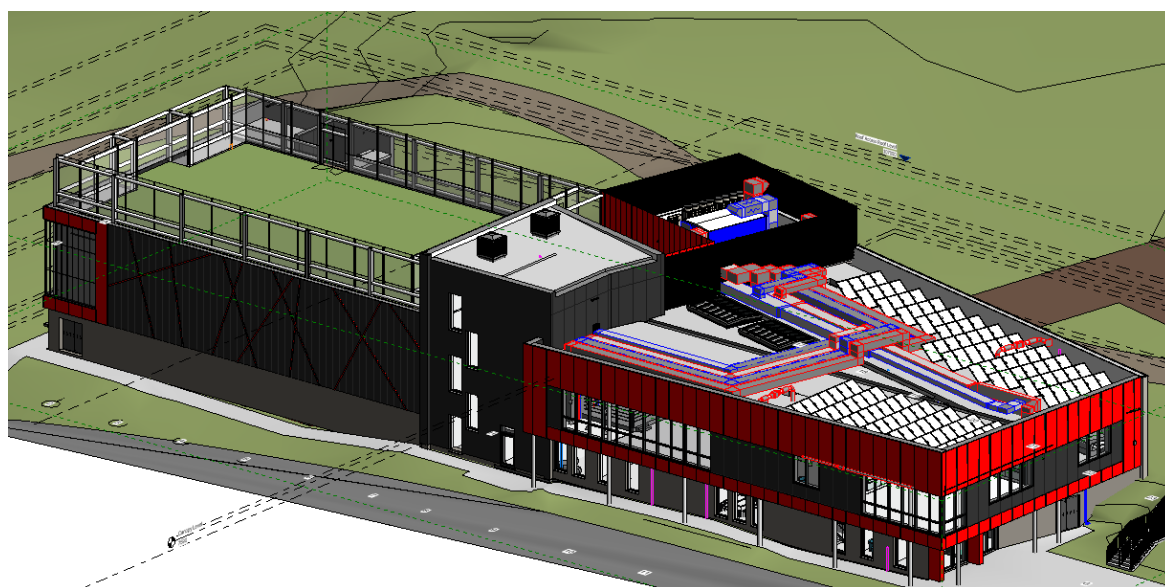


TACE[®]

Part L2 Compliance & Energy Strategy Report Barnsley Youth Zone PA1562



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Controlled Document

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1.0 Executive Summary

This report has been prepared to satisfy the requirements of the national charity OnSide and Barnsley Council targets to demonstrate that thorough consideration has been given to the energy use of the proposed Youth Zone at Barnsley. The development consists of two storey building to suit the needs of the Youth Zone.

1.1 Planning

The Local Planning Authority (LPA) is Barnsley Borough Council. To meet the energy requirements, set out by the local authority, the following must be achieved:

- Calculate the energy baseline load in both kWh and CO₂
- Demonstrate improvements through the energy hierarchy

1.2 Low or Zero Carbon (LZC)

185m² of photovoltaics zero carbon technology has been incorporated into the design to comply with the Part L2A building regulations 2013. To attain BER better than TER and to achieve the reduction in CO₂ emissions we have adopted the fabric first approach and through the provision of renewable energy and decentralized energy.

1.3 Building Regulations Part L2A 2013

This building is currently complying with Part L2A 2013. The actual building emissions rate (BER) demonstrating a 12% reduction in carbon emissions in comparison with the notional building target emissions rate (TER).

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

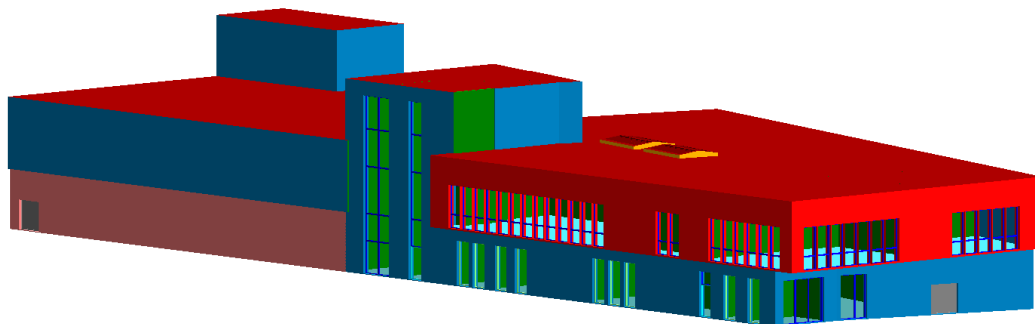
CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	31.9
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	31.9
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	28.1
Are emissions from the building less than or equal to the target?	BER <= TER
Are as built details the same as used in the BER calculations?	Separate submission



