Appendix F – DHN correspondence with Richmond Council.

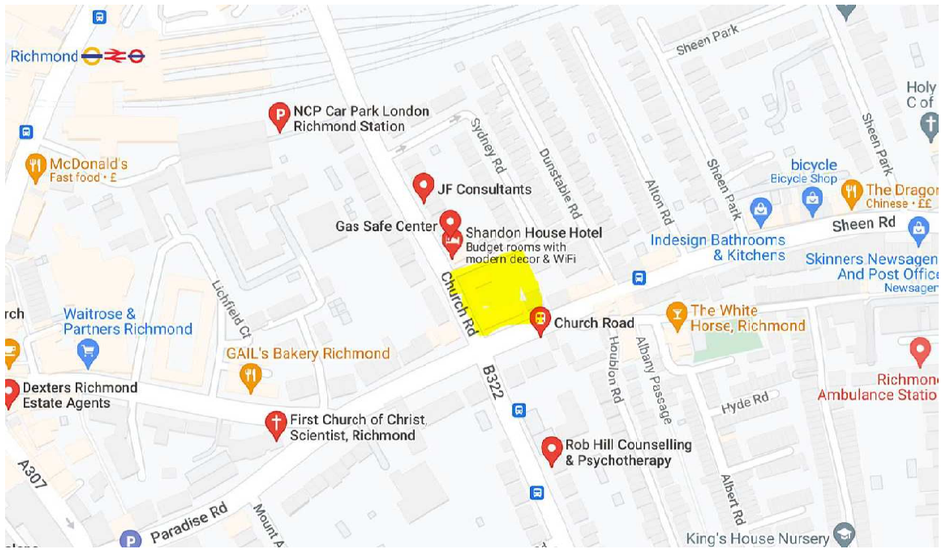
Gisele Braga

From: Gisele Braga
Sent: 12 April 2022 01:43
To: localplan@richmond.gov.uk
Subject: New development located at Richmond Centre Cluster - Connection to an existing Decentralised Energy (DE) system
Attachments: Heat Map Report - Richmond.pdf

Good morning,

I'm currently working on a development which will be submitted for planning permission within the next two months.

This development is located at Richmond Centre Cluster (Junction Sheen Rd with Church Road – see below), and to address Policy LP 22 Decentralised Energy (DE) Network within Richmond's Adopted Local Plan, we're currently investigating if there is an existing DE network for connection.



We have reviewed the London Heat Map (no existing, nor proposed heat network) and the attached Richmond Heap Map Report (dated 2012).

As the Richmond Heap Map Report has been published 10 year ago, is there any existing DE network near the development site for future connection?

Thank you in advance.

Regards,

Gisele Braga
Principal Sustainability Consultant

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Email giselebraga@hoarelea.com

HOARE LEA
A TETRA TECH COMPANY

Appendix G – BRUKL document, Post-Refurb Building Be Green.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Richmond Inn (Refurb Part L2B) Be Green As designed

Date: Wed May 04 10:39:12 2022

Administrative information

Building Details

Address: 50-56 Sheen Rd, London, TW9 1UG

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: HL

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	71.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	71.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	69.3
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.66	0.7	01000012:Surf[0]
Floor	0.25	0.18	0.18	GF000011:Surf[8]
Roof	0.25	0.1	0.1	RM000016:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.3	1.3	01000012:Surf[2]
Personnel doors	2.2	1.4	1.4	GF00000A:Surf[2]
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

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* 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	8

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	0.9 to 0.95

1- HVAC 03 - FCU (MVHR) - All areas

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.4	2.8	0	1.6	0.8
Standard value	2.5*	3.2	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* 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.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

2- HVAC 02 - FCU (AHU02) - Restaurant

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.1	2.8	0	1.52	0.82
Standard value	2.5*	3.2	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* 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.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

3- HVAC 01 - FCU (AHU01) - Kitchen

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.1	2.8	0	1.54	0.83
Standard value	2.5*	3.2	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* 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.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

"No HWS in project, or hot water is provided by HVAC system"

