_BED 047	-	60	-	65
2nd F_BR 047	-	60	-	24
2nd F_BED 048	-	60	-	62
1st F_Sluice (1)	-	60	-	31
2nd F_BR 049	-	60	-	24
2nd F_BED 049	-	60	-	66
2nd F_BR 050	-	60	-	24
2nd F_BED 050	-	60	-	65
2nd F_BR 051	-	60	-	24
2nd F _BED 051	-	60	-	65
2nd F_BR 052	-	60	-	24
2nd F_BED 052	-	60	-	63
2nd F_BED 053	-	60	-	71
2nd F_BR 053	-	60	-	24
1st F _Foyer 6 (1)	-	60	-	56
1st F_Stairs (1)	-	60	-	48
2nd F_BR 055	-	60	-	24
2nd F_BED 055	-	60	-	63
2nd F_BED 054	-	60	-	63
2nd F_BR 054	-	60	-	24
1st F_Stairs case (1)	-	60	-	46
2nd F_BR 056	-	60	-	23
2nd F_BED 056	-	60	-	62
2nd F_Assisted Bathroom	-	60	-	47
2nd F_Foyer 3	-	60	-	38
1st _BR 029	-	60	-	26
2nd F_Store	60	-	-	71

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
2nd F_BR 048	-	60	-	24
2nd F_Foyer 4	-	60	-	39
2nd F_Foyer 5	-	60	-	165
2nd F_Drugs Room	-	60	-	43
2nd F_BR 058	-	60	-	22
2nd F_BED 057	-	60	-	60
2nd F_BR 057	-	60	-	21
2nd F_BED 058	-	60	-	76
2nd F_BR 059	-	60	-	22
2nd F_BED 059	-	60	-	72
2nd F_BED 060	-	60	-	63
2nd F_BR 060	-	60	-	23
2nd F_Dining/Lounge Room	-	60	-	343
1st F_Foyer 2	-	60	-	35
2nd F_Foyer 1	-	60	-	28
stairs	-	60	-	48
Archive Store	60	-	-	205
Staff Room	60	-	-	351
Hairn and beauty	-	60	-	146
Training/Conference Room	60	-	-	697
Plant Room	60	-	-	213
wc	-	60	-	33
Cooms Room	60	-	-	122
Stairs	-	60	-	46
Entrance	-	60	22	180
Lift + DW	-	60	-	34
kitchen	-	60	-	578
store	60	-	-	40
Store	60	-	-	43
Female change	-	60	-	62
Male Change	-	60	-	62
Store	60	-	-	239
Stairs	-	60	-	48
Kitchen change	-	60	-	92
Laundry Room	-	60	-	517
Cinema	60	-	-	379
Lift	-	60	-	24
Private Family Room	60	-	-	332
Sensory Room	-	60	-	166
Activity Room	60	-	-	588
wc	-	60	-	34
Foyer 1	-	60	-	118
wc	-	60	-	30

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Office space	60	-	-	193
Meeting Room	60	-	-	408
Foyer 4	-	60	-	188
Foyer 2	-	60	-	20
Foyer 3	-	60	-	122

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Manager office	NO (-78.4%)	NO
Drugs Room	N/A	N/A
Admin Room	NO (-77.4%)	NO
Gf_BED 014	NO (-78.6%)	NO
Gf_BED 015	NO (-78.6%)	NO
GF_ BED 016	NO (-78.6%)	NO
GF_BED 017	NO (-88.7%)	NO
Gf_BED 018	NO (-85%)	NO
Gf_BED 019	NO (-72.8%)	NO
Gf_BED 020	NO (-72.4%)	NO
Gf_BED 021	NO (-64.7%)	NO
GF_Dining/ Lounge Room	NO (-77.1%)	NO
Gf_BED 013	NO (-84.2%)	NO
Gf_BED 012	NO (-71.4%)	NO
Gf_BED 011	NO (-67.1%)	NO
Gf_BED 01	NO (-73.2%)	NO
Gf_BED 02	NO (-72.8%)	NO
Gf_BED 03	NO (-83.9%)	NO
Gf_BED 04	NO (-72.7%)	NO
Gf_BED 05	NO (-72.7%)	NO
Gf_BED 06	NO (-73.3%)	NO
Gf_BED 07	NO (-76.7%)	NO
Gf_BED 08	NO (-83.9%)	NO
Gf_BED 010	NO (-77.9%)	NO
Gf_BED 09	NO (-77.9%)	NO
Dining Room	NO (-58.6%)	NO
1st F_BED 022	NO (-73.2%)	NO
1st F_BED 023	NO (-72.8%)	NO
1st F_Sluice	NO (-63.3%)	NO
1st F_BED 024	NO (-83.9%)	NO
1st F_BED 025	NO (-72.7%)	NO
1st _BED 026	NO (-72.7%)	NO
1st F_BED 027	NO (-73.3%)	NO
1st F_BED 028	NO (-76.7%)	NO
1st F_BED 029	NO (-83.9%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1st F_BED 031	NO (-77.9%)	NO
1st F_BED 030	NO (-77.9%)	NO
1st F_Drugs Room	N/A	N/A
1st F_BED 033	NO (-59.6%)	NO
1st F dining room extension	NO (-55.8%)	NO
1st F_ BED 034	NO (-62%)	NO
1st F_BED 035	NO (-52.1%)	NO
1st f_BED 039	NO (-78.6%)	NO
1st F_BED 040	NO (-78.6%)	NO
1st f_ BED 041	NO (-78.6%)	NO
1st F_BED 042	NO (-88.7%)	NO
1st F_BED 043	NO (-85%)	NO
1st_F 044	NO (-72.8%)	NO
1st F_BED 045	NO (-72.4%)	NO
1st F_BED 046	NO (-64.7%)	NO
1st F_BED 038	NO (-84.2%)	NO
1st f_BED 037	NO (-71.4%)	NO
1st f_BED 036	NO (-67.1%)	NO
1st F_BED 032	NO (-63.5%)	NO
1st F_Dning / Lounge room	NO (-73%)	NO
2nd F_BED 047	NO (-73.2%)	NO
2nd F_BED 048	NO (-72.8%)	NO
1st F_Sluice (1)	NO (-63.3%)	NO
2nd F_BED 049	NO (-83.9%)	NO
2nd F_BED 050	NO (-72.7%)	NO
2nd F _BED 051	NO (-72.7%)	NO
2nd F_BED 052	NO (-73.3%)	NO
2nd F_BED 053	NO (-76.7%)	NO
2nd F_BED 055	NO (-77.9%)	NO
2nd F_BED 054	NO (-77.9%)	NO
2nd F_BED 056	NO (-63.5%)	NO
2nd F_Drugs Room	N/A	N/A
2nd F_BED 057	NO (-62.1%)	NO
2nd F_BED 058	NO (-74.1%)	NO
2nd F_BED 059	NO (-65.7%)	NO
2nd F_BED 060	NO (-67.4%)	NO
2nd F_Dining/Lounge Room	NO (-79.9%)	NO
Staff Room	N/A	N/A
Training/Conference Room	N/A	N/A
Cooms Room	N/A	N/A
Entrance	N/A	N/A
Cinema	NO (-65.6%)	NO
Private Family Room	NO (-79.4%)	NO
Activity Room	NO (-86.7%)	NO
Office space	N/A	N/A
Meeting Room	NO (-79.3%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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
Area [m^2]	3624.4	3624.4
External area [m^2]	3905.7	3905.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	1402.62	1759.23
Average U-value [W/m^2K]	0.36	0.45
Alpha value* [%]	18.78	19.43

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
94	**C2 Residential Institutions: Hospitals and Care Homes**
6	**C2 Residential Institutions: Residential schools**
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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/m^2]

	Actual	Notional
Heating	38.25	42.91
Cooling	0	0
Auxiliary	4.1	2.2
Lighting	15.86	16.58
Hot water	100.02	100.02
Equipment*	60.53	60.53
TOTAL**	**158.23**	**161.71**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	291.1	344.93
Primary energy* [kWh/m^2]	229.97	230.6
Total emissions [kg/m^2]	40.2	40.4

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	117.7	173.4	38.3	0	4.1	0.86	0	0.91	0
	Notional	126.5	218.4	42.9	0	2.2	0.82	0	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.26	"SL000000_W4"
Floor	0.2	0.22	"MN000000_F"
Roof	0.15	0.18	"MN000000_C"
Windows, roof windows, and rooflights	1.5	1.6	"SL000000_W4_O0"
Personnel doors	1.5	1.67	"ST000000_W3_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	3

SBEM Main Calculation Output Document

Fri Apr 01 16:24:42 2022 v5.6.b.0

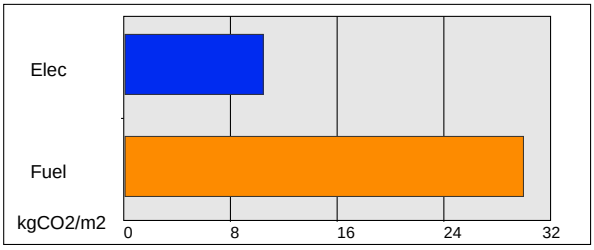
Building name

18 Pield Heath-Baseline

Building type: C2 Residential Institutions - Hospitals and Care Homes

SBEM is an energy calculation tool for the purpose of assessing and demonstrating compliance with Building Regulations (Part L for England and Wales, Section 6 for Scotland, Part F for Northern Ireland, and Building Bye-laws Jersey Part 11) and to produce Energy Performance Certificates and Building Energy Ratings. Although the data produced by the tool may be of use in the design process, **SBEM is not intended as a building design tool.**

Building Energy Performance and CO2 emissions

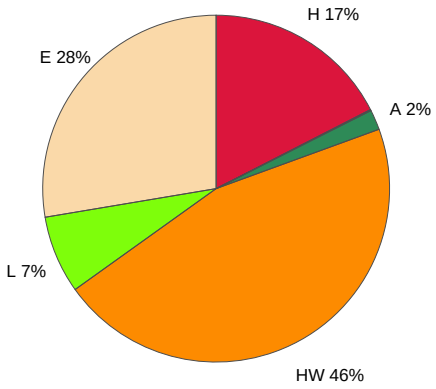


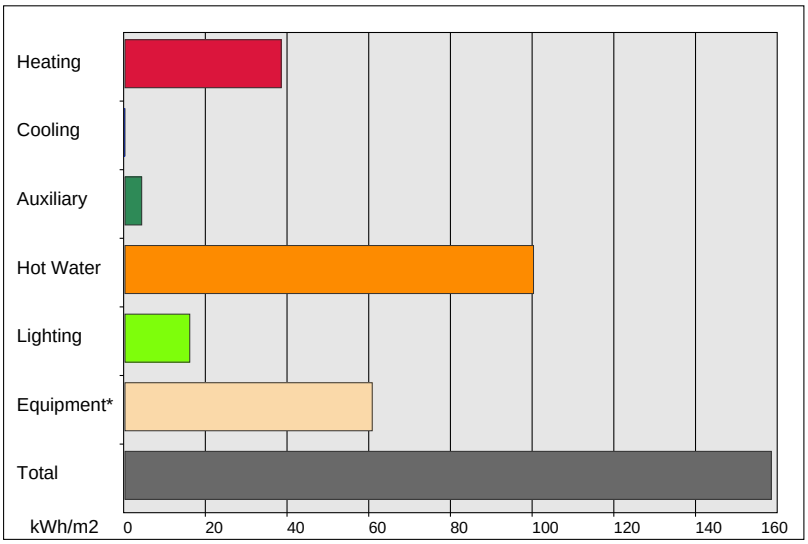
0 kgCO2/m2 displaced by the use of renewable sources.

