

Energy Statement

Client: Russells Construction

Site: New Smithfield Market

Manchester

Date: 16 February 2022

Ref: CSS1108

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1.0 Executive Summary

An energy statement has been carried out on the proposed development known as New Smithfield Market. The structure and philosophy of the report has been based upon utilising best practice methodology and adheres to the “Be Lean, Be Clean and Be Green” hierarchy as follows:

Energy Efficient Measures (Be Lean – Use Less Energy)

To maximise the energy efficiency of the development and reduce the energy demand, the development will benefit from the following:

- High specification building fabric with U values that will improve on Part L2A standard values
- Low air leakage rates

Energy Efficient Systems (Be Clean – Supply Energy Efficiently)

The development will utilise highly efficient space and water heaters. The development will also be provided with highly efficient mechanical ventilation. Dedicated LED low energy efficient light fittings within all areas

Renewable Technologies (Be Green – Use Renewable Energy)

The following renewable technologies have been evaluated as part of this report:

- Solar Thermal
- Solar PV
- Combined Heat and Power (CHP)
- Air Source Heat Pump
- Ground Source Heat Pump
- Wind Turbines

This report demonstrates the proposed development will be designed to use less energy, to use energy efficiently and reviews the feasibility of renewable technologies.

The steps listed above highlighted Unit 1 is currently on track to secure a 15.8% improvement over Building Regulations Part L 2016 and Unit 2 is on track to secure a 13.4% improvement above Building Regulations Part L 2016.

Prior to start of RIBA stage 5: Detailed design SBEM calculations shall be produced. At this point calculations must prove, taking into account any changes to the building specification, build solution or system efficiencies. That the scheme will meet the MCC's policy of a 9% improvement upon Part L 2016. (15% on Part L 2010).

3.0 Policy Context

Within this section of the report we will review both local and national policy, establishing key principles that can be taken forward and applied across the development.

3.1 Policy Context – National

National Planning Policy Framework July 2021

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and

c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

3.2 Policy Context – Local

Manchester's Local Development Framework Core Strategy Development Plan 2012 – 2027.

3.2.1 Strategic Areas for low and zero carbon decentralised energy infrastructure

Within Manchester it is considered that the following strategic areas, indicated on the key diagram, will have a major role to play in achieving an increase in the level of decentralised, low and zero-carbon energy supplies available:

- The Regional Centre, which also includes the Oxford Road Corridor and Eastlands

- District Centres (and associated major development sites)
- Airport Strategic Site
- Strategic housing location
- Strategic employment locations

Within these areas new development, regeneration and retrofit projects, will be expected to take place in the context of more detailed proposals for decentralised low and zero carbon energy infrastructure in the form of energy proposals plans. The Council will work with all relevant stakeholders, which may include developers, landowners, residents, community groups, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward such plans.

Where investment or development is being undertaken into or adjacent to a public building/asset or district heating network, full consideration shall be given to the potential role that these can have in providing an anchor load within a decentralised energy network or in creating opportunities for CO₂ reduction funded by contributions.

3.2.2 Manchester City Council's Policy EN 6 of Core Strategy.

Policy EN 6 requires applications for new development of 10 or more units and all other development over 1,000 sq. m to achieve a 15% reduction in CO₂ emissions on Part L 2010, this equates to a 9% improvement upon Building Regulations Part L 2016.

After reviewing the Local Planning Policies, the development is required to achieve a 9% improvement above Building Regulations Part L 2016.

4.0 Carbon Reduction Strategy

Within this section of the report we will, utilising SBEM software, carry out an assessment of the proposed development against current Building Regulations. We will establish CO₂ baseline, then following the energy hierarchy, establish a low-carbon specification to ensure CO₂ emissions meet the requirements of both national and local policy.

Full calculations in accordance with Part L will be carried out at technical design stage to ensure any modification to performance criteria does not impact upon compliance with Manchester Planning Requirements.

4.1 Step 1 – Create Baseline

Due to the proposed building on this development Building Regulations Part L2A 2016 is applicable. Part L2A has dictated the baseline carbon emissions through notional, producing the Target Emission Rate (TER). The developers proposed specification has then been incorporated within the modelling software to calculate the Building Emission Rate (BER). This methodology can therefore be used to calculate the increase in performance.

The preliminary results are highlighted within the table below.