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		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
01-101	-	-	-	-	-	-	-	0.2	-	-	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
01-101	-	-	-	-	-	-	-	0.2	-	-	N/A
01-102	-	-	-	-	-	-	-	0.2	-	-	N/A
01-102	-	-	-	-	-	-	-	0.2	-	-	N/A
01-102	-	-	-	-	-	-	-	0.2	-	-	N/A
01-103	-	-	-	-	-	-	-	0.2	-	-	N/A
01-103	-	-	-	-	-	-	-	0.2	-	-	N/A
01-104	-	-	-	-	-	-	-	0.2	-	-	N/A
01-105	-	-	-	-	-	-	-	0.2	-	-	N/A
01-120	-	-	-	-	-	-	-	0.2	-	-	N/A
01-120	-	-	-	-	-	-	-	0.2	-	-	N/A
01-121	-	-	-	-	-	-	-	0.2	-	-	N/A
01-121	-	-	-	-	-	-	-	0.2	-	-	N/A
01-Circ 4	-	-	-	-	-	-	-	0.2	-	-	N/A
01-Circ 2	-	-	-	-	-	-	-	0.2	-	-	N/A
01-Circ 3	-	-	-	-	-	-	-	0.2	-	-	N/A
02-Lobby	-	-	-	-	-	-	-	0.2	-	-	N/A
02-204	-	-	-	-	-	-	-	0.2	-	-	N/A
02-201	-	-	-	-	-	-	-	0.2	-	-	N/A
02-201	-	-	-	-	-	-	-	0.2	-	-	N/A
02-202	-	-	-	-	-	-	-	0.2	-	-	N/A
02-202	-	-	-	-	-	-	-	0.2	-	-	N/A
02-202-Dormer	-	-	-	-	-	-	-	0.2	-	-	N/A
02-203	-	-	-	-	-	-	-	0.2	-	-	N/A
02-203	-	-	-	-	-	-	-	0.2	-	-	N/A
02-204	-	-	-	-	-	-	-	0.2	-	-	N/A
02-220	-	-	-	-	-	-	-	0.2	-	-	N/A
02-221	-	-	-	-	-	-	-	0.2	-	-	N/A
02-221	-	-	-	-	-	-	-	0.2	-	-	N/A
02-?	-	-	-	-	-	-	-	0.2	-	-	N/A
02-Circ 3	-	-	-	-	-	-	-	0.2	-	-	N/A
02-Circ 2	-	-	-	-	-	-	-	0.2	-	-	N/A
02-Circ 2	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-001	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-001	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-002	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-003	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-019	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-019	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-020	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-020	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-Circ 5	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-Circ 2	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-Circ 4	-	-	-	-	-	-	-	0.2	-	-	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
GF-Circ 3	-	-	-	-	-	-	-	0.2	-	-	N/A
LG-Restaurant/Bar	-	-	-	-	-	-	-	0.2	-	-	N/A
02-202	-	-	-	-	-	-	-	0.2	-	-	N/A
02-220	-	-	-	-	-	-	-	0.2	-	-	N/A
02-220 Dormer	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-004	-	-	-	-	-	-	-	0.2	-	-	N/A
01-105	-	-	-	-	-	-	-	0.2	-	-	N/A
LG-Kitchen	-	-	-	-	-	-	-	0.8	0.8	-	N/A
02-205	-	-	-	-	-	-	-	0.2	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
01-101	-	90	-	60
01-101	-	90	-	21
01-102	-	90	-	22
01-102	-	90	-	33
01-102	-	90	-	35
01-103	-	90	-	27
01-103	-	90	-	54
01-104	-	90	-	57
01-105	-	90	-	26
01-120	-	90	-	40
01-120	-	90	-	43
01-121	-	90	-	46
01-121	-	90	-	40
01-Circ 4	-	100	-	39
01-Circ 2	-	100	-	94
01-Circ 3	-	100	-	68
01-Stair 3	-	110	-	31
02-Lobby	-	100	-	55
02-204	-	90	-	27
02-201	-	90	-	13
02-201	-	90	-	48
02-202	-	90	-	20
02-202	-	90	-	33
02-202-Dormer	-	90	-	0
02-203	-	90	-	50
02-203	-	90	-	24
02-204	-	90	-	53
02-220	-	90	-	34
02-221	-	90	-	40
02-221	-	90	-	43

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
02-?	-	90	-	10
02-Circ 3	-	100	-	92
02-Circ 2	-	100	-	34
02-Circ 2	-	100	-	42
02-Stair 3	-	110	-	25
GF-001	-	90	-	47
GF-001	-	90	-	54
GF-002	-	90	-	74
GF-003	-	90	-	89
GF-019	-	90	-	43
GF-019	-	90	-	41
GF-020	-	90	-	41
GF-020	-	90	-	51
GF-Circ 5	-	100	-	73
GF-Circ 2	-	100	-	45
GF-Circ 4	-	100	-	51
GF-Circ 3	-	100	-	51
GF-Stair 3	-	110	-	38
LG-Restaurant/Bar	-	90	60	359
LG-BOH/Service Corridor	-	110	-	97
02-202	-	90	-	27
02-220	-	90	-	34
02-220 Dormer	-	90	-	0
GF-004	-	90	-	79
01-105	-	90	-	83
LG-Kitchen	-	100	-	747
02-205	-	90	-	77