Building area is 3624.4 m2

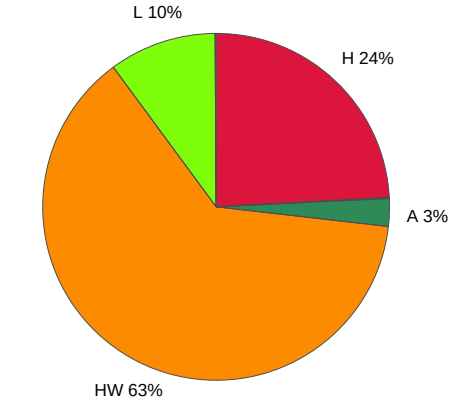
Annual Energy Consumption

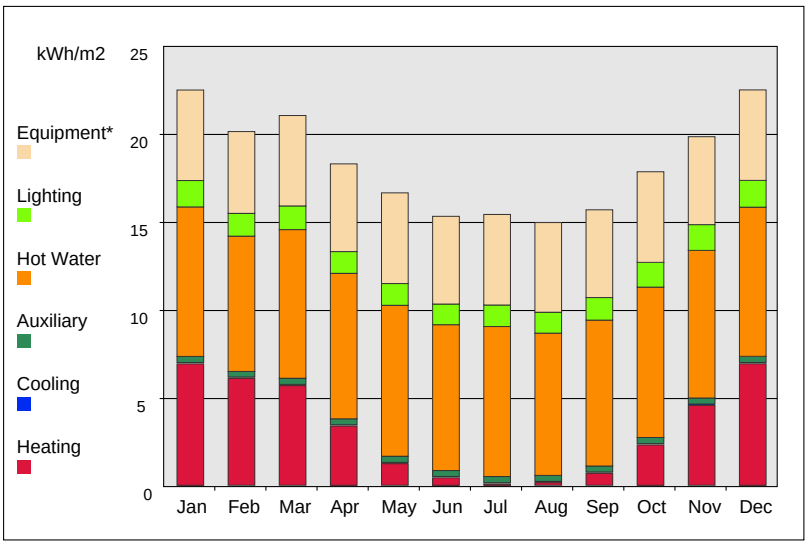
(Pie chart including Equipment end-use)





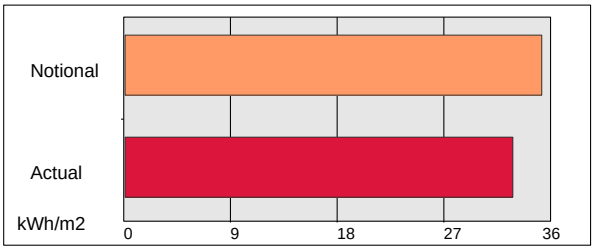
(Pie chart excluding Equipment end-use)

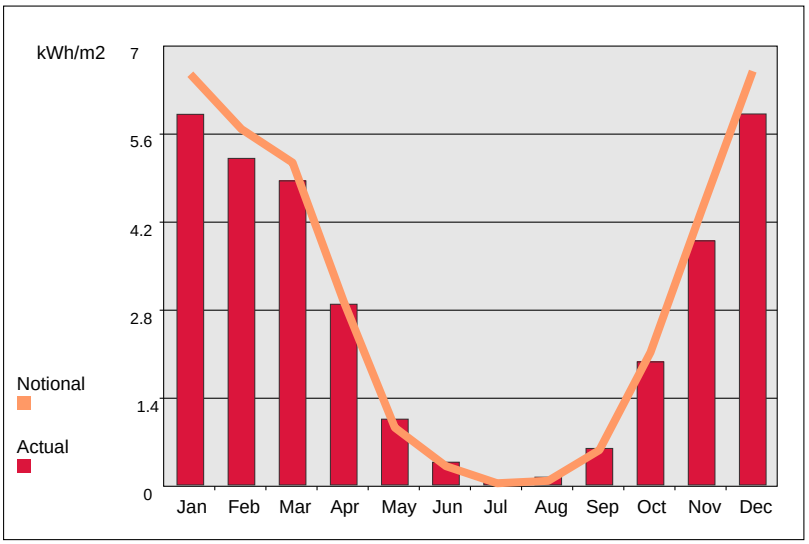




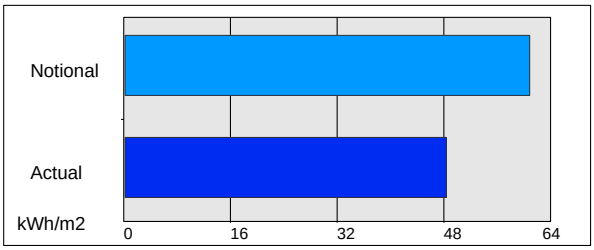
(*) Although energy consumption by equipment is shown in the graphs for information, this end-use has not been included in the total results of the building or the calculation of the ratings.

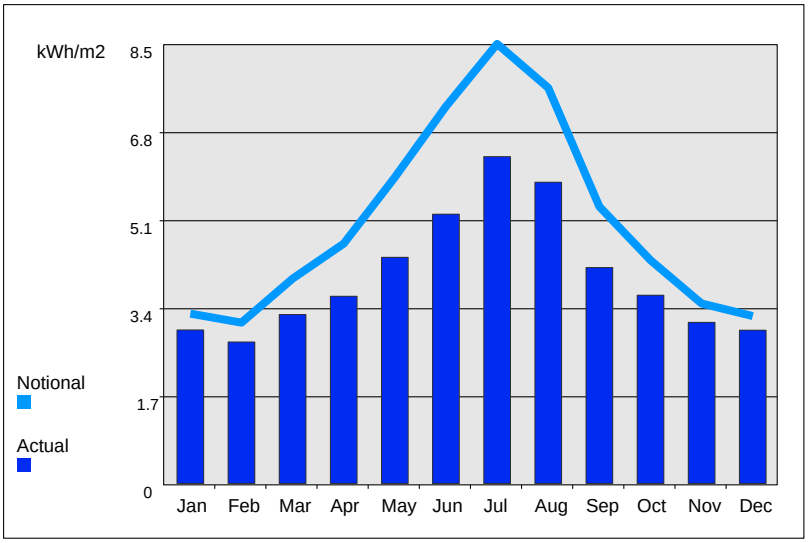
Annual Heating Demand





Annual Cooling Demand





BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

18 Pield Heath-Be Lean (Targeted)

As designed

Date: Mon Apr 04 09:24:33 2022

Administrative information

Building Details

Address: London, UB8 3NF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: SyntegraENG

Telephone number: 01184028520

Address: 63 Milford Rd, Reading, RG1 8LG

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	40.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	40.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	39.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.28	1.79	"FY000002_W17_A0"
Floor	0.25	0.16	0.16	"MN000000_F"
Roof	0.25	0.17	1.09	"LF000001_C_A0"
Windows***, roof windows, and rooflights	2.2	1.29	1.29	"SL000000_W4_O0"
Personnel doors	2.2	1.03	1.03	"ST000000_W3_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	3

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Gas Boiler

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.91	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

1- SYST0000-DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Ass Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_Br 014	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_ Br 015	0.3	-	-	-	-	-	-	-	-	-	N/A
GF_ Br 016	0.3	-	-	-	-	-	-	-	-	-	N/A
GF_BR 017	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR018	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 019	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 020	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR021	0.3	-	-	-	-	-	-	-	-	-	N/A
WC	0.3	-	-	-	-	-	-	-	-	-	N/A
Assisted Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 013	0.3	-	-	-	-	-	-	-	-	-	N/A
GF _BR 012	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 011	0.3	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Gf_BR 01	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 02	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 03	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR04	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 05	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 06	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 07	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 08	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 010	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 09	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 022	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 023	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 024	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 025	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 026	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 027	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 028	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 031	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 030	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 033	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 034	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 035	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_Br 039	0.3	-	-	-	-	-	-	-	-	-	N/A
1st_ Br 040	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_ Br 041	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 042	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 043	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 044	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 045	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_Assisted Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_BR 036	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR046	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 038	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f _BR 037	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 032	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_Assisted Bathroom	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 047	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 049	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 050	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 051	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 052	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 053	0.3	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
2nd F_BR 055	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 054	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 056	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_Assisted Bathroom	0.3	-	-	-	-	-	-	-	-	-	N/A
1st _BR 029	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 048	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 058	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 057	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 059	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 060	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Sluice	-	60	-	25
Stairs	-	60	-	48
Ass Bath	-	60	-	46
Stairs	-	60	-	48
Manager office	60	-	-	144
Drugs Room	60	-	-	120
Foyer GF 6	-	60	-	56
Admin Room	60	-	-	206
wc	-	60	-	21
Foyer GF 4	-	60	-	109
Gf_BED 014	-	60	-	66
Gf_Br 014	-	60	-	24
Gf_ Br 015	-	60	-	24
Gf_BED 015	-	60	-	65
GF_ Br 016	-	60	-	24
GF_ BED 016	-	60	-	65
GF_BED 017	-	60	-	68
GF_BR 017	-	60	-	26
Gf_BR018	-	60	-	23
Gf_BED 018	-	60	-	67
Gf_BED 019	-	60	-	63
Gf_BR 019	-	60	-	24
Gf_BR 020	-	60	-	24
Gf_BED 020	-	60	-	62
Gf_BR021	-	60	-	25
Gf_BED 021	-	60	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
WC	-	60	-	19
Assisted Bath	-	60	-	59
LIFT	-	60	-	24
GF_Dining/ Lounge Room	-	60	-	304
Gf_BR 013	-	60	-	26
Gf_BED 013	-	60	-	61
Gf_BED 012	-	60	-	65
GF _BR 012	-	60	-	23
Gf_BED 011	-	60	-	65
Gf_BR 011	-	60	-	23
Gf_BED 01	-	60	-	65
Gf_BR 01	-	60	-	24
Gf_BR 02	-	60	-	24
Gf_BED 02	-	60	-	62
Gf_BR 03	-	60	-	24
Gf_BED 03	-	60	-	66
Gf_BR04	-	60	-	24
Gf_BED 04	-	60	-	65
Gf_BR 05	-	60	-	24
Gf_BED 05	-	60	-	65
Gf_BR 06	-	60	-	24
Gf_BED 06	-	60	-	63
Gf_BED 07	-	60	-	71
Gf_BR 07	-	60	-	24
Gf_BR 08	-	60	-	26
Gf_BED 08	-	60	-	66
Gf_BR 010	-	60	-	24
Gf_BED 010	-	60	-	63
Gf_BED 09	-	60	-	63
Gf_BR 09	-	60	-	24
Dining Room	-	60	-	187
Foyer GF 5	-	60	-	200
Foyer 1 & Sitting area	-	60	-	183
1st F_BED 022	-	60	-	65
1st F_BR 022	-	60	-	24
1st F_BR 023	-	60	-	24
1st F_BED 023	-	60	-	62
1st F_Sluice	-	60	-	31
1st F_BR 024	-	60	-	24
1st F_BED 024	-	60	-	66
1st F_BR 025	-	60	-	24
1st F_BED 025	-	60	-	65
1st F_BR 026	-	60	-	24