	Building Emission Rate KgCO₂/Yr/M².	Target Emission Rate KgCO₂/Yr/M².	Current Improvement upon Part L2A 2016
Barton & Redman Unit 1	13.3	15.8	15.8%
Barton and Redman Unit 2	14.2	16.4	13.4%

4.2 Step 2 – Review and implement the Energy Hierarchy: Be Lean – Be Clean – Be Green

The **Energy Hierarchy** is a classification of energy options, prioritised to assist progress towards a more sustainable energy system. The energy hierarchy uses a step by step process,

- Step 1 Be lean – use less energy.
- Step 2 Be Clean – use energy efficiently.
- Step 3 Be Green – utilise renewable technology.

4.2.1 Be Lean - Use Less Energy

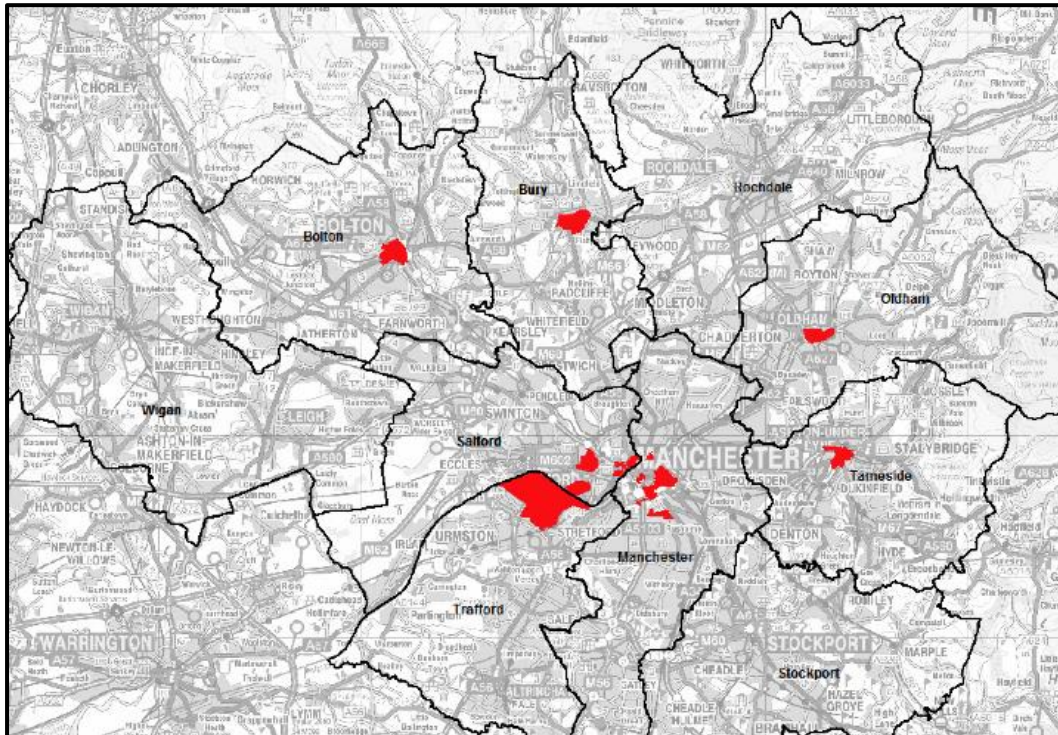
The developer, in accordance with both national and local planning policy, has stated their wish towards ensuring the development follows a fabric first approach, therefore reducing demand on the national grid as reasonably possible. Below we have highlighted the proposed U values, going beyond the requirements of Building Regulations; thus improving upon the baseline CO² emissions.

Be Lean	Performance
Ground Floor	0.2 W/m ² k
External Wall	0.21 W/m ² k - 0.25 W/m ² k Allowance for different wall types.
Roof:	0.18 W/m ² k
Windows including roof lights	1.4 W/m ² k
External Doors	1.4 W/m ² k

4.2.2 Be Clean – Supply Energy Efficiently

Within this section of the energy hierarchy, we see an emphasis being placed upon ensuring the regulated energy demands of the development are met as efficiently as possible. In the first instance we will do this by carrying out a review of district and communal heating networks.

Both district-wide and site-wide heat networks can be utilised to provide heating and hot water to a development in an efficient manner. Furthermore, in many cases we also see opportunities to include a combined heat and power system (CHP), which allows for the production of electricity. Given the nature of the development and the hotwater demand, we do not feel a site-wide solution to be suitable. In addition to this it can be seen from the diagram below that there are no existing district heating networks close to the site.



Therefore, the design of the development moves forward to identify, analyse and minimise areas of energy consumption. Below we have identified and highlighted the measures the design team will incorporate as part of the energy/carbon reduction strategy.

