REPORT

Savills Earth

Wrexham Association Football Club – July 2025

Energy Statement – Section 96A Non-Material Amendment Planning Application for Kop Stand, STōK Cae Ras, Wrexham

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01. Executive Summary

Overview of the project and results

Savills Earth has been appointed by Wrexham AFC to prepare an Energy Statement for a Section 96A Non-Material Amendment (NMA) to the proposed new Stand at the Racecourse Ground (STōK Cae Ras) in Wrexham.

This report outlines the Energy Strategy of the proposed development and updated design of the Kop Stand. This Energy Statement has been developed in line with national, regional and local energy policies and Building Regulations 2010 – Approved Document Part L2 (2022).

This report demonstrates that the proposal has been designed to meet the relevant energy planning policy guidance as listed below:

- Planning Policy Wales (Adopted February 2024);
- Future Wales, The National Plan 2040; and
- Wrexham County Borough Local Development Plan 2013-2028 (Adopted and Emerging Local Plan Policies December 2023).

The design aligns with the Energy Hierarchy outlined in Planning Policy Wales (adopted February 2024) and includes the following features:

- Minimising energy demand by utilising a 'fabric-first' approach and specifying low U-Values and air permeability, along with passive design measures, to reduce heat loss; and
- Efficiently uses energy through highly efficient ventilation systems, Air Source Heat Pumps (ASHP) for heating and cooling, and a dedicated ASHP for hot water, eliminating fossil fuels.

The potential carbon emission savings for the development on the proposed site is estimated to be 64% over the TER baseline of Part L2 (2022).

Table 1: Site-wide building energy consumption and carbon emissions

Stage	TER[1] ($kgCO_2/yr$)	BER[2] ($kgCO_2/yr$)	TPER[3] (kWh/m^2)	BPER[4] (kWh/m^2)
Kop Stand	10.0	3.5	59.1	36.7
% reduction	64%		38%	

[1] TER: Target Emissions Rate
[2] BER: Building Emissions Rate
[3] TPER: Target Primary Energy Rate
[4] BPER: Building Primary Energy Rate

02. Introduction

Introduction and objectives of the report

Savills Earth has been appointed by Wrexham AFC to prepare an Energy Statement to support the NMA Application of the proposed new Stand at the Racecourse Ground (STōK Cae Ras) in Wrexham.

It is understood that a previous planning application (Planning ref: P/2023/0776), including an Energy Statement based on the 2014 version of Building Regulations Part L was submitted to Wrexham County Borough Council in July 2022. In January 2023, Planning Permission was granted for a detailed scheme for a replacement Kop Stand. The design of the Stand has now changed, which requires the submission of a NMA Application and energy analysis to be undertaken in line with 'The Building Regulations 2010 – Approved Document Part L2 Buildings other than dwellings (Adopted November 2022)'.

Site Location:

The site is located in the City of Wrexham, in North Wales. The Stadium is bordered to the north by the University campus, while residential areas lie to the south and east – separated by main roads.

Figure 1: Aerial photograph of the proposed site

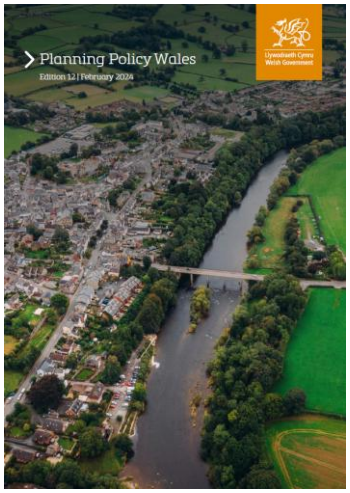


03. Planning Context

Energy Requirements

National planning policy

Planning Policy Wales (Adopted February 2024)



Energy Hierarchy for Planning

The Welsh Government planning policy outlines an Energy Hierarchy (right). The Welsh Government expects all new development to mitigate the causes of climate change in accordance with the Energy Hierarchy for planning, as set out in the following energy policies. Reducing energy demand and increasing energy efficiency, through the location and design of new development, will assist in meeting energy demand with renewable and low carbon sources. This is particularly important in supporting the electrification of energy use, such as the growing use of electric vehicles and Heat Pumps. All aspects of the Energy Hierarchy have their part to play, simultaneously, in helping meet decarbonisation and renewable energy targets.

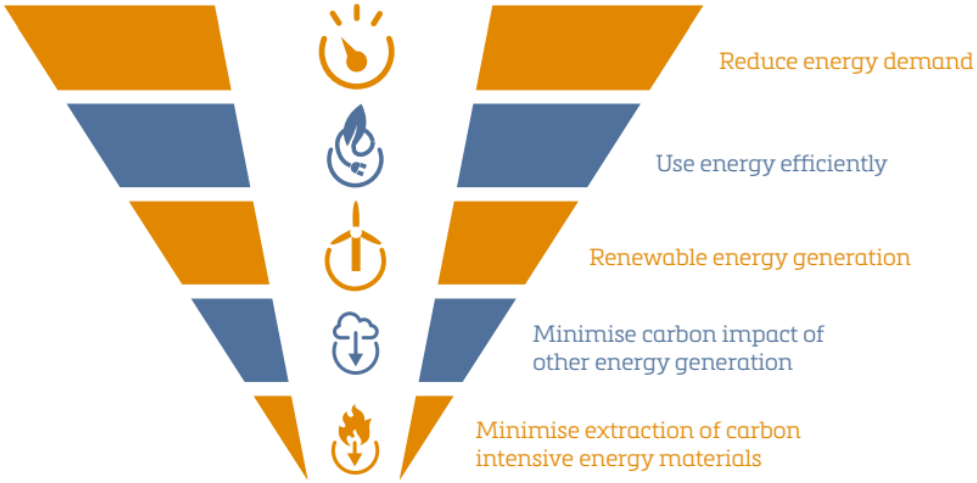
Reduce Energy Demand and Use of Energy Efficiency – Sustainable Buildings

The Welsh Government's policy is to promote zero carbon buildings while continuing to promote a range of low and zero carbon technologies as a means to achieve this.

Sustainable building design principles should be integral to the design of new development. Development proposals should:

- Mitigate the causes of climate change, by minimising carbon and other greenhouse gas emissions associated with the development's location, design, construction, use and eventual demolition.

Figure 2: Energy Hierarchy for Planning



In order to further promote energy efficiency and energy conservation, planning authorities should consider including development plan policies requiring applications for major development to be accompanied by an Energy Report. This independent report should include recommendations to the developer relating to energy efficiency and appropriate renewable energy technologies that could be incorporated into the development. A response to that report from the developer should also accompany the application.

Renewables and Low Carbon Energy

Local authorities should facilitate all forms of renewable and low carbon energy development. Planning authorities should seek to ensure their area's full potential for renewable and low carbon energy generation is maximised and renewable energy targets are achieved.

