VISION
ENERGY

ENERGY STATEMENT

01625 315040

info@vision-energy.co.uk

SAP03299 Energy Statement Proposed Development of Bay 6 and Bay 7

Nifty Lifts,

Platts Common Industrial Estate,

Mason Way,

Hoyland,

Barnsley

S74 9TF

Table 1 Document Version

REV	Date	Description	PREPARED	CHECKED
1	19/01/2024	First Draft V1	Dr Bilal Alsheglawi	D.Barsted

This report has been prepared for the client only and expressly for the purposes set out in February 2023 and we owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Contents

Contents 2
1.Executive Summary 3
1.1Introduction 3
1.2Policies and Requirements 3
1.3Energy Efficiency Measures 5
1.4Low Carbon Energy Supply 5
1.5On-site renewable technologies 5
1.6Site Description 5
1.7Renewable and Low Carbon Energy 6
2Methodology 7
2.1Limitations 7
2.2Energy Hierarchy 7
2.3 Carbon Factors 7
3.Be Lean Measures 8
3.1Thermal Insulation 8
3.2Fabric Air Permeability 9
3.3Improved Glazing Elements 9
3.4Summary of Be Lean Measures 10
4.Be Clean Measures 11
4.1Low Carbon Energy Supply 11
5.Be Green Measures 11
5.1Solar Hot Water Panels 11
5.2Photovoltaic (PV) Cells 12
5.3Combined Heat and Power (CHP) and Micro-CHP (mCHP) 12
5.4Ground Source Heat Pumps (GSHP) 13
5.5Air Source Heat Pumps (ASHP) 13
5.6Wind Turbines 13
5.7Biomass 14
5.8Summary of Be Green Measures 15
6.Conclusion 16
6.1Summary of energy efficient measures 16
6.2Summary of renewable or Low Carbon measures 16
6.3Summary of Carbon Emissions reductions 17

1. Executive Summary

1.1 Introduction

This energy strategy has been prepared on behalf of Richard Kalu, hereafter referred to as the Applicant, in support of a full planning application for the of bay 6 and bay 7 Nifty Lifts, Platts Common Industrial Estate, Mason Way, Hoyland, Barnsley S74 9TF, hereafter referred to as the Development.

1.2 Policies and Requirements

National Policies

Below outlines the national policies this energy statement has been developed in accordance with,

- **National Planning Policy Framework**

The National Planning Policy Framework sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced.

Local policies

Policy CC1 Climate Change

- Giving preference to development of previously developed land in sustainable locations.
- Promoting the reduction of greenhouse gas emissions through sustainable design and construction techniques.
- Locating and designing development to reduce the risk of flooding.
- Promoting the use of Sustainable Drainage Systems (SuDS).
- Promoting and supporting the delivery of renewable and low carbon energy; and
- Promoting investment in Green Infrastructure to promote and encourage biodiversity gain.

Policy CC2 Sustainable Design and Construction

Development will be expected to minimise resource and energy consumption through the inclusion of sustainable design and construction features, where this is technically feasible and viable.

All non-residential development will be expected, to achieve a minimum standard of BREEAM 'Very Good' (or any future national equivalent). This should be supported by preliminary assessments at planning application stage

1.3 Energy Efficiency Measures

The proposed development incorporates several energy efficiency measure and designs to ensure compliance & C02 reduction including:

- Fabric Insulation improvements on Building Regulations Part L2a minimum standards,
- Air permeability improvements on Building Regulations Part L2a minimum standards,
- Improved U & G Values for the development,
- Accredited thermal bridging scheme adopted for cold bridging to minimise heat loss.
- Low Energy lighting scheme adopted on site.

1.4 Low Carbon Energy Supply

The proposed development does not have a significant thermal demand and is not within an area of which allows for a decentralised energy network to be utilised, therefore this option will not be explored further within this energy statement. It is recommended that the site is development in a manner that will allow to connection to a district heating system in the future is one is to become feasible.

1.5 On-site renewable technologies

The proposed design of the development incorporates the use of **Air Source Heat Pump t**o meet the requirements of the local authority. Further options have been reviewed to provide further carbon reductions; the use of on-site renewable technologies has been reviewed in further details within this statement.

