



Grange Road, Cwmbran

Energy Statement

For Arctech Partnership LLP

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CONTENTS

1.	EXECUTIVE SUMMARY	2
2.	INTRODUCTION.....	3
2.1	Site Context.....	Error! Bookmark not defined.
3.	PLANNING POLICY OVERVIEW	4
3.1	Policy and Regulations Overview	4
3.2	National Policies.....	4
3.3	County and Local Policies.....	5
4.	ENERGY STRATEGY.....	6
4.1	Step 1 – Minimising Energy Consumption – Be Lean	6
4.2	Step 2 – Supply Energy Efficiently – Be Clean	7
4.3	Step 3 – Utilising Low to Zero Carbon Technologies – Be Green	7
5.	THERMAL MODELLING ASSESSMENT.....	8
5.1	Part L2A Results	8
6.	CONCLUSION	10

1. EXECUTIVE SUMMARY

This report provides an analysis of the potential energy strategy for the proposed development of Grange Road, Cwmbran. The report also outlines the key policy drivers and provides a summary of the energy modelling completed for the development.

In devising the energy strategy for the development, consideration has been taken of the local and national planning policies, as well as other relevant requirements. The strategy has been based upon the Energy Hierarchy, which aims at first to reduce energy requirements, followed by improve energy efficiency and then implement renewable technologies if/as required.

This report concludes that the scheme will require the introduction of a photovoltaic array, as well as high-performance building fabric and lighting in order to comply with Part L of the Building Regulations.

2. INTRODUCTION

Hydrock have been appointed on behalf Archtech Partnership to prepare a report detailing the proposed shell-and-core energy requirements of the Grange Road industrial unit in Cwmbran.

The unit will be required to comply with Building Regulation Part L2A criteria. A Dynamic Simulation Model (DSM) calculation has been performed for the development to assess compliance.

This report assesses the proposed development consisting of a main factory floor, adjoining office space, and circulation and WC areas as per the site plan below.