Be Clean

Highly efficient Air Source Heat Pump to provide heating and hot water
 A high level of user control, local and central;
 High Efficiency Mechanical Ventilation with a low SFP.
 100% LED lighting @ 100 lumens per circuit watt

4.2.3 Be Green-Review of Renewable Technologies

The final phase of the report is to ascertain if the development will benefit from renewable/low carbon technologies and the following renewable/low carbon technologies will be analysed for this development;

- Solar Thermal
- Solar PV
- CHP
- Air Source Heat Pump
- Ground Source Heat Pump

Solar Thermal

Solar thermal hot water collectors are panels or evacuated tubes which are typically located on the roof of the buildings. The collectors harness the sun's energy to warm domestic hot water and this is topped up by a conventional boiler or immersion heater.

Pros

- Reduced fuel bills and carbon footprint.
- Low maintenance.
- Proven technology.

Cons

- Only compatible with boilers that have hot water storage.
- Need south facing roofs to optimise efficiency.
- Carbon saved is low comparative to the savings offered by PV.

Suitability

Solar thermal HW is not deemed suitable for this development due to the nature of the scheme in particular the level of hot water demand thus making the suitability of a system unfeasible.

Solar PV

Solar Photovoltaic (PV) panels work by converting energy from the sun into electricity. This can then be used with the development to offset the electrical usage.

Pros

- Reduced bills and carbon footprint.
- Benefit from the feed in tariff.
- Proven technology.
- Relatively maintenance free.

Cons

- PV panels lose efficiency over their lifetime.
- Not as efficient if installed facing East/West.

Suitability

PV would be suited to this development; however it has been discounted in favor of an air source heat pump. PV can be retro fitted at a later stage if required.

Combined Heat & Power (CHP)

CHP is a technology which develops heat and power from the same energy source – typically mains gas. The CHP engine is fed by mains gas which then drives an alternator to provide electricity. CHP is highly energy efficient as the heat and electricity are produced at site, therefore reducing transmission losses. Typical efficiencies are 50% for the heat and 35% for the electric.

Pros

- Reduced fuel bills and carbon footprints.
- Eligible for the feed in tariff.
- Proven technology which is in use in many schemes in the UK.
- Suited to large developments.

Cons

- Not a true renewable technology.
- Heating and electricity demand must remain fairly stable to ensure CHP is running at optimum efficiency.
- Requires a centralised/district heating network scheme so is therefore more suited to apartment blocks.
- Noise.
- Capital intensive.

Suitability

The total size and nature of the development does not lend itself to CHP. It would add to the capital costs of the development making the development not financially viable. For these reasons, CHP has been discounted.

Air Source Heat Pump

Air source heat pumps extract heat from the external air which can be used to heat radiators/underfloor heating and hot water within a commercial property. ASHP can still extract heat from air as cold as -15 degrees centigrade. ASHP are particularly useful on sites where gas is not available. There are two forms of ASHP – air to air and air to water. Typically an air to water system would be used on a domestic development. This would provide heating to the heating system and hot water. As this heat is low grade, under floor heating is the most efficient choice. ASHP are electrically powered and are typically 200-400% efficient. This is known as a coefficient of performance.

Pros

- Can offer lower heating bills and reduce carbon footprints (when compared to electric systems).
- Relatively maintenance free.
- Offers high efficiencies.
- Can offer heating and cooling depending on system chosen (air to air).

Cons

- Requires space to locate the external condenser unit. The unit requires lots of space around it to ensure adequate air flow.
- Requires the use of underfloor heating or large radiators due to low grade heat.
- Noise issues.

Suitability

Air source heat pumps (ASHP) have been selected as a suitable and most appropriate renewable technology for this development. Therefore, we see a significant impact upon carbon emissions through the inclusion of an ASHP.

Ground Source Heat Pump

Ground source heat pumps (GSHP) work in a similar way to air source heat pumps, however they extract heat from the ground. A ground loop is buried within the garden and a mixture of water and refrigerant is circulated along the loop. The heat from the ground is then absorbed within the fluid and then passes through a heat exchanger within the GSHP. Ground loops can be laid horizontally at depths of 1-2m or vertically at depths of up to 100m. The length/depth of the ground loop depends on the amount of heat required and the space available. As with an ASHP they are electrically powered and offer a coefficient of performance of 200-400% upwards.

Pros

- Can offer lower heating bills and reduce carbon footprints (when compared to electric systems).
- Relatively maintenance free.
- Offers high efficiencies.

Cons

- High capital costs.
- Requires space for boreholes or trenches to locate ground loops.

- Requires the use of under floor heating or large radiators due to low grade heat.

Suitability

Ground source heat pumps have been discounted on this development predominantly due to the nature of the development and the lower emissions associated with an ASHP.