2.0 Introduction

TACE have been appointed by the client to develop a new Youth Zone with facilities such as climbing wall, sports hall, fitness suite etc. at Barnsley Town Centre near to Harborough Hill Road and Mottram Street.

This project comprises of a new two-storey Youth Zone offering range of sporting, artistic, cultural, physical, and recreational activities. In addition to leisure time activities the building include training, mentoring, group work and project areas. On ground floor there is large recreation area incorporating café and reception desk at the entrance, along with inclusion, wellbeing and crafts and kitchen areas. On the first floor there are project areas and one to one space. Also, the fitness studio along with staff office and board meeting room is situated on the first floor.



Proposed development

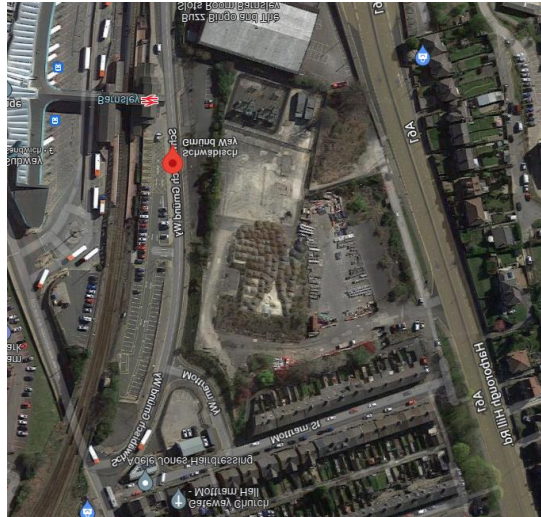
2.1 Software

This study has been undertaken using TAS dynamic simulation software V9.5.1 and UK Building Regulations 2013 studio to generate a BRUKL and EPC rating. This allows us to assess the building servicing strategy and energy profiles.

2.2 Location

The weather file selected for the project is Leeds in accordance with the SBEM weather locations application. The project building is deemed partially exposed.

The building will be situated at Barnsley Town Centre near to Harborough Hill Road and Mottram Street.



Project location

3.0 Energy & Sustainability Strategy

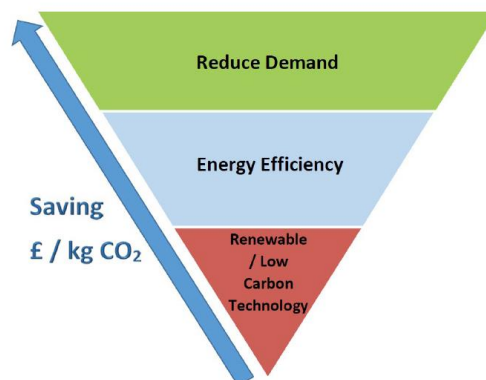
3.1 Introduction

A sustainable building will be delivered through the utilisation of a holistic approach, which considers, plans, and monitors the use of natural resources. The strategy for achieving this is outlined as follows:

The Low Carbon Design Hierarchy

The strategy for reducing carbon dioxide (CO₂) emissions and energy consumption within the Youth Zone development will be to embrace a lean, mean and green approach as defined below.

