

MXM Pollard Street, Manchester

Energy Statement Update

For Information

26 April 2022

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ISSUE HISTORY

Issue	Date	Description
P01	26/04/2022	S2 – For Information

MAX FORDHAM LLP TEAM CONTRIBUTORS

Engineer (Initials)	Role
EC	Principal Engineer

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1.0 EXECUTIVE SUMMARY

This memo will report and explain the updates to the energy strategy for Building B and C of the Pollard Street development.

This report shall be read in conjunction with the previous “Energy Statement” report, issued 01 October 2020.

For clarity this memo will cover:

- the main features of the previous energy strategies of the buildings now subject to update.
- the reasons that brought the need for a revision of the previous energy strategy.
- The new energy strategy approach and the additional benefits they will have to the operational energy use.

Building	Energy strategy	BER kg CO ₂ /m ²	TER kg CO ₂ /m ²	% improvement against Part L 2013	% improvement against Part L 2010	PV area
Building A	VRV & MVHR	15	16.2	7.4%	16.4%	-
Building B	Nat vent & VRV & PV	15.4	19	19%	26%	100 m ²
Building C	Nat vent & VRV & PV	13.3	15.6	15%	22.3%	100 m ²
Building D	VRV & MVHR	14.3	18	20.6%	29.6%	-
Building E	VRV & MVHR	14.1	15.8	10.8%	19.8%	-

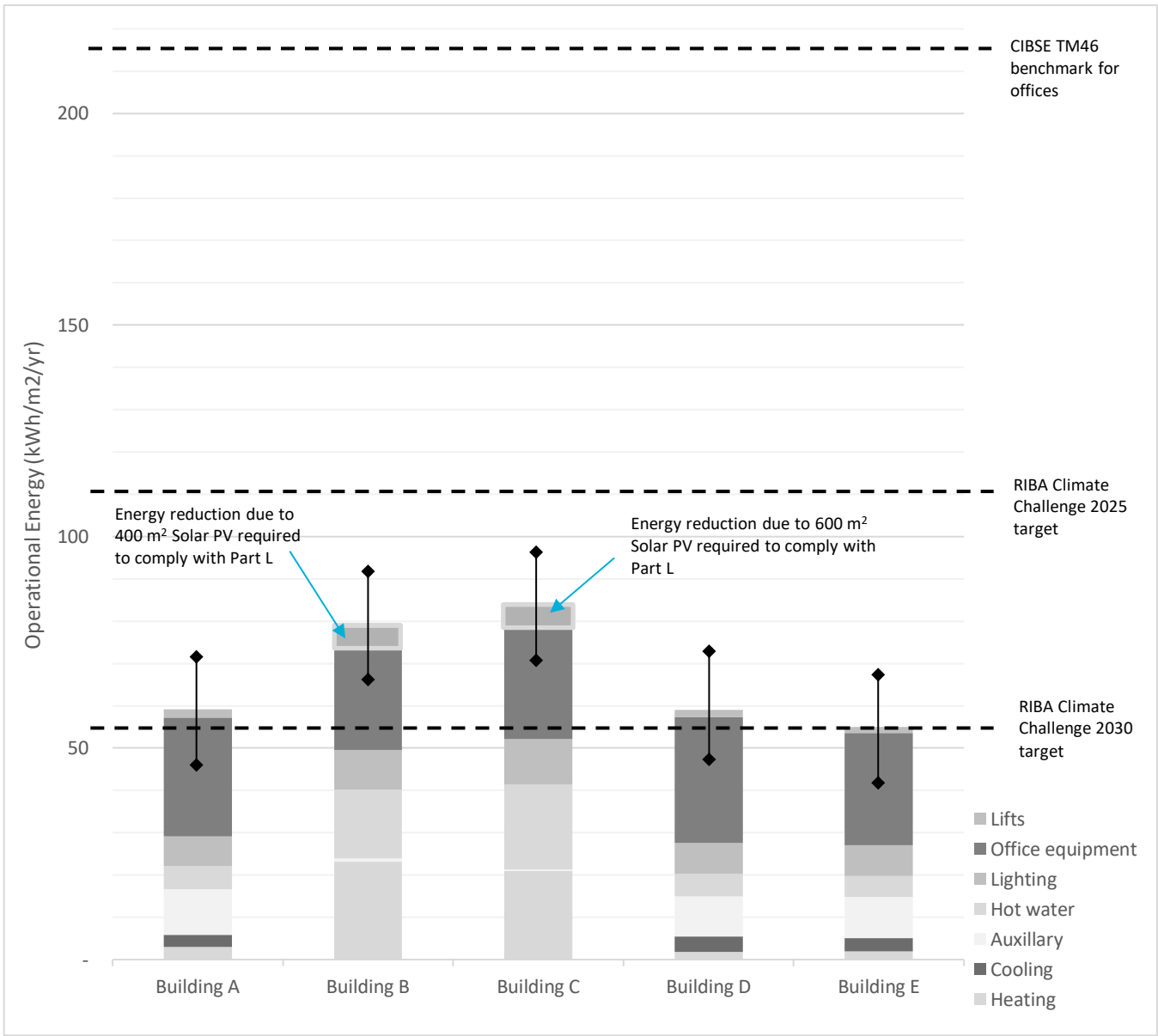


Figure 1-1 - Operational Energy consumption - initial energy strategy

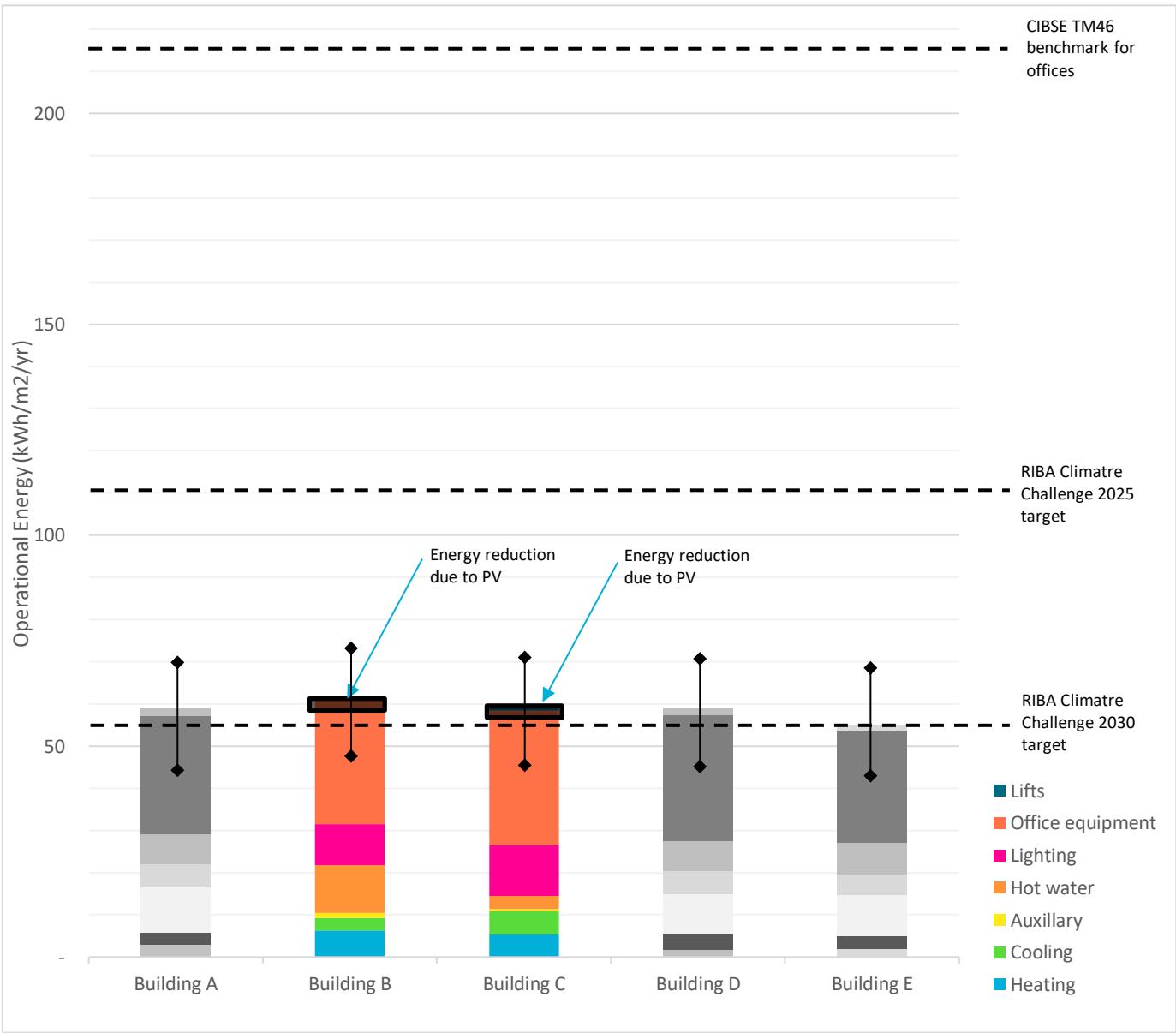


Figure 1-2 - Operational Energy consumption - current energy strategy

2.0 BUILDING B&C – PREVIOUS ENERGY STRATEGY

Pollard Street is a proposed development (previously called “the Collective”) of 5no. office buildings. Three of the buildings (A, D and E) will be spec offices while the other two (B and C) will be more lo-fi office/workshops more suitable for startups.