Be Green

An ASHP has been selected as the most suitable renewable technology. Preliminary calculations include for an ASHP with a seasonal efficiency of 300 % and a cooling efficiency of 300%.

4.3 Summary of Be Lean, Be Green, Be Clean proposals

The table below summarises the Be Lean, Be Green, Be Clean proposals.

Be Lean	Performance
Ground Floor	0.2 W/m ² k
External Wall	0.21 W/m ² k - 0.25 W/m ² k Allowance for different wall types.
Roof:	0.18 W/m ² k
Windows including roof lights	1.4 W/m ² k
External Doors	1.4 W/m ² k
Be Clean	
Highly efficient Air Source Heat Pump to provide heating and hot water	
A high level of user control, local and central;	
High Efficiency Mechanical Ventilation with a low SFP.	
100% LED lighting @ 100 lumens per circuit watt	
Be Green	
An ASHP has been selected as the most suitable renewable technology. Preliminary calculations include for an ASHP with a seasonal efficiency of 300 % and a cooling efficiency of 300%.	

4.4 Review of Energy and Carbon Reduction

The table below details the CO₂ emissions for the development, incorporating the energy hierarchy, following a Be Lean, Be Clean, Be Green methodology.

	Building Emission Rate KgCO₂/Yr/M².	Target Emission Rate KgCO₂/Yr/M².	Improvement upon Part L2A 2016
Barton & Redman Unit 1	13.3	15.8	15.8%
Barton and Redman Unit 2	14.2	16.4	13.4%

4.5 Detailed Design Review

Prior to start of RIBA stage 5: Detailed design SBEM calculations shall be produced. At this point calculations must prove, taking into account any changes to the building specification, build solution or system efficiencies. That the scheme will meet the MCC's policy of a 9% improvement upon Part L 2016. (15% on Part L 2010).

5.0 Conclusion

This report is based upon a review of the proposals and a thorough analysis of relevant national and local planning policy requirements. Both the National Planning Policy Framework 2019 and Manchester's Local Development Framework Core Strategy Development Plan 2012 – 2027 have been reviewed and applied to the development.

Manchester City Council's Core Strategy, Policy EN6 – Target Framework for CO₂ reductions from low or zero carbon energy supplies – highlights the requirement for a 15% increase on Part L 2010, which equates to a 9% increase on Part L 2016.

Energy Efficient Measures (Be Lean – Use Less Energy).

To maximise the energy efficiency of the development and reduce the energy demand, the development will benefit from a high specification of building fabric with U values that will improve on Part L2A 2016 standard values.

Energy Efficient Systems (Be Clean – Supply Energy Efficiently)

All development will utilise highly efficient ASHPs, be provided with a high level of user control, local and central; high efficiency mechanical ventilation with a low specific Fan Power and 100% LED lighting @ 100 lumens per circuit watt

Renewable Technologies (Be Green – Use Renewable Energy)

The following renewable technologies have been evaluated as part of this report;

- Solar Thermal
- Solar PV
- Combined Heat and Power (CHP)
- Air Source Heat Pump
- Ground Source Heat Pump
- Wind Turbines

An ASHP has been selected as the most suitable renewable technology. Preliminary calculations include for an ASHP with a seasonal efficiency of 300 % and a cooling efficiency of 300%.

The steps listed above highlighted confirm Unit 1 will achieve a 15.8% improvement over Building Regulations Part L 2016 and Unit 2 will achieve a 13.4% improvement above Building Regulations Part L 2016.

Project name

Barton and Redman - Unit 2**As designed****Date:** Fri Feb 04 08:53:30 2022**Administrative information****Building Details****Address:** Smithfield Market, Manchester,**Certification tool****Calculation engine:** Apache**Calculation engine version:** 7.0.13**Interface to calculation engine:** IES Virtual Environment**Interface to calculation engine version:** 7.0.13**BRUKL compliance check version:** v5.6.b.0**Certifier details****Name:** Andy Graves**Telephone number:** 0161 706 0298**Address:** Complete Sustainability Solutions, 76 King Street, Manchester, M2 4NH**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	16.4
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	16.4
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	14.2
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	0.21	0.21	NT000035:Surf[1]
Floor	0.25	0.2	0.2	NT000036:Surf[0]
Roof	0.25	0.18	0.18	NT000035:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.16	1.4	NT00003D:Surf[2]
Personnel doors	2.2	2.2	2.2	NT000036:Surf[15]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building
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	6

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- ASHP MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	0	0	0.7
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

2- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	0	0	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