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st _BED 026	-	60	-	65
1st F_BR 027	-	60	-	24
1st F_BED 027	-	60	-	63
1st F_BED 028	-	60	-	71
1st F_BR 028	-	60	-	24
1st F_BED 029	-	60	-	66
1st F _Foyer 6	-	60	-	56
1st F_Stairs	-	60	-	48
1st F_BR 031	-	60	-	24
1st F_BED 031	-	60	-	63
1st F_BED 030	-	60	-	63
1st F_BR 030	-	60	-	24
1st F_Drugs Room	-	60	-	43
1st F_BR 033	-	60	-	21
1st F_BED 033	-	60	-	60
1st F_Stairs case	-	60	-	46
Stairs and Main entrance	-	60	-	80
1st F dining room extension	-	60	-	39
1st F_BR 034	-	60	-	25
1st F_ BED 034	-	60	-	60
1st F_BED 035	-	60	-	60
1st F_BR 035	-	60	-	25
1st F_Foyer 1 & Sitting area	-	60	-	183
1ST f_Stairs	-	60	-	48
1st f_BED 039	-	60	-	66
1st f_Br 039	-	60	-	24
1st_ Br 040	-	60	-	24
1st F_BED 040	-	60	-	65
1st f_ Br 041	-	60	-	24
1st f_ BED 041	-	60	-	65
1st F_BED 042	-	60	-	68
1st F_BR 042	-	60	-	26
1st F_BR 043	-	60	-	23
1st F_BED 043	-	60	-	67
1st_F 044	-	60	-	63
1st F_BR 044	-	60	-	24
1st F_BR 045	-	60	-	24
1st F_BED 045	-	60	-	62
1st F_Assisted Bath	-	60	-	59
1st F_LIFT	-	60	-	24
1st f_BR 036	-	60	-	23
1st F_BR046	-	60	-	25
1st F_BED 046	-	60	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st F_BR 038	-	60	-	26
1st F_BED 038	-	60	-	61
1st f_BED 037	-	60	-	65
1st f_BED 036	-	60	-	65
1st f _BR 037	-	60	-	23
1st F_WC	-	60	-	30
Foyer 3	-	60	-	50
Foyer 2	-	60	-	35
1st F_BR 032	-	60	-	23
1st F_BED 032	-	60	-	62
1st F_Assisted Bathroom	-	60	-	47
1st F_Foyer 5	-	60	-	200
1st F_Foyer 4	-	60	-	38
1st F_Dning / Lounge room	-	60	-	382
1st F_Foyer 3	-	60	-	41
1st F_Store	60	-	-	53
2nd F_BED 047	-	60	-	65
2nd F_BR 047	-	60	-	24
2nd F_BED 048	-	60	-	62
1st F_Sluice (1)	-	60	-	31
2nd F_BR 049	-	60	-	24
2nd F_BED 049	-	60	-	66
2nd F_BR 050	-	60	-	24
2nd F_BED 050	-	60	-	65
2nd F_BR 051	-	60	-	24
2nd F _BED 051	-	60	-	65
2nd F_BR 052	-	60	-	24
2nd F_BED 052	-	60	-	63
2nd F_BED 053	-	60	-	71
2nd F_BR 053	-	60	-	24
1st F _Foyer 6 (1)	-	60	-	56
1st F_Stairs (1)	-	60	-	48
2nd F_BR 055	-	60	-	24
2nd F_BED 055	-	60	-	63
2nd F_BED 054	-	60	-	63
2nd F_BR 054	-	60	-	24
1st F_Stairs case (1)	-	60	-	46
2nd F_BR 056	-	60	-	23
2nd F_BED 056	-	60	-	62
2nd F_Assisted Bathroom	-	60	-	47
2nd F_Foyer 3	-	60	-	38
1st _BR 029	-	60	-	26
2nd F_Store	60	-	-	71

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
2nd F_BR 048	-	60	-	24
2nd F_Foyer 4	-	60	-	39
2nd F_Foyer 5	-	60	-	165
2nd F_Drugs Room	-	60	-	43
2nd F_BR 058	-	60	-	22
2nd F_BED 057	-	60	-	60
2nd F_BR 057	-	60	-	21
2nd F_BED 058	-	60	-	76
2nd F_BR 059	-	60	-	22
2nd F_BED 059	-	60	-	72
2nd F_BED 060	-	60	-	63
2nd F_BR 060	-	60	-	23
2nd F_Dining/Lounge Room	-	60	-	343
1st F_Foyer 2	-	60	-	35
2nd F_Foyer 1	-	60	-	28
stairs	-	60	-	48
Archive Store	60	-	-	205
Staff Room	60	-	-	351
Hairn and beauty	-	60	-	146
Training/Conference Room	60	-	-	697
Plant Room	60	-	-	213
wc	-	60	-	33
Cooms Room	60	-	-	122
Stairs	-	60	-	46
Entrance	-	60	22	180
Lift + DW	-	60	-	34
kitchen	-	60	-	578
store	60	-	-	40
Store	60	-	-	43
Female change	-	60	-	62
Male Change	-	60	-	62
Store	60	-	-	239
Stairs	-	60	-	48
Kitchen change	-	60	-	92
Laundry Room	-	60	-	517
Cinema	60	-	-	379
Lift	-	60	-	24
Private Family Room	60	-	-	332
Sensory Room	-	60	-	166
Activity Room	60	-	-	588
wc	-	60	-	34
Foyer 1	-	60	-	118
wc	-	60	-	30

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Office space	60	-	-	193
Meeting Room	60	-	-	408
Foyer 4	-	60	-	188
Foyer 2	-	60	-	20
Foyer 3	-	60	-	122

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Manager office	NO (-78.5%)	NO
Drugs Room	N/A	N/A
Admin Room	NO (-77.5%)	NO
Gf_BED 014	NO (-78.8%)	NO
Gf_BED 015	NO (-78.8%)	NO
GF_ BED 016	NO (-78.8%)	NO
GF_BED 017	NO (-88.8%)	NO
Gf_BED 018	NO (-85.1%)	NO
Gf_BED 019	NO (-72.9%)	NO
Gf_BED 020	NO (-72.5%)	NO
Gf_BED 021	NO (-64.8%)	NO
GF_Dining/ Lounge Room	NO (-77.2%)	NO
Gf_BED 013	NO (-84.3%)	NO
Gf_BED 012	NO (-71.6%)	NO
Gf_BED 011	NO (-67.3%)	NO
Gf_BED 01	NO (-73.4%)	NO
Gf_BED 02	NO (-72.9%)	NO
Gf_BED 03	NO (-84%)	NO
Gf_BED 04	NO (-72.9%)	NO
Gf_BED 05	NO (-72.9%)	NO
Gf_BED 06	NO (-73.4%)	NO
Gf_BED 07	NO (-76.9%)	NO
Gf_BED 08	NO (-84%)	NO
Gf_BED 010	NO (-78%)	NO
Gf_BED 09	NO (-78%)	NO
Dining Room	NO (-58.8%)	NO
1st F_BED 022	NO (-73.4%)	NO
1st F_BED 023	NO (-72.9%)	NO
1st F_Sluice	NO (-63.5%)	NO
1st F_BED 024	NO (-84%)	NO
1st F_BED 025	NO (-72.9%)	NO
1st _BED 026	NO (-72.9%)	NO
1st F_BED 027	NO (-73.4%)	NO
1st F_BED 028	NO (-76.9%)	NO
1st F_BED 029	NO (-84%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1st F_BED 031	NO (-78%)	NO
1st F_BED 030	NO (-78%)	NO
1st F_Drugs Room	N/A	N/A
1st F_BED 033	NO (-59.8%)	NO
1st F dining room extension	NO (-56%)	NO
1st F_ BED 034	NO (-62.2%)	NO
1st F_BED 035	NO (-52.4%)	NO
1st f_BED 039	NO (-78.8%)	NO
1st F_BED 040	NO (-78.8%)	NO
1st f_ BED 041	NO (-78.8%)	NO
1st F_BED 042	NO (-88.8%)	NO
1st F_BED 043	NO (-85.1%)	NO
1st_F 044	NO (-72.9%)	NO
1st F_BED 045	NO (-72.5%)	NO
1st F_BED 046	NO (-64.9%)	NO
1st F_BED 038	NO (-84.3%)	NO
1st f_BED 037	NO (-71.6%)	NO
1st f_BED 036	NO (-67.3%)	NO
1st F_BED 032	NO (-63.7%)	NO
1st F_Dning / Lounge room	NO (-73.1%)	NO
2nd F_BED 047	NO (-73.4%)	NO
2nd F_BED 048	NO (-72.9%)	NO
1st F_Sluice (1)	NO (-63.5%)	NO
2nd F_BED 049	NO (-84%)	NO
2nd F_BED 050	NO (-72.9%)	NO
2nd F _BED 051	NO (-72.9%)	NO
2nd F_BED 052	NO (-73.4%)	NO
2nd F_BED 053	NO (-76.9%)	NO
2nd F_BED 055	NO (-78%)	NO
2nd F_BED 054	NO (-78%)	NO
2nd F_BED 056	NO (-63.7%)	NO
2nd F_Drugs Room	N/A	N/A
2nd F_BED 057	NO (-62.3%)	NO
2nd F_BED 058	NO (-74.2%)	NO
2nd F_BED 059	NO (-65.8%)	NO
2nd F_BED 060	NO (-67.6%)	NO
2nd F_Dining/Lounge Room	NO (-80%)	NO
Staff Room	N/A	N/A
Training/Conference Room	N/A	N/A
Cooms Room	N/A	N/A
Entrance	N/A	N/A
Cinema	NO (-65.8%)	NO
Private Family Room	NO (-79.5%)	NO
Activity Room	NO (-86.7%)	NO
Office space	N/A	N/A
Meeting Room	NO (-79.4%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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
Area [m^2]	3624.4	3624.4
External area [m^2]	3905.7	3905.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	1103.03	1759.23
Average U-value [W/m^2K]	0.28	0.45
Alpha value* [%]	23.88	19.43

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
94	**C2 Residential Institutions: Hospitals and Care Homes**
6	**C2 Residential Institutions: Residential schools**
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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/m^2]

	Actual	Notional
Heating	35.04	42.91
Cooling	0	0
Auxiliary	4.02	2.2
Lighting	15.86	16.58
Hot water	100.02	100.02
Equipment*	60.53	60.53
TOTAL**	**154.94**	**161.71**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	285.03	344.93
Primary energy* [kWh/m^2]	225.82	230.6
Total emissions [kg/m^2]	39.5	40.4

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	107.9	177.2	35	0	4	0.86	0	0.91	0
	Notional	126.5	218.4	42.9	0	2.2	0.82	0	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.17	"SL000000_W4"
Floor	0.2	0.16	"MN000000_F"
Roof	0.15	0.16	"MN000000_C"
Windows, roof windows, and rooflights	1.5	1.29	"SL000000_W4_O0"
Personnel doors	1.5	1.03	"ST000000_W3_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	3

SBEM Main Calculation Output Document

Mon Apr 04 09:24:26 2022 v5.6.b.0

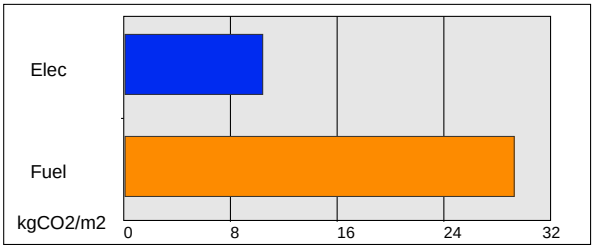
Building name

18 Pield Heath-Be Lean (Target

Building type: C2 Residential Institutions - Hospitals and Care Homes

SBEM is an energy calculation tool for the purpose of assessing and demonstrating compliance with Building Regulations (Part L for England and Wales, Section 6 for Scotland, Part F for Northern Ireland, and Building Bye-laws Jersey Part 11) and to produce Energy Performance Certificates and Building Energy Ratings. Although the data produced by the tool may be of use in the design process, **SBEM is not intended as a building design tool.**