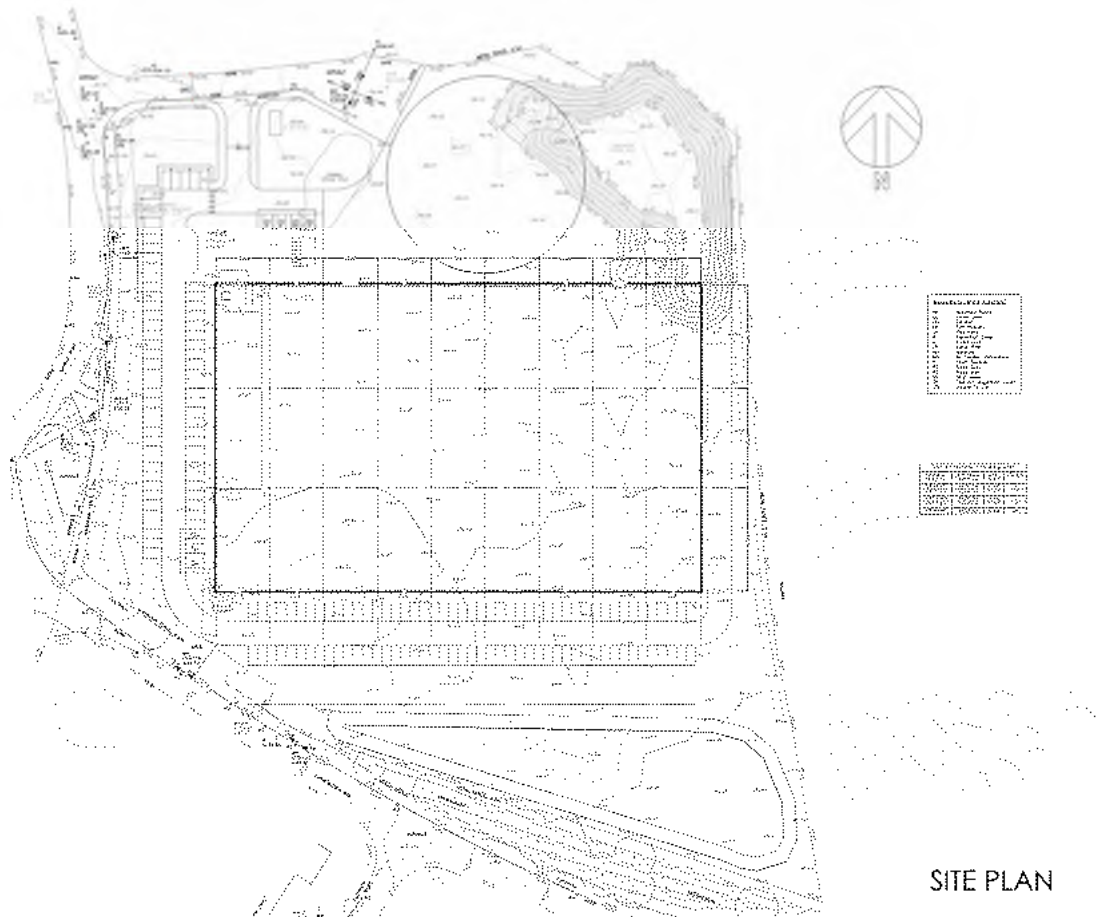


Figure 1: Proposed Site Layout

3. PLANNING POLICY OVERVIEW

This section summarises the key local policy and national regulations affecting the proposed development.

3.1 Policy and Regulations Overview

Local and national policy, regulations and guidance have been followed. Best practice standards and the high aspirations of the client have also been integrated.

3.2 National Policies

3.2.1 *National Planning Policy Framework*

The National Planning Policy Framework (NPPF) (revised 2019) sets out the overarching planning policy objectives for the delivery of sustainable development through the planning system. In order to achieve the goal of sustainable development, NPPF places emphasis on the following:

- Pursuing development in an integrated manner, promoting outcomes in which environmental, economic and social objective are achieved together over time; and adopting a holistic spatial planning approach (Sections 2,3).
- Promoting high quality and inclusive design in the layout of new developments over the lifetime of the development; and including clear comprehensive and inclusive access policies that consider people's diverse needs and aims to break down unnecessary barriers and exclusions (Section 8).
- Addressing the causes and potential impacts of climate change, including via the promotion of renewable and low carbon energy, as well as taking passive design measures into account from inception to reduce greenhouse gas emissions (Section 14).

The NPPF also advises that developers should consider the opportunity for incorporating renewable energy projects in all new developments. Where renewable energy developments are proposed, account should be taken of a range of issues arising from that development, but also the benefits that it provides. NPPF identifies the following key principles in approaching renewable and low carbon energy:

- Renewable energy developments should be capable of being accommodated in locations where the technology is viable.
- Developers should recognise the full range of renewable energy sources, their differing characteristics, location requirements and the potential for exploiting them.
- Development proposals should demonstrate any environmental, economic and social benefits as well as how any negative environmental and social impacts have been minimised.
- Developers should identify opportunities for developments to draw their supply from decentralised, renewable, or low carbon energy supply systems.

3.2.2 Building Regulations, Part L2A (Wales) 2014

Part L2A of the Building Regulations details the minimum standards new build, non-domestic developments (such as this scheme) are required to meet, thus ensuring reduction in both carbon emissions and a developments dependency on grid supplied resources. The building will be assessed on its Building Emissions Rate (BER) and Building Primary Energy Consumption (BPEC). These are compared to a notional building of the same purpose and size to assess whether compliance is achieved.

To fully comply with Building Regulations Approved Document Part L2A (ADL2A) 2014, 5 Criteria must be met. This report details compliance with Criteria 1, 2 and 3. Criteria 4 and 5 will require post construction testing and demonstration.