1- HW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.5	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1			
Unit 2 GF Dry Storage Warehouse / Cash and Carry				1.5	-	-	-	-	-	-	-	N/A
Unit 2 GF Cash Office	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Unit 2 GF Male WC	-	-	0.5	-	-	-	-	-	-	-	-	N/A
Unit 2 GF Female WC	-	-	0.5	-	-	-	-	-	-	-	-	N/A
Unit 2 GF Office	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Unit 2 FF Open Plan Office	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Unit 2 FF Male WC	-	-	0.5	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Unit 2 FF Female WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Unit 2 FF One to One Office 01	-	-	-	1.5	-	-	-	-	-	-	N/A
Unit 2 FF One to One Office 02	-	-	-	1.5	-	-	-	-	-	-	N/A
Unit 2 FF One to One Office 03	-	-	-	1.5	-	-	-	-	-	-	N/A
Unit 2 SF WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Unit 2 SF WC	-	-	0.5	-	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
Standard value	60	60	22		
Unit 2 GF Dry Storage Warehouse / Cash and Carry	100	-	-		22363
Unit 2 GF Meat Counter	100	-	-		442
Unit 2 GF Meat Counter Store	100	-	-		21
Unit 2 GF Chill Store	100	-	-		152
Unit 2 GF Freezer Chamber	100	-	-		3143
Unit 2 GF Chilled Air Lock	100	-	-		318
Unit 2 GF Tobacco Room	100	-	-		237
Unit 2 GF Checkouts	100	-	-		735
Unit 2 GF Exit	-	100	-		37
Unit 2 GF Cash Office	100	-	-		125
Unit 2 GF Lift	-	100	-		15
Unit 2 GF Office Entrance	100	-	-		242
Unit 2 GF Reception	-	100	100		56
Unit 2 GF Trade Entrance	-	100	-		58
Unit 2 GF Male WC	-	100	-		74
Unit 2 GF Cleaner Store	100	-	-		11
Unit 2 GF DPT	-	100	-		18
Unit 2 GF Female WC	-	100	-		28
Unit 2 GF Circulation	-	100	-		45
Unit 2 GF Plant & Meter Room	100	-	-		29
Unit 2 GF Canteen	-	100	-		52
Unit 2 GF Prayer Room	100	-	-		205
Unit 2 GF Ablutions	-	100	-		42
Unit 2 GF Display Area	100	-	-		504
Unit 2 GF Circulation	-	100	-		41
Unit 2 GF Escape Staircase	-	100	-		33
Unit 2 GF Office	100	-	-		106
Unit 2 FF Open Plan Office	100	-	-		1015
Unit 2 FF Circulation	-	100	-		53
Unit 2 FF Staircase	-	100	-		46
Unit 2 FF Lift	-	100	-		13
Unit 2 FF Male WC	-	100	-		52
Unit 2 FF DPT	-	100	-		14

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Unit 2 FF Female WC		-	100	-	27
Unit 2 FF Circulation		-	100	-	62
Unit 2 FF Canteen		-	100	-	48
Unit 2 FF Cleaner Store		100	-	-	9
Unit 2 FF Ablutions		-	100	-	26
Unit 2 FF Prayer Room		100	-	-	182
Unit 2 FF One to One Office 01		100	-	-	120
Unit 2 FF One to One Office 02		100	-	-	120
Unit 2 FF CCTV Room		100	-	-	85
Unit 2 FF Server Store		100	-	-	11
Unit 2 FF Circulation		-	100	-	82
Unit 2 FF One to One Office 03		100	-	-	123
Unit 2 FF Boardroom		100	-	-	131
Unit 2 FF Banking Room		100	-	-	128
Unit 2 FF Escape Staircase		-	100	-	35
Unit 2 SF Shell Build		-	100	-	257
Unit 2 SF Lift		-	100	-	12
Unit 2 SF Staircase		-	100	-	37
Unit 2 SF Circulation		-	100	-	106
Unit 2 SF Shell Build		-	100	-	289
Unit 2 SF WC		-	100	-	24
Unit 2 SF WC		-	100	-	24
Unit 2 SF Escape Staircase		-	100	-	33

