DSSR | CONSULTING ENGINEERS

PROJECT | LLANTRISANT HEALTH PARK

ENERGY STATEMENT

RIBA STAGE 3b

GIG CYMRU NHS WALES

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Revision History

Revision	Date	Status and Purpose	Changes Overview
P01	25.04.25	RIBA Stage 3b	First Issue

Contents

1 EXECUTIVE SUMMARY

Energy use and CO_2 emissions pose a significant impact on today's-built environment; therefore, buildings are required to minimise these impacts through Lean, Clean and Green design.

The proposed modular building shall therefore be designed to achieve and where possible exceed the minimum standards of Part L: Conservation of Fuel and Power by using this methodology.

To achieve the desired reduction in energy and CO_2 emissions, the following energy hierarchy has been followed:

1) Be Lean – Optimise the building fabric and architectural design to reduce energy demand
2) Be Clean – Utilise clean energy where possible, preferably electricity
3) Be Green – Use renewable and low zero carbon technologies to maximise the site energy production with minimal Fossil Fuels being burnt.

We propose that the following shall be incorporated:

4) LED Lighting;
5) Lighting Control;
6) Daylighting Control;
7) Heat Recovery on Ventilation Systems via plate heat exchangers

It is proposed that the following LZC technologies shall be considered;

8) Air Source Heat Pumps – air source heat pumps are a viable option for the provision of space heating via air heating with dx coils in the air handling plant.
9) Thew provision of photovoltaic electrical generation, potentially alongside battery storage, may be considered if Spire wish to explore this option. This is not included at present.

2 NATIONAL PLANNING POLICY FRAMEWORK

The NPPF was published in 2021 and replaces all previous national guidance notes and statements. The document sets out the Government's planning policies for England and how they are expected to be applied. Its purpose is to perform a number of key roles to ensure:

- A strong, responsive and competitive economy;
- Strong, vibrant and healthy communities; and
- Protection and enhancement of the natural, built and historic environment.

Central to achieving sustainable development is to secure reductions in greenhouse gas emissions, reduce vulnerability and provide resilience to the impacts of climate change.

To support and promote the move to a low carbon future, and reduce vulnerability to climate change, local planning authorities should:

- Plan for new development in locations and ways which reduce greenhouse gas emissions;
- Have a positive strategy to promote energy from renewable and low carbon sources;
- Design their policies to maximise renewable and low carbon energy development while ensuring that adverse impacts are addressed satisfactorily, including cumulative landscapes and visual impacts; and
- Direct development away from areas at highest risk of flooding or coastal change and ensure that flood risk is not increased elsewhere.

3 NHS WALES – DELIVERING NET ZERO

The NHS Net Zero Building Standard (NZBS) has been created to set out the vision for achieving whole-life net zero carbon buildings in healthcare while also providing a roadmap and clear set of performance criteria for reducing operational building energy demands, embodied carbon in construction and the whole life carbon (WLC) of building elements used within them. The NZBS's three key objectives are to:

Define the performance standards for operational energy and embodied carbon.

Set targets for operational energy and embodied carbon.

Establish a process for collecting data for those elements which are not currently collected. Thus, allowing the NHS to contribute to the creation of new industry benchmarks whilst ensuring the NZBS is routinely improved over time.

The NZBS will enable estate leads to use the NZBS to understand and compare operational energy use to current regulatory requirements and improve performance, while improving patient care and creating better environments for all estate users.

The NZBS, and the associated tools, user guide and compliance matrix, were released in February 2023. The NZBS applies to all investments in new buildings or upgrades to existing facilities that are subject to HM Treasury business case approval and are at pre-strategic outline case (pre-SOC) business case stage from 1st October 2023 onwards. As such, the NZBS will be applied incrementally across the estate

The Welsh Government published in the 'NHS Wales Decarbonisation Strategic Delivery Plan' (DSDP) (2021) to drive ambitious carbon emissions reductions, reinforcing the commitment of NHSW to achieving net zero carbon emissions by 2030 across all three scopes as defined by the Greenhouse Gas Protocol in line with the Welsh Government's net zero target for the public sector. The DSDP sets out carbon emissions targets for NHSW as a whole, and four categories of use, rather than by scopes; unlike NHS England's 'Delivering a Net Zero National Health Service' (2022).