Building Energy Performance and CO2 emissions

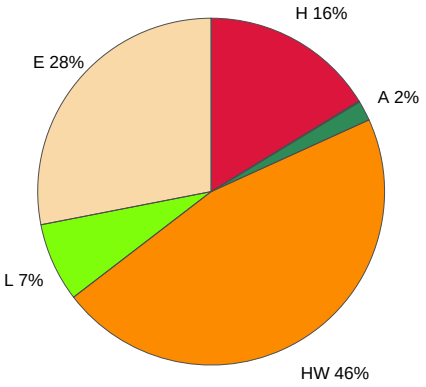


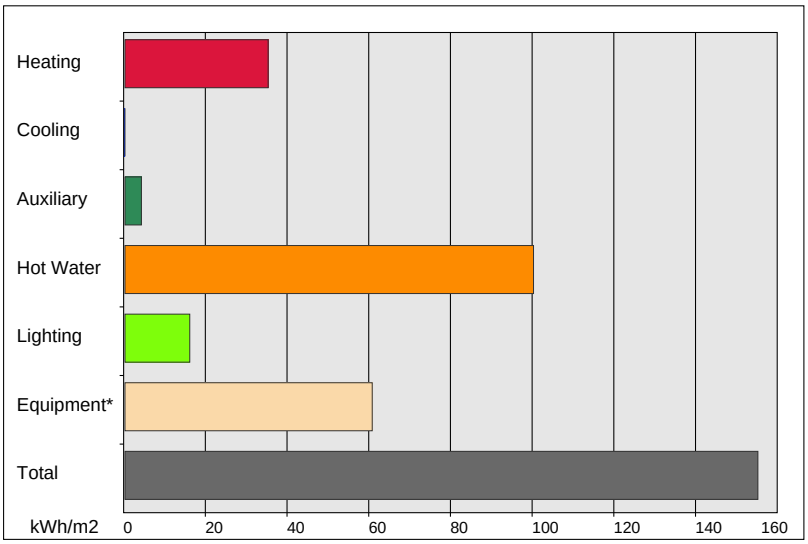
0 kgCO2/m2 displaced by the use of renewable sources.

Building area is 3624.4 m2

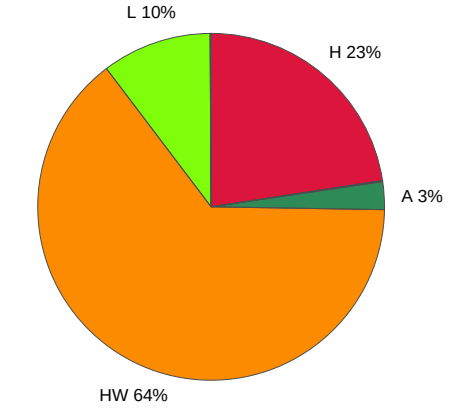
Annual Energy Consumption

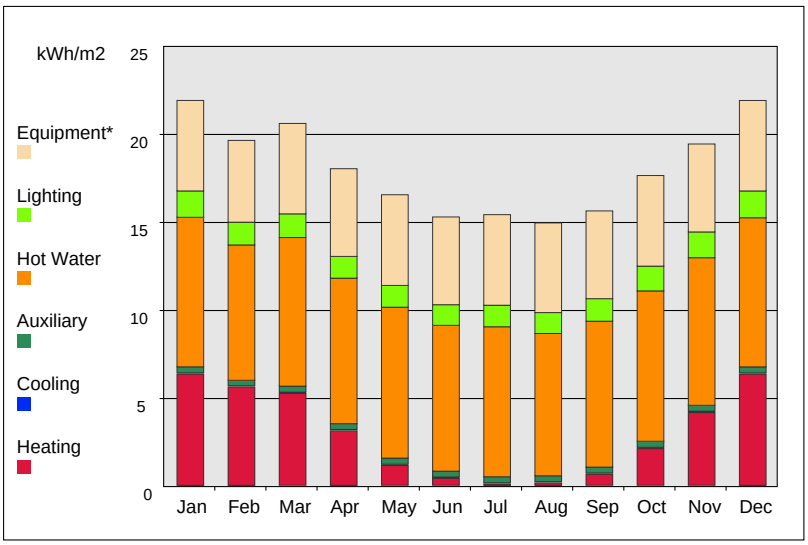
(Pie chart including Equipment end-use)





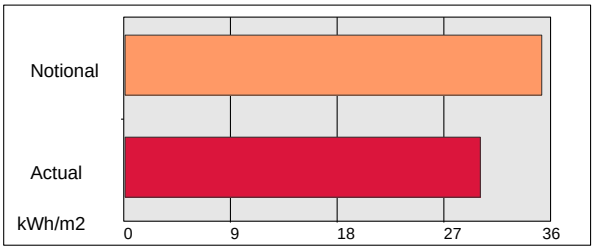
(Pie chart excluding Equipment end-use)

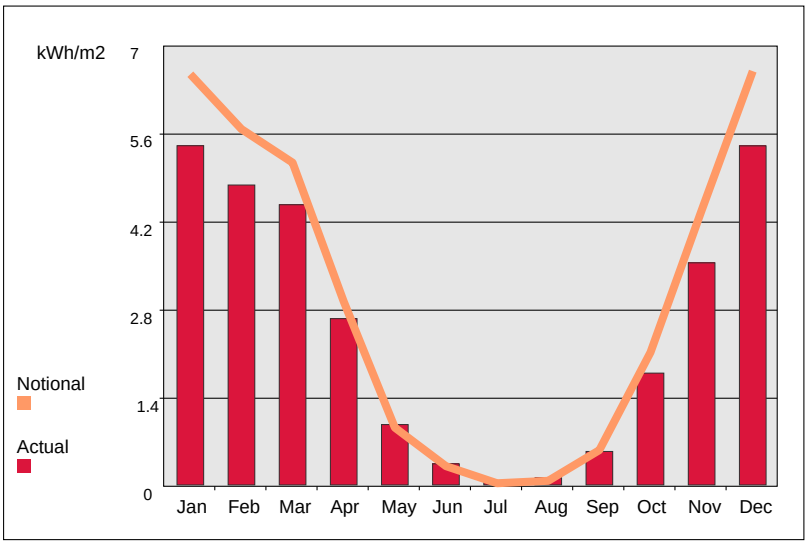




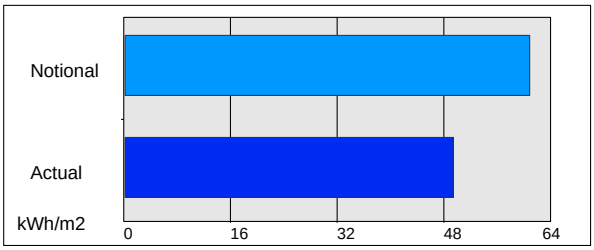
(*) Although energy consumption by equipment is shown in the graphs for information, this end-use has not been included in the total results of the building or the calculation of the ratings.

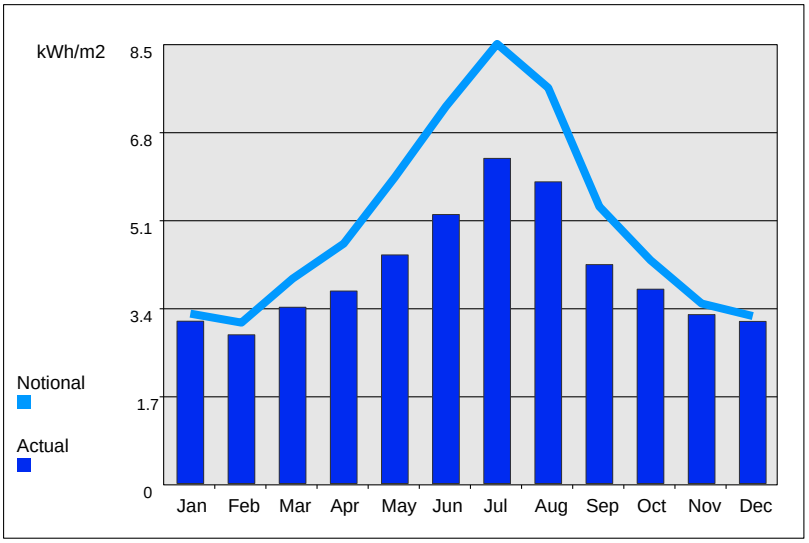
Annual Heating Demand





Annual Cooling Demand





BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

18 Pield Heath-Be Lean LETI+WWHR

As designed

Date: Mon Apr 04 15:39:02 2022

Administrative information

Building Details

Address: London, UB8 3NF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: SyntegraENG

Telephone number: 01184028520

Address: 63 Milford Rd, Reading, RG1 8LG

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	40.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	40.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	35.2
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.24	1.79	"FY000002_W17_A0"
Floor	0.25	0.08	0.08	"MN000000_F"
Roof	0.25	0.12	1.09	"LF000001_C_A0"
Windows***, roof windows, and rooflights	2.2	0.98	0.98	"SL000000_W4_O0"
Personnel doors	2.2	1.03	1.03	"ST000000_W3_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	1

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- Gas Boiler

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.91	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

1- SYST0000-DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Ass Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_Br 014	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_ Br 015	0.3	-	-	-	-	-	-	-	-	-	N/A
GF_ Br 016	0.3	-	-	-	-	-	-	-	-	-	N/A
GF_BR 017	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR018	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 019	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 020	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR021	0.3	-	-	-	-	-	-	-	-	-	N/A
WC	0.3	-	-	-	-	-	-	-	-	-	N/A
Assisted Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 013	0.3	-	-	-	-	-	-	-	-	-	N/A
GF _BR 012	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 011	0.3	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Gf_BR 01	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 02	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 03	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR04	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 05	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 06	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 07	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 08	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 010	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 09	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 022	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 023	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 024	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 025	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 026	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 027	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 028	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 031	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 030	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 033	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 034	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 035	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_Br 039	0.3	-	-	-	-	-	-	-	-	-	N/A
1st_ Br 040	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_ Br 041	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 042	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 043	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 044	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 045	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_Assisted Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_BR 036	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR046	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 038	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f _BR 037	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 032	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_Assisted Bathroom	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 047	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 049	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 050	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 051	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 052	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 053	0.3	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
2nd F_BR 055	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 054	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 056	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_Assisted Bathroom	0.3	-	-	-	-	-	-	-	-	-	N/A
1st _BR 029	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 048	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 058	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 057	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 059	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 060	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Sluice	-	60	-	25
Stairs	-	60	-	48
Ass Bath	-	60	-	46
Stairs	-	60	-	48
Manager office	60	-	-	144
Drugs Room	60	-	-	120
Foyer GF 6	-	60	-	56
Admin Room	60	-	-	206
wc	-	60	-	21
Foyer GF 4	-	60	-	109
Gf_BED 014	-	60	-	66
Gf_Br 014	-	60	-	24
Gf_ Br 015	-	60	-	24
Gf_BED 015	-	60	-	65
GF_ Br 016	-	60	-	24
GF_ BED 016	-	60	-	65
GF_BED 017	-	60	-	68
GF_BR 017	-	60	-	26
Gf_BR018	-	60	-	23
Gf_BED 018	-	60	-	67
Gf_BED 019	-	60	-	63
Gf_BR 019	-	60	-	24
Gf_BR 020	-	60	-	24
Gf_BED 020	-	60	-	62
Gf_BR021	-	60	-	25
Gf_BED 021	-	60	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
WC	-	60	-	19
Assisted Bath	-	60	-	59
LIFT	-	60	-	24
GF_Dining/ Lounge Room	-	60	-	304
Gf_BR 013	-	60	-	26
Gf_BED 013	-	60	-	61
Gf_BED 012	-	60	-	65
GF _BR 012	-	60	-	23
Gf_BED 011	-	60	-	65
Gf_BR 011	-	60	-	23
Gf_BED 01	-	60	-	65
Gf_BR 01	-	60	-	24
Gf_BR 02	-	60	-	24
Gf_BED 02	-	60	-	62
Gf_BR 03	-	60	-	24
Gf_BED 03	-	60	-	66
Gf_BR04	-	60	-	24
Gf_BED 04	-	60	-	65
Gf_BR 05	-	60	-	24
Gf_BED 05	-	60	-	65
Gf_BR 06	-	60	-	24
Gf_BED 06	-	60	-	63
Gf_BED 07	-	60	-	71
Gf_BR 07	-	60	-	24
Gf_BR 08	-	60	-	26
Gf_BED 08	-	60	-	66
Gf_BR 010	-	60	-	24
Gf_BED 010	-	60	-	63
Gf_BED 09	-	60	-	63
Gf_BR 09	-	60	-	24
Dining Room	-	60	-	187
Foyer GF 5	-	60	-	200
Foyer 1 & Sitting area	-	60	-	183
1st F_BED 022	-	60	-	65
1st F_BR 022	-	60	-	24
1st F_BR 023	-	60	-	24
1st F_BED 023	-	60	-	62
1st F_Sluice	-	60	-	31
1st F_BR 024	-	60	-	24
1st F_BED 024	-	60	-	66
1st F_BR 025	-	60	-	24
1st F_BED 025	-	60	-	65
1st F_BR 026	-	60	-	24