Future Wales, The National Plan 2040



The Welsh national development framework is a plan for promoting development and change over the next two decades that enhances wellbeing and the quality of life in Wales by shaping places of work, travel, the environment and housing. As outlined in the diagram below, Wrexham is located in the National Growth area and National Connectivity. The area aims to support:

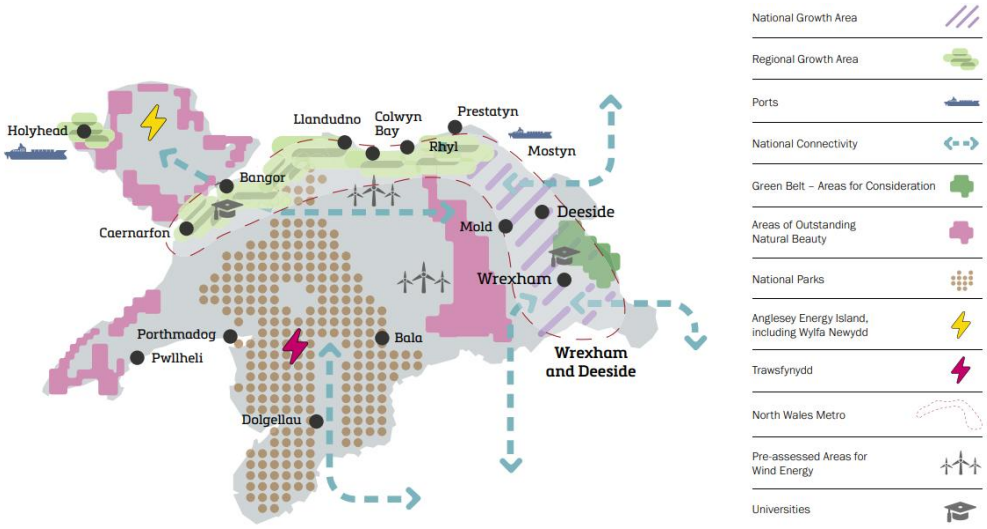
- A low carbon economy and decarbonisation of industry and the growth of renewable and sustainable energy.
- Growth in innovation.
- Infrastructure development around energy, transport and digital comms.

The most relevant policies are:

Policy 17- Renewable and Low Carbon Energy and Associated Infrastructure

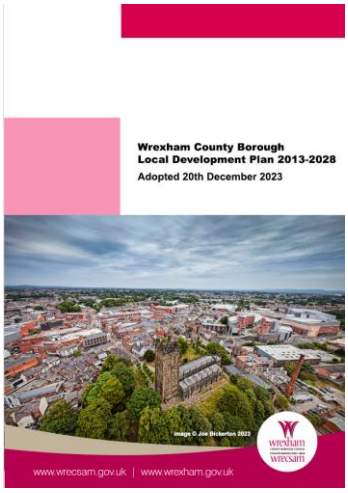
The Welsh Government strongly supports the principle of developing renewable and low carbon energy from all technologies and at all scales to meet future energy needs (70% of consumed electricity by renewable means by 2030).

Figure 3: Regional Strategic Diagram



Local Planning Policy

Wrexham County Borough Local Development Plan 2013-2028 (Adopted and Emerging Local Plan Policies December 2023)



Although adopted in December 2023, the RLDP status was altered as a result of a Court of Appeal ruling in December 2024 and clarification is awaited from WCBC on this. The section below uses the RLDP policy as the most recent commentary. The most relevant policy for the proposal is:

Policy SP18: Climate Change

To mitigate against the effects of climate change and adapt to its impacts, development proposals will need to demonstrate that they have taken into account the following:

- Reducing carbon emissions: it should be demonstrated how the proposal seeks to reduce carbon emissions through reducing energy demand associated with the development by maximising energy efficiency; and
- Promoting energy efficiency and increasing the supply of renewable energy: It should be demonstrated how renewable energy and low carbon development have been incorporated into the design to reduce reliance on fossil fuels.

The Building Regulations 2010 – Approved Document Part L2 Buildings other than dwellings (Adopted November 2022)



The Approved Document deals with the requirements of regulations 24, 25, 25B, 25C, 26, 26A, 27 and 27A and new regulations for primary energy of the Building Regulations 2010.

Regulation 24 - Methodology of calculation and expression of energy performance

Regulations 24 set requirements for a new non-domestic building energy performance, the approved methodologies are the Simplified Building Energy Model or other software tools approved under the Notice of Approval.

Regulation 25 - Minimum energy performance requirements for new buildings

Minimum energy performance requirements for new buildings, in the form of target carbon emission rates that should be calculated in accordance with approved methodology.

Regulation 25B – Nearly zero-energy requirements for new buildings

Where a building is erected, it must be a nearly zero-energy building. A building has a very high-performance rate for the purposes of the definition of a nearly zero-energy building if both of the following are met.

- The building meets the target emission rate required under regulation 26; and
- An analysis is made of the technical, environmental and economic feasibility of using high efficiency alternative systems, which include decentralised energy supply systems based on energy from renewable sources.

Regulation 26 – Carbon emission rates for new buildings

Where a building is erected, it shall not exceed the target carbon emission rate (TER) for the building that has been approved pursuant to regulation 25, applying the methodology of calculation and expression of the energy performance of buildings approved pursuant to regulation 24.

The latest Building Regulations 2010 – Approved Document Part L2 (2022) introduces enhanced building Standards, incorporating improvements in both building fabric and services, as well as the integration of low carbon technologies. Table 2 outlines the minimum thermal performance Standards.

In terms of building services, the Building Regulations 2010 – Approved Document Part L2 (2022) enhances the minimum efficiency Standards and introduces guidelines to ensure that the sizing of building services more accurately matches demand, thereby increasing overall efficiency.

Table 2: 2010 Part L2 2022 U-values

	New building maximum U-Values
External wall	0.26 W/(m²K)
Exposed and ground floors	0.22 W/(m²K)
Roof	0.20 W/(m²K)
Windows	1.60 W/(m²K)
Curtain Walling	1.80 W/(m²K)
Door (including glazed doors)	1.80 W/(m²K)
Air permeability rate	8.0 m³/(h.m²) @50Pa

The document outlines the essential criteria that must be met as follows:

- The Building Primary Energy Rate and Building Emission Rate must be no greater than the Target Primary Energy Rate and the Target Emission Rate respectively;
- Consideration of high-efficiency alternative systems: feasibility analysis of installing high-efficiency alternative systems such as a decentralised energy supply system based on energy from renewable sources, cogeneration, district heating/cooling and Heat Pumps;
- Fixed building services energy efficiency and controls and on-site generation of electricity: system specific minimum efficiencies and design guidance, including BMS and on-site electricity generation and storage;
- Limiting heat gains and losses: limiting Standards on building fabric such as U-values;
- Pressure testing: minimum air permeability Standard and demonstrating compliance;
- Commissioning: system specific guidance for commissioning; and
- Providing information: operating and maintenance instructions for the new dwellings.

04. Energy

Energy modelling inputs and results

In line with the Energy Hierarchy outlined in Planning Policy Wales (Adopted February 2024), the design approach for the proposed Kop Stand at Wrexham AFC has prioritised passive design measures to reduce energy demand and utilised energy efficiently through its building services.