To meet the Welsh Government's legislative net zero commitments and to prevent irreversible impacts as a result of climate change, leading scientists and industry experts are advising that bold action must happen now. In response to this, NHSW has made a commitment that all new buildings will be designed and accredited to a net zero framework and for all existing buildings to undergo an energy efficient upgrade.

At RIBA Stage 2, Mott MacDonalds produced a Net Zero Carbon Principles Strategic Outline Case Report which set out the RIBA 2 level of design; considering the Schedule of Accommodation (SOA), site constraints and engineering technical performance criteria. The report also helped develop a Net Zero Carbon (NZC) strategy to ensure that the New Llantrisant Health Park aligns with the broader goals of the Welsh NHS Decarbonisation Strategic Delivery Plan and NHS Net Zero Building Standard Alignment. The strategy was tailored to the specific needs and characteristics of the hospital site and align with broader strategies, including:

- Digital technologies to enhance energy efficiency, monitor carbon emissions, and optimize resource use.
- Innovative Modern Methods of Construction techniques that reduce carbon footprint, improve building performance, and accelerate project timelines.

This strategy will be closely worked to within the design development of RIBA Stage 3 and RIBA Stage 4 by the wider design team.

4 BREEAM

The Building Research Establishment Environmental Assessment Method, BREEAM, is a sustainability assessment and certification scheme first launched by the BRE in 1990 and now in use in over 78 countries. BREEAM sets standards for a range of environmental and sustainable criteria for building design, specification and construction providing a robust assessment and certification system.

BREEAM credit criteria supports the NHS commitment to Net Zero, promoting a reduction in building energy use, encouraging the use of renewable energy sources, supporting a reduction in water usage and waste recycling.

The building performance is scored and rated against the BREEAM criteria:

- Outstanding -85%
- Excellent- 70%
- Very Good- 55%
- Good – 45%
- Pass – 30%

The BREEAM review identifies the achievable credits (baseline score) and the additional credits to be reviewed to improve the overall score. The following credit target is recommended to achieve an Excellent rating:

- BREEAM Excellent – 70% required + minimum 5 credit margin, target 75%

In addition to the overall credit score, each rating has minimum standards; mandatory credits to be achieved for the award of the rating.

The BREEAM New Construction 2018 scheme is divided into categories each of which has differing weightings:

- Management
- Health and Wellbeing
- Energy
- Transport
- Water

- Materials
- Waste
- Land Use and ecology
- Pollution

ENE 01: Reduction of Energy Use and Carbon Emissions

The energy section in BREEAM NC 2018 aims to recognise and encourage buildings that are designed to minimise operational energy demand, primary energy consumption and CO2 emissions.

It offers four additional credits to carry out works related to the "Prediction of operational energy consumptions", this is required for projects targeting BREEAM 'Excellent' or above.

Guidance will be sought regarding how reported information has been gained, calculated and reported in line with BREEAM NC 2018 ENE 01.

BREEAM advises the use of the CIBSE TM54 methodology for use in the calculations which shall be used for the design stage operational calculations.

At RIBA Stage 2, Hydrock completed a Passive Design Study and a LZCT Feasibility Study in order to achieve some early credits for ENE04. The design team will follow the findings of these studies as the design develops in RIBA Stage 3 and RIBA Stage 4.

5 RHONDDA CYNON TAF. LOCAL DEVELOPMENT PLAN

Rhondda Cynon Taf have a local plan in addition to national planning policy. The following section is based on Rhondda Cynon Taf Local Development Plan.