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st _BED 026	-	60	-	65
1st F_BR 027	-	60	-	24
1st F_BED 027	-	60	-	63
1st F_BED 028	-	60	-	71
1st F_BR 028	-	60	-	24
1st F_BED 029	-	60	-	66
1st F _Foyer 6	-	60	-	56
1st F_Stairs	-	60	-	48
1st F_BR 031	-	60	-	24
1st F_BED 031	-	60	-	63
1st F_BED 030	-	60	-	63
1st F_BR 030	-	60	-	24
1st F_Drugs Room	-	60	-	43
1st F_BR 033	-	60	-	21
1st F_BED 033	-	60	-	60
1st F_Stairs case	-	60	-	46
Stairs and Main entrance	-	60	-	80
1st F dining room extension	-	60	-	39
1st F_BR 034	-	60	-	25
1st F_ BED 034	-	60	-	60
1st F_BED 035	-	60	-	60
1st F_BR 035	-	60	-	25
1st F_Foyer 1 & Sitting area	-	60	-	183
1ST f_Stairs	-	60	-	48
1st f_BED 039	-	60	-	66
1st f_Br 039	-	60	-	24
1st_ Br 040	-	60	-	24
1st F_BED 040	-	60	-	65
1st f_ Br 041	-	60	-	24
1st f_ BED 041	-	60	-	65
1st F_BED 042	-	60	-	68
1st F_BR 042	-	60	-	26
1st F_BR 043	-	60	-	23
1st F_BED 043	-	60	-	67
1st_F 044	-	60	-	63
1st F_BR 044	-	60	-	24
1st F_BR 045	-	60	-	24
1st F_BED 045	-	60	-	62
1st F_Assisted Bath	-	60	-	59
1st F_LIFT	-	60	-	24
1st f_BR 036	-	60	-	23
1st F_BR046	-	60	-	25
1st F_BED 046	-	60	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st F_BR 038	-	60	-	26
1st F_BED 038	-	60	-	61
1st f_BED 037	-	60	-	65
1st f_BED 036	-	60	-	65
1st f _BR 037	-	60	-	23
1st F_WC	-	60	-	30
Foyer 3	-	60	-	50
Foyer 2	-	60	-	35
1st F_BR 032	-	60	-	23
1st F_BED 032	-	60	-	62
1st F_Assisted Bathroom	-	60	-	47
1st F_Foyer 5	-	60	-	200
1st F_Foyer 4	-	60	-	38
1st F_Dning / Lounge room	-	60	-	382
1st F_Foyer 3	-	60	-	41
1st F_Store	60	-	-	53
2nd F_BED 047	-	60	-	65
2nd F_BR 047	-	60	-	24
2nd F_BED 048	-	60	-	62
1st F_Sluice (1)	-	60	-	31
2nd F_BR 049	-	60	-	24
2nd F_BED 049	-	60	-	66
2nd F_BR 050	-	60	-	24
2nd F_BED 050	-	60	-	65
2nd F_BR 051	-	60	-	24
2nd F _BED 051	-	60	-	65
2nd F_BR 052	-	60	-	24
2nd F_BED 052	-	60	-	63
2nd F_BED 053	-	60	-	71
2nd F_BR 053	-	60	-	24
1st F _Foyer 6 (1)	-	60	-	56
1st F_Stairs (1)	-	60	-	48
2nd F_BR 055	-	60	-	24
2nd F_BED 055	-	60	-	63
2nd F_BED 054	-	60	-	63
2nd F_BR 054	-	60	-	24
1st F_Stairs case (1)	-	60	-	46
2nd F_BR 056	-	60	-	23
2nd F_BED 056	-	60	-	62
2nd F_Assisted Bathroom	-	60	-	47
2nd F_Foyer 3	-	60	-	38
1st _BR 029	-	60	-	26
2nd F_Store	60	-	-	71

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
2nd F_BR 048	-	60	-	24
2nd F_Foyer 4	-	60	-	39
2nd F_Foyer 5	-	60	-	165
2nd F_Drugs Room	-	60	-	43
2nd F_BR 058	-	60	-	22
2nd F_BED 057	-	60	-	60
2nd F_BR 057	-	60	-	21
2nd F_BED 058	-	60	-	76
2nd F_BR 059	-	60	-	22
2nd F_BED 059	-	60	-	72
2nd F_BED 060	-	60	-	63
2nd F_BR 060	-	60	-	23
2nd F_Dining/Lounge Room	-	60	-	343
1st F_Foyer 2	-	60	-	35
2nd F_Foyer 1	-	60	-	28
stairs	-	60	-	48
Archive Store	60	-	-	205
Staff Room	60	-	-	351
Hairn and beauty	-	60	-	146
Training/Conference Room	60	-	-	697
Plant Room	60	-	-	213
wc	-	60	-	33
Cooms Room	60	-	-	122
Stairs	-	60	-	46
Entrance	-	60	22	180
Lift + DW	-	60	-	34
kitchen	-	60	-	578
store	60	-	-	40
Store	60	-	-	43
Female change	-	60	-	62
Male Change	-	60	-	62
Store	60	-	-	239
Stairs	-	60	-	48
Kitchen change	-	60	-	92
Laundry Room	-	60	-	517
Cinema	60	-	-	379
Lift	-	60	-	24
Private Family Room	60	-	-	332
Sensory Room	-	60	-	166
Activity Room	60	-	-	588
wc	-	60	-	34
Foyer 1	-	60	-	118
wc	-	60	-	30

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Office space	60	-	-	193
Meeting Room	60	-	-	408
Foyer 4	-	60	-	188
Foyer 2	-	60	-	20
Foyer 3	-	60	-	122

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Manager office	NO (-78.6%)	NO
Drugs Room	N/A	N/A
Admin Room	NO (-77.6%)	NO
Gf_BED 014	NO (-78.9%)	NO
Gf_BED 015	NO (-78.9%)	NO
GF_ BED 016	NO (-78.9%)	NO
GF_BED 017	NO (-88.8%)	NO
Gf_BED 018	NO (-85.2%)	NO
Gf_BED 019	NO (-73%)	NO
Gf_BED 020	NO (-72.6%)	NO
Gf_BED 021	NO (-65%)	NO
GF_Dining/ Lounge Room	NO (-77.3%)	NO
Gf_BED 013	NO (-84.4%)	NO
Gf_BED 012	NO (-71.7%)	NO
Gf_BED 011	NO (-67.4%)	NO
Gf_BED 01	NO (-73.5%)	NO
Gf_BED 02	NO (-73%)	NO
Gf_BED 03	NO (-84.1%)	NO
Gf_BED 04	NO (-73%)	NO
Gf_BED 05	NO (-73%)	NO
Gf_BED 06	NO (-73.5%)	NO
Gf_BED 07	NO (-77%)	NO
Gf_BED 08	NO (-84.1%)	NO
Gf_BED 010	NO (-78.1%)	NO
Gf_BED 09	NO (-78.1%)	NO
Dining Room	NO (-59%)	NO
1st F_BED 022	NO (-73.5%)	NO
1st F_BED 023	NO (-73%)	NO
1st F_Sluice	NO (-63.7%)	NO
1st F_BED 024	NO (-84.1%)	NO
1st F_BED 025	NO (-73%)	NO
1st _BED 026	NO (-73%)	NO
1st F_BED 027	NO (-73.5%)	NO
1st F_BED 028	NO (-77%)	NO
1st F_BED 029	NO (-84.1%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1st F_BED 031	NO (-78.1%)	NO
1st F_BED 030	NO (-78.1%)	NO
1st F_Drugs Room	N/A	N/A
1st F_BED 033	NO (-60%)	NO
1st F dining room extension	NO (-56.2%)	NO
1st F_ BED 034	NO (-62.4%)	NO
1st F_BED 035	NO (-52.6%)	NO
1st f_BED 039	NO (-78.9%)	NO
1st F_BED 040	NO (-78.9%)	NO
1st f_ BED 041	NO (-78.9%)	NO
1st F_BED 042	NO (-88.8%)	NO
1st F_BED 043	NO (-85.2%)	NO
1st_F 044	NO (-73%)	NO
1st F_BED 045	NO (-72.6%)	NO
1st F_BED 046	NO (-65.1%)	NO
1st F_BED 038	NO (-84.4%)	NO
1st f_BED 037	NO (-71.7%)	NO
1st f_BED 036	NO (-67.4%)	NO
1st F_BED 032	NO (-63.9%)	NO
1st F_Dning / Lounge room	NO (-73.3%)	NO
2nd F_BED 047	NO (-73.5%)	NO
2nd F_BED 048	NO (-73%)	NO
1st F_Sluice (1)	NO (-63.7%)	NO
2nd F_BED 049	NO (-84.1%)	NO
2nd F_BED 050	NO (-73%)	NO
2nd F _BED 051	NO (-73%)	NO
2nd F_BED 052	NO (-73.5%)	NO
2nd F_BED 053	NO (-77%)	NO
2nd F_BED 055	NO (-78.1%)	NO
2nd F_BED 054	NO (-78.1%)	NO
2nd F_BED 056	NO (-63.9%)	NO
2nd F_Drugs Room	N/A	N/A
2nd F_BED 057	NO (-62.5%)	NO
2nd F_BED 058	NO (-74.4%)	NO
2nd F_BED 059	NO (-66%)	NO
2nd F_BED 060	NO (-67.8%)	NO
2nd F_Dining/Lounge Room	NO (-80.1%)	NO
Staff Room	N/A	N/A
Training/Conference Room	N/A	N/A
Cooms Room	N/A	N/A
Entrance	N/A	N/A
Cinema	NO (-66%)	NO
Private Family Room	NO (-79.6%)	NO
Activity Room	NO (-86.8%)	NO
Office space	N/A	N/A
Meeting Room	NO (-79.5%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	3624.4	3624.4
External area [m^2]	3905.7	3905.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	1	3
Average conductance [W/K]	832.96	1759.23
Average U-value [W/m^2K]	0.21	0.45
Alpha value* [%]	31.62	19.43