The energy strategy for the development is driven by the following policies and guidance:

- Building Regulations Part L
- Manchester City Council Planning guidance
- Greater Manchester’s zero carbon aspirations

Building B and C offer more low-fi workspaces and workshops with cheaper rates. These spaces were designed to operate more passively using natural ventilation both for fresh air supply and free cooling strategies.

The previous energy strategy for these 2 buildings mainly consisted of:

- Meeting the minimum requirements of Approved Document L2A
- having less HVAC services and therefore having a lower embodied carbon – therefore targeting the less onerous RIBA 2025 operational energy target of <110,000 kWh/2 per year and looked to get as close as possible to the RIBA 2030 targets

To be considered lower spec offices Buildings B and C were designed with the following MEP systems:

- Natural ventilation
- Direct electric heating
- Instantaneous direct electric point of use water heaters for wash hand basins
- Direct electric hot water cylinder for showers

To meet the energy targets described above, the passive, active and renewable measures previously implemented were:

- Best practice U-values for building fabric
- Providing natural ventilation strategy for occupant fresh air supply and passive cooling approach in warm seasons
- Efficient LED lighting with daylight controls and presence detection
- Domestic hot water for wash hand basins by instantaneous direct electric to remove storage and distribution losses
- PV on roof to generate electricity

3.0 BUILDINGS B & C – NEW ENERGY STRATEGY

During the Stage 3 design, there has been an aspiration to provide a more robust heating & cooling system for Building B & C, while maintaining the idea of a lower MEP-spec office to minimise the embodied carbon contribution to the overall scheme.

The idea is to provide a ***mixed mode HVAC strategy***. The revised brief is:

- To maintain the natural ventilation strategy, using a cross-flow ventilation approach through the facades of the sites. The natural ventilation will contribute:
 - To the fresh air supply for the occupants
 - To provide free cooling to the internal spaces when the outdoor temperature is below the indoor temperature and the occupiers ask for cooling.
- To provide an additional mean of mechanical cooling, as a *future-proof* infrastructure for:
 - Giving additional flexibility of controlling indoor temperature during hot weathers
 - Providing a more robust solution for the risk of overheating related with the future global warming.

These new considerations brought a revision of the MEP design for these 2 buildings. The proposed new system can be summarised as:

- A natural ventilation system, using manual openable windows, giving to the occupants the full control of the ventilation strategy
- A new VRF (Variable Refrigerant Flow) system that will provide both heating & cooling via exposed FCU into the space and external units on the roof.
- Efficient LED lighting with daylight controls and presence detection
- Domestic hot water for wash hand basins provided by instantaneous direct electric water heaters to remove storage and distribution losses
- PV on roof to generate electricity
- Direct electric hot water cylinder for showers

3.1 The new heating & cooling system

VRF systems are Air-Source Heat Pump & Chiller combined systems: they offer high efficiency (via the heat pump technology) and a high level of flexibility to the occupants, as each individual indoor unit can either work in heating or cooling mode, recycling the indoor energy within the building. This will result in a higher efficiency in use than the values declared by the manufacturers: the “*heat recovery*” feature is well suited to the modern buildings characteristics of having opposite heating & cooling demands on different part of the building.

For building B & C it is proposed to provide a VRF system in place of the previously proposed direct electric heating system.

3.2 PV panels

The new VRF system will have a beneficial effect on reducing the operational energy demand for the heating & cooling of Building B and C (see the following section). This will result in a significantly reduced PV panel area required to meet the minimum Part L requirements but also to outperform the previous building strategy.

4.0 BUILDING REGULATIONS AND PART L COMPLIANCE

IES VE Compliance software has been used to model the new Building B and C energy strategy in accordance with the National Calculation Methodology to show compliance with Part L of the Building Regulations.

The fabric performance and building services efficiencies summarised in Error! Reference source not found. have been used.

The results of the Part L modelling are shown in Error! Reference source not found..

Table 1 Summary of Part L Building Regulations compliance model assumptions

	Building A, D and E	Building B and C
Floor U-value	0.18 W/(m².K)	0.18 W/(m².K)
Wall U-value	0.20 W/(m².K)	0.20 W/(m².K)
Roof U-value	0.15 W/(m².K)	0.15 W/(m².K)
Window U-value	1.4 W/(m².K)	1.4 W/(m².K)
Air permeability	3 m³/(h.m²)	5 m³/(h.m²) (Building B,C)
Glass light transmission	0.7	0.7
Glass solar gain transmission	0.4	0.4
Heating SCoP	VRF heat pump, 5.91	VRF heat pump, 5.91
Cooling SEER	VRF heat pump, 4.62	VRF heat pump, 4.62
Ventilation SFP	MVHR: 1.65 W/l/s	Toilet and shower extract: 0.4 W/l/s
Heat recovery efficiency	0.7	n/a
Lighting efficacy	> 80 lm/W	> 80 lm/W
Lighting control	Daylight dimming in offices Presence detection in WC and circulation spaces	Daylight dimming in offices Presence detection in WC and circulation spaces
Hot water	VRF heat pump	Direct electric

Building	Energy strategy	BER kg CO ₂ /m²	TER kg CO ₂ /m²	% improvement against Part L 2013	% improvement against Part L 2010	PV area
Building A	VRV & MVHR	15	16.2	7.4%	16.4%	-
Building B	Nat vent & VRV & PV	15.4	19	19%	26%	100 m²
Building C	Nat vent & VRV & PV	13.3	15.6	15%	22.3%	100 m²
Building D	VRV & MVHR	14.3	18	20.6%	29.6%	-
Building E	VRV & MVHR	14.1	15.8	10.8%	19.8%	-

The new MEP systems for Building B and C provides a significant improvement against the minimum Part L 2013 requirements when compared to the initial energy strategy. This is mainly a result of Building B and C now being equipped with a high efficiency heating & cooling system (VRF) when compared to the previous strategy (direct electric).

5.0 OPERATIONAL ENERGY ANALYSIS

The new MEP strategy has a beneficial effect on the operation energy.

As a brief reminder, the analysis is carried out under the following conditions:

5.1 Energy benchmarks and targets

CIBSE TM46

The energy benchmark given in CIBSE TM46 for a general office building is 215 kWh/m² per year.

RIBA 2030 Climate Challenge

The 2025 target for the RIBA Climate Challenge for operational energy usage is < 110 kWh/m² per year, which is the equivalent of a DEC B rating.

The 2030 target for the RIBA climate challenge for operational energy usage is < 55 kWh/m² per year, which is the equivalent of a DEC A rating.

To make up for the slightly higher embodied carbon (compared to Building B and C, see Sustainability Statement) associated with Building A, D and E, we will use the more onerous RIBA 2030 target for Buildings A, D and E.

Considering the slightly lower embodied carbon (compared to Building A, D and E, see Sustainability Statement) we will use the less onerous RIBA 2025 target for Buildings B and C.

5.2 Calculating operational energy

CIBSE TM54 provides guidance on estimating operation energy usage.

Lighting

Prior to carrying out a full lighting design and whilst being unsure of occupant profiles we will use the BRUKL output for estimating lighting energy usage.

Lifts

Energy use calculations provided by prospective lift manufacturer.

Small power

We assume a power density of 12 W/m² over all office and workshop spaces. This assumption will be refined as the design progresses.

Catering

F&B units will be delivered at Shell & Core level across the scheme, therefore their final use cannot be predicted at the moment. Their contribution over the operational energy analysis is currently on hold. Nevertheless, the future tenants will be encouraged to consider holistically the Sustainability strategy of the buildings and provide systems that maximise the energy savings and efficiency.

Server rooms

For now, server rooms are part of the small power office equipment allowance.

