DSSR | CONSULTING ENGINEERS

PROJECT | NORTH DENBIGHSHIRE COMMUNITY HOSPITAL

ROYAL ALEXANDRA HOSPITAL, RHYL

KIER

SUSTAINABILITY STATEMENT

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Contents

1 INTRODUCTION 1

2 PROJECT CONTEXT 1

3 ENERGY AND SUSTAINABILITY STRATEGY 2

3.1 Energy Consumption Analysis 3

3.2 Renewable Technology 4

3.2.1 Photovoltaic Cells: 4
3.2.2 Wind Turbine: 5
3.2.3 Air to Water Heat Pump 5

3.3 Electric Vehicle ULEV 6

3.4 Future Proofing the Design Proposals 6

1 INTRODUCTION

This planning energy statement is prepared for the Proposed Development to the rear of Royal Alexander Hospital.

The Proposed Development recognises an energy hierarchy of reducing energy demand through lean building design such as fabric performance and passive energy enhancements, improving energy efficiency through clean building design, such as air to water heat pumps and local renewable energy generation by incorporating renewable technologies that are electrically focused such as photovoltaic cells and wind turbines.

The Proposed Development design has been conceptualised around embracing electrification of building design and bringing forward standards higher than the national minimum, which is set out in Building Regulations and has also projected the benefits of these standards against future grid carbon factors. Whilst having high energy efficiency performance, the design further tackles the causes of climate change and adapts to the current future effects of climate change through the incorporation of effective mitigation and adaption measures.

2 PROJECT CONTEXT

The Proposed Development is a new Community Hospital that is to be located at the rear of the existing Royal Alexandra Hospital, Rhyl.

The Proposed Development consists of the following defined areas:

Ground Floor:

- Catering
- Dental
- FM
- Imaging & Ultrasound
- Main Entrance
- Patient and Visitor HUB
- Plant
- Same Day Care Centre
- Sexual Health
- Staff Hub

First Floor:

- Day Therapy Assessment Unit (IV)
- FM
- OP Mental Health
- Outpatients
- Plant
- Staff Hub

- Therapies Outpatients
- Toilets

Second Floor:

- Emergency Multi-Disciplinary
- FM
- Plant
- Therapies Inpatients
- Ward

3 ENERGY AND SUSTAINABILITY STRATEGY

In line with the Welsh Government targets; to deliver net zero carbon buildings by 2050, this sustainability strategy has been developed with a focus on achieving a low carbon building with an aspiration to achieving net zero carbon. In addition to the Welsh Government targets, this building has been designed to ensure that BREEAM Excellent and Approved Document L2A targets are achieved.

As a result of continued decarbonisation of the electrical grid, through the use of renewable technologies such as wind power, photovoltaic cells, gas generation power stations etc, this building will benefit from electrically led systems and therefore this sustainability strategy has been formulated in response to this holistic decarbonisation strategy.

To verify this sustainability strategy, the proposed building will be modelled using Dynamic Simulation Modelling techniques as the design develops.

The philosophy that has been embraced within the proposed development is:

1. Reduce the demand for energy through implementation of façade passive measures;
2. Reduce primary energy and carbon emissions through incorporation of efficient low carbon plant selections, low grade heating and passive cooling such as natural ventilation;
3. Reduce energy and carbon emissions through incorporation of electrically led renewable technologies such as heat pumps;

The passive measures that have been implemented within this building are:

- Reduce energy consumption through implementation of a high efficiency building envelope;
- Reduce energy consumption through the use of natural ventilation;
- Reduce primary energy through integration of low grade heating systems and renewable technologies;
- Reduce CO_2 emission by use of low grade heating and cooling systems and high efficiency renewable technology sources;

The minimum façade optimisation passive measures will exceed building regulations and some Passivehaus u-values.

- Low building fabric air tightness – 5 m^3 (m^2.h) @ 50Pa;
- Low building fabric u-values – Walls 0.12W/m^2.K, Floor 0.12W/m^2.K, Roof 0.12W.m^2.K;
- Low window u-values – 1.4W/m^2.K;
- Low door u-values – 1.4W/m^2.K;
- Selective solar control glass to give a high light transmittance (70%) and low g-value (33%);

Primary energy strategies once energy reduction measures have been implemented through good design principles are:

- Underfloor heating and cooling served from;
- High efficiency air source heat pump technology;
- Air handling unit heating and cooling served by air source heat pump technology;
- Low specific fan powers on air handling units;
- High efficiency heat recovery within air handling units;
- High efficiency LED lighting and optimum automatic control functionality;
- Building energy management system;
- Reduced domestic hot water storage;

To further reduce energy and consequently carbon emissions, whilst embracing the nett zero carbon aspiration, it is proposed to implement 250m^2 of Photovoltaic cells that are South facing and are of high efficiency. In addition to this, it is proposed to incorporate two 7kWe wind turbines placed within the car park to generate electrical energy.

3.1 Energy Consumption Analysis

A simulation has been carried out to establish the current predicted performance of the Proposed Development in relation to Welsh Building Regulations Part L2A. This analysis indicates that the performance of the building exceeds the minimum standards by achieving a 25% reduction in Carbon Emission over a current Target Emission Building:

Predicted CO_2 emission		
Target Emissions Rate (TER)	23.1	$kgCO_2/m^2$.annum
Building Emissions Rate (BER)	17.2	$kgCO_2/m^2$.annum
Building Regulation Result	**25.54**	% PASS
Building Primary Energy Consumption	126.09	kWh/m2/annum
Target Primary Energy Consumption	139.44	kWh/m2/annum
Building Regulations Result	**9.00**	%PASS
Predicted Regulated Renewable Technology Contribution		
Renewable Heat Pump Energy Contribution (Heat Only)	**4**	%
Renewable Wind Turbine Energy Contribution	**10**	%
Renewable PV Energy Contribution	**12**	%
Total Renewable Energy Provided of Regulated Loads	**26**	%

The National Grid is continually decarbonising which makes the use of gas systems less preferential over electrically fuelled systems. When considering this decarbonising grid impact on this development there is a potential that the systems that have been selected future proof the performance and aspiration of a net zero carbon development.