1.6 Site Description

This report analyses the performance of the ground floor area of the proposed development. Which is consist of two storage units. The following figure illustrate the IES model of the proposed development:

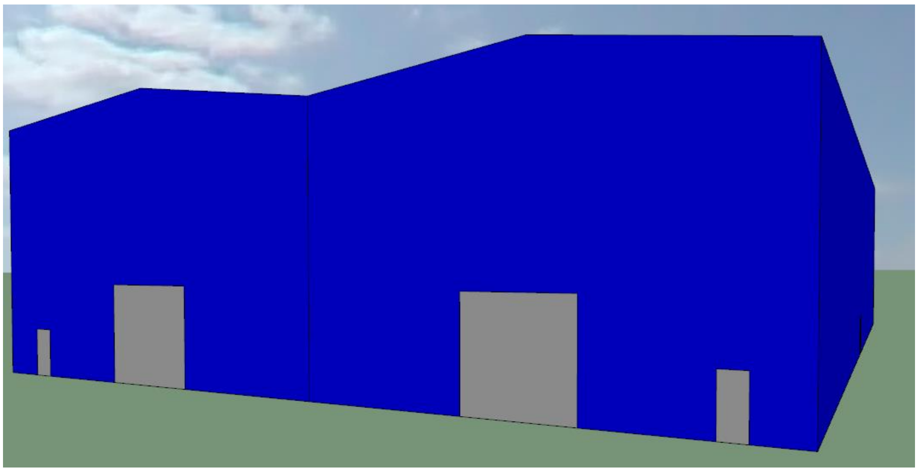

Figure 1 Model view

1.7 Renewable and Low Carbon Energy

Overall, 23% of the predicted energy requirements is to be produced utilising Renewable or Low Carbon technologies as shown below, totalling a reduction of 23% site wide.

Table 2 Low Carbon technologies of proposed building

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per Annum)	%
Be lean: Savings from energy demand reduction	0	0
Be clean: Savings from heat network	0	0
Be green: Savings from renewable energy	0.2	23%
Cumulative on-site savings	0.2	23%

3 Methodology

3.1 Limitations

The calculations and figures utilised within this energy statement are based on Building regulations Part L methodology and should not be understood as a predictive assessment of likely future energy requirements. Other external factors will be present such as occupant system operation patterns and weather patterns.

3.2 Energy Hierarchy

The assessment has been carried out in accordance to the energy hierarchy method in line with GLA policy/s. The energy hierarchy method has been utilised to ensure the design of the development has reduced the demand for energy as far as reasonably practicable prior to the consideration of integrating Low or Zero Carbon technologies.

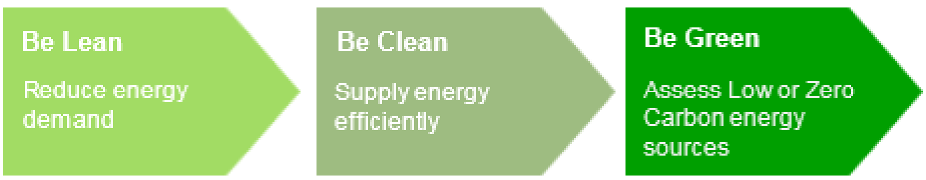

Figure 1 Energy Hierarchy

3.3 Carbon Factors

The below emissions factors were used to convert the energy requirement figures into $C0^2$ emissions; figures taken from Building Regulations Part L 2021 In Accordance with approved document guidance the below SAP 10 emission factors have been used within the calculations.

Table 3 Carbon Factors

Fuel	Emission Factor (kgC02/KWh)
Gas	0.210
Electricity	0.233

4 Be Lean Measures

The following sections details the design measures that have been considered/to be implemented at the development.

4.1 Thermal Insulation

To reduce the overall heating and cooling requirements for the development it is imperative that the development incorporates an efficient thermal envelope. The below elements have been considered for the development.

- Fabric Insulation improvements on Building Regulations Part L2a minimum standards,
- Air permeability improvements on Building Regulations Part L2a minimum standards,
- Improved U & G Values for the development,
- Low Energy lighting scheme adopted on site.

The table below outlines the u-value targets for the development in comparison to the limiting factor set out in Building regulations Part L.