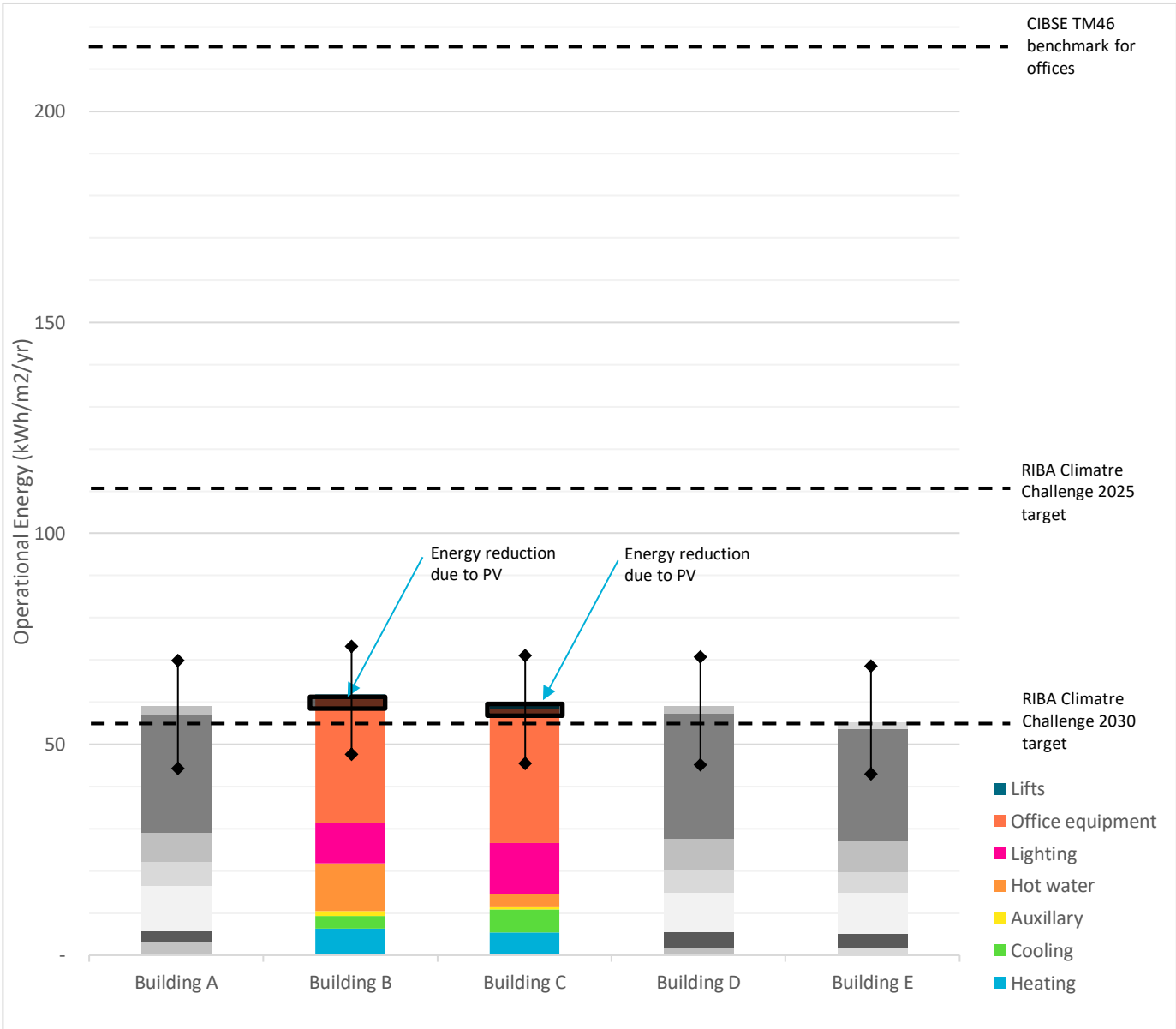
Domestic hot water

Prior to carrying out a system design and whilst being unsure of occupant profiles we will use the BRUKL output for estimating lighting energy usage.

Space heating, cooling, fans, and pumps

Prior to carrying out a full heating and cooling design and whilst being unsure of occupant profiles we will use the BRUKL output for estimating heating and cooling energy usage.

The new MEP system contributes to significantly reduction in the heating and cooling operation energy use of the two news buildings, bringing the estimated threshold in line with the building A, D and E.



6.0 APPENDIX - BRUKLS

BRUKL Output Document HM Government Compliance with England Building Regulations Part L 2013

Project name

Pollard Street Building B As designed

Date: Fri Apr 01 10:40:01 2022

Administrative information

Building Details

Address: Pollard Street, Manchester, M4 7DS

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: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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	19
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	19
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	15.4
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	0.2	0.2	B0000005:Surf[0]
Floor	0.25	0.17	0.18	B0000005:Surf[2]
Roof	0.25	0.15	0.15	B0000001:Surf[13]
Windows***, roof windows, and rooflights	2.2	1.4	1.4	B0000001:Surf[3]
Personnel doors	2.2	2.2	2.2	B0000001: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/(m²K)]

U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Area [m ²]	6045	6045		A1/A2 Retail/Financial and Professional services
External area [m ²]	6606.8	6602.7		A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
Weather	MAN	MAN	100	B1 Offices and Workshop businesses
Infiltration [m ³ /hm ² @ 50Pa]	5	3		B2 to B7 General Industrial and Special Industrial Groups
Average conductance [W/K]	2424.19	3541.36		B8 Storage or Distribution
Average U-value [W/m ² K]	0.37	0.54		C1 Hotels
Alpha value* [%]	10.14	10		C2 Residential Institutions: Hospitals and Care Homes
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging				
				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	6.28	10.17
Cooling	2.98	3.79
Auxiliary	1.21	0.38
Lighting	9.64	15.57
Hot water	11.35	12
Equipment*	38.26	38.26
TOTAL**	31.46	41.9

* 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	1.7	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]	114.75	145.3
Primary energy* [kWh/m ²]	96.59	102.7
Total emissions [kg/m ²]	15.4	19

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

BRUKL Output Document



Compliance with England Building Regulations Part L 2013

Project name

Pollard Street Building C

As designed

Date: Fri Apr 01 10:48:22 2022

Administrative information

Building Details

Address: Pollard Street, Manchester, M4 7DS

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: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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	15.6
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.6
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	0.2	0.28	C0000006:Surf[6]
Floor	0.25	0.18	0.18	C0000002:Surf[5]
Roof	0.25	0.15	0.15	C0000002:Surf[6]
Windows***, roof windows, and rooflights	2.2	1.4	1.4	C0000004:Surf[2]
Personnel doors	2.2	2.2	2.2	C0000002:Surf[0]
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/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* 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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	10154.1	10154.1
External area [m ²]	11193.1	11221.6
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	4427.79	5809.34
Average U-value [W/m ² K]	0.4	0.52
Alpha value* [%]	10.14	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
100	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	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	5.44	8.62
Cooling	5.45	4.24
Auxiliary	0.46	0.33
Lighting	12.05	15.68
Hot water	3.14	3.17
Equipment*	42.18	42.18
TOTAL**	26.55	32.05

* 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	1.01	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]	128.71	137.27
Primary energy* [kWh/m ²]	81.51	89.92
Total emissions [kg/m ²]	13.3	15.6

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

MXM Pollard Street, Manchester
Energy Statement
For Information

01 October 2020

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MAX FORDHAM LLP TEAM CONTRIBUTORS

Engineer (Initials)	Role
EC	Senior Engineer
STM	Engineer
HP	Senior Sustainability Consultant
BN	Sustainability Consultant

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1.0 EXECUTIVE SUMMARY

Pollard Street is a proposed development (following called as “the Collective”) of 5 no. office buildings. Three of the building (A, D and E) will be spec offices. The other two (B and C) will be more lo-fi office/workshops more suitable for startups.

The energy strategy for the development is driven by the following policy and guidance:

- Building Regulations Part L
- Manchester City Council Planning guidance
- Greater Manchester’s zero carbon aspirations

We will use targets from the RIBA 2030 Climate Challenge to benchmark our proposals.

The proposed energy and carbon reduction strategy targets for the scheme are as follows:

- Meet the minimum requirements of Approved Document L2A
- Building A, D and E are more heavily serviced and therefore will have a higher embodied carbon – therefore we will target the more onerous RIBA 2030 operational energy target of <55,000 kWh/2 per year
- Building B and C have less HVAC services and therefore have a lower embodied carbon – therefore will target the less onerous RIBA 2025 operational energy target of <110,000 kWh/2 per year and look to get as close as possible to the RIBA 2030 targets

How we will reduce operational energy (Building A, D and E):

- Best practice U-values for building fabric
- Efficient LED lighting with daylight controls and presence detection
- Mechanical ventilation with heat recovery
- VRF heat pump for simultaneous heating, cooling and domestic hot water generation for showers
- Domestic hot water for hash hand basins by instantaneous direct electric to remove storage and distribution losses

How we will reduce operational energy (Building B and C):

- Best practice U-values for building fabric
- Providing natural ventilation strategy for occupant fresh air supply and passive cooling approach in warm seasons
- Efficient LED lighting with daylight controls and presence detection
- Domestic hot water for hash hand basins by instantaneous direct electric to remove storage and distribution losses
- PV on roof to generate electricity

Table 1 shows the results from the Part L compliance modelling.

Table 1 Results of Part L modelling for Pollard Street

Building	Energy strategy	BER kg CO ₂ /m ²	TER kg CO ₂ /m ²	% improvement against Part L 2013	% improvement against Part L 2010	PV area
Building A	VRV & MVHR	15	16.2	7.4%	16.4%	-
Building B	Nat vent & PV	22.2	22.9	3.1%	12.1%	400 m ²
Building C	Nat vent & PV	23.9	24.3	1.6%	10.6%	600 m ²
Building D	VRV & MVHR	14.3	18	20.6%	29.6%	-
Building E	VRV & MVHR	14.1	15.8	10.8%	19.8%	-

Figure 1 shows the results of an operation energy estimate carried out in line with guidance from CIBSE TM54. It shows building A, D and E are roughly inline with RIBA 2030 targets while Building B and C are well below the RIBA 2025 targets. This estimate will develop as the design progresses through RIBA Stage 3 and 4.