3.2 Renewable Technology

As part of the design proposal the following renewable technologies have been implemented:

3.2.1 Photovoltaic Cells:

250m^2 of photovoltaic cells which are South facing.

3.2.2 Wind Turbine:

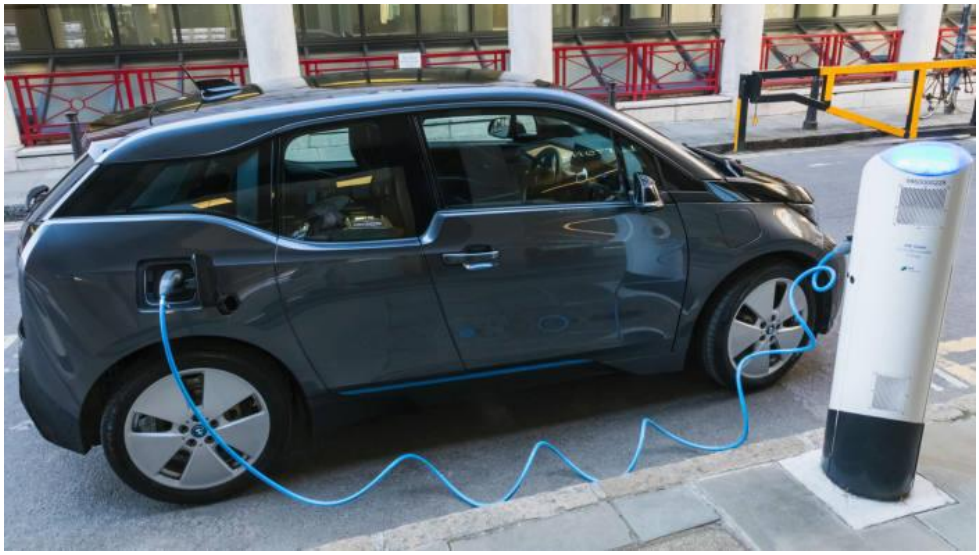
Two 7kWe wind turbines have been included to the East Parade Road carpark entrance

3.2.3 Air to Water Heat Pump

Four roof mounted Air to Water Heat Pumps have been included.

3.3 Electric Vehicle ULEV

In addition to the energy and sustainability strategies incorporated within the building, further strategies have been included to encourage the use of Ultra Low Emission Vehicles (ULEVs). The development has provided 7.4% of all carparking to be electric hook up.



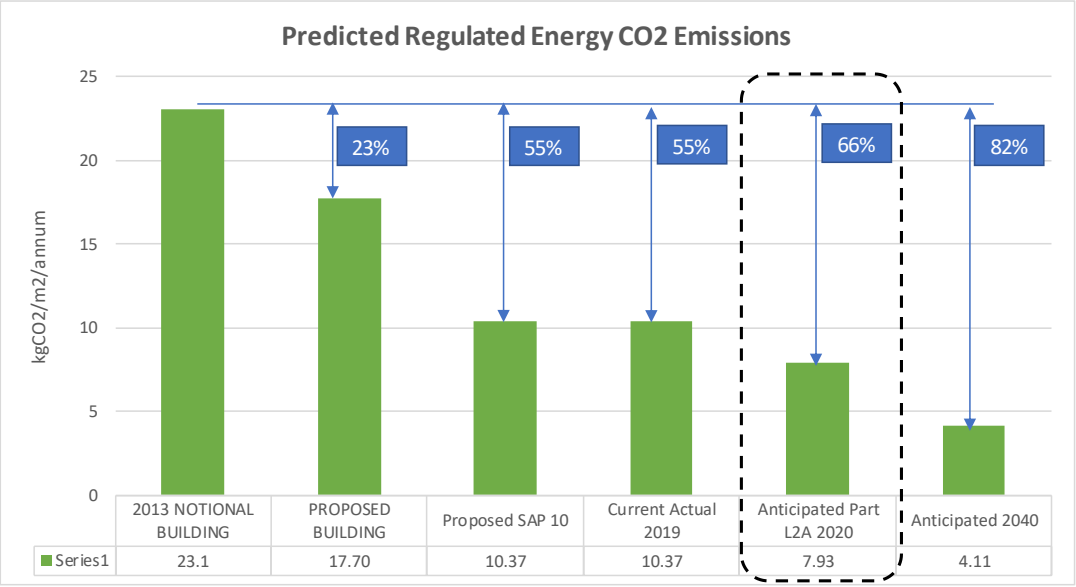
3.4 Future Proofing the Design Proposals

As decarbonisation of the grid continues through the introduction of renewable green technologies, grid carbon factors are reducing. An assessment has been made to the likely reduction in carbon emissions with the current selections been made.

The analysis has identified that through implementation of the proposed 2020 carbon factors, which are not currently released, the development has the potential to reduce its anticipated CO_2 emissions by 66% over the current target emission for the building.

A projection has then been made to the 2040 anticipated electrical CO_2 factor which indicates that there is a 82% reduction in CO_2 emissions over the current target emissions for the building.

	Current and Projected Carbon Factors				
	Part L2A (2013)	SAP 10 (July 2018)	Current actual average (2019)	SAP 10.1 (October 2019)	Anticipated 2040
Electric	0.519	0.233	0.2556	0.136	0.01
Gas	0.216	0.21	0.1835	0.21	0.18



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