Table 4 Proposed Building U-values based on Part L regulations.

Element	U-Value (W/m2K)	
	Part L2 Limiting Factor	Proposed Building
Ground Floor	0.25	0.12
External Façade	0.55	0.16
Insulated at Ceiling Roof	0.16	0.12
Glazing	1.6	N/A
Doors	1.6	1.6
Air Permeability	8	8
Low Energy Lighting	60 Lm/W	120 Lm/W

4.2 Fabric Air Permeability

Fabric air permeability is a measure of the volume of air that can penetrate through the fabric of a building leading to ventilation heat loss and gain. An improved air permeability rate has been included within the development to reduce the heat loss and gain and therefore reduce the heating and cooling requirements.

4.3 Improved Glazing Elements

The proposed building has no windows. Hence, no improvements were proposed for glazing.

4.4 Summary of Be Lean Measures

Table 5 Summary of Be Lean Measures

Element	U-Value (W/m2K)		
	Part L2 Limiting Factor existing	Part L2 Limiting Factor new build	Proposed building
Ground Floor	0.25	0.18	0.12
External Façade	0.55	0.26	0.16
Insulated at Ceiling Roof	0.16	0.16	0.12
Glazing	1.6	1.6	N/A
Doors	1.6	1.6	1.6
Air Permeability	8	8	8
Low Energy Lighting	60 Lm/W	95 Lm/W	120 Lm/W

5 Be Clean Measures

5.1 Low Carbon Energy Supply

The proposed development does not have a significant thermal demand and is not within an area of which allows for a decentralised energy network to be utilised. Therefore, this option will not be explored further within this energy statement.

6 Be Green Measures

The following sections discuss the renewable energy generation measures that have been considered, and those which will be implemented at the Development.

Renewable technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available. However, not all these are commercially viable, suitable for city-centre locations or appropriate for the Development. Technologies considered for the Development include:

- Solar Hot Water Panels (Solar Thermal)
- Photovoltaic (PV) Cells
- Combined Heat and Power (CHP) and Micro-CHP (mCHP)
- Ground Source Heat Pumps (GSHP)
- Air Source Heat Pumps (ASHP)
- Wind Turbines

6.1 Solar Hot Water Panels

Solar Hot Water Panels or, Solar Panels as they are commonly known, are used to supplement the energy required for the domestic hot water requirement. The system will collect and absorb solar radiation and transfer the heat directly to the storage tank. The circulation may then be either ‘passive’ thus relying on the natural convection or ‘active’ using a pump which increases a system’s efficiency but has additional costs for the controls and energy requirement.

There are two main types of solar panel collector available to the UK market. The first is Flat Plate Collectors which consist of a dark absorber sheet with pipes built into the sheet encased in a weatherproof box. This will pump the collected solar radiation to the storage device to heat the water for use. The second main system is Evacuated Tube Collectors. These devices are more efficient and are effective under a "...wider range of conditions..." (TM38:2006) due to the energy being drawn from "...light rather than outside temperature..." This therefore allows this type of system to adapt to cooler climes.

Solar Hot Water Panels have been deemed viable for this development due to the available roof space. However, adding Solar Hot Water Panels did not offer reasonable reductions in energy consumption and carbon emissions that meet the finical and on-site feasibility requirements. Therefore, Solar Hot Water Panels are not recommended.

6.2 Photovoltaic (PV) Cells

Solar panel electricity systems, also known as solar Photovoltaics' (PV), capture the sun's energy using photovoltaic cells. These cells do not need direct sunlight to work - they can still generate some electricity on a cloudy day. The cells convert the sunlight into electricity, which can be used to run household appliances and lighting.

PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on your roof.

The power of a PV cell is measured in kilowatts peak (kWp). That is the rate at which it generates energy at peak performance in full direct sunlight during the summer. PV cells come in a variety of shapes and sizes. Most PV systems are made up of panels that fit on top of an existing roof, but you can also fit solar tiles.

Photovoltaic (PV) Cells have been considered and have been deemed viable for this site, the available roof space would accommodate the required level of PV array to meet the on-site reductions. However, Solar PV is not recommended for this project as it requires 180 Kwp to meet the requirements. Hence it does not meet the finical and on-site feasibility requirements.