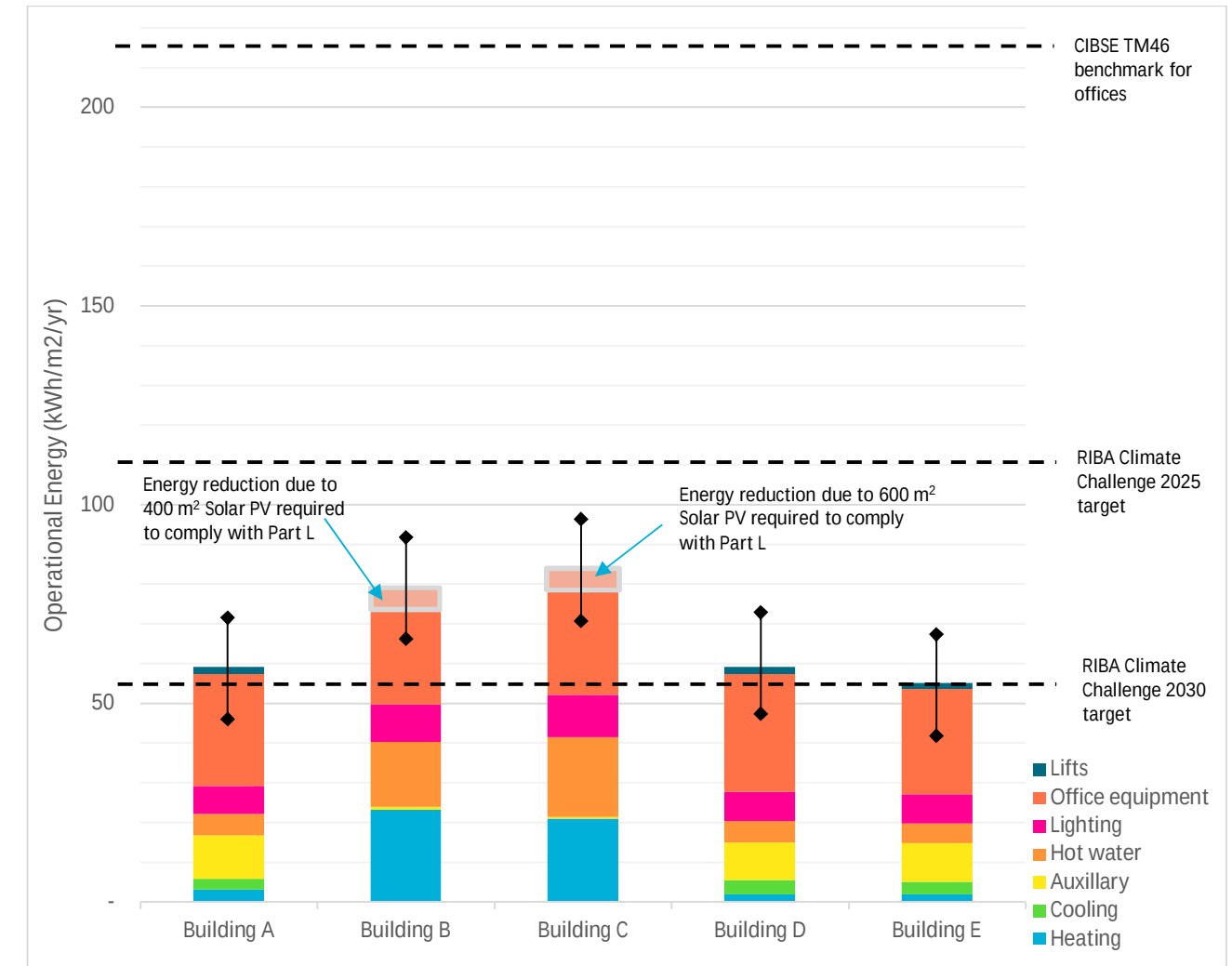


Figure 1 Chart to show estimated operational energy use of each building

2.0 INTRODUCTION

This report intends to detail the energy strategy for the proposed development on Pollard Street. It highlights the way in which the scheme aims to minimise energy usage and carbon emissions in line with national and local policies.

The new development will consist of 5no. new buildings on the land around the New Islington Metrolink station in Manchester. The ambition of this project is to provide new spaces that can be suitable for makers, `start-ups`, and incubators, together with more standard “grown-up” offices, across the Collective site offering a range of flexible unit sizes.

2.1 This report

There is an executive summary at the beginning of the report which summarises the whole report in one page.

This Introduction section provides information about the use and size of the proposed buildings.

The Legislation, Policy and Drivers section summarises key national and local policy, as well and industry guidance on interpretation and compliance with the polices.

Section 4 summarises the Energy Strategy of the development.

Section 5 summarises our renewable energy generation feasibly study and gives reasons for selecting and omitting certain technologies.

Section 6 presents the results of the Building Regulations Part L compliance modelling which only looks at regulated energy usage (heating, cooling, fans, pumps, lighting and hot water).

Section 7 provides a more complete analysis of predicted operational energy usage looking at both regulated energy (included in Building regulations Part L compliance) and unregulated energy use (lifts, small power, catering etc).

2.2 Site location

Address	Location
Pollard Street	Grid reference SJ 85486 98212
Manchester	Eastings 385486
M4 7DS	Northings 398212
	Latitude 53.480427
	Longitude -2.2201679

Local Council Manchester City Council

- <https://www.manchester.gov.uk/planning>

2.3 Proposed mix of uses

Buildings A, D and E (referred to throughout as Office Buildings)

- Flexible use spaces at ground floor to include possible future retail, restaurant, offices, gym and or creche
- Central core including reception, lifts, stair case and risers
- Spec offices on upper floors
- Back of house bin store on ground floor
- Bike store and shower facilities on ground floor
- Ground floor plantroom and electrical substation
- Accessible roof for building systems plant (all buildings) and a Multi-use area (Building A)

Buildings B and C (referred to throughout as Workshop Buildings)

- Flexible use spaces at ground floor to include possible future retail, restaurant, offices, gym and or creche
- Central core including reception, lifts, stair case and risers
- Lo-fi office/workshop spaces
- Back of house bin store on ground floor
- Bike store and shower facilities on ground floor
- Ground floor plantroom and electrical substation
- Accessible roof for building systems plant

2.4 Schedule of floorspace for each use

Table 2, Table 3, Table 4, Table 5 and Table 6 show the areas of each type of space used in the Building Regulations compliance energy model.

Table 2 Building A

Use	Area
Office	5201 m ²
Eating and drinking	793 m ²
Food preparation	65 m ²
Circulation	744 m ²
Toilet	403 m ²
Showers and changing	67 m ²
Plant rooms and stores	157 m ²
TOTAL	6961 m ²

Table 3 Building B

Use	Area
Office/workshop	4737 m ²
Eating and drinking	272 m ²
Food preparation	44 m ²
Circulation	483 m ²
Toilet	150 m ²
Showers and changing	59 m ²
Plant rooms and stores	212 m ²
TOTAL	6164 m ²

Table 4 Building C

Use	Area
Office/workshop	8629 m ²
Eating and drinking	130 m ²
Food preparation	22 m ²
Circulation	565 m ²
Toilet	429 m ²
Showers and changing	153 m ²
Plant rooms and stores	362 m ²
TOTAL	10,292 m ²

Table 5 Building D

Use	Area
Office	8168 m ²
Eating and drinking	-
Food preparation	-
Circulation	1207 m ²
Toilet	560 m ²
Showers and changing	106 m ²
Plant rooms and stores	273m ²
TOTAL	10,314 m ²

Table 6 Building E

Use	Area
Office	6383 m ²
Eating and drinking	240 m ²
Food preparation	84 m ²
Circulation	1325 m ²
Toilet	555 m ²
Showers and changing	75 m ²
Plant rooms and stores	368 m ²
TOTAL	9030 m ²

2.5 Proposed building systems strategy for the development

Building A, D and E

- Heating and cooling with VRF
- Mechanical ventilation with heat recovery
- Instantaneous direct electric point of use water heaters for wash hand basins
- Indirect hot water cylinder from VRF system for hot water for showers

Building B and C

- Natural ventilation
- Direct electric heating
- Instantaneous direct electric point of use water heaters for wash hand basins
- Direct electric hot water cylinder for showers

3.0 LEGISLATION, POLICY AND DRIVERS

In this section we outline the relevant national and local legislation, policy, guidance.

First we start with Building Regulations which are a UK statutory instrument which give minimum standards for design, construction and alteration of building sin the UK.

Then we look at national targets and planning policy. These set out UK and England wide policies which are then used by local councils to set local planning policy.

In addition to local planning policy, Manchester City has issued some additional local sustainability objectives which will likely shape future local planning policy.

We highlight the projected carbon emissions intensity of UK electricity supply and the role this can play in providing low carbon energy.