- Lean – the use of advanced building modelling software and passive construction techniques.
- Mean – Incorporation of high-efficiency systems and effective controls throughout the design.
- Green – Incorporation of renewable energy sources where possible



3.1.1 Lean – Building Passive Measures

The passive measures are to be included within the design of the Youth Zone, to reduce energy use and the associated CO₂ emissions are:

- Improved building fabric parameters over those required by Building Regulations Part L2A 2013
- Windows with high thermal insulation
- Improved air permeability
- Maximisation of daylight
- Optimise glazing solar energy transmittance

Enhanced Insulation to the Building Envelope

Limiting heat losses across the entire building envelope will future proof the energy efficiency of the development over its whole life. To achieve this, the fabric thermal U-Value requirements as detailed within Approved Document L2A 2013 of the Building Regulations will be improved upon.

The table below shows the limiting U-values required to meet Building Regulations compared to the targeted values which exceed the Building Regulations requirements.

The targeted values as noted will be confirmed during the detailed design stage of the building in conjunction with finalisation of the energy efficiency measures included to meet the CO₂ emission rates required by Building Regulations.

Building Element	Building Regulations Limiting Value (W/m ² .K)	Proposed Construction Value (W/m ² .K)
Roof	0.25	0.12
External Wall	0.35	0.12
Floor	0.25	0.12
Windows & Door	2.20	1.4

Engineered Façade Design

The glazed proportion of the building façades and the glazing location will be designed to maximise the use of natural daylight to offset demand for artificial lighting.

Building Element	AD L2A Solar G Value	Target Solar G Value
Glazed Units	0.68	0.4

Reduced Air Permeability

The development will be constructed to improved building airtightness criteria beyond the level required to comply with Building Regulations.

Building Regulations Document	Maximum allowable air permeability (m ³ /m ² .hr at 50 Pa)	Targeted air permeability (m ³ /m ² .hr at 50 Pa)
Approved Document L2A	10.0	5.0

3.1.2 Mean – High-Efficiency Systems, Plant and Controls

High-efficiency systems, plant, controls, and equipment will be incorporated as follows:

Optimised Plant Controls

Control of heating and cooling plant will be optimised, and weather compensated to ensure plant operates as close to demand as possible and not at full capacity.

Variable Speed Drives

Variable speed drives shall be installed on circulation pumps and ventilation fans to allow the speed of the respective motors to be amended by the automatic controls to suit changing load of the building. This will ensure energy usage matches demand requirements.

Energy Efficient LED Lighting

Internal lighting within the youth zone will incorporate energy-efficient LED lighting where practicable.

Lighting controls will be provided to limit energy use.

Automatic presence/absence detection will be included in appropriate areas. This form of control will ensure lights are automatically switched off during periods of non-occupancy. Fitness Suite and Open Recreation areas will be installed with photocell dimming lights.

External lighting will be designed to incorporate energy efficient luminaires and an automatic lighting control system utilising daylight sensors and time clock control to ensure energy-efficient operation of the lighting.

High Efficiency Heating Systems

The building heating system shall utilise a high efficiency heating system. The mechanical building services designed for the project will utilise various means to heating the building, depending upon the function of the Zones.

For sports hall gas fired radiant heating is designed whereas the amenity areas will be installed with electric panel heaters. The offices and recreation areas will be installed with high

efficiency variable refrigerant heating/cooling units. The use of high efficiency systems minimise the emission of greenhouse gases compared with traditional systems.

High Efficiency Water Heaters

Similarly, the domestic hot water (DHW) demand shall be supplied via gas fired water heaters which have efficiencies of up to 96%. Just like standard water heaters, high-efficiency water heaters extract heat energy out of the exhaust gases to heat the water, but they include a secondary heat exchanger that maximizes the heat transfer process to extract as much heat energy as possible out of the whole combustion process.

Heat Recovery on Ventilation Systems

The ventilation systems installed within the development will also incorporate heat recovery within the mechanical ventilation plant to recover waste heat from the exhaust air. This is then used to heat the incoming fresh air and therefore reduce energy usage.

The air handling plant will have a low specific fan power to minimise the energy used by the fans.

3.1.3 Green – Renewable Technologies

The design of the building as detailed above will place particular emphasis on the fabric first approach by careful design of the building and the building services.

To complement the energy savings previously detailed the following renewable, low carbon and sustainable measures have been considered for use within the scheme design:

- Solar Photovoltaics (PV)
- Air Source Heat Pump (ASHP)

The thermal modelling undertaken adopted the fabric first approach first. Fabric first approach was used along with the highly efficient building services systems (LED lighting, heat pumps and gas fired hot water) and associated control strategies. Using this approach, the analysis performed does not meet the CO₂ requirements for compliance with Part L2A 2013 by itself.