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
94	**C2 Residential Institutions: Hospitals and Care Homes**
6	**C2 Residential Institutions: Residential schools**
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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/m^2]

	Actual	Notional
Heating	30.53	42.91
Cooling	0	0
Auxiliary	4.02	2.2
Lighting	15.86	16.58
Hot water	84.78	100.02
Equipment*	60.53	60.53
TOTAL**	**135.19**	**161.71**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	278.71	344.93
Primary energy* [kWh/m^2]	201.72	230.6
Total emissions [kg/m^2]	35.2	40.4

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	94	184.7	30.5	0	4	0.86	0	0.91	0
	Notional	126.5	218.4	42.9	0	2.2	0.82	0	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.13	"SL000000_W4"
Floor	0.2	0.08	"MN000000_F"
Roof	0.15	0.11	"MN000000_C"
Windows, roof windows, and rooflights	1.5	0.98	"SL000000_W4_O0"
Personnel doors	1.5	1.03	"ST000000_W3_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	1

SBEM Main Calculation Output Document

Mon Apr 04 15:28:01 2022 v5.6.b.0

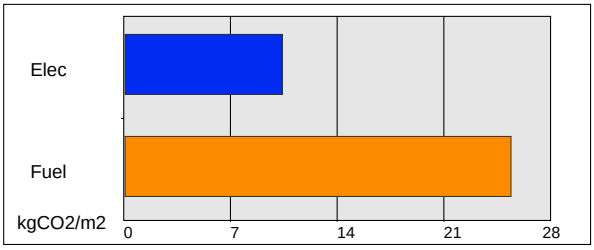
Building name

18 Pield Heath-Be Lean LETI+WW

Building type: C2 Residential Institutions - Hospitals and Care Homes

SBEM is an energy calculation tool for the purpose of assessing and demonstrating compliance with Building Regulations (Part L for England and Wales, Section 6 for Scotland, Part F for Northern Ireland, and Building Bye-laws Jersey Part 11) and to produce Energy Performance Certificates and Building Energy Ratings. Although the data produced by the tool may be of use in the design process, **SBEM is not intended as a building design tool.**

Building Energy Performance and CO2 emissions

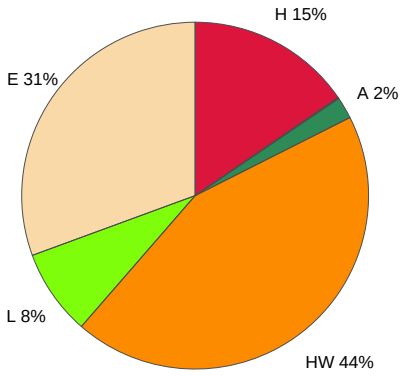


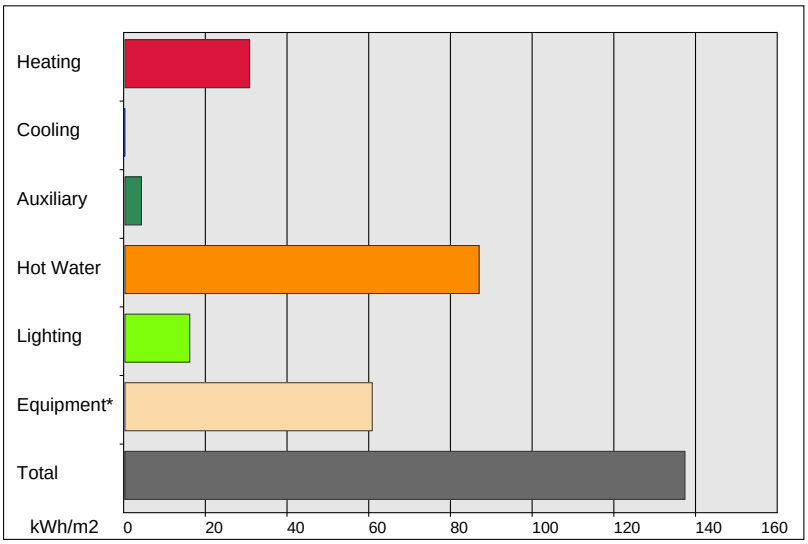
0 kgCO2/m2 displaced by the use of renewable sources.

Building area is 3624.4 m2

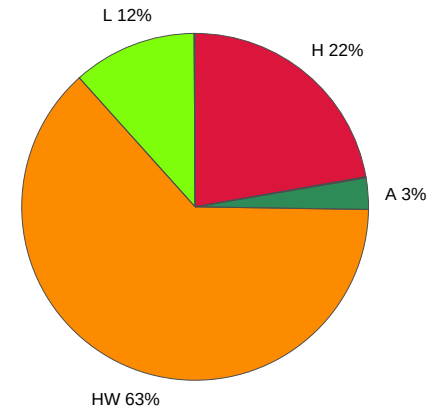
Annual Energy Consumption

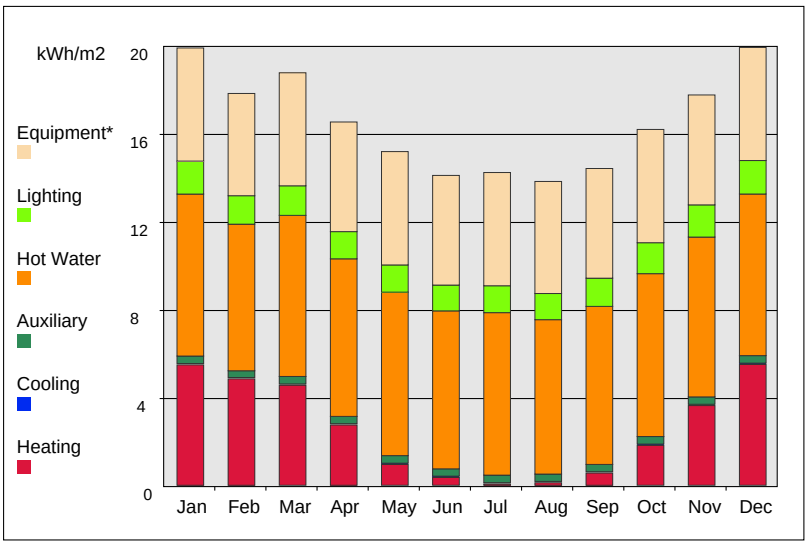
(Pie chart including Equipment end-use)





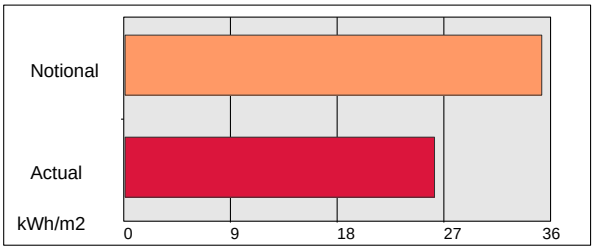
(Pie chart excluding Equipment end-use)

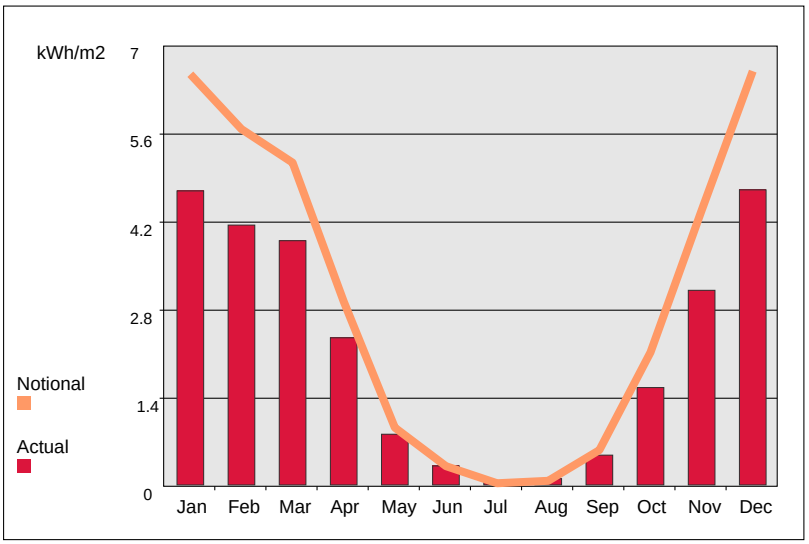




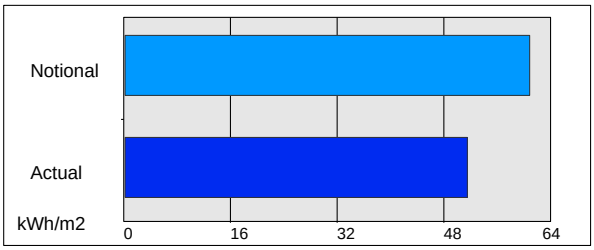
(*) Although energy consumption by equipment is shown in the graphs for information, this end-use has not been included in the total results of the building or the calculation of the ratings.

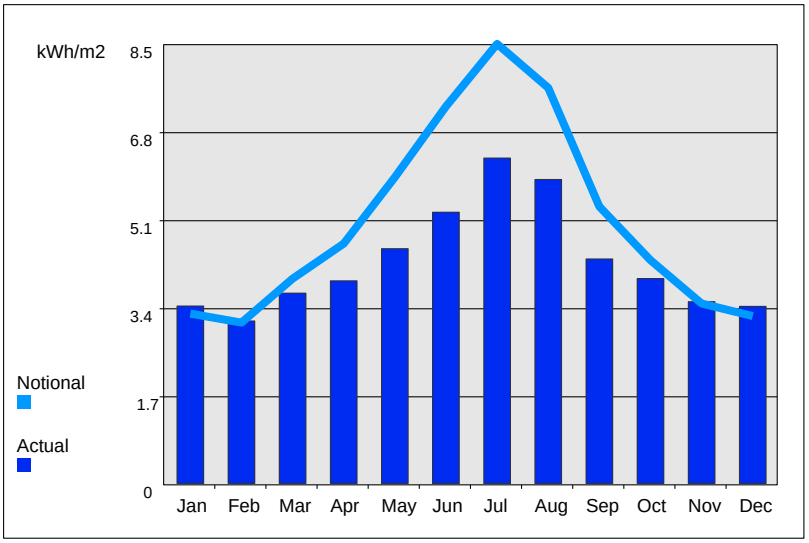
Annual Heating Demand





Annual Cooling Demand





BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

18 Pield Heath-Be Green ASHP+WWHR

As designed

Date: Mon Apr 04 17:21:39 2022

Administrative information

Building Details

Address: London, UB8 3NF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: SyntegraENG

Telephone number: 01184028520

Address: 63 Milford Rd, Reading, RG1 8LG

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, kgCO_2/m^2.annum	33.9
Target CO_2 emission rate (TER), kgCO_2/m^2.annum	33.9
Building CO_2 emission rate (BER), kgCO_2/m^2.annum	25.3
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.24	1.79	"FY000002_W17_A0"
Floor	0.25	0.08	0.08	"MN000000_F"
Roof	0.25	0.12	1.09	"LF000001_C_A0"
Windows***, roof windows, and rooflights	2.2	0.98	0.98	"SL000000_W4_O0"
Personnel doors	2.2	1.03	1.03	"ST000000_W3_O0"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m^{2}K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m^{2}K)]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m^{2}K)]