We then summarise some industry guidance on Net Zero Carbon before outlining our proposed energy and carbon reduction strategy for Pollard Street.

3.1 Building Regulations

Buildings Regulations are minimum standards for design, construction and alterations of buildings. They are a UK Statutory Instrument and approval by Building Control or an approved inspector is required prior to construction and occupation.

Building Regulations cover all aspects of a building including structure (Part A), fire safety (Part B) and energy usage (Part L).

Approved documents published by the government set out ways to demonstrate compliance with Building Regulations.

Approved Document L2A describes how a new non-domestic buildings can show compliance with Part L of the Building Regulations

Approved Document L2A – Conservation of Fuel and Power
In summary Approved Document L2A provides the following:

- Minimum fabric standards
- Minimum energy efficiency standards (No-Domestic Compliance Guide)
- National Calculation Methodology (NCM) to calculate carbon emissions for Actual building and Notional Building
- Limits the calculated Building Emissions Rate (BER) to that of the Target Emissions Rate (TER)
- Limits on solar gains

The NCM uses a set of carbon emissions factors for different fuels. The emissions factor used for grid electricity is out of date and does not reflect the current – or future – performance of grid electricity.

3.2 National targets and planning policy

Climate Change Act 2008 (2050 Target Amendment)

- Introduces a target of at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) in the UK by 2050

National Planning Policy Framework

- Sets out the Government's planning polices for England and how these should be applied
- New developments should help increase the use and supply of renewable and low carbon energy and heat
 - Low carbon technologies are those that can help reduce emissions (compared to conventional use fossil fuels)

3.3 Local planning policy

There are a number of energy related policies throughout Manchester City Council planning documents.

The policies are summarised as follows:

Manchester's LDF Core Strategy Development Plan Document (July 2012)
EN4 Reducing CO2 Emissions by Enabling Low and Zero Carbon Development

- All development must follow the Energy Hierarchy:
 - Reduce the need for energy through design features that provide passive heating, natural lighting and cooling
 - Reduce the need for energy through energy efficient features such as improved insulation and glazing
 - Meet residual requirements through the use of low or zero carbon energy generating technologies

EN6 Target Framework for CO2 reductions from low or zero carbon

- 10% improvement over Part L 2010 or compliance with current regs - whichever is greater
- Set out baseline info and scheme that complies with Part L 2010 -> Calculate regulated energy demand -> Apply appropriate emissions target -> Apply energy hierarchy -> Consider low-carbon and renewable tech -> Choose least cost option -> Look at offsetting of cost of renewables is prohibitive

Guide to Development in Manchester SPD and Planning Guidance (April 2007)

- Aim to reduce CO2 emission by at least 25% more than requirements of current Building Regs
- Minimise reliance on heating, cooling, lighting and ventilation energy using equipment

- Integrate energy efficient micro-generation and community heating schemes
- Maximise daylight and passive solar gain in winter, whilst avoiding excessive solar gain in summer
- Aim for at least 20% of final site energy demand to be met by on-site renewable energy technologies
- It may be possible to provide 50% or even 100% of energy from renewable sources

Consultation with planners so far

- It was acknowledged reductions in carbon emissions relative to Part L are not the most appropriate metric for evaluating future performance.
- We were advised relate the proposed development performance to future grid emission scenarios and overall net zero carbon goals

3.4 Additional local sustainability objectives

In addition to planning policy documents, there is the Manchester Climate Change Framework 2020-2025 which is the city's high level strategy for tackling climate change and the Greater Manchester Spatial Framework which is the region's plan for Homes, Jobs and the Environment.

Manchester Climate Change Framework 2020-2025 (February 2020)

- Provide renewable energy generation inside the City where possible
- Reduce demand for gas
- Replace gas-based heating systems with renewable based heating technologies

Greater Manchester Spatial Framework Revised Draft (January 2019)

- Minimise energy demand
- Maximise energy efficiency
- Utilise renewables energy
- Utilise low carbon energy
- By 2028 new developments should be net zero carbon

3.5 Projected carbon emissions intensity of UK electricity supply

In the past the carbon emissions intensity of the UKs electricity supply has been at least double that of natural gas. This has now changed and currently the carbon emissions intensity of the UKs electricity is roughly equal to natural gas. In the near future the carbon emissions intensity of the national grid is projected to fall to less than 25% of natural gas by 2030.

Figure 2 show the projected emissions intensity of the UKs electricity supply, and Table 7 shows these figures in comparison to gas and to the emissions intensity of the fuels used in the Building Regulations Part L.

The current Building Regulations still use the an out of date figure for carbon intensity of the UKs electricity supply. Therefore the carbon emissions calculations associated with Part L of the Building Regulations do not provide a true indication of future performance.

The projected emissions of the UK’s electricity supply shown in Figure 2 and Table 7 mean that by the government’s definition grid electricity will reduce carbon emissions compared to conventional use fossil fuels and thus be a low carbon technology.

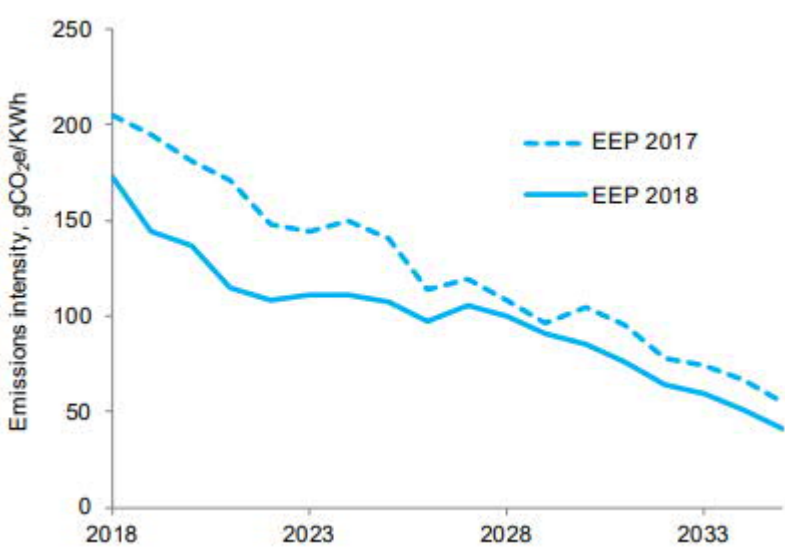


Figure 2 Emissions intensity of the UKs electricity supply (From BEIS 2019)

Table 7 Comparison of carbon emissions factors

	Grid electricity	Natural gas
Building Regulations 2013	519 gCO ₂ e/kWh	216 gCO ₂ e/kWh
BEIS 2018	200 gCO ₂ e/kWh	204 gCO ₂ e/kWh
BEIS 2030	41 gCO ₂ e/kWh	204 gCO ₂ e/kWh

3.6 Industry guidance on Net Zero Carbon

As mentioned previously with the Climate Change Act 2008 (2050 Target Amendment), the UK government has passed a law to require the UK to end its contribution to global warming by 2050. In response to this the UK Green Building Council (UKGBC) and the Royal Institute of British Architects (RIBA) have published guidance on how the built environment can help achieve this.

The guidance can be summarised as follows:

UK GBC Net Zero Carbon Buildings: A Framework Definition

- Reduce construction impacts
- Reduce operational energy use
 - Reduce energy demand and consumption
 - Calculate in use energy demand and display publicly
- Increase renewable energy supply
- Offset any remaining carbon emissions

RIBA 2030 Climate Challenge

- Reduce operational energy by 75% from CIBSE TM 46 benchmarks
- Operational energy targets:
 - RIBA 2025 target < 110 kWh/m2
 - RIBA 2030 target < 55 kWh/m2

3.7 Proposed energy and carbon reduction strategy for Pollard Street

- Meet the minimum requirements of Approved Document L2A
- Building A, D and E are more heavily serviced and therefore will have a higher embodied carbon (see Sustainability Statement) – therefore we will target the more onerous RIBA 2030 operational energy target of <55 kWh/m² per year
- Building B and C have less HVAC services and therefore have a lower embodied carbon (see Sustainability Statement) – therefore will target the less onerous RIBA 2025 operational energy target of <110 kWh/m² per year

4.0 ENERGY STRATEGY

4.1 Summary

See M&E systems strategy report for further descriptions (PLS-MXF-ZZ-XX-RP-J-56000).

Briefly this section describes the performance and efficiencies of the fabric and building services.

Building A, D and E

- Best practice fabric efficiency
- Heating and cooling with VRF
- Mechanical ventilation with heat recovery
- Instantaneous direct electric point of use water heaters for wash hand basins
- Indirect hot water cylinder from VRF system for hot water for showers

Building B and C

- Natural ventilation
- Direct electric heating
- Instantaneous direct electric point of use water heaters for wash hand basins
- Direct electric hot water cylinder for showers

4.2 Fabric

Both building types – Office building (Building A, D and E) and Workshop buildings (Building B and C) – will have good levels of fabric performance which generally represent industry best practice as shown in Table 8.

