



CWC

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Project 6 Manchester Grammar School

Planning Submission
Energy Strategy Statement
Revision 1

Date: 10/07/2023

Ref: 2879-CWC-XX-R-N-0001

Revision Record

Date	Reference	Revision	Prepared By	Checked By	Authorised By
04/07/2023	Draft	-	M Lloyd		
			ML		
10/07/2023	2879-CWC-XX-R-N-0001	1	M Lloyd		
			ML		

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1.0 Executive Summary

This Energy Statement reviews the opportunities for passive design measures, energy efficiency measures and feasible low and zero carbon technologies, in keeping with an 'Energy Hierarchy' approach for the redevelopment of the Pavilion building at Manchester Grammar School (MSG), Manchester.

Building Regulations Part L: 2021 is used as the assessment methodology in determining CO2 emissions.

The analysis provided in this report demonstrates that the redevelopment of the Pavilion scheme will seek to achieve the requirements of Manchester City Council Core Strategy 2012 to 2027.

Particular characteristics of this development that have contributed to this have included the following:

- Use of building components with good thermal properties
- Built with low air permeability
- The benefit of potentially connecting to low carbon systems
- The benefit of good daylighting and the use of appropriate lighting controls to reduce the electrical energy consumption.
- Reducing solar gains by installing improved glazing and internal blinds.
- Ventilation strategy – optimising the use of natural ventilation and mechanical heat recovery solutions.

Carbon Emission Reduction

The percentage reduction saving over Part L (2010) have been estimated at around 36% improvement. This betterment surpasses the 10% requirement stated in the Manchester City Council Core Strategy 2012 to 2017.

2.0 Background

2.1 Introduction

The following statement outlines the energy strategy for the redevelopment of the Pavilion building at Manchester Grammar School and more specifically compliance with the Manchester City Council Core Strategy 2012 to 2027.

The proposals consist of the demolition of existing Pavilion and Sieff Theatre buildings and construction of a new Pavilion and sixth form building on the existing site.

2.2 General

The buildings will be modelled with accredited software packages to determine the optimum energy efficiency strategy including layout and solar performance of the building given the constraints that its orientation and massing provides. This exercise will then review the above against varying servicing strategies to establish the optimum strategy to minimise on-site energy demand and carbon emissions of the development and promote sustainability and a high quality local environment. This report provides the results of the initial modelling studies.

2.3 Purpose

This Energy Statement reviews the opportunities for passive design measures, energy efficiency measures and feasible low and zero carbon technologies, in keeping with an 'Energy Hierarchy' approach. Building Regulations Part L: 2021 is used as the assessment methodology in determining CO2 emissions.

3.0 Energy Target

3.1 Building Regulations Part L (2013) Compliance

The scheme will comply with the criteria of Building Regulations Part L2A (2021) for the non - residential buildings.

3.2 Manchester City Council Core Strategy 2012 to 2027

In addition to Building Regulations compliance the performance of the buildings will be such as to provide additional carbon savings in line with Policy EN 6 of the Core Strategy as below:

Core Strategy EN 6 - Target Framework for CO₂ reductions from low or zero carbon energy supplies

Development must follow the principles of the Energy Hierarchy, being designed:

- to reduce the need for energy through design features.
- to reduce the need for energy through energy efficient features; and
- to meet residual energy requirements through the use of low or zero carbon energy generating technologies.

New residential development of 10 units or more, to achieve carbon emissions reduction standards **15% greater than Part L of the Building Regulations (2010)** depending on the type and location of the scheme, unless this can be shown not to be viable.

Non-domestic development over 1,000m² will be expected as a minimum to achieve **carbon emissions reduction standards between 10% and 15% greater than Part L of the Building Regulations (2010)** depending on the type and location of the scheme, unless this can be shown not to be viable.

- Commercial buildings with a high proportion of emissions from electricity use (>45 kg CO₂/m²) to achieve +10%increase on Part L 2010.
- Other buildings to achieve +15%increase on Part L 2010

As the application is over 1,000 sq m it is intended to meet the Core Strategy targets shown in Tables 12.2 regarding non-domestic CO₂ emissions.

4.0 Building and System Criteria

The scheme has been assessed for energy improvement by using the following design criteria for the thermal elements and building services systems.

Element	Design Characteristics/Criteria
Heating Fuel	Electric / Standalone plant
External Walls	0.15 W/m ² k
Windows/Door	U-value – 1.4 W/m ² k G-value – 0.35
Rooflights	U-value – 2.2 W/m ² k G-value – 0.4
Roof (pitched / flat)	0.15 / 0.16 W/m ² k
Party walls	Full Fill - zero heat loss element
Air permeability	3 m ³ /(hr.m ²) at 50 Pa
Thermal Bridging	Approved Details
Ventilation	Natural, Mixed Mode & Mechanical with heat recovery
Lighting	Low Energy throughout
Heating Fuel	Electric / Standalone plant

Table 1: System Characteristics and Design Criteria

5.0 Energy Studies

5.1 Methodology

Building Regulations Part L: 2021 is used as the assessment methodology in determining CO2 emissions.