6.3 Combined Heat and Power (CHP) and Micro-CHP (mCHP)

Micro-CHP' stands for micro combined heat and power. This technology generates heat and electricity simultaneously, from the same energy source, in individual homes or buildings. The main output of a micro-CHP system is heat, with some electricity generation, at a typical ratio of about 6:1 for domestic appliances.

A typical domestic system will generate up to 1kW of electricity once warmed up: the amount of electricity generated over a year depends on how long the system is able to run. Any electricity you generate and don't use can be sold back to the grid.

Domestic micro-CHP systems are currently powered by mains gas or LPG; in the future there may be models powered by oil or bio-liquids. Although gas and LPG are fossil fuels rather than renewable energy sources, the technology is still considered to be a 'low carbon technology' because it can be more efficient than just burning a fossil fuel for heat and getting electricity from the national grid. Micro-CHP systems are similar in size and shape to ordinary, domestic boilers and like them can be wall hung or floor standing. The only difference to a standard boiler is that they are able to generate electricity while they are heating water.

For the householder, there is little difference between a micro-CHP installation and a standard boiler. If the dwelling already has a conventional boiler, then a micro-CHP unit should be able to replace it as it's roughly the same size. However, the installer must be approved under the Micro generation Certification Scheme. Servicing costs and maintenance are estimated to be similar to a standard boiler – although a specialist will be required.

CHP and mCHP have been considered for the project, in order to house the system, an external additional plant area would be required and therefore the feasibility of the CHP has not been deemed acceptable or viable due to planning restrictions. Additionally, the carbon reductions for the mCHP system does not meet the Local Authority requirements due to the low heat demand.

6.4 Ground Source Heat Pumps (GSHP)

Ground source heat pumps use pipes which are buried in the garden to extract heat from the ground. This heat can then be used to heat radiators, underfloor or warm air heating systems and hot water in the home.

A ground source heat pump circulates a mixture of water and antifreeze around a loop of pipe - called a ground loop - which is buried in the garden. Heat from the ground is absorbed into the fluid and then passes through a heat exchanger into the heat pump. The ground stays at a constant temperature under the surface, so the heat pump can be used throughout the year - even in the middle of winter.

The length of the ground loop depends on the size of the home and the amount of heat needed. Longer loops can draw more heat from the ground, but need more space to be buried in. If space is limited, a vertical borehole can be drilled instead. Running costs will depend on several factors - including the size of the dwelling and how well insulated it is.

GSHP was avoided for this building, as there is no available ground space to accommodate the GSHP. A more suitable technology has been selected to reduce the carbon emissions as well as financial and on-site feasibility.

6.5 Air Source Heat Pumps (ASHP)

Air source heat pumps absorb heat from the outside air. This heat can then be used to heat radiators, underfloor heating systems, or warm air convectors and hot water in dwellings.

An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can get heat from the air even when the temperature is as low as -15° C. Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the ground, air, or water is constantly being renewed naturally.

Running costs will vary depending on several factors - including the size of the home, and how well insulated it is, and what room temperatures are achieved.

Air Source Heat Pump has been considered for the project and deemed a viable option for the project, the carbon reductions of the installation of a ASHP exceed the council requirements in carbon emissions, therefore this technology has been adopted on site.

6.6 Wind Turbines

Wind turbines harness the power of the wind and use it to generate electricity. Forty percent of all the wind energy in Europe blows over the UK, making it an ideal country for domestic turbines (known as 'micro wind' or 'small-wind' turbines). A typical system in an exposed site could easily generate more power than a dwelling’s lights and electrical appliances use.

Wind turbines use large blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced. There are two types of domestic-sized wind turbine:

Pole mounted: these are free standing and are erected in a suitably exposed position, often around 5kW to 6Kw

Building mounted: these are smaller than mast mounted systems and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size. Wind turbines are eligible for the UK government’s Feed-in-Tariffs which means money can be earned from the electricity generated by the turbine. Payments for the electricity does not use and export to the local grid are available as well. To be eligible, the installer and wind turbine product must be certified under the Microgeneration Certification Scheme (MCS). If the turbine is not connected to the local electricity grid (known as off grid), unused electricity can be stored in a battery for use when there is no wind. Please note that the Feed-in Tariffs scheme is not available in Northern Ireland.