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Unit 2 GF Dry Storage Warehouse / Cash and Carry	NO (-72.5%)	NO
Unit 2 GF Meat Counter	N/A	N/A
Unit 2 GF Meat Counter Store	N/A	N/A
Unit 2 GF Chill Store	N/A	N/A
Unit 2 GF Freezer Chamber	N/A	N/A
Unit 2 GF Chilled Air Lock	N/A	N/A
Unit 2 GF Tobacco Room	N/A	N/A
Unit 2 GF Checkouts	NO (-77.4%)	NO
Unit 2 GF Exit	NO (-36.9%)	NO
Unit 2 GF Cash Office	N/A	N/A
Unit 2 GF Lift	N/A	N/A
Unit 2 GF Office Entrance	NO (-15.4%)	NO
Unit 2 GF Reception	N/A	N/A
Unit 2 GF Trade Entrance	NO (-36.8%)	NO
Unit 2 GF Male WC	NO (-75.8%)	NO
Unit 2 GF Cleaner Store	N/A	N/A
Unit 2 GF DPT	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Unit 2 GF Female WC	N/A	N/A
Unit 2 GF Circulation	N/A	N/A
Unit 2 GF Plant & Meter Room	N/A	N/A
Unit 2 GF Canteen	NO (-74.4%)	NO
Unit 2 GF Prayer Room	N/A	N/A
Unit 2 GF Ablutions	N/A	N/A
Unit 2 GF Display Area	NO (-75.5%)	NO
Unit 2 GF Circulation	N/A	N/A
Unit 2 GF Escape Staircase	N/A	N/A
Unit 2 GF Office	N/A	N/A
Unit 2 FF Open Plan Office	NO (-74.2%)	NO
Unit 2 FF Circulation	NO (-88.3%)	NO
Unit 2 FF Staircase	N/A	N/A
Unit 2 FF Lift	N/A	N/A
Unit 2 FF Male WC	NO (-84.2%)	NO
Unit 2 FF DPT	N/A	N/A
Unit 2 FF Female WC	N/A	N/A
Unit 2 FF Circulation	N/A	N/A
Unit 2 FF Canteen	NO (-76%)	NO
Unit 2 FF Cleaner Store	N/A	N/A
Unit 2 FF Ablutions	N/A	N/A
Unit 2 FF Prayer Room	N/A	N/A
Unit 2 FF One to One Office 01	NO (-74%)	NO
Unit 2 FF One to One Office 02	NO (-74%)	NO
Unit 2 FF CCTV Room	NO (-56.8%)	NO
Unit 2 FF Server Store	N/A	N/A
Unit 2 FF Circulation	N/A	N/A
Unit 2 FF One to One Office 03	N/A	N/A
Unit 2 FF Boardroom	N/A	N/A
Unit 2 FF Banking Room	N/A	N/A
Unit 2 FF Escape Staircase	N/A	N/A
Unit 2 SF Shell Build	NO (-74.6%)	NO
Unit 2 SF Lift	N/A	N/A
Unit 2 SF Staircase	N/A	N/A
Unit 2 SF Circulation	NO (-85.1%)	NO
Unit 2 SF Shell Build	NO (-90.2%)	NO
Unit 2 SF WC	N/A	N/A
Unit 2 SF WC	N/A	N/A
Unit 2 SF Escape Staircase	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	7379.3	7379.3
External area [m ²]	17066.9	17066.9
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	6	5
Average conductance [W/K]	4099.06	5430.42
Average U-value [W/m ² K]	0.24	0.32
Alpha value* [%]	10.05	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
100	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.98	7.55
Cooling	1.41	2.57
Auxiliary	4.73	2.7
Lighting	14.05	17.97
Hot water	1.87	1.65
Equipment*	28.67	28.67
TOTAL **	28.04	32.43

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	71.01	104.48
Primary energy* [kWh/m ²]	83.94	97.07
Total emissions [kg/m ²]	14.2	16.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	132.2	18.3	13.1	2.4	0.1	2.8	2.13	3	3
	Notional	133.6	43	14.5	3.2	0	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	48.5	10.1	4.8	1.3	6.6	2.8	2.13	3	3
	Notional	61	37.2	6.6	2.7	3.7	2.56	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.21	NT000035:Surf[1]
Floor	0.2	0.2	NT000036:Surf[0]
Roof	0.15	0.18	NT000035:Surf[0]
Windows, roof windows, and rooflights	1.5	1.09	NT000036:Surf[1]
Personnel doors	1.5	2.2	NT000036:Surf[15]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-Min} = Minimum individual element U-values [W/(m²K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	6

Project name

Barton and Redman - Unit 1**As designed****Date:** Fri Feb 04 08:48:31 2022**Administrative information****Building Details****Address:** Smithfield Market, Manchester,**Certification tool****Calculation engine:** Apache**Calculation engine version:** 7.0.13**Interface to calculation engine:** IES Virtual Environment**Interface to calculation engine version:** 7.0.13**BRUKL compliance check version:** v5.6.b.0**Certifier details****Name:** Andy Graves**Telephone number:** 0161 706 0298**Address:** Complete Sustainability Solutions, 76 King Street, Manchester, M2 4NH**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	15.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	13.3
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	0.21	0.21	NT000000:Surf[4]
Floor	0.25	0.2	0.2	NT000000:Surf[0]
Roof	0.25	0.18	0.18	NT000000:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.18	1.4	NT000000:Surf[2]
Personnel doors	2.2	2.2	2.2	NT000010:Surf[1]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building
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	6