Therefore, to comply with the Building Regulations Part L2A 2013 provision of renewables as stated above, TACE recommends using photovoltaics to comply with the requirements Part L2A.

Below is the information for the photovoltaics used to achieve 20% of energy consumption by renewables.

- PV Area = 160m²
- PV efficiency = 20%
- PV inclination = 15°
- PV orientation = South

4.0 Mechanical Services Design Criteria

The modelled mechanical services systems, configurations and efficiencies are all based on the current TACE design. Any deviations need to be carefully considered to ensure the minimum efficiencies are achieved.

It is the responsibility of the contractor as part of his plant selection and installation to implement these measures. Should the contractor deviate from these assumptions he will be responsible for producing a revised Part L calculation and report to demonstrate compliance.

The following table summarises the strategy adopted by TACE to the mechanical services installation:

Type of system	System Performance Data	System Performance Values
Heating system Radiant Panels Sports Hall	a) Heat Source Generator Type b) Fuel Type c) Generator Seasonal Efficiency d) Heat Recovery Effectiveness e) Delivery Efficiency	Direct Gas Fired Natural Gas 94% N/A N/A
Heating system Radiant Panels EPH (Circulation, WC)	a) Heat Source Generator Type b) Fuel Type c) Generator Seasonal Efficiency d) Heat Recovery Effectiveness e) Delivery Efficiency	Electric Panel Heater Grid Supplied Electricity 100% N/A N/A
Heating system VRF System (Offices, Fitness Suite, Climbing Wall, etc.)	a) Heat Source Generator Type b) Fuel Type c) Generator Seasonal Efficiency d) Heat Recovery Effectiveness e) Delivery Efficiency	VRF Grid Supplied Electricity 410% N/A 100%
Heating system ASHP System (Server)	a) Heat Source Generator Type b) Fuel Type c) Generator Seasonal Efficiency d) Heat Recovery Effectiveness e) Delivery Efficiency	ASHP Grid Supplied Electricity 410% N/A 100%
Cooling system VRF System (offices, Fitness Suite, Climbing Wall etc.)	a) Chiller Type b) Cooling Generator Seasonal efficiency (SEER) c) Fuel Type	VRF 3.8 Grid Supplied Electricity

Cooling system ASHP System (Server)	a) Chiller Type b) Cooling Generator Seasonal efficiency (SEER) c) Fuel Type d)	VRF 3.8 Grid Supplied Electricity
DHW	a) Method of DHW generation, i.e. combi boilers, cylinder, etc. b) Size and type of DHW cylinder c) DHW delivery efficiency d) Fuel Type e) Generator Seasonal Efficiency	Direct Fired Hot Water Cylinder 300L 95% Natural Gas 96%
Natural Ventilation (Sports Hall)	a) Details of all systems and areas served b) Specific fan power of AHUs (W/l/s) c) Efficiency of heat recovery	Windcatchers N/A N/A
Mechanical Ventilation Systems – (offices, Fitness, Sports, Climbing Wall etc.)	a) Details of all systems and which areas served b) Specific fan power of AHUs (W/l/s) c) Efficiency of heat recovery	AHU 1.8 75%
Mechanical Ventilation Systems – Kitchen Zone	a) Details of all systems and which areas served b) Specific fan power of AHUs (W/l/s) c) Efficiency of heat recovery	Supply Fan 1 N/A
Mechanical Ventilation Systems – Kitchen Zone	a) Details of all systems and which areas served b) Specific fan power of AHUs (W/l/s) c) Efficiency of heat recovery	Extract Fan 1 N/A
Mechanical Ventilation Systems – Extract Only	d) Details of all systems and which areas served e) Specific fan power of AHUs (W/l/s) f) Efficiency of heat recovery	Extract only 0.5 N/A
Control Corrections	a) Are there system provisions for metering? b) Does the system warn of 'out of range' values?	Yes No Following controls are installed on HVAC systems a) Central time control b) Optimum start/stop control c) Local time control

5.0 Electrical Services Design Criteria

The modelled services systems, configurations and efficiencies are all based on the current TACE design. Any deviations need to be carefully considered to ensure the minimum efficiencies are achieved.