Wind Turbines have been considered for this project, Pole mounted wind turbine has been excluded due to nature of the development and building mounted would not achieve the required reductions on site to meet the local requirements, therefore this has not been explored further.

6.7 Biomass

Energy from Biomass is produced by burning organic matter. Biomass fuel sources include trees, crops or animal dung are "...harvested and processed to create energy in the form of Electricity, Heat and Steam." (TM38:2006) Biomass is carbon based and when used as a fuel, produces carbon emissions. However, the carbon emitted during the combustion process is "...equivalent to the amount absorbed during growth..." (TM38:2006) The only carbon emissions associated with this energy source is treatment and transportation costs of the fuel to the end user.

Carbon savings that can be attributed to this technology type are significant. Biomass boiler installation can "...deliver all of the heating requirements for a building...using an almost carbon neutral fuel source." (TM38:2005) Biomass can be cost effective when directly compared to convention as oil and electricity heating sources. The benefit can be increased when the biomass source, for example wood chips, is diverted from the waste stream. However, maintenance requirements of a biomass system are higher and should be taken into account when installing one. Additionally, the UK introduced the Clean Air Act (1993) (www.uksmokecontrolareas.co.uk) to control the smoke pollution in areas caused by burning of smoky fuels.

Biomass been considered for the project, to house the system, an external additional plant area would be required and therefore the feasibility of the CHP has not been deemed acceptable or viable due to planning restrictions. If planning restrictions are limited on Biomass it is recommended to review the financial feasibility as the Biomass option exceeds the planning requirements.

6.8 Summary of Be Green Measures

The following table is a summary of what energy efficiency technologies can be used on building site:

Technology	Deemed viable	Adopted on site
Solar Hot Water Panels (Solar Thermal)	Yes	No
Photovoltaic (PV) Cells	Yes	No
Combined Heat and Power (CHP) and Micro-CHP (mCHP)	No	No
Ground Source Heat Pumps (GSHP)	No	No
Air Source Heat Pumps (ASHP)	Yes	Yes
Wind Turbines	No	No
Biomass	No	No

Low Carbon technologies of proposed building

	Regulated domestic carbon dioxide savings	
	(Tonnes CO2 per Annum)	%
Be lean: Savings from energy demand reduction	0	0
Be clean: Savings from heat network	0	0
Be green: Savings from renewable energy	0.2	23%
Cumulative on-site savings	0.2	23%

7 Conclusion

After reviewing the above renewable technologies, Air Source Heat Pump has been identified as the most viable options to achieve the criteria set out by the local authority. The development has been deemed viable for additional measures and therefore it is recommended to explore the financial feasibility of these options to maximise the reduction in carbon emissions on site. The target of 23% has been exceeded to ensure compliance to Building regulations Part L.

7.1 Summary of energy efficient measures

Element	U-Value (W/m2K)	
	Part L2 Limiting Factor	Proposed building
Ground Floor	0.25	0.12
External Façade	0.35	0.16
Insulated at Ceiling Roof	0.25	0.12
Glazing	1.6	N/A
Doors	1.6	1.6
Air Permeability	8	8
Low Energy Lighting	75 lm/w	120 Lm/W

7.2 Summary of renewable or Low Carbon measures

Element	System
Main Heating System	Air source heat pump (3.7 COP)
Hot Water System	Electric Standalone hot water heater, seasonal efficiency 2.86
Renewable Technologies	NA
Wastewater Heat Recovery System	NA

7.3 Summary of Carbon Emissions reductions

Low Carbon technologies of Proposed building

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per Annum)	%
Be lean: Savings from energy demand reduction	0	0
Be clean: Savings from heat network	0	0
Be green: Savings from renewable energy	0.2	23%
Cumulative on-site savings	0.2	23%

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Extension Bay 6 and Bay 7-BeGreen-ASHP

As designed

Date: Fri Jan 19 13:34:52 2024

Administrative information

Building Details

Address: Nifty Lifts, Nifty Lifts, Platts Common Industrial Estate, Mason Way, Hoyland, Barnsley, S74 9TF