The model for the proposed building has been developed using EDSL TAS v9.5.6, an approved software in line with Welsh Government 2010 Part L2 (2022) requirements. The calculations were performed by a thermal modelling engineer.

Passive design measures to reduce energy demand

As advocated by the Energy Hierarchy, designing out energy use in the first instance is weighted more favourably than the generation of low-carbon or renewable energy to offset unnecessary demand. This is referred to as 'fabric-first' approach and concentrates efforts on improving fabric performance, reducing thermal bridging, improving air-tightness and installing energy efficient ventilation.

The following passive design features are proposed:

- Optimised fabric performance with high levels of insulation beyond minimum regulation requirements and airtight construction to prevent heat loss. The proposed fabric performance for the proposed development is presented in Table 3 below; and
- External shading, including a ground floor overhang and a double skin brick facade, is used to reduce direct solar gains, improve energy efficiency, and enhance occupant comfort.

Table 3: Proposed and limiting building fabric performance for Wrexham AFC Stand

	2010 Part L2 (2022) - New building maximum U-Values	Proposed U-Values
External wall	0.26 W/(m^{2}K)	0.18 – 0.20 W/(m^{2}K)
Exposed and ground floors	0.22 W/(m^{2}K)	0.15 W/(m^{2}K)
Roof	0.20 W/(m^{2}K)	0.22 W/(m^{2}K)
Windows	1.60 W/(m^{2}K)	1.40 W/(m^{2}K)
Curtain Walling	1.80 W/(m^{2}K)	1.40 – 1.60 W/(m^{2}K)
Door (including glazed doors)	1.80 W/(m^{2}K)	1.40 – 1.80 W/(m^{2}K)
Air permeability rate	8.0m^3/(h.m^2) @50Pa	5.0m^3/(h.m^2) @50Pa

Use Energy Efficiently

Following the implementation of passive design features, energy efficiency measures have been applied to the active building systems to further reduce energy consumption and carbon emissions.

The following energy efficient systems are proposed:

- Low energy LED lighting throughout with control sensors (refer to Table 4);
- Two Air Handling Units (AHUs) to provide fresh air located underneath the stadium seating (refer to Table 5);
- Air Source Heat Pumps (ASHPs) to supply heating and cooling via a 4-pipe fan coil unit to most of the spaces (refer to Table 6); and
- Dedicated ASHP for hot water (refer to Table 6).

Table 4: Proposed lighting system performance

Use	Lighting Efficacy (lm/W)	Constance illuminance control	Occupancy Sensing	Daylight Controls	Display Lighting (lm/W)
Premium GA concourse	100	Yes	Presence	Yes	-
Hospitality Lounge	100	Yes	Absence	Yes	-
Media	100	Yes	Presence	No	-
Kitchen	100	Yes	None	No	-
Plant	100	Yes	None	No	-
Circulation	100	Yes	Presence	No	-
WC	100	Yes	Presence	No	-
Stairs	100	Yes	Presence	No	-
Club Shop	100	Yes	None	No	80
Concessions	100	Yes	None	No	-

Table 5: Proposed ventilation systems

Use	System type	Demand control sensor	Demand control method	SFP Supply and Extract (W/l/s)	Heat recovery
Player Zones	Air Handling Unit	-	-	1.65	Plate Heat Exchanger 79%
Level 03 GA concourse	Air Handling Unit	-	-	1.80	Thermal Wheel 77%
East hospitality WC	Air Handling Unit	-	-	1.50	Plate Heat Exchanger 75%
West hospitality WC	Air Handling Unit	-	-	1.60	Plate Heat Exchanger 75%
Shop	Mechanical Ventilation	-	-	1.10	Plate Heat Exchanger 83%
Level 02 Hospitality Lounges	Mechanical Ventilation	Speed Control	Occupancy Density	1.50	Plate Heat Exchanger 81%
Level 04 Hospitality Lounges	Mechanical Ventilation	Speed Control	Occupancy Density	1.35 – 1.40	Plate Heat Exchanger 80%
WCs	Extract Only	-	-	0.30	-
Kitchen	Extract Only	-	-	0.90	-
Waste Stores	Extract Only	-	-	0.30	-

Heat Pumps

ASHPs are considered a low carbon technology. They are electrically powered and use high efficiency pumps and heat exchangers to extract heat from the outside air. ASHPs work by having an external evaporator unit with a fan linked to an internal condenser unit to release the heat.

The proposed strategy involves using ASHPs for heating, cooling, and ASHPs for hot water. Local fan cool units are utilised in some areas to assist with ventilation and cooling, and local extract fans are provided to WCs, Kitchens and Waste stores.

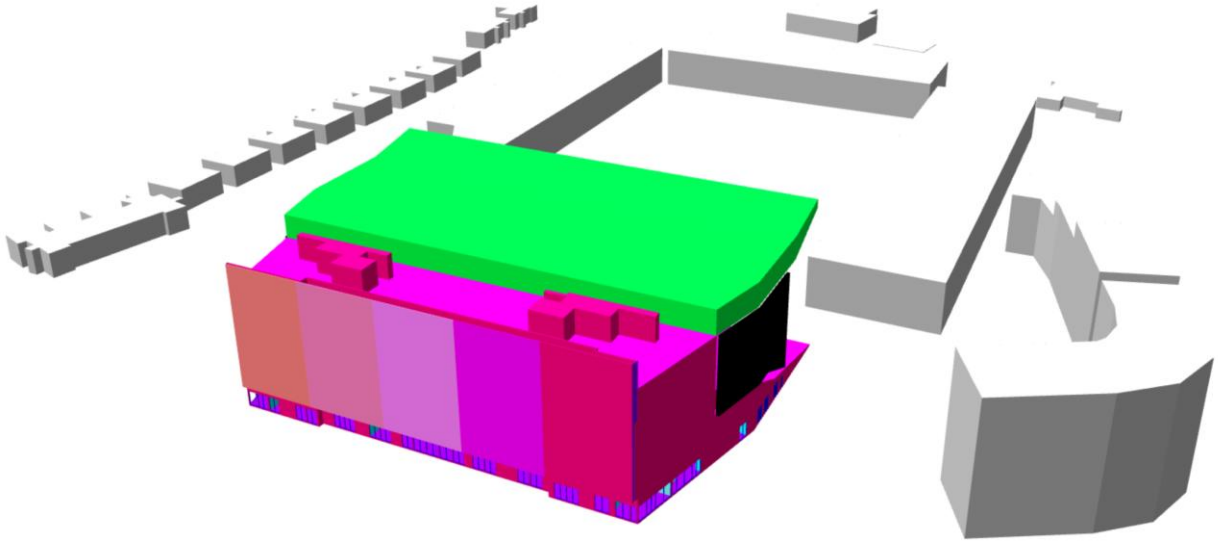
Further details on the ASHPs system efficiencies can be found in Table 6.