Policy AW 6 – Design and Placemaking

Development Proposals will be supported where:-

1) They are of a high standard of design, which reinforces attractive qualities and local distinctiveness and improves areas of poor design and layout;
2) They are appropriate to the local context in terms of siting, appearance, scale, height, massing, elevational treatment, materials and detailing;
3) In the case of extensions to buildings, they reflect, complement or enhance the form, siting, materials, details and character of the original building, its curtilage and the wider area;
4) In the case of proposals for new and replacement shop fronts and signage, they make a positive contribution to the streetscene;
5) In the public realm and key locations such as town centres, major routes, junctions and public spaces, the character and quality of the built form is to a high standard of design;
6) They include public art;
7) Landscaping and planting are integral to the scheme and enhance the site and the wider context;
8) They include an integrated mixture of uses appropriate to the scale of the development;
9) They include the efficient use of land, especially higher-density residential development on sites in proximity to local amenities and public transport;

10) Open space is provided in accordance with the Fields in Trust Standards;

11) A high level of connectivity and accessibility to existing centres, by a wide range of modes of sustainable transport;

12) Schemes incorporate a flexibility in design to allow changes in use of buildings and spaces as requirements and circumstances change;

13) The development reflects and enhances the cultural heritage of Rhondda Cynon Taf;

14) The design protects and enhances the landscape and biodiversity;

15) The development promotes energy efficiency and the use of renewable energy; and

16) The design promotes good water management, including rainwater storage, sustainable urban drainage, porous paving etc

6 ENVIRONMENTAL DESIGN STRATEGY

Hospitals by their nature require comprehensive HVAC installations in order to meet stringent operational thermal comfort and hygiene demands. For this reason, the environmental strategy for the hospital building focuses upon fabric performance and the specification of energy efficient HVAC equipment. Passive design strategies have been incorporated where practical.

The priority of any energy strategy is to reduce energy demand ('Be LEAN'). Once this is achieved, efficient means of supplying energy can then be considered ('Be CLEAN') and subsequently the provision of LZC technologies ('Be GREEN') The following sections summarise the Lean and Clean design measures proposed to be incorporated in order to improve the energy efficiency of the new Hospital building.

6.1 Use less energy: be lean

Passive building fabric measures are prioritised, and these are intended to limit the energy demands for space heating, cooling and lighting:

- High performance building fabric
- U-values that better Part L requirements
- Minimised thermal bridging (approved construction details where practical)
- Robust air tightness
- Provision of external solar shading in conjunction with solar control glazing in order to limit unwanted solar gains whilst maximising daylight ingress

6.1.1 Building Fabric

Building envelope performance is key to demonstrating Part L2a (2013) compliance. The enhancement of U-values whilst limiting thermal bridging and uncontrolled air ingress/leakage (air permeability) can significantly reduce the energy demand of the building. As such the building envelope is proposed to achieve an excellent standard of thermal insulation with limited thermal bridging* and optimised air tightness.

The following table summarises the proposed building fabric U-value performances:

Building Element	Thermal Performance (W/(m²·K))	Unit
External walls	0.13	W/m²K
Roof	0.1	W/m²K
Floor	0.1	W/m²K
Glazing g-value/ light transmittance	1.3 / 0.33 / 77%	W/m²K
Doors Pedestrian	1.6	W/m²K
Air permeability	2.5	m³/(hm²) at 50Pa

NOTE:- U-Values may change following design development.

6.1.2 Lighting Scheme Efficiency and Associated Controls

Lighting energy consumption is a key Part L2a consideration and for this reason the proposed compliance strategy is heavily reliant upon the specification of highly efficient (ambient lighting) luminaires throughout the Hospital. It is currently proposed that LED luminaires are to be specified which help to achieve demanding performance targets.

In summary, it is proposed that luminaire lumens/circuit watt values **≥ 95lm/W1** are specified throughout2 and that brightness (Lux) levels are both carefully specified as not to be excessive whilst still meeting hospital specific design requirements.

In terms of lighting controls:

- The use of occupancy presence sensors is proposed in circulation zones – AutoON/AutoOFF.
- Lighting control parasitic power consumptions are to be minimised (<0.05W/m2 per area/room served)
- Photocell automatic daylight dimming will be included in perimeter areas
- Manual dimming will be provided to all areas.