Table 8 Proposed fabric properties

Element	Notional building	Proposed values
Floor U-value	0.22 W/(m ² .K)	0.18 W/(m ² .K)
Wall U-value	0.26 W/(m ² .K)	0.20 W/(m ² .K)
Roof U-value	0.18 W/(m ² .K)	0.15 W/(m ² .K)
Window U-value	1.6 W/(m ² .K)	1.4 W/(m ² .K)
Air permeability	3 m ³ /(h.m ²)	3 m ³ /(h.m ²) (Building A,D,E) 5 m ³ /(h.m ²) (Building B,C)
Glass light transmission	-	0.7
Glass solar gain transmission	-	0.4

4.3 Heating and cooling

Both building types will have zero combustion on site to avoid increase in local air pollution. We will use a combination of grid electricity and solar PV to power the heating and cooling systems.

Building A, D and E

Buildings A, D and E are spec offices and will have a requirement for local active cooling to ensure overheating can be avoided in all future climate scenarios. Therefore we propose a to use variable refrigerant flow (VRF) reversible heat pump heating and cooling systems. These systems offer very efficient performance when compared to a similar system used on the Notional Building.

We are proposing to use a Daikin VRV system which allows for rejected heat from one space to be used to heat another space if there are simultaneous requirements for heating and cooling. For example heat could be rejected from offices in summer and used to heat hot water for showers. Or in winter heat could be rejected from south facing offices receiving solar gain and used to heat north facing offices which require heating.

- Efficient Daikin VRV system for simultaneous heating and cooling
 - o ie remove heat from area requiring cooling and use it for heating hot water
 - o Air source heat pump used to generate/reject heat
 - o Refrigerant used to move heat around the building to split units in each area
 - o Cooling SEER: 4.62 (compared to 3.6 for the Notional Building)
 - o Heating SCoP 5.91 (compared to 2.43 for the Notional Building)

Building B and C

Building B and C offer more low-fi workspaces and workshops with cheaper rates. These spaces will be designed to operate more passively using natural ventilation to remove excess heat in summer. This strategy reduces costs and lowers embodied carbon compared to the strategy for Building A, D and E.

- Direct electric panel heaters
 - o Part of lower embodied carbon strategy for the stripped back workshop/office spaces
- Natural ventilation for removing excess heat

4.4 Domestic hot water

Where hot water use is short and sporadic, ie wash hand basins, we will use instantaneous point of use electric heaters to avoid any standing losses.

Where a greater, prolonged hot water use is required, ie in showers, hot water will be generated and stored locally to reduce peak demand on the hot water generation system.

- Wash hand basins supplied by instantaneous inline direct electric water heaters

Building A, D and E

- Shower supplied by stored hot water generated efficiently using the VRV (Variable refrigerant Volume) system

- Secondary circulation pump controlled using occupancy detection in changing area

Building B and C

- Shower supplied by stored hot water generated using direct electric cylinder
- Secondary circulation pump controlled using occupancy detection in changing area

4.5 Ventilation

In Buildings A, D and E where we will use active cooling, we will use a mechanical ventilation system with heat recovery to be efficient as possible.

In Building B and C where overheating will be avoided using natural ventilation, our overall ventilation strategy will be to use

Building A, D and E

- Mechanical ventilation with heat recovery
 - o Heat extracted from extract air and used to warm incoming filtered air
 - o Thermal wheel with efficiency > 70%
 - o Specific fan power < 1.65 W/l/s

Building B and C

- Natural ventilation
 - o Part of lower embodied carbon strategy for Building C and D

4.6 Lighting

- LED luminaire with luminous efficacy of > 80 lm/W (compared with 60 lm/W for the Notional Building)
- Daylight dimming in office and workshop spaces
- Presence detection in circulation spaces, toilets and showers

4.7 Renewable/low carbon energy generation

Building A, D and E

Building A, D and E will use an efficient reversible heat pump system for heating and cooling. This will use less energy for heating than a conventional fossil fuel natural gas boiler and with the grid decarbonisation will also lower carbon emissions as well compared to a gas boiler.

Building B and C

In addition to the services summarised in this section, Building B and C will also use solar PV on the roof to generate electricity to reduce grid electricity demand. In times of PV electricity high generation and low grid demand the building will export electricity to the grid.

5.0 RENEWABLE AND LOW CARBON ENERGY GENERATION FEASIBILITY

This section summarises our renewable energy feasibility study and gives reasons for selecting or omitting each technology.

5.1 Solar PV ✓

- Capture energy from sun, convert to electricity
- Simple operation and low maintenance
- Solar PV is proposed for the roofs of Buildings B and C to achieve building regulations compliance

5.2 Solar thermal ✗

- Uses solar collectors to transfer heat from the sun directly to water
- Generally used to generate domestic hot water
- Complex system with high level of operational maintenance
- Not proposed for building A, D and E because we already have VRV system to generate domestic hot water for showers
- Not proposed for Building B and C because it does not fit the simple operation and low embodied carbon strategy

5.3 Heat pumps ✓

- Use ambient air to extract heat from and reject heat to
- ASHP will be used on Buildings A, D and E to provide simultaneous heating and cooling to achieve Building Regulations compliance

5.4 Wind turbines ✗

- Two basic types – horizontal axis and vertical axis
- Efficiently of horizontal axis wind turbines reduces in turbulent air found around buildings
- Wind turbines can cause noise, vibration and flicker
- Generally not suited to an urban environment
- Wind turbines are not proposed for the Pollard Street development

5.5 Biomass ✗

- Uses plant derived organic material to produce heat
- High maintenance
- Requires regular deliveries of fuel to site – not ideal for city location
- Combustion of biomass will lead to increase of localised air pollution

5.6 CHP ✗

- Generates both electricity and heat using natural gas
- Combustion of natural gas leads to onsite NOx emissions
- With projected electricity grid decarbonisation CHP no longer becomes a low carbon solution

6.0 BUILDING REGULATIONS PART L COMPLIANCE

We have used *IES VE Compliance* software to model the Pollard Street development in accordance with the National Calculation Methodology to show compliance with Part L of the Building Regulations.

We have used the performance and efficiencies of the fabric and building services as described in Section 4.0 Energy Strategy and summarised in Table 9.

The results of the Part L modelling are shown in Table 10.

Table 9 Summary of Part L Building Regulations compliance model assumptions

	Building A, D and E	Building B and C
Floor U-value	0.18 W/(m ² .K)	0.18 W/(m ² .K)
Wall U-value	0.20 W/(m ² .K)	0.20 W/(m ² .K)
Roof U-value	0.15 W/(m ² .K)	0.15 W/(m ² .K)
Window U-value	1.4 W/(m ² .K)	1.4 W/(m ² .K)
Air permeability	3 m ³ /(h.m ²)	5 m ³ /(h.m ²) (Building B,C)
Glass light transmission	0.7	0.7
Glass solar gain transmission	0.4	0.4
Heating SCoP	VRF heat pump, 5.91	Direct electric, 1
Cooling SEER	VRF heat pump, 4.62	n/a
Ventilation SFP	MVHR: 1.65 W/l/s	Toilet and shower extract: 0.4 W/l/s
Heat recovery efficiency	0.7	n/a
Lighting efficacy	> 80 lm/W	> 80 lm/W
Lighting control	Daylight dimming in offices Presence detection in WC and circulation spaces	Daylight dimming in offices Presence detection in WC and circulation spaces
Hot water	VRF heat pump	Direct electric

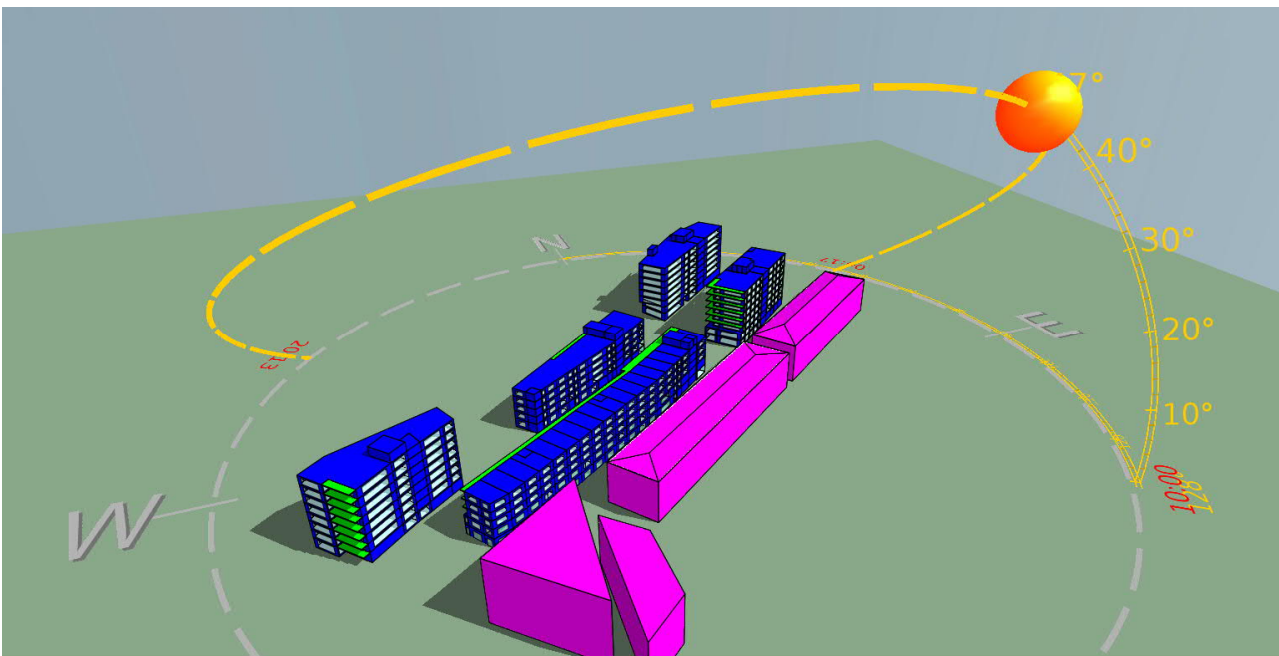


Figure 3 Image of building model from IES VE compliance for RIBA design stage 2 Building Regulations compliance calculation and thermal modelling