Table 6: Details of the proposed servicing strategy

Heating & cooling circuit	**Units**	
System type		Heat Pump
Efficiency	SCOP[1] / SEER[2]	3.53/ 5.02
Distribution efficiency	%	95%
Fuel source		Electricity
Hot water circuit	**Units**	
System type		Heat Pump
Efficiency	%	2.20
Distribution efficiency	%	95%
Fuel source		Electricity

[1] SCOP: Seasonal Coefficient of Performance
[2] SEER: Seasonal Energy Efficiency Rating

Figure 4: EDSL TAS model of proposed design



Renewable Energy

A total of 690 Photovoltaic (PV) panels, covering approximately 1,104 m^2 of roof space, have been integrated into the proposed design. This system will contribute to the generation of on-site renewable electricity, helping to offset a portion of the building's energy demand, reduce reliance on grid-supplied electricity, and lower associated carbon emissions. The inclusion of solar panels aligns with local and national energy policies promoting the use of renewable technologies in new developments.

Table 7: Details of the proposed PV Array

Number of Panels	690
Size of panel	1.6 m^2
Inclination	3.5°
Orientation	125°

Battery Storage

Battery storage is included as part of the proposed energy strategy to maximise the benefits of the on-site solar PV system. While the exact location of the Battery Storage is to be determined, its function will store surplus electricity generated during the day, so it can be utilised later, either during periods of low energy generation or during peak demand.

This approach reduces reliance on grid electricity, supports decarbonisation objectives, and contributes to improved operational efficiency. The integration of battery storage aligns with national and local planning policy goals around energy resilience, carbon reduction, and future-proofing of developments.

It should be noted that battery storage does not directly impact the calculated on-site carbon reduction. Under current assessment methodologies, carbon reductions are attributed at the point of renewable energy generation, not at the point of use. Therefore, while battery storage improves the utilisation of renewable energy, it does not alter the carbon emission figures outlined in this report.

Results

This section provides an overview of how the proposed development has the potential to exceed minimum standards and achieve being a nearly zero energy building in line with Building Regulations 2010 – Approved Document Part L2 (2022).

A fabric-first approach was adopted by meeting or improving upon improved building fabric performance and reduced air permeability to meet and exceed the fabric energy efficiency criteria set by Building Regulations 2010 – Approved Document Part L2 (2022).

Additional energy efficiency measures, including fossil fuel-free and highly efficient building services for heating, cooling, and hot water, as well as low energy lighting, further reduce the energy consumption of the development.

It has been calculated that the total carbon emissions savings for the proposed development are 64% over the TER baseline of the Building Regulations 2010 – Approved Document Part L2 Buildings other than dwellings (Adopted November 2022).

Table 8: Site-wide building energy consumption and carbon emissions

Stage	TER[1] ($kgCO_2/yr$)	BER[2] ($kgCO_2/yr$)	TPER[3] (kWh/m^2)	BPER[4] (kWh/m^2)
Kop Stand	10.0	3.5	59.1	36.7
% reduction	64%		38%	

[1] TER: Target Emissions Rate
[2] BER: Building Emissions Rate
[3] TPER: Target Primary Energy Rate
[4] BPER: Building Primary Energy Rate

05. Low or Zero Carbon Generating Technologies

Selecting the appropriate Low Carbon Technology

The table below evaluates the applicability of various low carbon technology options for the proposed building in line with Wrexham County Borough Local Development Plan 2013-2028 (Adopted December 2023).

The aim is to identify the most viable solutions to reduce the building's carbon footprint. The technologies considered include renewable energy sources and energy-efficient systems.

The table provides a comparative analysis of each technology option, highlighting feasibility, benefits, and potential challenges. This appraisal has guided the decision-making process, ensuring that the selected technologies are both practical and effective in achieving our low carbon objectives.

Table 9: Low Carbon Technologies Feasibility Appraisal

Technology	Description of Technology	Energy delivery	Challenges (spatial, proximity to site, energy source, carbon emissions)	Feasibility
Solar PV – ground	Efficient and scalable installations that convert sunlight into electricity, ideal for areas with ample space but requiring significant land and higher initial investment.	Electricity	Requires large area of land which is unavailable.	✗
Solar PV – building integrated	Incorporate solar panels into the building's structure, such as roofs or facades, providing efficient energy generation without requiring additional land.	Electricity	Achievable for the site.	✓
Wind - onshore	The system involves installing turbines on land to harness wind energy, providing a renewable and efficient source of electricity but requiring suitable locations with consistent wind patterns.	Electricity	Density of development and proximity of houses and university does not allow enough free space for the installation of wind turbines.	✗

Technology	Description of Technology	Energy delivery	Challenges (spatial, proximity to site, energy source, carbon emissions)	Feasibility
Biomass boilers	The system uses organic materials, such as wood pellets or agricultural waste, to produce heat and electricity, offering a renewable energy source but requiring a consistent supply of biomass and proper emissions management.	Heat	Requires storage space and access routes, unavailable on site.	✗
Heat Pumps – Ground Source Heat Pump (GSHP), and Air Source Heat Pump (ASHP)	Transfers heat from the ground or air to provide heating and cooling, offering energy-efficient solutions but requiring suitable installation conditions and higher initial costs.	Heat	Ground source heat pumps may be viable depending on ground conditions. Air source heat pumps are viable and have been included.	✓
Water Source Heat Pump (WSHP)	Extracts heat from water sources, such as lakes or rivers, to provide heating and cooling, offering an energy-efficient solution but requiring proximity to suitable water bodies and proper installation.	Heat	WSHP requires suitable body of water within proximity to enable feasibility.	✗
Hydrogen ready boiler	These systems are designed to operate on hydrogen fuel, offering a low-carbon heating solution but requiring the availability of hydrogen infrastructure and proper safety measures.	Heat	Although feasible, the delivery of green hydrogen at a national scale is uncertain, and is therefore not recommended.	✗
Solar thermal	Solar thermal systems use solar collectors to capture and convert sunlight into heat, providing an efficient and renewable source of hot water and space heating.	Heat	Solar PVs are chosen over solar thermal technology due to favourable cost and carbon saving potential.	✗
District Heating	District heating systems distribute heat from a central source to multiple buildings through a network of insulated pipes, providing an efficient and centralised heating solution.	Heat	Whilst the Future Wales plan identifies Wrexham as an area suitable for town/city District Heat Network. Should there be development of a DHN in the locality of the stadium, connection could be assessed. However, we are not currently aware of any plans to implement a DHN infrastructure near to the site.	✗

Technology	Description of Technology	Energy delivery	Challenges (spatial, proximity to site, energy source, carbon emissions)	Feasibility
Deep geothermal	Deep geothermal systems extract heat from deep underground to provide a reliable and renewable source of heating and electricity.	Heat and Electricity	Large remote site is needed for deep geothermal technology, this is unavailable.	✖
Combined heat and power (CHP) gas, hydrogen and biomass	Combined heat and power (CHP) systems simultaneously generate electricity and useful heat from fuels like gas, hydrogen, or biomass, offering high efficiency and reduced carbon emissions.	Heat and Electricity	A gas CHP uses fossil fuels which does not align with the net zero objective of the development.	✖

06. Summary

Summary of the report findings

This Energy Statement for the NMA Application outlines the proposed Energy Strategy for the Kop Stand at the Racecourse Ground (STōK Cae Ras) in Wrexham, demonstrating its alignment with national, regional, and local policies. The strategy has been formulated with careful consideration of key energy policy documents, including:

- Planning Policy Wales (Adopted February 2024);
- Future Wales, The National Plan 2040; and
- Wrexham County Borough Local Development Plan 2013-2028 (Adopted and Emerging Local Plan Policies December 2023).