A preliminary assessment has been made for the building using IES version 7.0.21

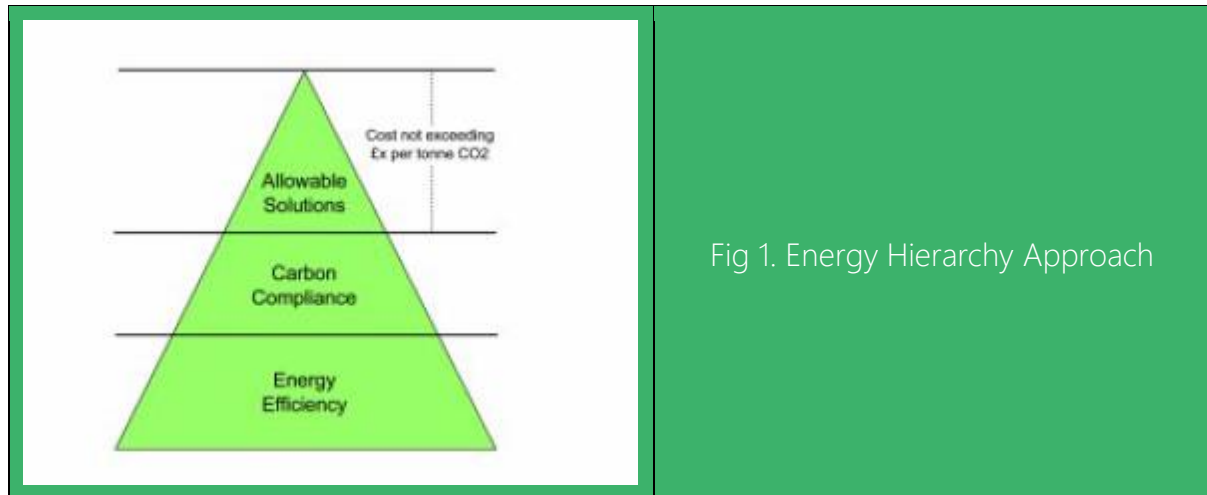
5.2 Results

The building has achieved compliance with Part L2A 2021 and also achieves a 36% improvement over Part L2A 2010 (this surpasses the 10% improvement required by Manchester City Council Core Strategy).

We believe that compliance with EN6 is achieved by meeting the energy reduction targets of Part L2A 2021. Refer to Section 8.0 for the results of the initial BRUKL calculation.

6.0 Energy Hierarchy

The development of the design will adopt a hierarchy approach to the design by looking at passive design methods to reduce energy and provide a high level of energy efficiency.



6.1 Passive Design- Thermal Elements

To facilitate the development, the following elements have been considered through the design process from both an energy efficiency and thermal comfort perspective:

- Use of building components with good thermal properties
- Built with low air permeability
- The benefit of potentially connecting to low carbon systems
- The benefit of good daylighting and the use of appropriate lighting controls to reduce the electrical energy consumption.
- Reducing solar gains by installing improved glazing and internal blinds.
- Ventilation strategy – optimising the use of natural ventilation and mechanical heat recovery solutions.

6.2 Passive Design- Glazing, Daylighting and Solar Gain

There are three key criteria when considering the glazing strategy for the development. These are energy efficiency, natural daylighting factors and summertime internal temperatures. They are intrinsically linked and should be considered holistically to determine the optimum strategy to achieve a comfortable, productive and healthy environment in all weather conditions, whilst making best use of the sun as a natural heating source.

The main factors in optimising the above are the size, orientation and specification of the glazing in relation to the occupancy and usage patterns of the buildings.

Through the modelling exercise the effect of high external temperatures will be assessed and measures taken to minimise the heat gain and temperature rise within the building. Solar control finish applied to the glazing, internal blinds, ventilation and free cooling shall be considered to minimise/remove the need for cooling.

This strategy also has the benefit that the insulation will keep vital heat in during the colder winter months which will minimise the heat input required.

The proposed building will also benefit from deep eaves, to provide solar shading during the summer months.

6.3 Systems Design

6.3.1 Systems Selection

The systems and components will be selected for the project to ensure that the energy targets within the Part L assessment are achieved.