Table 10 Results of Part L modelling for Pollard Street (RIBA Stage 2 design)

Building	Energy strategy	BER kg CO ₂ /m ²	TER kg CO ₂ /m ²	% improvement against Part L 2013	% improvement against Part L 2010	PV area
Building A	VRV & MVHR	15	16.2	7.4%	16.4%	-
Building B	Nat vent & PV	22.2	22.9	3.1%	12.1%	400 m ²
Building C	Nat vent & PV	23.9	24.3	1.6%	10.6%	600 m ²
Building D	VRV & MVHR	14.3	18	20.6%	29.6%	-
Building E	VRV & MVHR	14.1	15.8	10.8%	19.8%	-

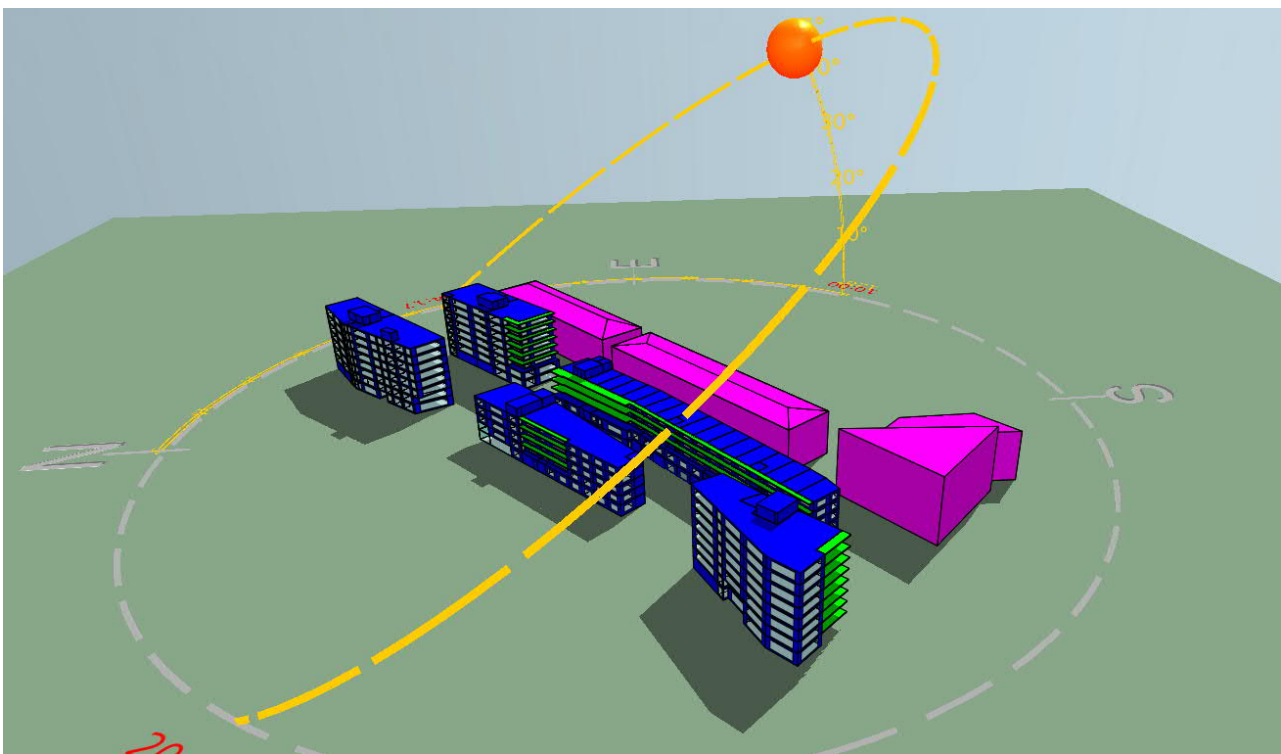


Figure 4 Image of building model (from alternative angle) from IES VE compliance for RIBA design stage 2 Building Regulations compliance calculation and thermal modelling

7.0 OPERATIONAL ENERGY

In this section we estimate operational energy performance of the buildings and report on this relative to the guidance set out in the RIBA 2030 Climate Challenge.

7.1 Design stage estimate of operation energy performance

During the design stage we will estimate operational energy using the methodology set out in CIBSE TM 54 as recommended in the RIBA 2030 climate challenge guidance. This calculation will develop and become more detailed as the design of the development progresses from RIBA Stage 2 to RIBA Stage 4.

7.2 Energy benchmarks and targets

CIBSE TM46

The energy benchmark given in CIBSE TM46 for a general office building is 215 kWh/m² per year.

RIBA 2030 Climate Challenge

The 2025 target for the RIBA Climate Challenge for operational energy usage is < 110 kWh/m² per year, which is the equivalent of a DEC B rating.

The 2030 target for the RIBA climate challenge for operational energy usage is < 55 kWh/m² per year, which is the equivalent of a DEC A rating.

To make up for the slightly higher embodied carbon (compared to Building B and C, see Sustainability Statement) associated with Building A, D and E, we will use the more onerous RIBA 2030 target for Buildings A, D and E.

In light of the slightly lower embodied carbon (compared to Building A, D and E, see Sustainability Statement) we will use the less onerous RIBA 2025 target for Buildings B and C.

7.3 Calculating operational energy

CIBSE TM54 provides guidance on estimating operation energy usage.

Lighting

Prior to carrying out a full lighting design and whilst being unsure of occupant profiles we will use the BRUKL output for estimating lighting energy usage.

Lifts

Energy use calculations provided by prospective lift manufacturer.

Small power

We assume a power density of 12 W/m² over all office and workshop spaces. This assumption will be refined as the design progresses.

Catering

F&B units will be delivered at Shell&Core level across the scheme, therefore their final use cannot be predicted at the moment. Their contribution over the operational energy analysis is currently on hold. Nevertheless the future tenants will be encouraged to consider holistically the Sustainability strategy of the buildings and provide systems that maximise the energy savings and efficiency.

Server rooms

For now, sever rooms is part of the small power office equipment allowance.

Domestic hot water

Prior to carrying out a system design and whilst being unsure of occupant profiles we will use the BRUKL output for estimating lighting energy usage.

Space heating, cooling, fans and pumps

Prior to carrying out a full heating and cooling design and whilst being unsure of occupant profiles we will use the BRUKL output for estimating heating and cooling energy usage.

7.4 Review against benchmarks

Estimates for operational energy usage in buildings B and C fall within the RIBA 2025 target as shown in Figure 5.

Estimates for operational energy usage in buildings A, D and E fall in the region of the RIBA 2030 target.

In addition, this analysis demonstrates there is a significant decrease on the estimated operational energy consumption compared with the current office benchmark (CIBSE TM46), in a region of -74% for A,D& E and -63% for B&C respectively.