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	0	0	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

2- ASHP MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	3	0	0	0.7
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

1- HW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.5	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1			
Unit 1 GF Demo Kitchen	-	-	0.5	-	-	-	-	-	-	-	-	N/A
Unit 1 GF Small Meeting Room	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Unit 1 GF WC	-	-	0.5	-	-	-	-	-	-	-	-	N/A
Unit 1 GF 20 Person Canteen	-	-	-	1.5	-	-	-	-	-	-	-	N/A
Unit 1 GF WC & Shower	-	-	0.5	-	-	-	-	-	-	-	-	N/A
Unit 1 GF WC	-	-	0.5	-	-	-	-	-	-	-	-	N/A
Unit 1 GF WC	-	-	0.5	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard	
Unit 1 GF WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Unit 1 GF 2 Person Office	-	-	-	1.5	-	-	-	-	-	-	N/A	
Unit 1 GF 6 Person Office	-	-	-	1.5	-	-	-	-	-	-	N/A	
Unit 1 GF WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Unit 1 GF WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Unit 1 FF Director Office 01	-	-	-	1.5	-	-	-	-	-	-	N/A	
Unit 1 FF Director Office 02	-	-	-	1.5	-	-	-	-	-	-	N/A	
Unit 1 FF WC & Shower	-	-	0.5	-	-	-	-	-	-	-	N/A	
Unit 1 FF WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Unit 1 FF WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Unit 1 FF Open Plan Office	-	-	-	1.5	-	-	-	-	-	-	N/A	

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Unit 1 GF Demo Kitchen		-	100	-	268
Unit 1 GF Small Meeting Room		100	-	-	98
Unit 1 GF WC		-	100	-	30
Unit 1 GF DPT		100	-	-	62
Unit 1 GF Circulation		-	100	-	18
Unit 1 GF Main Entrance		-	100	-	39
Unit 1 GF Staircase		-	100	-	31
Unit 1 GF Future Lift		-	100	-	11
Unit 1 GF 20 Person Canteen		-	100	-	89
Unit 1 GF Gen. Store		100	-	-	8
Unit 1 GF WC & Shower		-	100	-	34
Unit 1 GF WC		-	100	-	28
Unit 1 GF WC		-	100	-	28
Unit 1 GF WC		-	100	-	28
Unit 1 GF Cleaners Store		100	-	-	6
Unit 1 GF Plant Store		100	-	-	10
Unit 1 GF Corridor		-	100	-	71
Unit 1 GF Lockers		100	-	-	16
Unit 1 GF 2 Person Office		100	-	-	122
Unit 1 GF Drivers Room		100	-	-	15
Unit 1 GF 6 Person Office		100	-	-	227
Unit 1 GF Staircase		-	100	-	28
Unit 1 GF WC		-	100	-	26
Unit 1 GF WC		-	100	-	26
Unit 1 GF Dry Storage and Loading		100	-	-	4635
Unit 1 FF Circulation		-	100	-	96
Unit 1 FF Staircase		-	100	-	36
Unit 1 FF Dry Storage		100	-	-	4874

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Unit 1 GF Freezer Storage		100	-	-	1375
Unit 1 GF Fridge Prep. Area		100	-	-	894
Unit 1 GF Fridge Prep. Area		100	-	-	387
Unit 1 GF Fridge Prep. Area		100	-	-	388
Unit 1 GF Dairy Storage		100	-	-	925
Unit 1 GF Air Lock		-	100	-	29
Unit 1 GF Ripening Room		100	-	-	503
Unit 1 GF Chill Store		100	-	-	1387
Unit 1 FF Chill Store		100	-	-	1459
Unit 1 FF Board Room		100	-	-	261
Unit 1 FF Director Office 01		100	-	-	150
Unit 1 FF Director Office 02		100	-	-	158
Unit 1 FF Circulation		-	100	-	63
Unit 1 FF WC & Shower		-	100	-	51
Unit 1 FF Future Lift		-	100	-	12
Unit 1 FF Staircase		-	100	-	46
Unit 1 FF WC		-	100	-	30
Unit 1 FF WC		-	100	-	32
Unit 1 FF Server Store		100	-	-	12
Unit 1 FF Open Plan Office		100	-	-	622
Unit 1 FF Dairy		100	-	-	907
Unit 1 FF Fridge Prep. Area		100	-	-	897
Unit 1 FF Fridge Prep. Area		100	-	-	382
Unit 1 FF Fridge Prep. Area		100	-	-	384
Unit 1 FF Freezer Store		100	-	-	226