1. Criterion 1 is a mandatory requirement which must be met by all new buildings. In order to achieve compliance, it must be demonstrated that:
 - a. The calculated Building CO2 Emissions Rate (BER) does not exceed the Target CO2 Emissions Rate (TER).
 - b. The calculated Building Primary Energy Consumption (BPEC) rate does not exceed the Target Primary Energy Consumption (TPEC).
2. Reasonable provision has been made to limit heat gains and losses through the fabric of the building, and energy efficient fixed building services with effective controls are provided to all buildings.
3. The building has appropriate passive control measures to limit solar gains and limit or eliminate the need for air conditioning.
4. The performance of the building, as built, is consistent with the prediction made in the BER.
5. The necessary provisions for enabling energy efficient operation of the building are put in place.

3.3 County and Local Policies

The Grange Road development falls within the jurisdiction of Torfaen County Borough Council, therefore the development is required to comply with the TCBC Local Development Plan (Adopted December 2013).

Section 5, sub-section S3 of the plan concerns policy responses to climate change, the paragraph relating to Part L regulations is below:

"Development proposals are required to deliver minimum standards for energy efficiency in buildings in line with recognised WG sustainable building standards and Part L of the Building Regulations. Whilst this policy does not prescribe higher standards than these national standards proposals which exceed these standards will be encouraged."

'WG sustainable building standards' refers to the Welsh Government practice guidance for sustainable buildings document. There are no requirements within that to better Part L2A building regulations.

In summary, there will be no requirements to achieve compliance over-and-above Part L2A regulations on this scheme, although there are requirements to design to best practice and with energy efficiency measures at the forefront of any design decisions.

4. ENERGY STRATEGY

The energy strategy for the proposed scheme has been developed in accordance to local and national policies and is based on the principles of the Energy Hierarchy, a framework that assists progress towards more sustainable energy systems. The basic principles of the Energy Hierarchy are:

1. Be Lean – Use less energy
2. Be Clean – Use energy more efficiently
3. Be Green – Use renewable energy



Figure 2: Energy Hierarchy

4.1 Step 1 – Minimising Energy Consumption – Be Lean

This section of the report looks at the measures that are available to reduce the energy demand for the new development beyond the notional building baseline.

Energy demand reduction provides the largest opportunity for minimising a building's potential CO₂ emissions. Minimising energy consumption for the development will be accommodated by driving down energy demand through passive building design and operational techniques prior to focusing on energy efficient plant and controls.

The first principle therefore relies on energy efficient design and the site characteristics which embody passive designs. Furthermore, the design of the building fabric can reduce energy wastage and associated energy demand.

Passive design can be described as designing a building to take maximum advantage of the light and heat from the sun and natural ventilation to reduce the energy demand of a building. The following passive design measures have been explored:

- Location, grouping, orientation and layout;
- Natural ventilation where possible;
- Landscape features and shading
- Thermal mass

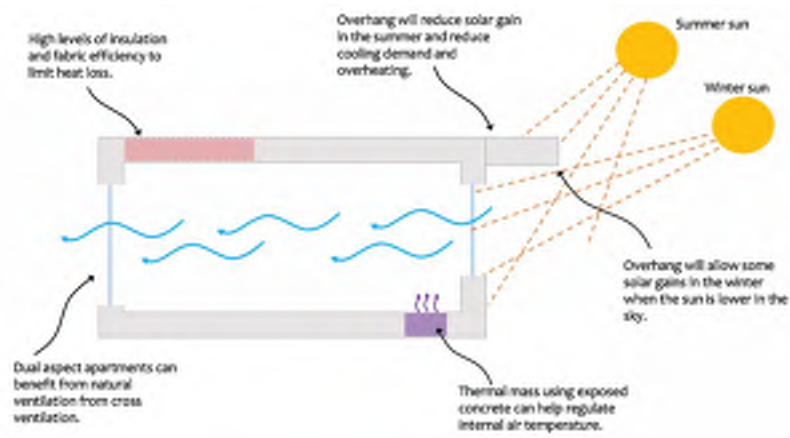


Figure 3: Example of Passive Design Options

The orientation and layout of the unit has been developed where possible to utilise natural light and heat from the sun. High performance glazing will maximise day lighting and winter sun solar gain whilst reducing heat loss through the glazed areas.