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m^3/(h.m^2) at 50 Pa	10	1

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- ASHP

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

1- SYST0001-DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Ass Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_Br 014	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_ Br 015	0.3	-	-	-	-	-	-	-	-	-	N/A
GF_ Br 016	0.3	-	-	-	-	-	-	-	-	-	N/A
GF_BR 017	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR018	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 019	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 020	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR021	0.3	-	-	-	-	-	-	-	-	-	N/A
WC	0.3	-	-	-	-	-	-	-	-	-	N/A
Assisted Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 013	0.3	-	-	-	-	-	-	-	-	-	N/A
GF _BR 012	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 011	0.3	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Gf_BR 01	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 02	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 03	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR04	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 05	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 06	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 07	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 08	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 010	0.3	-	-	-	-	-	-	-	-	-	N/A
Gf_BR 09	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 022	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 023	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 024	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 025	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 026	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 027	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 028	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 031	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 030	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 033	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 034	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 035	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_Br 039	0.3	-	-	-	-	-	-	-	-	-	N/A
1st_ Br 040	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_ Br 041	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 042	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 043	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 044	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 045	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_Assisted Bath	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f_BR 036	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR046	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 038	0.3	-	-	-	-	-	-	-	-	-	N/A
1st f _BR 037	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_WC	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_BR 032	0.3	-	-	-	-	-	-	-	-	-	N/A
1st F_Assisted Bathroom	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 047	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 049	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 050	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 051	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 052	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 053	0.3	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
2nd F_BR 055	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 054	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 056	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_Assisted Bathroom	0.3	-	-	-	-	-	-	-	-	-	N/A
1st _BR 029	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 048	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 058	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 057	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 059	0.3	-	-	-	-	-	-	-	-	-	N/A
2nd F_BR 060	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A
wc	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Sluice	-	60	-	25
Stairs	-	60	-	48
Ass Bath	-	60	-	46
Stairs	-	60	-	48
Manager office	60	-	-	144
Drugs Room	60	-	-	120
Foyer GF 6	-	60	-	56
Admin Room	60	-	-	206
wc	-	60	-	21
Foyer GF 4	-	60	-	109
Gf_BED 014	-	60	-	66
Gf_Br 014	-	60	-	24
Gf_ Br 015	-	60	-	24
Gf_BED 015	-	60	-	65
GF_ Br 016	-	60	-	24
GF_ BED 016	-	60	-	65
GF_BED 017	-	60	-	68
GF_BR 017	-	60	-	26
Gf_BR018	-	60	-	23
Gf_BED 018	-	60	-	67
Gf_BED 019	-	60	-	63
Gf_BR 019	-	60	-	24
Gf_BR 020	-	60	-	24
Gf_BED 020	-	60	-	62
Gf_BR021	-	60	-	25
Gf_BED 021	-	60	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
WC	-	60	-	19
Assisted Bath	-	60	-	59
LIFT	-	60	-	24
GF_Dining/ Lounge Room	-	60	-	304
Gf_BR 013	-	60	-	26
Gf_BED 013	-	60	-	61
Gf_BED 012	-	60	-	65
GF _BR 012	-	60	-	23
Gf_BED 011	-	60	-	65
Gf_BR 011	-	60	-	23
Gf_BED 01	-	60	-	65
Gf_BR 01	-	60	-	24
Gf_BR 02	-	60	-	24
Gf_BED 02	-	60	-	62
Gf_BR 03	-	60	-	24
Gf_BED 03	-	60	-	66
Gf_BR04	-	60	-	24
Gf_BED 04	-	60	-	65
Gf_BR 05	-	60	-	24
Gf_BED 05	-	60	-	65
Gf_BR 06	-	60	-	24
Gf_BED 06	-	60	-	63
Gf_BED 07	-	60	-	71
Gf_BR 07	-	60	-	24
Gf_BR 08	-	60	-	26
Gf_BED 08	-	60	-	66
Gf_BR 010	-	60	-	24
Gf_BED 010	-	60	-	63
Gf_BED 09	-	60	-	63
Gf_BR 09	-	60	-	24
Dining Room	-	60	-	187
Foyer GF 5	-	60	-	200
Foyer 1 & Sitting area	-	60	-	183
1st F_BED 022	-	60	-	65
1st F_BR 022	-	60	-	24
1st F_BR 023	-	60	-	24
1st F_BED 023	-	60	-	62
1st F_Sluice	-	60	-	31
1st F_BR 024	-	60	-	24
1st F_BED 024	-	60	-	66
1st F_BR 025	-	60	-	24
1st F_BED 025	-	60	-	65
1st F_BR 026	-	60	-	24

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st _BED 026	-	60	-	65
1st F_BR 027	-	60	-	24
1st F_BED 027	-	60	-	63
1st F_BED 028	-	60	-	71
1st F_BR 028	-	60	-	24
1st F_BED 029	-	60	-	66
1st F _Foyer 6	-	60	-	56
1st F_Stairs	-	60	-	48
1st F_BR 031	-	60	-	24
1st F_BED 031	-	60	-	63
1st F_BED 030	-	60	-	63
1st F_BR 030	-	60	-	24
1st F_Drugs Room	-	60	-	43
1st F_BR 033	-	60	-	21
1st F_BED 033	-	60	-	60
1st F_Stairs case	-	60	-	46
Stairs and Main entrance	-	60	-	80
1st F dining room extension	-	60	-	39
1st F_BR 034	-	60	-	25
1st F_ BED 034	-	60	-	60
1st F_BED 035	-	60	-	60
1st F_BR 035	-	60	-	25
1st F_Foyer 1 & Sitting area	-	60	-	183
1ST f_Stairs	-	60	-	48
1st f_BED 039	-	60	-	66
1st f_Br 039	-	60	-	24
1st_ Br 040	-	60	-	24
1st F_BED 040	-	60	-	65
1st f_ Br 041	-	60	-	24
1st f_ BED 041	-	60	-	65
1st F_BED 042	-	60	-	68
1st F_BR 042	-	60	-	26
1st F_BR 043	-	60	-	23
1st F_BED 043	-	60	-	67
1st_F 044	-	60	-	63
1st F_BR 044	-	60	-	24
1st F_BR 045	-	60	-	24
1st F_BED 045	-	60	-	62
1st F_Assisted Bath	-	60	-	59
1st F_LIFT	-	60	-	24
1st f_BR 036	-	60	-	23
1st F_BR046	-	60	-	25
1st F_BED 046	-	60	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st F_BR 038	-	60	-	26
1st F_BED 038	-	60	-	61
1st f_BED 037	-	60	-	65
1st f_BED 036	-	60	-	65
1st f _BR 037	-	60	-	23
1st F_WC	-	60	-	30
Foyer 3	-	60	-	50
Foyer 2	-	60	-	35
1st F_BR 032	-	60	-	23
1st F_BED 032	-	60	-	62
1st F_Assisted Bathroom	-	60	-	47
1st F_Foyer 5	-	60	-	200
1st F_Foyer 4	-	60	-	38
1st F_Dning / Lounge room	-	60	-	382
1st F_Foyer 3	-	60	-	41
1st F_Store	60	-	-	53
2nd F_BED 047	-	60	-	65
2nd F_BR 047	-	60	-	24
2nd F_BED 048	-	60	-	62
1st F_Sluice (1)	-	60	-	31
2nd F_BR 049	-	60	-	24
2nd F_BED 049	-	60	-	66
2nd F_BR 050	-	60	-	24
2nd F_BED 050	-	60	-	65
2nd F_BR 051	-	60	-	24
2nd F _BED 051	-	60	-	65
2nd F_BR 052	-	60	-	24
2nd F_BED 052	-	60	-	63
2nd F_BED 053	-	60	-	71
2nd F_BR 053	-	60	-	24
1st F _Foyer 6 (1)	-	60	-	56
1st F_Stairs (1)	-	60	-	48
2nd F_BR 055	-	60	-	24
2nd F_BED 055	-	60	-	63
2nd F_BED 054	-	60	-	63
2nd F_BR 054	-	60	-	24
1st F_Stairs case (1)	-	60	-	46
2nd F_BR 056	-	60	-	23
2nd F_BED 056	-	60	-	62
2nd F_Assisted Bathroom	-	60	-	47
2nd F_Foyer 3	-	60	-	38
1st _BR 029	-	60	-	26
2nd F_Store	60	-	-	71

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
2nd F_BR 048	-	60	-	24
2nd F_Foyer 4	-	60	-	39
2nd F_Foyer 5	-	60	-	165
2nd F_Drugs Room	-	60	-	43
2nd F_BR 058	-	60	-	22
2nd F_BED 057	-	60	-	60
2nd F_BR 057	-	60	-	21
2nd F_BED 058	-	60	-	76
2nd F_BR 059	-	60	-	22
2nd F_BED 059	-	60	-	72
2nd F_BED 060	-	60	-	63
2nd F_BR 060	-	60	-	23
2nd F_Dining/Lounge Room	-	60	-	343
1st F_Foyer 2	-	60	-	35
2nd F_Foyer 1	-	60	-	28
stairs	-	60	-	48
Archive Store	60	-	-	205
Staff Room	60	-	-	351
Hairn and beauty	-	60	-	146
Training/Conference Room	60	-	-	697
Plant Room	60	-	-	213
wc	-	60	-	33
Cooms Room	60	-	-	122
Stairs	-	60	-	46
Entrance	-	60	22	180
Lift + DW	-	60	-	34
kitchen	-	60	-	578
store	60	-	-	40
Store	60	-	-	43
Female change	-	60	-	62
Male Change	-	60	-	62
Store	60	-	-	239
Stairs	-	60	-	48
Kitchen change	-	60	-	92
Laundry Room	-	60	-	517
Cinema	60	-	-	379
Lift	-	60	-	24
Private Family Room	60	-	-	332
Sensory Room	-	60	-	166
Activity Room	60	-	-	588
wc	-	60	-	34
Foyer 1	-	60	-	118
wc	-	60	-	30

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Office space	60	-	-	193
Meeting Room	60	-	-	408
Foyer 4	-	60	-	188
Foyer 2	-	60	-	20
Foyer 3	-	60	-	122