The proposed development exemplifies a commitment to sustainable energy practices and supports relevant policies by:

- Adopting a 'fabric-first' approach which minimises energy demand through the specification of enhanced building fabric performance and low air permeability to effectively reduce heat loss; and
- Implementing highly efficient ventilation services, LED lighting and ASHP systems to meet the heating, cooling and hot water demands of the conditioned spaces.

Overall, the proposed scheme comprehensively integrates the energy-saving principles and adheres to the policy requirements of national, regional, and local plans.

The potential carbon emission savings for the proposed development are estimated to be 64% over the TER baseline of the Building Regulations 2010 – Approved Document Part L2 Buildings other than dwellings (Adopted November 2022).

While the proposal achieves a 64% reduction in carbon emissions compared to the Welsh Building Regulations Part L2 2010 (2022), the approved scheme (under refer. P/2022/0725) achieved a reduction of 11.5% over the previous version of Part L2 2014. However, it is important to note that these reductions cannot be directly compared, as they refer to two different versions of Part L2, with updates to the methodology having been adopted in the interim.

Additionally, the ongoing decarbonisation of the national grid will gradually reduce the development's carbon footprint, allowing it to meet the national net zero goal.

Appendix 1

BRUKL

BRUKL Output Document

Compliance with Wales Building Regulations Part L 2022

Llywodraeth Cymru
Welsh Government

Project name

Wrexham

As designed

Date: Tue Jul 22 16:28:18 2025

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.6"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.6

BRUKL compliance module version: v6.1.e.0

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

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	9.97	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	3.54	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	59.07	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	36.7	
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.2	0.2	W-External Wall
Floors	0.22	0.17	0.22	W-Exposed Floor
Pitched roofs	0.2	-	-	No pitched roofs in project
Flat roofs	0.2	0.18	0.18	W-Roof-04
Windows**	1.6	1.44	1.8	DR-GL-high usage-Display-small
Roof windows	1.8	-	-	No roof windows in project
Rooflights***	2.2	-	-	No rooflights in project
Personnel doors	1.8	1.4	1.4	DR-01-solid-small
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project

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

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

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

** Automatic U-value check by the tool does not apply to glazed doors whose limiting standard is similar to that for personnel doors. Display windows and similar glazing are excluded from the U-value check.

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

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

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

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- 8. MVHR - GA concourse 03 - SFP-1.8 (22 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	5.02	-	-	0.77
Standard value	2.5*	5	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.					

2- 9. MVHR -Hospitality Lounge 02 - SFP - 1.5 (3 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	5.02	-	-	0.81
Standard value	N/A	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

3- 10. MVHR - Hospitality Lounge 04 - SFP - 1.35 (7 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	5.02	-	-	0.81
Standard value	2.5*	5	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.					

4- 6. MVHR - Shop - SFP - 1.1 (Shop-00 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	5.02	-	-	0.83
Standard value	2.5*	5	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.					

5- 5. Extract Only - KI (3 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	-	-	-	-
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.					

6- 1. AHU - East WC - SFP - 1.5 (9 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	5.02	-	1.5	0.75
Standard value	2.5*	5	N/A	1.5^	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. ^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

7- 2. AHU - West WC - SFP - 1.6 (11 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	5.02	-	1.6	0.75
Standard value	2.5*	5	N/A	1.5^	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.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

8- 7. AHU - Players Zone - SFP - 1.65 (56 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	5.02	-	1.65	0.79
Standard value	2.5*	5	N/A	1.5^	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.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

9- 3. Extract Only - WC and Waste (29 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	-	-	-	-
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.

10- 11. Natrural Ventilation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.53	-	-	-	-
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.

1- Player Zone - ASHP 2.2

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.2	0
Standard value	1	N/A

2- Hopitality / Kitchen / Toilets - ASHP 2.2

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.2	0.02
Standard value	1	N/A