The scheme will be specified with high efficiency building fabric to minimise heat loss and air leakage. This building will be assessed under Part L2A.

4.2 Step 2 – Supply Energy Efficiently – Be Clean

Following the implementation of all appropriate passive measures, the integration of energy efficient technologies into the development should be sought.

The second principle places the emphasis on using energy more efficiently. This is on the understanding that low carbon technologies can be cost-effective and can also provide significant carbon savings when compared to conventional technologies.

The unit will also encourage the use of low energy appliances and provide information and guidance on efficient use and operation of the buildings. Appliances will be chosen where practicable to be A/A+ rated under the EU Energy Labelling Scheme.

4.3 Step 3 – Utilising Low to Zero Carbon Technologies – Be Green

The most suitable renewable technology for this scheme will be the inclusion of a roof-mounted photovoltaic array. The results of the compliance assessment will determine whether a PV array is needed and if so, the quantity of which will be required.

5. THERMAL MODELLING ASSESSMENT

The scheme was modelled using IES VE 2019 under a DSM assessment.

The building fabric parameters used for the simulation are shown below:

Table 1: Building Elements Thermal Properties

Building Element Thermal Properties		
U Values		
External Walls	0.20	W/m ² K
Exposed Floor	0.18	W/m ² K
Roof	0.16	W/m ² K
Doors	2.2	W/m ² K
Glazing	1.4	W/m ² K
Glazing G Value	0.4	-
Air Permeability	3.0	m ³ /(h.m ²) @50Pa

Throughout the simulations of the following building services assumptions were inputted to the program:

- Heating System: Flued gas radiant heaters on industrial floor. LTHW radiators served via 95% efficiency gas boilers in WC areas and office circulation. Heat pump VRF in office area.
- Ventilation: Natural ventilation throughout.
- Hot Water: Gas-Fired DHW cylinders.
- Lighting: Model assumes that luminaires installed shall have a luminous efficacy of at least 130 Lumens/Watt.

5.1 Part L2A Results

The simulations were run with the purpose of determining any strategy or geometric changes necessary to pass Part L regulations, as well as whether the addition of photovoltaic panels was necessary.

The results of the DSM assessments are shown below. The actual building must beat both the target emission rate and target primary energy consumption to pass.

The assessment was run both with and without PV to allow for comparison.

Without PV Panels:

Target Emissions Rate (kgCO ₂ /m ² per annum)	Building Emissions Rate (kgCO ₂ /m ² per annum)	Target Primary Energy Consumption (TPEC) kWh/m ² .annum	Building Primary Energy Consumption (BPEC) kWh/m ² .annum	Result
14.6	18.0	90.8	90.6	Fail

In this scenario the building beat the target energy consumption and failed to beat the target emissions rate. Therefore, PV must be added until both criteria are passed.

With 90000kWh/annum PV:

Target Emissions Rate (kgCO ₂ /m ² per annum)	Building Emissions Rate (kgCO ₂ /m ² per annum)	Target Primary Energy Consumption (TPEC) kWh/m ² .annum	Building Primary Energy Consumption (BPEC) kWh/m ² .annum	Result
14.6	13.6	90.8	90.6	Pass

In this scenario the building beat both the target energy consumption and the target emissions rate, demonstrating compliance as a whole.

90 000kWh/annum of PV equates to roughly 500m² of PV, or approximately 320 individual panels. These figures are estimates only at this time and should be confirmed by a PV specialist.

6. CONCLUSION

The energy requirements and potential energy sources have been considered and discussed for the proposed development. The relevant local and national policies have been analysed and the assessments carried out show that the requirements of these policies are satisfied. The overarching requirement is compliance with Building Regulations Part L2A.

It has been shown that the implementation of passive design measures as well as efficient lighting and the introduction of a roof mounted PV array satisfies the criteria for Part L building compliance as demonstrated above.

Further studies can be undertaken as the design progresses to find the preferred solution for the design team.