More specifically the building will include the following systems:

- Heat recovery in the ventilation system providing fresh air
- Lighting controls offering both daylight dimming and presence detection, where appropriate
- Use of Building Energy Management System to control and monitor system performance
- Use of inverter drives to control system output to closely match demand
- Night time cooling to reduce cooling energy demand.
- Controls to external lighting

6.3.2 Metering

Metering will be installed within the building to ensure all energy utilised can be identified and assessed accurately.

Metering and sub-metering to BREEAM standards will be incorporated. In line with Part L, at least 90% of the estimated annual energy consumption of each fuel will be accounted for.

A metering data collection system via the BMS will be installed to ensure quality real time data is available to the proposed monitoring and targeting system to identify avoidable wastage. The metering installation will follow the guidance of CIBSE TM39.

6.3.3 Water Conservation

Water is a naturally occurring resource that is critical to supporting life and must be managed and conserved effectively. Minimising the water consumption of the site is of utmost importance and this will be addressed through the use of flow restricted fittings and dual flush WCs.

Whilst water consumption shall be minimised, the water that is used and that which falls on the hard surfaces will need to be drained from site in an efficient, effective and sustainable manner. Sustainable drainage methods shall be considered including water recycling systems where appropriate and viable.

The proposed development site is currently occupied by buildings and hard standing areas. Post development, it is the intention to potentially reduce the surface water flow into the combined sewer by utilising infiltration to soft landscaping and utilising storm water attenuation. For further information please refer to the DP Squared Ltd Drainage Strategy report (ref. 1950-MGS-DP2-A180-RP-XX-9005).

7.0 Site Opportunities for Carbon Reduction

In building design it is critical to address energy efficiency from the outset of the design process to minimise reliance on fossil fuels and other natural resources.

7.1 Consideration of Low and Zero Carbon Technologies

Following the optimisation of the respective energy efficiencies of the buildings the development will aspire to obtain a proportion of its predicted usage through decentralised low and zero carbon technologies where feasible and viable.

The following table demonstrates the merits of different technologies in relation to this development: -

Low or Zero Carbon Technology	Likelihood of Being Feasible	Main Reason for Dismissal	Feasible to Export Energy? Cost For Carbon Emission Reduction
HYDRO-POWER	Unlikely	No appropriate running water course near site.	N/A
COMBINED HEAT & POWER	Unlikely	There are no appropriate CHP systems in the area. The size of the new building does not make this type of system viable	N/A
GROUND SOURCE HEAT PUMPS	Likely	There is useable below ground area, subject to further investigation	No
AIR SOURCE HEAT PUMPS	Likely	This technology is likely to be applicable & external space is available.	No
WIND POWER	Unlikely	The strobing effect and noise issues from this technology are not acceptable in this location.	Yes (if technology was feasible for development)
BIOMASS	Unlikely	Site logistics may preclude this from viability. Also looking to move away from gas installations	N/A
SOLAR PV	Likely	There would appear to be available roof space to accommodate the panels.	Yes – can potentially be linked to the grid supplied electricity
SOLAR THERMAL	Unlikely	May not be compatible with the proposed heat pump installation.	No

Table 2: Low and Zero Carbon opportunity analysis.

The technologies that are likely to be feasible will be considered and assessed further against viability criteria through the design development.

8.0 BRUKL Results

Below are extracts from the BRUKL document to show compliance with Part L 2021.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

2879 Manchester Grammar School
As designed

Date: Mon Jul 03 14:13:46 2023

Administrative information

Building Details
Address: Old Hall Lane, Manchester, M13 0XT

Certifier details
Name: Crookes Walker Consulting Ltd
Telephone number: 0161 834 9999
Address: Bloc, Marble Street, Manchester, M2 3AW

Certification tool
Calculation engine: Apache
Calculation engine version: 7.0.21
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.21
BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 980.06

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	4.85
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	4.43
Target primary energy rate (TPER), kWh _{tp} /m ² .annum	51
Building primary energy rate (BPER), kWh _{tp} /m ² .annum	46.7
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-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.15	0.15	L0000001:Surf[0]
Floors	0.18	0.1	0.1	L0000001:Surf[4]
Pitched roofs	0.16	0.15	0.15	RF0000000:Surf[0]
Flat roofs	0.18	0.16	0.19	L000006B:Surf[18]
Windows** and roof windows	1.6	1.4	1.4	L0000005:Surf[0]
Rooflights***	2.2	2.2	2.2	RF0000000:Surf[1]
Personnel doors ^Δ	1.6	1.6	1.6	L0000001:Surf[2]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	1.4	1.4	L000004A:Surf[3]

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)] U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]
 U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]
 * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
 ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.
 Δ For fire doors, limiting U-value is 1.8 W/m²K
 NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

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