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Manager office	NO (-78.6%)	NO
Drugs Room	N/A	N/A
Admin Room	NO (-77.6%)	NO
Gf_BED 014	NO (-78.9%)	NO
Gf_BED 015	NO (-78.9%)	NO
GF_ BED 016	NO (-78.9%)	NO
GF_BED 017	NO (-88.8%)	NO
Gf_BED 018	NO (-85.2%)	NO
Gf_BED 019	NO (-73%)	NO
Gf_BED 020	NO (-72.6%)	NO
Gf_BED 021	NO (-65%)	NO
GF_Dining/ Lounge Room	NO (-77.3%)	NO
Gf_BED 013	NO (-84.4%)	NO
Gf_BED 012	NO (-71.7%)	NO
Gf_BED 011	NO (-67.4%)	NO
Gf_BED 01	NO (-73.5%)	NO
Gf_BED 02	NO (-73%)	NO
Gf_BED 03	NO (-84.1%)	NO
Gf_BED 04	NO (-73%)	NO
Gf_BED 05	NO (-73%)	NO
Gf_BED 06	NO (-73.5%)	NO
Gf_BED 07	NO (-77%)	NO
Gf_BED 08	NO (-84.1%)	NO
Gf_BED 010	NO (-78.1%)	NO
Gf_BED 09	NO (-78.1%)	NO
Dining Room	NO (-59%)	NO
1st F_BED 022	NO (-73.5%)	NO
1st F_BED 023	NO (-73%)	NO
1st F_Sluice	NO (-63.7%)	NO
1st F_BED 024	NO (-84.1%)	NO
1st F_BED 025	NO (-73%)	NO
1st _BED 026	NO (-73%)	NO
1st F_BED 027	NO (-73.5%)	NO
1st F_BED 028	NO (-77%)	NO
1st F_BED 029	NO (-84.1%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1st F_BED 031	NO (-78.1%)	NO
1st F_BED 030	NO (-78.1%)	NO
1st F_Drugs Room	N/A	N/A
1st F_BED 033	NO (-60%)	NO
1st F dining room extension	NO (-56.2%)	NO
1st F_ BED 034	NO (-62.4%)	NO
1st F_BED 035	NO (-52.6%)	NO
1st f_BED 039	NO (-78.9%)	NO
1st F_BED 040	NO (-78.9%)	NO
1st f_ BED 041	NO (-78.9%)	NO
1st F_BED 042	NO (-88.8%)	NO
1st F_BED 043	NO (-85.2%)	NO
1st_F 044	NO (-73%)	NO
1st F_BED 045	NO (-72.6%)	NO
1st F_BED 046	NO (-65.1%)	NO
1st F_BED 038	NO (-84.4%)	NO
1st f_BED 037	NO (-71.7%)	NO
1st f_BED 036	NO (-67.4%)	NO
1st F_BED 032	NO (-63.9%)	NO
1st F_Dning / Lounge room	NO (-73.3%)	NO
2nd F_BED 047	NO (-73.5%)	NO
2nd F_BED 048	NO (-73%)	NO
1st F_Sluice (1)	NO (-63.7%)	NO
2nd F_BED 049	NO (-84.1%)	NO
2nd F_BED 050	NO (-73%)	NO
2nd F _BED 051	NO (-73%)	NO
2nd F_BED 052	NO (-73.5%)	NO
2nd F_BED 053	NO (-77%)	NO
2nd F_BED 055	NO (-78.1%)	NO
2nd F_BED 054	NO (-78.1%)	NO
2nd F_BED 056	NO (-63.9%)	NO
2nd F_Drugs Room	N/A	N/A
2nd F_BED 057	NO (-62.5%)	NO
2nd F_BED 058	NO (-74.4%)	NO
2nd F_BED 059	NO (-66%)	NO
2nd F_BED 060	NO (-67.8%)	NO
2nd F_Dining/Lounge Room	NO (-80.1%)	NO
Staff Room	N/A	N/A
Training/Conference Room	N/A	N/A
Cooms Room	N/A	N/A
Entrance	N/A	N/A
Cinema	NO (-66%)	NO
Private Family Room	NO (-79.6%)	NO
Activity Room	NO (-86.8%)	NO
Office space	N/A	N/A
Meeting Room	NO (-79.5%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	3624.4	3624.4
External area [m^2]	3905.7	3905.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	1	3
Average conductance [W/K]	832.96	1759.23
Average U-value [W/m^2K]	0.21	0.45
Alpha value* [%]	31.62	19.43

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
94	**C2 Residential Institutions: Hospitals and Care Homes**
6	**C2 Residential Institutions: Residential schools**
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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/m^2]

	Actual	Notional
Heating	7.94	14.46
Cooling	0	0
Auxiliary	4.02	2.2
Lighting	15.86	16.58
Hot water	22.54	33.71
Equipment*	60.53	60.53
TOTAL**	**50.36**	**66.96**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	1.71	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	278.71	344.93
Primary energy* [kWh/m^2]	154.61	200.42
Total emissions [kg/m^2]	25.3	33.9

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

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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	94	184.7	7.9	0	4	3.29	0	3.5	0
	Notional	126.5	218.4	14.5	0	2.2	2.43	0	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.13	"SL000000_W4"
Floor	0.2	0.08	"MN000000_F"
Roof	0.15	0.11	"MN000000_C"
Windows, roof windows, and rooflights	1.5	0.98	"SL000000_W4_O0"
Personnel doors	1.5	1.03	"ST000000_W3_O0"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	1

SBEM Main Calculation Output Document

Mon Apr 04 17:21:37 2022 v5.6.b.0

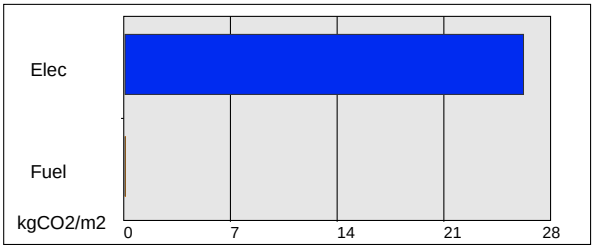
Building name

18 Pield Heath-Be Green ASHP+W

Building type: C2 Residential Institutions - Hospitals and Care Homes

SBEM is an energy calculation tool for the purpose of assessing and demonstrating compliance with Building Regulations (Part L for England and Wales, Section 6 for Scotland, Part F for Northern Ireland, and Building Bye-laws Jersey Part 11) and to produce Energy Performance Certificates and Building Energy Ratings. Although the data produced by the tool may be of use in the design process, **SBEM is not intended as a building design tool.**

Building Energy Performance and CO2 emissions

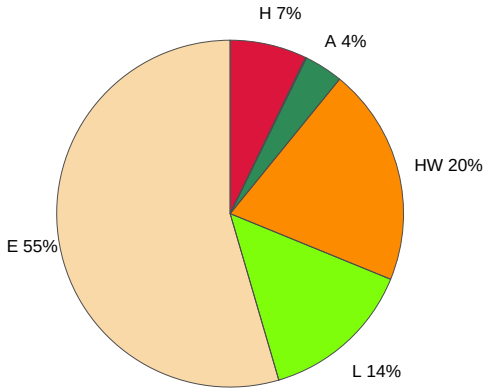


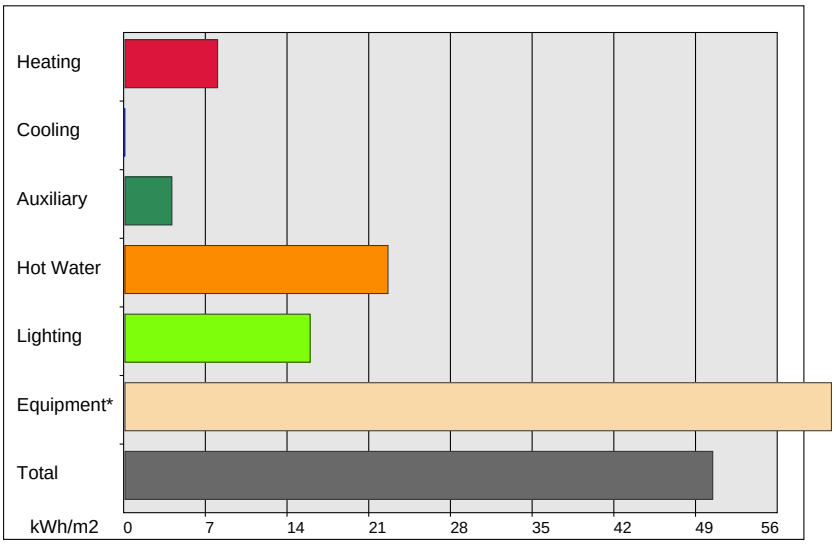
1 kgCO2/m2 displaced by the use of renewable sources.

Building area is 3624.4 m2

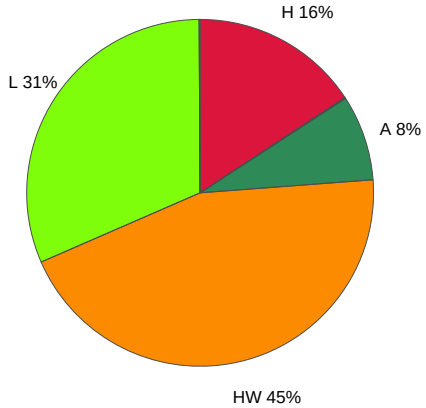
Annual Energy Consumption

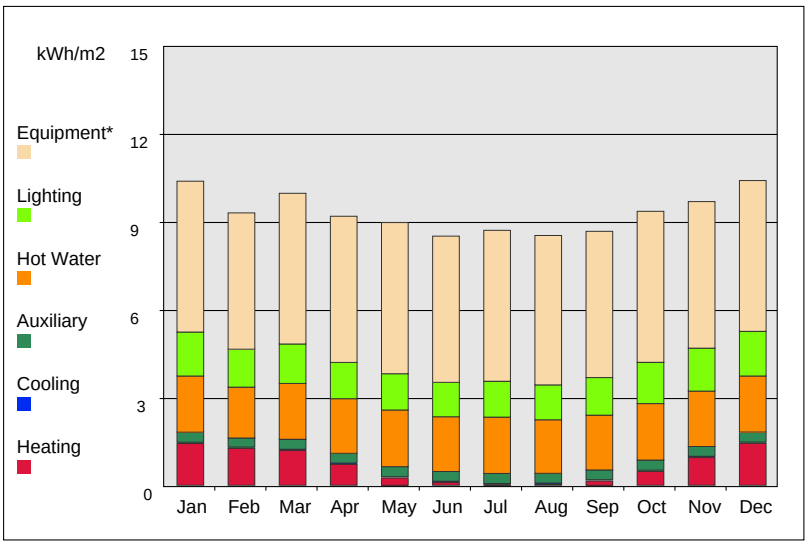
(Pie chart including Equipment end-use)





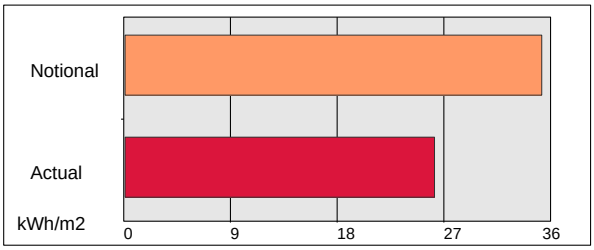
(Pie chart excluding Equipment end-use)

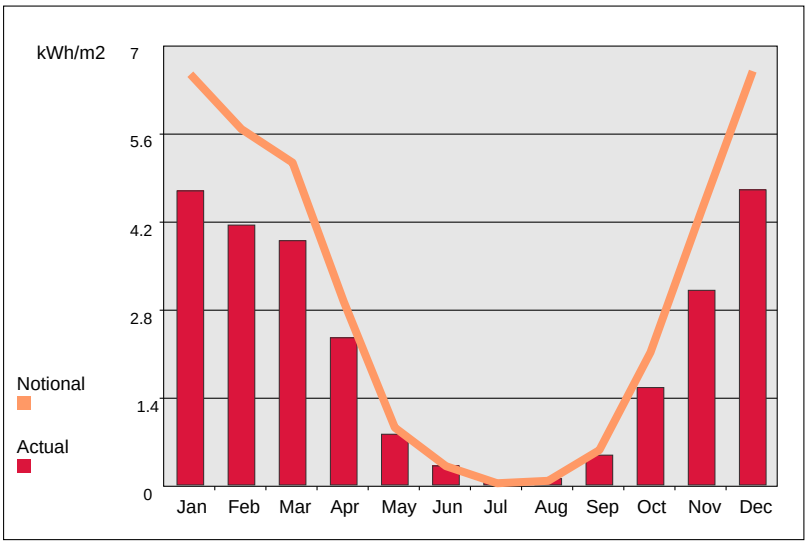




(*) Although energy consumption by equipment is shown in the graphs for information, this end-use has not been included in the total results of the building or the calculation of the ratings.

Annual Heating Demand





Annual Cooling Demand