3- Concourse - ASHP - 2.2

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.2	0
Standard value	0.91	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
WC-00 1	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00 2	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00 3	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01 2	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01 3	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-02 1	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-02 3	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-03 1	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-03 2	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-03 3	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-03 5	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-04 4	-	-	-	1.6	-	-	-	-	-	-	N/A
ST-01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
ST-01 2	-	-	-	1.7	-	-	-	-	-	-	N/A
ST-01 5	-	-	-	1.7	-	-	-	-	-	-	N/A
KI-00 1	-	-	-	-	-	-	-	-	0.9	-	N/A
Shop-00 1	-	-	-	1.1	-	-	-	-	-	-	N/A
OF-01 3	-	-	-	1.7	-	-	-	-	-	-	N/A
OF-01 4	-	-	-	1.7	-	-	-	-	-	-	N/A
OF-01 5	-	-	-	1.7	-	-	-	-	-	-	N/A
OF-01 6	-	-	-	1.7	-	-	-	-	-	-	N/A
OF-01 7	-	-	-	1.7	-	-	-	-	-	-	N/A
OF-01 8	-	-	-	1.7	-	-	-	-	-	-	N/A
OF-01 9	-	-	-	1.7	-	-	-	-	-	-	N/A
OF-01 10	-	-	-	1.7	-	-	-	-	-	-	N/A
Shower&Change-01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
Shower&Change-01 2	-	-	-	1.7	-	-	-	-	-	-	N/A
KI-02 1	-	-	-	-	-	-	-	-	0.9	-	N/A
KI-02 2	-	-	-	-	-	-	-	-	0.9	-	N/A
Press-01 1	-	-	-	1.7	-	-	-	-	-	-	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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Lounge-01 2	-	-	-	1.7	-	-	-	-	-	-	N/A
Warmup-01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
Consessions-03 1	-	-	-	1.8	-	-	-	-	-	-	N/A
Consessions-03 2	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 2	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 3	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 4	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 5	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 6	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 8	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 9	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 10	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-03 3	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 4	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 5	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 6	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 8	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 9	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 10	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 11	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 12	-	-	-	1.8	-	-	-	-	-	-	N/A
Media Lounge-01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
Photographer workshop-01-M 1	-	-	-	1.7	-	-	-	-	-	-	N/A
ST-00 22	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01 21	0.3	-	-	-	-	-	-	-	-	-	N/A
Shower&Change-01 21	-	-	-	1.7	-	-	-	-	-	-	N/A
Shower&Change-01 22	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 22	-	-	-	1.7	-	-	-	-	-	-	N/A
WC-01 22	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00 21	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00 22	0.3	-	-	-	-	-	-	-	-	-	N/A
CL-01 24	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 25	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 26	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 27	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 28	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 29	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 30	-	-	-	1.7	-	-	-	-	-	-	N/A
Press-01 21	-	-	-	1.7	-	-	-	-	-	-	N/A
Shower&Change-01 23	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 31	-	-	-	1.7	-	-	-	-	-	-	N/A
Physio - 01 1	-	-	-	1.7	-	-	-	-	-	-	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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Physio - 01 2	-	-	-	1.7	-	-	-	-	-	-	N/A
Medical - 01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
Prayer Room -01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
WC-01 26	0.3	-	-	-	-	-	-	-	-	-	N/A
Anti-Doping -01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
Anti-Doping -01 2	-	-	-	1.7	-	-	-	-	-	-	N/A
Anti-Doping -01 3	-	-	-	1.7	-	-	-	-	-	-	N/A
CL-01 32	-	-	-	1.7	-	-	-	-	-	-	N/A
WC-01 27	0.3	-	-	-	-	-	-	-	-	-	N/A
Shower&Change-01 25	-	-	-	1.7	-	-	-	-	-	-	N/A
WC-01 28	0.3	-	-	-	-	-	-	-	-	-	N/A
Shower&Change-01 26	-	-	-	1.7	-	-	-	-	-	-	N/A
WC-01 29	0.3	-	-	-	-	-	-	-	-	-	N/A
CL-03 21	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 22	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 23	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 24	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 25	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 26	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 27	-	-	-	1.8	-	-	-	-	-	-	N/A
CL-03 28	-	-	-	1.8	-	-	-	-	-	-	N/A
CL - Public - 01 1	-	-	-	1.7	-	-	-	-	-	-	N/A
CL - Public - 01 2	-	-	-	1.7	-	-	-	-	-	-	N/A
CL - Public - 01 3	-	-	-	1.7	-	-	-	-	-	-	N/A
CL - Public - 01 4	-	-	-	1.7	-	-	-	-	-	-	N/A
CL - Public - 01 5	-	-	-	1.7	-	-	-	-	-	-	N/A
WC-04 22	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-04 23	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-04 24	-	-	-	1.6	-	-	-	-	-	-	N/A
CL - Public - 01 21	-	-	-	1.7	-	-	-	-	-	-	N/A
WC-02 24	-	-	-	1.6	-	-	-	-	-	-	N/A
WC-01-East 1	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01-East 2	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01-East 3	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01-East 4	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01-East 5	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01-East 6	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01-East 7	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01-East 8	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-01-East 9	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-02-East 1	-	-	-	1.5	-	-	-	-	-	-	N/A
WC-02-East 2	-	-	-	1.5	-	-	-	-	-	-	N/A
WC-03-East 1	-	-	-	1.5	-	-	-	-	-	-	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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
WC-03-East 2	-	-	-	1.5	-	-	-	-	-	-	N/A
WC-03-East 3	-	-	-	1.5	-	-	-	-	-	-	N/A
WC-03-East 4	-	-	-	1.5	-	-	-	-	-	-	N/A
WC-04-East 1	-	-	-	1.5	-	-	-	-	-	-	N/A
WC-04-East 2	-	-	-	1.5	-	-	-	-	-	-	N/A
WC-04-East 3	-	-	-	1.5	-	-	-	-	-	-	N/A
WC-00-East 1	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00-East 2	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00-East 3	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00-East 4	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00-East 5	0.3	-	-	-	-	-	-	-	-	-	N/A
WC-00-East 6	0.3	-	-	-	-	-	-	-	-	-	N/A
Lounge-02-P 1	-	-	-	1.5	-	-	-	-	-	-	N/A
Lounge-02-P 2	-	-	-	1.5	-	-	-	-	-	-	N/A
Lounge-02-I 1	-	-	-	1.5	-	-	-	-	-	-	N/A
Lounge-03-I 1	-	-	-	1.8	-	-	-	-	-	-	N/A
Lounge-03-P 1	-	-	-	1.8	-	-	-	-	-	-	N/A
Lounge-03-P 2	-	-	-	1.8	-	-	-	-	-	-	N/A
Lounge-04-p 1	-	-	-	1.4	-	-	-	-	-	-	N/A
Lounge-04-p 2	-	-	-	1.4	-	-	-	-	-	-	N/A
Lounge-04-I 1	-	-	-	1.4	-	-	-	-	-	-	N/A
Lounge-04-I 2	-	-	-	1.4	-	-	-	-	-	-	N/A
Lounge-04-I 3	-	-	-	1.4	-	-	-	-	-	-	N/A
Lounge-04-I 4	-	-	-	1.4	-	-	-	-	-	-	N/A
Lounge-04-p 21	-	-	-	1.4	-	-	-	-	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
WC-00 1	100	-	-
WC-00 2	100	-	-
WC-00 3	100	-	-
WC-01 2	100	-	-
WC-01 3	100	-	-
WC-02 1	100	-	-
WC-02 3	100	-	-
WC-03 1	100	-	-
WC-03 2	100	-	-
WC-03 3	100	-	-
WC-03 5	100	-	-
WC-04 4	100	-	-
ST-01 1	100	-	-
ST-01 2	100	-	-

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
ST-01 5	100	-	-
ST-03 1	100	-	-
PL-00 1	100	-	-
PL-00 2	100	-	-
EL-00 1	100	80	-
KI-00 1	100	-	-
Shop-00 1	100	80	-
OF-01 3	100	-	-
OF-01 4	100	-	-
OF-01 5	100	-	-
OF-01 6	100	-	-
OF-01 7	100	-	-
OF-01 8	100	-	-
OF-01 9	100	-	-
OF-01 10	100	-	-
Shower&Change-01 1	100	-	-
Shower&Change-01 2	100	-	-
KI-02 1	100	-	-
KI-02 2	100	-	-
Medical-00 1	100	-	-
Press-01 1	100	-	-
Lounge-01 2	100	-	-
Warmup-01 1	100	-	-
Consessions-03 1	100	-	-
Consessions-03 2	100	-	-
CL-00-Public 2	100	-	-
CL-01 1	100	-	-
CL-01 2	100	-	-
CL-01 3	100	-	-
CL-01 4	100	-	-
CL-01 5	100	-	-
CL-01 6	100	-	-
CL-01 8	100	-	-
CL-01 9	100	-	-
CL-01 10	100	-	-
CL-02 1	100	-	-
CL-02 2	100	-	-
CL-02 3	100	-	-
CL-02 4	100	-	-
CL-02 5	100	-	-
CL-02 6	100	-	-
CL-02 7	100	-	-
CL-02 8	100	-	-