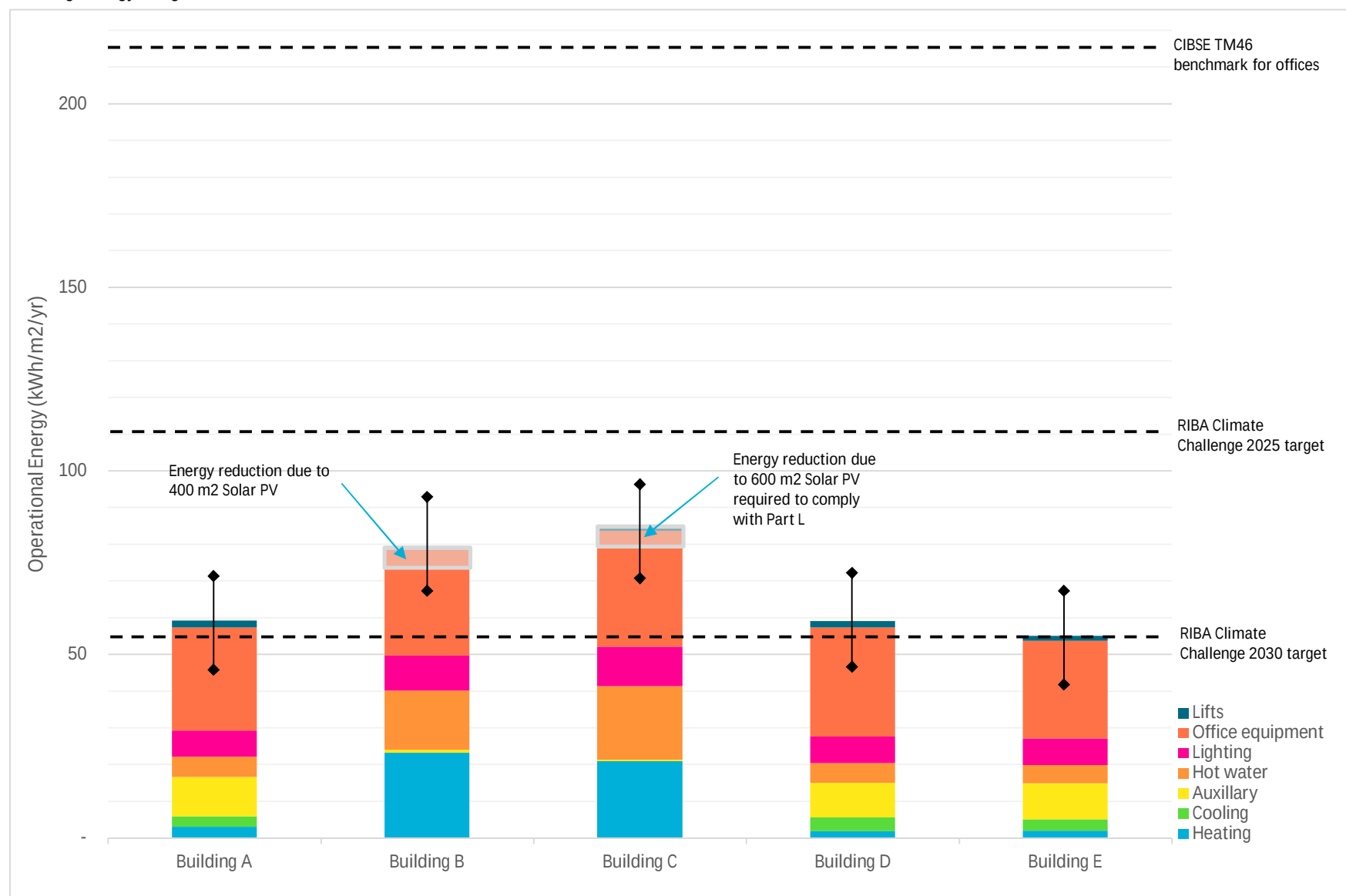


Figure 5 Chart to show estimated operational energy use of each building

8.0 APPENDIX - BRUKLS

BRUKL Output Document

Compliance with England Building Regulations Part L 2013



HM Government

Project name

Pollard Street Building A 0050 baseline

As built

Date: Fri Aug 14 14:20:24 2020

Administrative information

Building Details

Address: Pollard Street, Manchester, M4 7DS

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.12

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: General Projects

Telephone number: Phone

Address: 55 Blandford Street, London, W1U 7HW

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	6960.6	6960.6
External area [m ²]	6084	6084
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	3395.21	3612.23
Average U-value [W/m ² K]	0.56	0.59
Alpha value* [%]	10	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
100	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	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

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	16.2
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	16.2
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	15
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	0.2	0.2	SP000000:Surf[1]
Floor	0.25	0.18	0.18	SP000000:Surf[0]
Roof	0.25	0.16	0.16	2W000004:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.39	1.39	SP000003:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
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/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* 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	3

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	2.01	2.55
Cooling	3.55	5.71
Auxiliary	10.78	4.63
Lighting	7.09	13.07
Hot water	5.49	6.92
Equipment*	40.78	40.78
TOTAL**	28.92	32.87

* 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]	83.85	101.36
Primary energy* [kWh/m ²]	105.19	115.13
Total emissions [kg/m ²]	15	16.2

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

BRUKL Output Document

Compliance with England Building Regulations Part L 2013



Project name

Pollard Street Building B 0063 PV 400 m2 As built

Date: Sun Aug 16 23:36:16 2020

Administrative information

Building Details

Address: Pollard Street, Manchester, M4 7DS

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.12

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: General Projects

Telephone number: Phone

Address: 55 Blandford Street, London, W1U 7HW

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	6163.9	6163.9
External area [m ²]	6509.8	6509.8
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	2658.31	3525.69
Average U-value [W/m ² K]	0.41	0.54
Alpha value* [%]	10	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
100	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	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

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	22.9
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	22.9
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	22.2
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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	23.11	28.83
Cooling	0	0
Auxiliary	0.83	0.55
Lighting	9.43	15.55
Hot water	16.15	17.29
Equipment*	43.07	43.07
TOTAL**	49.51	62.21

* 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.

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	0.2	0.2	SP000009:Surf[1]
Floor	0.25	0.18	0.18	SP000009:Surf[0]
Roof	0.25	0.16	0.16	SP00000E:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.39	1.39	SP00000C:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
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/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* 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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	6.66	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]	83.19	89.46
Primary energy* [kWh/m ²]	152.01	98.91
Total emissions [kg/m ²]	22.2	22.9

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

BRUKL Output Document

Compliance with England Building Regulations Part L 2013



HM Government

Project name

Pollard Street Building C 0064 PV 600 m2 As designed

Date: Wed Aug 19 09:22:56 2020

Administrative information

Building Details

Address: Pollard Street, Manchester, M4 7DS

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.12

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: General Projects

Telephone number: Phone

Address: 55 Blandford Street, London, W1U 7HW

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	10291.7	10291.7
External area [m ²]	11261.3	11261.3
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	4236.4	5302.65
Average U-value [W/m ² K]	0.38	0.47
Alpha value* [%]	10	10

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

Building Use

% Area	Building Type
100	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 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

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	24.3
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	24.3
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	23.9
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	0.2	0.2	SP000018:Surf[1]
Floor	0.25	0.18	0.18	SP000017:Surf[0]
Roof	0.25	0.16	0.16	SP000039:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.39	1.39	SP000017:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
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/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* 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	3

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	20.9	26.73
Cooling	0	0
Auxiliary	0.37	0.22
Lighting	10.77	17.21
Hot water	20.06	21.76
Equipment*	41.71	41.71
TOTAL**	52.1	65.93

* 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	5.98	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]	75.25	82.96
Primary energy* [kWh/m ²]	159.96	105.54
Total emissions [kg/m ²]	23.9	24.3

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

BRUKL Output Document



Compliance with England Building Regulations Part L 2013

Project name

Pollard Street Building D 0050 baseline As designed

Date: Wed Aug 19 10:06:06 2020

Administrative information

Building Details

Address: Pollard Street, Manchester, M4 7DS

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.12

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: General Projects

Telephone number: Phone

Address: 55 Blandford Street, London, W1U 7HW

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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	18
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	18
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	14.3
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	0.2	0.2	SP000025:Surf[1]
Floor	0.25	0.18	0.18	SP000025:Surf[0]
Roof	0.25	0.16	0.16	D2000016:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.39	1.39	SP000028:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
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/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* 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	3

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	10313.7	10313.7
External area [m ²]	8381	8381
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	4572.31	4923.61
Average U-value [W/m ² K]	0.55	0.59
Alpha value* [%]	10	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
100	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	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	1.83	2.28
Cooling	3.67	6.45
Auxiliary	9.42	3.73
Lighting	7.31	17.2
Hot water	5.39	6.79
Equipment*	40.86	40.86
TOTAL**	27.62	36.45

* 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]	82.05	109.03
Primary energy* [kWh/m ²]	99.94	123.95
Total emissions [kg/m ²]	14.3	18

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

BRUKL Output Document

Compliance with England Building Regulations Part L 2013



HM Government

Project name

Pollard Street Building E 0050 Baseline

As designed

Date: Wed Aug 19 10:30:05 2020

Administrative information

Building Details

Address: Pollard Street, Manchester, M4 7DS

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.12

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: General Projects

Telephone number: Phone

Address: 55 Blandford Street, London, W1U 7HW

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	9030.1	9030.1
External area [m ²]	7263.6	7263.6
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	3889.07	4182.84
Average U-value [W/m ² K]	0.54	0.58
Alpha value* [%]	10	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
100	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	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

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	14.1
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	0.2	0.2	SP00002C:Surf[2]
Floor	0.25	0.18	0.18	SP00002C:Surf[0]
Roof	0.25	0.16	0.16	OR000000:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.39	1.39	SP00002C:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
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/(m²K)]U_{A-Calc} = Calculated area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* 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	3

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.91	2.31
Cooling	3.11	5.14
Auxiliary	9.74	4.6
Lighting	7.34	13.77
Hot water	4.98	6.27
Equipment*	38.51	38.51
TOTAL**	27.08	32.09

* 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]	76.19	91.44
Primary energy* [kWh/m ²]	97.98	110.68
Total emissions [kg/m ²]	14.1	15.8

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