It is the responsibility of the contractor as part of his plant selection and installation to implement these measures. Should the contractor deviate from these assumptions he will be responsible for producing a revised Part L calculation and report to demonstrate compliance.

For the lighting gains W/m^2 provided by the electric team via lighting calculation has been used. For details of the lighting gains please follow electric team lighting design data.

The following table summarises the assumptions made to the electrical services installation:

Spaces	Power correction factor	Lighting level (Lux)	Day light dimming	Local manual switching
Offices	0.9	In line with HTM compliance.	No	Absence detection
Circulation/Stores/Toilets/Utility Rooms	0.9	In line with HTM compliance.	No	Presence detection
Sports Hall	0.9	In line with HTM compliance.	No	Manual
Plant Room	0.9	In line with HTM compliance.	No	Manual
Fitness Suite	0.9	In line with HTM compliance.	No	Manual with Daylight dimming

6.0 Conclusion

From this report, with the design parameters used within building regulation Part L2A compliance analysis, calculation performed exceed the requirements set out in Part L 2013.

To comply not only with Building Regulations 2013 and but also with planning policy of the Barnsley Borough Council, TACE Consultant adopted the holistic approach of renewable energy with fabric first approach.

The passive measures adopted to comply with the regulations are:

- External Wall u value = $0.12 W/m^2 K$
- Roof U value = $0.12 W/m^2 K$
- Ground U value = $0.12 W/m^2 K$
- Windows U Value = $1.4 W/m^2 K$
- Windows g value = 0.4
- LED lighting with high efficacy values.

TACE recommends using photovoltaics to comply with the Building Regulation Part L2 185m² of PV is required.

It should be noted that the calculation and subsequent results outlined within this report have been produced from anticipated TACE stage 3 design information.

It is the responsibility of the MEP subcontractor as part of his plant selection and installation to implement these measures. Should the contractor deviate from these assumptions he will be responsible for producing a revised Part L calculation and report to demonstrate compliance.

Appendix I – BRUKL Report

BRUKL Output Document



Compliance with England Building Regulations Part L 2013

Project name

Barnsley Youth Centre

As designed

Date: Thu Feb 24 16:13:34 2022

Administrative information

Building Details

Address: Leeds,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.1"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.1

BRUKL compliance check version: v5.6.b.0

Certifier details

Name:

Telephone number: 01614860429

Address: Portland House, Oak Green Business Park,
Stanley Road, Cheadle Hulme, Manchester, SK8
6QLCriterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	31.9
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	31.9
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	28.1
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.12	0.12	External Wall 518mm - Sports Brick Block
Floor	0.25	0.12	0.12	Ground Floor
Roof	0.25	0.12	0.12	Roof Sports
Windows***, roof windows, and rooflights	2.2	1.51	1.6	Roof Light
Personnel doors	2.2	1.59	1.59	Steel Door Pane
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the maximum U-value occurs.				
** 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.				
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	5

Appendix II – EPC

Energy Performance Certificate		HM Government	
Non-Domestic Building			
Leeds		Certificate Reference Number: 6025-8412-6119-9791-1285	
This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document <i>Energy Performance Certificates for the construction, sale and let of non-dwellings</i> available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.			
Energy Performance Asset Rating			
More energy efficient			
A+ Net zero CO₂ emissions 25 This is how energy efficient the building is.			
A 0-25			
B 26-50			
C 51-75			
D 76-100			
E 101-125			
F 126-150			
G Over 150			
Less energy efficient			
Technical information		Benchmarks	
Main heating fuel:	Grid Supplied Electricity	Buildings similar to this one could have ratings as follows:	
Building environment:	Air Conditioning		
Total useful floor area (m ²):	2502	28	If newly built
Building complexity:	Level 5	82	If typical of the existing stock
Building emission rate (kgCO ₂ /m ² per year):	28.07		
Primary energy use (kWh/m ² per year):	198.47		