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
CL-03 3	100	-	-
CL-03 4	100	-	-
CL-03 5	100	-	-
CL-03 6	100	-	-
CL-03 8	100	-	-
CL-03 9	100	-	-
CL-03 10	100	-	-
CL-03 11	100	-	-
CL-03 12	100	-	-
CL-04 1	100	-	-
CL-04 2	100	-	-
CL-04 3	100	-	-
CL-04 4	100	-	-
CL-04 5	100	-	-
CL-04 6	100	-	-
CL-04 7	100	-	-
Media Lounge-01 1	100	-	-
Photographer workshop-01-M 1	100	-	-
CL-00 4	100	-	-
CL-00 5	100	-	-
CL-00 7	100	-	-
IT-00 1	100	-	-
IT-00 2	100	-	-
ST-00 1	100	-	-
Medical-00 21	100	-	-
EL-00 21	100	80	-
ST-00 21	100	-	-
ST-00 22	100	-	-
ST-00 23	100	-	-
WC-01 21	100	-	-
Shower&Change-01 21	100	-	-
Shower&Change-01 22	100	-	-
CL-01 22	100	-	-
WC-01 22	100	-	-
CL-05 1	100	-	-
CL-05 2	100	-	-
CL-05 3	100	-	-
EL-00 22	100	80	-
PL-00 21	100	-	-
PL-00 22	100	-	-
WC-00 21	100	-	-
WC-00 22	100	-	-
Concessions-00 1	100	-	-

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
Concessions-00 2	100	-	-
Concessions-00 3	100	-	-
Concessions-00 4	100	-	-
Concessions-00 5	100	-	-
Press-00 1	100	-	-
Press-00 2	100	-	-
ST-00 24	100	-	-
ST-00 25	100	-	-
CL-00 21	100	-	-
PL-00 23	100	-	-
CL-00 22	100	-	-
CL-00 23	100	-	-
CL-00 24	100	-	-
CL-00 25	100	-	-
CL-00 26	100	-	-
CL-00 27	100	-	-
ST-01 25	100	-	-
ST-01 27	100	-	-
CL-01 24	100	-	-
CL-01 25	100	-	-
CL-01 26	100	-	-
CL-01 27	100	-	-
CL-01 28	100	-	-
ST-01 28	100	-	-
ST-01 29	100	-	-
ST-01 30	100	-	-
CL-01 29	100	-	-
CL-01 30	100	-	-
Press-01 21	100	-	-
Shower&Change-01 23	100	-	-
CL-01 31	100	-	-
Physio - 01 1	100	-	-
Physio - 01 2	100	-	-
Medical - 01 1	100	-	-
Prayer Room -01 1	100	-	-
WC-01 26	100	-	-
Anti-Doping -01 1	100	-	-
Anti-Doping -01 2	100	-	-
Anti-Doping -01 3	100	-	-
CL-01 32	100	-	-
WC-01 27	100	-	-
Shower&Change-01 25	100	-	-
WC-01 28	100	-	-

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
Shower&Change-01 26	100	-	-
WC-01 29	100	-	-
CL-02 21	100	-	-
CL-02 22	100	-	-
CL-02 23	100	-	-
CL-02 24	100	-	-
CL-02 25	100	-	-
CL-02 26	100	-	-
ST-02 2	100	-	-
ST-02 4	100	-	-
ST-02 5	100	-	-
ST-02 6	100	-	-
ST-02 11	100	-	-
ST-02 15	100	-	-
ST-02 16	100	-	-
ST-02 17	100	-	-
ST-02 18	100	-	-
ST-02 19	100	-	-
ST-02 20	100	-	-
CL-02 27	100	-	-
CL-02 28	100	-	-
CL-02 29	100	-	-
CL-03 21	100	-	-
CL-03 22	100	-	-
CL-03 23	100	-	-
CL-03 24	100	-	-
CL-03 25	100	-	-
CL-03 26	100	-	-
CL-03 27	100	-	-
CL-03 28	100	-	-
ST-03 30	100	-	-
ST-03 31	100	-	-
ST-03 32	100	-	-
CL-00-Public 21	100	-	-
CL-00-Public 22	100	-	-
CL-00-Public 23	100	-	-
CL - Public - 01 1	100	-	-
CL - Public - 01 2	100	-	-
CL - Public - 01 3	100	-	-
CL - Public - 01 4	100	-	-
CL - Public - 01 5	100	-	-
ST-04 26	100	-	-
WC-04 22	100	-	-

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
WC-04 23	100	-	-
WC-04 24	100	-	-
CL-04 21	100	-	-
CL-04 22	100	-	-
CL-04 23	100	-	-
CL-04 24	100	-	-
CL-04 25	100	-	-
CL-04 26	100	-	-
CL-04 27	100	-	-
CL-04 28	100	-	-
CL-04 29	100	-	-
CL-04 30	100	-	-
CL-04 31	100	-	-
ST-04 27	100	-	-
ST-04 29	100	-	-
ST-04 31	100	-	-
Concessions - 04 1	100	-	-
CL-05 21	100	-	-
CL - Public - 01 21	100	-	-
CL-00-Public 24	100	-	-
CL-00-Public 25	100	-	-
PL-01 1	100	-	-
WC-02 24	100	-	-
CL-02 31	100	-	-
WC-01-East 1	100	-	-
WC-01-East 2	100	-	-
WC-01-East 3	100	-	-
WC-01-East 4	100	-	-
WC-01-East 5	100	-	-
WC-01-East 6	100	-	-
WC-01-East 7	100	-	-
WC-01-East 8	100	-	-
WC-01-East 9	100	-	-
WC-02-East 1	100	-	-
WC-02-East 2	100	-	-
WC-03-East 1	100	-	-
WC-03-East 2	100	-	-
WC-03-East 3	100	-	-
WC-03-East 4	100	-	-
WC-04-East 1	100	-	-
WC-04-East 2	100	-	-
WC-04-East 3	100	-	-
WC-00-East 1	100	-	-

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
WC-00-East 2	100	-	-
WC-00-East 3	100	-	-
WC-00-East 4	100	-	-
WC-00-East 5	100	-	-
WC-00-East 6	100	-	-
CL-00-public-P 1	100	-	-
CL-00-public-I 1	100	-	-
Lounge-02-P 1	100	-	-
Lounge-02-P 2	100	-	-
Lounge-02-I 1	100	-	-
Lounge-03-I 1	100	-	-
Lounge-03-P 1	100	-	-
Lounge-03-P 2	100	-	-
Lounge-04-p 1	100	-	-
Lounge-04-p 2	100	-	-
Lounge-04-I 1	100	-	-
Lounge-04-I 2	100	-	-
Lounge-04-I 3	100	-	-
Lounge-04-I 4	100	-	-
Lounge-04-p 21	100	-	-