Certifier details

Name: Dr Bilal Alsheglawi

Telephone number: 01625 315040

Address: Suite F6.3 (B), Adelphi Mill, Grimshaw Lane, Bollington, Macclesfield, SK10 5JB

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.24

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

Foundation area [m^2]: 1685.6

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	10.87	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	7.24	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	114.18	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	76.4	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a-Limit}$	U_{a-Calc}	U_{i-Calc}	First surface with maximum value
Walls*	0.26	0.16	0.16	GF000001_W1
Floors	0.18	0.12	0.12	GF000001_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	GF000001_C
Windows** and roof windows	1.6	-	-	No external windows/roof-windows
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.6	1.6	GF000001_W1_O0
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

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

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

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

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

^ For fire doors, limiting U-value is 1.8 W/m^{2}K

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

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

Building services

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

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

1- Main system

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.7	-	-	-	-
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	NO				

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- SYST0000-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.86	-
Standard value	1	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m^2]**
Standard value	95	80	0.3
GF-Bay 7	120	-	-
GF-Bay 6	120	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF-Bay 7	N/A	N/A
GF-Bay 6	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	1685.6	1685.6
External area [m^2]	5257.9	5257.9
Weather	MAN	MAN
Infiltration [m^3/hm^2@ 50Pa]	8	5
Average conductance [W/K]	816.8	1808.53
Average U-value [W/m^2K]	0.16	0.34
Alpha value* [%]	10.73	22.78

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

Building Use

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

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	35.39	65.14
Cooling	0	0
Auxiliary	5.26	2.5
Lighting	7.51	3.99
Hot water	1.48	4.24
Equipment*	29.87	29.87
TOTAL**	**49.64**	**75.86**

* 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
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	435.84	688.06
Primary energy [kWh_{PE}/m^2]	76.4	114.19
Total emissions [kg/m^2]	7.24	10.87

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] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	420.7	15.2	35.4	0	5.3	3.3	0	3.7	0
	Notional	619.1	69	65.1	0	2.5	2.64	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

BRUKL Output Document

Compliance with England Building Regulations Part L 2021

HM Government

Project name

Extension Bay 6 and Bay 7-180 Kwp PV

As designed

Date: Fri Jan 19 12:17:50 2024

Administrative information

Building Details

Address: Nifty Lifts, Nifty Lifts, Platts Common Industrial Estate, Mason Way, Hoyland, Barnsley, S74 9TF

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.24

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

Certifier details

Name: Dr Bilal Alsheglawi

Telephone number: 01625 315040

Address: Suite F6.3 (B), Adelphi Mill, Grimshaw Lane, Bollington, Macclesfield, SK10 5JB

Foundation area [m²]: 1685.6

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	11.71	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	11.31	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	115.37	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	109.2	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a-Limit}$	U_{a-Calc}	U_{i-Calc}	First surface with maximum value
Walls*	0.26	0.16	0.16	GF000001_W1
Floors	0.18	0.12	0.12	GF000001_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	GF000001_C
Windows** and roof windows	1.6	-	-	No external windows/roof-windows
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.6	1.6	GF000001_W1_O0
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

$U_{a-Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]
U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

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

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

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

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

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

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	8

Building services

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

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

1- Main system

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

1- SYST0000-DHW

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

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
GF-Bay 7	120	-	-
GF-Bay 6	120	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF-Bay 7	N/A	N/A
GF-Bay 6	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	1685.6	1685.6
External area [m^2]	5257.9	5257.9
Weather	MAN	MAN
Infiltration [m^3/hm^2@ 50Pa]	8	5
Average conductance [W/K]	816.8	1808.53
Average U-value [W/m^{2}K]	0.16	0.34
Alpha value* [%]	10.73	22.78

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

Building Use

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

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	131	128.34
Cooling	0	0
Auxiliary	5.26	2.5
Lighting	7.51	3.99
Hot water	4.24	4.24
Equipment*	29.87	29.87
TOTAL**	**148**	**139.06**

* 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	80.97	63.77
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*80.97*	*63.77*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	435.84	688.06
Primary energy [kWh$_{PE}$/m^2]	109.2	115.37
Total emissions [kg/m^2]	11.31	11.71

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] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	420.7	15.2	131	0	5.3	0.89	0	1	0
	Notional	619.1	69	128.3	0	2.5	1.34	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