6.1.3 Thermal Mass

Exposed thermal mass (heavyweight building fabric) is an important thermal comfort design consideration, especially for naturally ventilated spaces. As the hospital building is predominately mechanically ventilated, thermal mass exposure becomes less of a concern, however, the architectural design is encouraged to expose building thermal mass where at all possible as this serves to help maintain a more stable and thermally comfortable internal environment.

6.1.4 Auxiliary Energy (Fans/Pumps/Controls)

Due to the nature of the hospital requiring extensive all-air systems in order to meet strict hygiene and thermal comfort requirements, 'Auxiliary energy' (fans/pumps/controls) consumption represents the main source of 'regulated' (Part L2a) CO2 emissions. Real life operation auxiliary energy consumption is also anticipated to be very significant. For this reason, the following design measures/specifications are proposed to be implemented:

- Air Handling Unit (AHU) specific fan powers (SFPS') are to be minimised – in some instances this may require significant oversizing of units in order to enable efficient fan speed operation
- Central balanced supply and extract systems with heating, cooling and heat recovery will target 1.9 W/l.s
- High efficiency heat recovery (≥ 70%) is also proposed on all supply and return AHUs
- All Low temperature hot water (LTHW), Domestic Hot Water (DHW) and Chilled Water (CHW) pumps are to be variable speed with appropriate sensor locations to ensure optimised energy efficient flow rates are used at all times
- All distribution pipework is to be comprehensively insulated to minimise losses and hence excessive pumping requirements
- Where dedicated extract ventilation fans are provided these will also have minimised SFP's as well as sensor linked controls (i.e. CO2, occupancy and/or timers) in order to limit energy consumptions
- It is proposed that all building HVAC and lighting systems will be comprehensively monitored and metered via an advanced Building Energy Management System (BEMS). This system will have the functionality to generate automatic alarms should any energy usages fall outside an acceptable pre-defined range. The presence of a comprehensive BEMS as well as a facilities team who are skilled in.

6.2 Be Clean

'Be Clean' typically refers to suppling energy efficiently and cleanly by switching away from fossil fuels as the primary energy source.

6.2.1 Space Heating, Cooling and DHW Generation

One of the key initiatives at Llantrisant Health Park is the integration of Air Source Heat Pumps (ASHPs). ASHPs are highly efficient systems that extract heat from the outside air and use it to heat the building. This technology significantly reduces the hospital's reliance on fossil fuels and lowers carbon emissions. ASHPs are particularly effective in the hospital's climate, providing a reliable and sustainable heating solution.

The ASHPs will be used to meet both the heating and cooling demands of the hospital in combination with water source heat pumps (WSHP). Pumps for heating will be located on the roof of building B to serve the heating plant located in each building.

The primary cooling loads for the building will be met by the ASHP(s). The cooling will serve each building separately.

There will be a separate cooling primary system within each building to ensure separation of hydraulic circuits, simplifying system operation, commissioning and maintenance.

The hospital will the use a communal heat network on the site, adopting a centralized plant that generates heat and distributes to the proposed hospital buildings. This will be modular such that it can expand as the building phases are constructed.

6.3 Be Green

Be Green refers to maximising renewable energy generation and storage to reduce grid demand and CO_2 emissions.

6.3.1 PV Technology

Llantrisant Health Park is actively embracing the 'Be Green' principles from the NHS Net Zero Building Standard (NZBS) to enhance its sustainability and reduce its carbon footprint. This approach focuses on maximizing the use of renewable energy sources and minimizing environmental impact.

A key component of the hospital's 'Be Green' strategy is the installation of photovoltaic (PV) panels. These solar panels are being placed on the rooftops of the new hospital buildings.

The following table summarises the proposed PV:

PV Area	**2687**
Module Efficiency (%)	**19.8**
Annual PV Generation (kWh/Annum)	**557.173**
Building Area (treated) (m2)	**22075**
Annual PV Generation (kWh/m2)	**25.24**

NOTE:- PV Area and PV Generation Information may change following design development.