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?
WC-02 1	N/A	N/A
WC-02 3	N/A	N/A
WC-03 1	N/A	N/A
WC-03 2	N/A	N/A
WC-03 3	N/A	N/A
WC-03 5	N/A	N/A
WC-04 4	N/A	N/A
ST-01 1	N/A	N/A
ST-01 2	N/A	N/A
ST-01 5	N/A	N/A
EL-00 1	YES (+33%)	NO
Shop-00 1	YES (+145%)	NO
OF-01 3	N/A	N/A
OF-01 4	N/A	N/A
OF-01 5	N/A	N/A
OF-01 6	N/A	N/A
OF-01 7	N/A	N/A
OF-01 8	N/A	N/A
OF-01 9	N/A	N/A
OF-01 10	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Shower&Change-01 1	N/A	N/A
Shower&Change-01 2	N/A	N/A
Medical-00 1	N/A	N/A
Press-01 1	N/A	N/A
Lounge-01 2	N/A	N/A
Warmup-01 1	N/A	N/A
Consessions-03 1	N/A	N/A
Consessions-03 2	N/A	N/A
CL-01 1	N/A	N/A
CL-01 2	N/A	N/A
CL-01 3	N/A	N/A
CL-01 4	N/A	N/A
CL-01 5	N/A	N/A
CL-01 6	N/A	N/A
CL-01 8	N/A	N/A
CL-01 9	N/A	N/A
CL-01 10	N/A	N/A
CL-03 3	N/A	N/A
CL-03 4	N/A	N/A
CL-03 5	N/A	N/A
CL-03 6	N/A	N/A
CL-03 8	N/A	N/A
CL-03 9	N/A	N/A
CL-03 10	N/A	N/A
CL-03 11	N/A	N/A
CL-03 12	N/A	N/A
Media Lounge-01 1	N/A	N/A
Photographer workshop-01-M 1	N/A	N/A
IT-00 1	N/A	N/A
IT-00 2	N/A	N/A
Medical-00 21	N/A	N/A
EL-00 21	YES (+103%)	NO
Shower&Change-01 21	N/A	N/A
Shower&Change-01 22	N/A	N/A
CL-01 22	N/A	N/A
EL-00 22	YES (+28%)	NO
Concessions-00 1	N/A	N/A
Concessions-00 2	N/A	N/A
Concessions-00 3	N/A	N/A
Concessions-00 4	N/A	N/A
Concessions-00 5	N/A	N/A
Press-00 1	N/A	N/A
Press-00 2	N/A	N/A
CL-01 24	N/A	N/A
CL-01 25	N/A	N/A
CL-01 26	N/A	N/A
CL-01 27	N/A	N/A
CL-01 28	N/A	N/A
CL-01 29	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
CL-01 30	N/A	N/A
Press-01 21	N/A	N/A
Shower&Change-01 23	N/A	N/A
CL-01 31	N/A	N/A
Physio - 01 1	N/A	N/A
Physio - 01 2	N/A	N/A
Medical - 01 1	N/A	N/A
Prayer Room -01 1	N/A	N/A
Anti-Doping -01 1	N/A	N/A
Anti-Doping -01 2	N/A	N/A
Anti-Doping -01 3	N/A	N/A
CL-01 32	N/A	N/A
Shower&Change-01 25	N/A	N/A
Shower&Change-01 26	N/A	N/A
CL-03 21	N/A	N/A
CL-03 22	N/A	N/A
CL-03 23	N/A	N/A
CL-03 24	N/A	N/A
CL-03 25	N/A	N/A
CL-03 26	N/A	N/A
CL-03 27	N/A	N/A
CL-03 28	N/A	N/A
CL - Public - 01 1	N/A	N/A
CL - Public - 01 2	N/A	N/A
CL - Public - 01 3	N/A	N/A
CL - Public - 01 4	N/A	N/A
CL - Public - 01 5	N/A	N/A
WC-04 22	N/A	N/A
WC-04 23	N/A	N/A
WC-04 24	YES (+34%)	NO
Concessions - 04 1	N/A	N/A
CL - Public - 01 21	N/A	N/A
WC-02 24	N/A	N/A
WC-02-East 1	N/A	N/A
WC-02-East 2	N/A	N/A
WC-03-East 1	N/A	N/A
WC-03-East 2	N/A	N/A
WC-03-East 3	N/A	N/A
WC-03-East 4	NO (-53%)	NO
WC-04-East 1	NO (-87%)	NO
WC-04-East 2	N/A	N/A
WC-04-East 3	N/A	N/A
Lounge-02-P 1	N/A	N/A
Lounge-02-P 2	NO (-99%)	NO
Lounge-02-I 1	N/A	N/A
Lounge-03-I 1	NO (-83%)	NO
Lounge-03-P 1	YES (+99%)	NO
Lounge-03-P 2	NO (-97%)	NO
Lounge-04-p 1	NO (-88%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Lounge-04-p 2	YES (+58%)	NO
Lounge-04-l 1	NO (-75%)	NO
Lounge-04-l 2	NO (-73%)	NO
Lounge-04-l 3	NO (-76%)	NO
Lounge-04-l 4	YES (+82%)	NO
Lounge-04-p 21	YES (+77%)	NO

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]	9421	9421
External area [m^2]	11659	11659
Weather	CAR	CAR
Infiltration [m^3/hm^2@ 50Pa]	5	4
Average conductance [W/K]	3504	3831
Average U-value [W/m^2K]	0.3	0.33
Alpha value* [%]	36.3	21.3

* 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
	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
100	**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	1.55	2.95
Cooling	2.45	4.4
Auxiliary	11.72	7.21
Lighting	14.48	12.2
Hot water	18.19	41.12
Equipment*	74.72	74.72
TOTAL**	**48.39**	**67.88**

* 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	23.67	17.75
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*23.67*	*17.75*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	64.01	82.94
Primary energy [kWh_{PE}/m^2]	36.7	59.07
Total emissions [kg/m^2]	3.54	9.97

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] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	0.8	91.2	0.1	5.3	18.9	3.35	4.77	3.53	5.02
	Notional	0.3	130.8	0.1	8.3	8.8	0.86	4.4	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	0	86.9	0	5.1	20.6	0	4.77	0	5.02
	Notional	0	133.9	0	8.5	11.4	0	4.4	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	6.1	69.2	0.5	4	19.2	3.35	4.77	3.53	5.02
	Notional	0.3	113.7	0.1	7.2	11.4	0.86	4.4	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	19.3	189.2	1.6	11	4.4	3.35	4.77	3.53	5.02
	Notional	8	121.2	2.6	7.7	3.3	0.86	4.4	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	2.3	0	0.2	0	77.9	3.35	0	3.53	0
	Notional	0.4	0	0.1	0	35	0.86	0	----	----
[ST] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	136.3	14.5	11.3	0.8	25.1	3.35	4.77	3.53	5.02
	Notional	32.5	118.3	10.5	7.5	12	0.86	4.4	----	----
[ST] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	10.1	17.4	0.8	1	25.9	3.35	4.77	3.53	5.02
	Notional	15.9	118.9	5.1	7.5	12	0.86	4.4	----	----
[ST] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	0.1	132.4	0	7.7	28.8	3.35	4.77	3.53	5.02
	Notional	0.9	216.3	0.3	13.7	13	0.86	4.4	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	30.2	0	2.5	0	19.4	3.35	0	3.53	0
	Notional	16.3	0	5.3	0	25.1	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	47.3	0	3.9	0	1.6	3.35	0	3.53	0
	Notional	25	0	8.1	0	1.6	0.86	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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	First surface with maximum value
Walls	0.2	0.2	W-External Wall
Floors	0.2	0.16	W-Ground Floor
Roofs	0.15	-	No pitched roofs in project
Windows and roof windows	1.5	1.4	GL-02
Personnel doors	1.5	1.39	DR-02-solid-small
Vehicle access & similar large doors	1.5	-	No vehicle access or similar large doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project

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

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

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