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Unit 1 GF Demo Kitchen	NO (-89.4%)	NO
Unit 1 GF Small Meeting Room	NO (-59.8%)	NO
Unit 1 GF WC	N/A	N/A
Unit 1 GF DPT	N/A	N/A
Unit 1 GF Circulation	N/A	N/A
Unit 1 GF Main Entrance	NO (-57.2%)	NO
Unit 1 GF Staircase	N/A	N/A
Unit 1 GF Future Lift	N/A	N/A
Unit 1 GF 20 Person Canteen	NO (-82.5%)	NO
Unit 1 GF Gen. Store	N/A	N/A
Unit 1 GF WC & Shower	N/A	N/A
Unit 1 GF WC	N/A	N/A
Unit 1 GF WC	N/A	N/A
Unit 1 GF WC	N/A	N/A
Unit 1 GF Cleaners Store	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Unit 1 GF Plant Store	N/A	N/A
Unit 1 GF Corridor	N/A	N/A
Unit 1 GF Lockers	N/A	N/A
Unit 1 GF 2 Person Office	N/A	N/A
Unit 1 GF Drivers Room	NO (-80%)	NO
Unit 1 GF 6 Person Office	NO (-72.5%)	NO
Unit 1 GF Staircase	N/A	N/A
Unit 1 GF WC	N/A	N/A
Unit 1 GF WC	N/A	N/A
Unit 1 GF Dry Storage and Loading	N/A	N/A
Unit 1 FF Circulation	N/A	N/A
Unit 1 FF Staircase	N/A	N/A
Unit 1 FF Dry Storage	N/A	N/A
Unit 1 GF Freezer Storage	N/A	N/A
Unit 1 GF Fridge Prep. Area	N/A	N/A
Unit 1 GF Fridge Prep. Area	N/A	N/A
Unit 1 GF Fridge Prep. Area	N/A	N/A
Unit 1 GF Dairy Storage	N/A	N/A
Unit 1 GF Air Lock	N/A	N/A
Unit 1 GF Ripening Room	N/A	N/A
Unit 1 GF Chill Store	N/A	N/A
Unit 1 FF Chill Store	NO (-8.9%)	NO
Unit 1 FF Board Room	NO (-67.3%)	NO
Unit 1 FF Director Office 01	NO (-65.6%)	NO
Unit 1 FF Director Office 02	NO (-80.3%)	NO
Unit 1 FF Circulation	N/A	N/A
Unit 1 FF WC & Shower	N/A	N/A
Unit 1 FF Future Lift	N/A	N/A
Unit 1 FF Staircase	N/A	N/A
Unit 1 FF WC	N/A	N/A
Unit 1 FF WC	N/A	N/A
Unit 1 FF Server Store	N/A	N/A
Unit 1 FF Open Plan Office	NO (-83.5%)	NO
Unit 1 FF Dairy	N/A	N/A
Unit 1 FF Fridge Prep. Area	N/A	N/A
Unit 1 FF Fridge Prep. Area	N/A	N/A
Unit 1 FF Fridge Prep. Area	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	8003.5	8003.5
External area [m ²]	12453.5	12453.5
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	6	5
Average conductance [W/K]	2893.24	3495.33
Average U-value [W/m ² K]	0.23	0.28
Alpha value* [%]	10.05	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
100	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	10.34	10.96
Cooling	1.03	1.18
Auxiliary	0.21	0.11
Lighting	13.51	17.97
Hot water	1.11	0.98
Equipment*	14.83	14.83
TOTAL **	26.19	31.2

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	111.92	117.08
Primary energy* [kWh/m ²]	78.38	93.38
Total emissions [kg/m ²]	13.3	15.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	112.6	7.9	11.2	1	0	2.8	2.13	3	3
	Notional	108.9	16.2	11.8	1.2	0	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	84.9	25.3	8.4	3.3	7.1	2.8	2.13	3	3
	Notional	95.8	53.5	10.4	3.9	3.7	2.56	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.21	NT000000:Surf[4]
Floor	0.2	0.2	NT000000:Surf[0]
Roof	0.15	0.18	NT000000:Surf[1]
Windows, roof windows, and rooflights	1.5	1.09	NT000024:Surf[1]
Personnel doors	1.5	2.2	NT000010:Surf[1]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-Min} = Minimum individual element U-values [W/(m²K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	6