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?
01-101	NO (-73.4%)	NO
01-101	NO (-54.9%)	NO
01-102	N/A	N/A
01-102	N/A	N/A
01-102	NO (-71.3%)	NO
01-103	NO (-50.5%)	NO
01-103	NO (-66%)	NO
01-104	NO (-73.5%)	NO
01-105	N/A	N/A
01-120	NO (-81.4%)	NO
01-120	NO (-79.5%)	NO
01-121	NO (-76.2%)	NO
01-121	NO (-73.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01-Circ 4	N/A	N/A
01-Circ 2	N/A	N/A
01-Circ 3	N/A	N/A
02-Lobby	N/A	N/A
02-204	N/A	N/A
02-201	NO (-73.7%)	NO
02-201	NO (-84.1%)	NO
02-202	N/A	N/A
02-202	NO (-87.8%)	NO
02-202-Dormer	NO (-91%)	NO
02-203	NO (-83.8%)	NO
02-203	NO (-74.7%)	NO
02-204	NO (-86.1%)	NO
02-220	NO (-91.2%)	NO
02-221	NO (-86.8%)	NO
02-221	NO (-88.5%)	NO
02-?	NO (-85.7%)	NO
02-Circ 3	N/A	N/A
02-Circ 2	N/A	N/A
02-Circ 2	N/A	N/A
GF-001	NO (-48.7%)	NO
GF-001	NO (-60.2%)	NO
GF-002	NO (-58%)	NO
GF-003	NO (-78.5%)	NO
GF-019	NO (-75.7%)	NO
GF-019	NO (-82.9%)	NO
GF-020	NO (-70.1%)	NO
GF-020	NO (-53.2%)	NO
GF-Circ 5	N/A	N/A
GF-Circ 2	N/A	N/A
GF-Circ 4	YES (+8.2%)	NO
GF-Circ 3	NO (-82.9%)	NO
LG-Restaurant/Bar	NO (-84.7%)	NO
02-202	NO (-91.3%)	NO
02-220	NO (-91.8%)	NO
02-220 Dormer	NO (-94.7%)	NO
GF-004	NO (-80.1%)	NO
01-105	NO (-85.1%)	NO
LG-Kitchen	NO (-88.7%)	NO
02-205	NO (-89.1%)	NO

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]	905.7	905.7
External area [m^2]	1384.5	1384.5
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	8	3
Average conductance [W/K]	724.87	765.83
Average U-value [W/m^2K]	0.52	0.55
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
	B8 Storage or Distribution
100	**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/m^2]

	Actual	Notional
Heating	13.19	11.27
Cooling	3.31	7.98
Auxiliary	42	37.91
Lighting	14.03	20.89
Hot water	73.18	73.76
Equipment*	43.05	43.05
TOTAL**	**145.71**	**151.81**

* 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/m^2]

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

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	227.88	212.62
Primary energy* [kWh/m^2]	409.15	423.81
Total emissions [kg/m^2]	69.3	71.4

* 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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	17.2	258.7	1.3	20.6	148.8	3.7	3.49	4.1	4.4
Notional	3	514.5	0.3	37.7	124.5	2.56	3.79	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	294.1	27.3	22.1	2.2	32.3	3.69	3.49	4.1	4.4
Notional	113.1	126.8	12.3	9.3	34.1	2.56	3.79	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	228.2	18	15.9	1.4	31.9	3.98	3.47	4.4	4.4
Notional	136.7	63	14.8	4.6	32.1	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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.13	LG00003C:Surf[10]
Floor	0.2	0.18	GF000011:Surf[8]
Roof	0.15	0.1	RM000016:Surf[0]
Windows, roof windows, and rooflights	1.5	1.3	01000012:Surf[2]
Personnel doors	1.5	1.4	GF00000A:Surf[2]
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

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = 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	8

Appendix H – BRUKL document, New Building Be Green.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Richmond Inn (Part L2A) Be Green

As designed

Date: Wed May 04 10:24:10 2022

Administrative information

Building Details

Address: 50-56 Sheen Rd, London, TW9 1UG

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: HL

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	63.1
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	63.1
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	59.3
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.13	0.13	LG000012:Surf[1]
Floor	0.25	0.1	0.1	LG000025:Surf[4]
Roof	0.25	0.1	0.1	RM00000F:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.3	1.3	LG000012:Surf[0]
Personnel doors	2.2	1	1	LG000000:Surf[2]
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

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* 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	2.5

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	0.9 to 0.95

1- HVAC 02 - FCU (MVHR)_GF/1F/2F

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.4	2.8	0	1.6	0.8
Standard value	2.5*	3.2	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* 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.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

2- HVAC 01 - FCU (MVHR)_LGF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.1	2.8	0	1.6	0.8
Standard value	2.5*	3.2	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* 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.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.41	0.003
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		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
01-106	-	-	-	-	-	-	-	0.2	-	-	N/A
01-107	-	-	-	-	-	-	-	0.2	-	-	N/A
01-108	-	-	-	-	-	-	-	0.2	-	-	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
01-109	-	-	-	-	-	-	-	0.2	-	-	N/A
01-110	-	-	-	-	-	-	-	0.2	-	-	N/A
01-111	-	-	-	-	-	-	-	0.2	-	-	N/A
01-112	-	-	-	-	-	-	-	0.2	-	-	N/A
01-113	-	-	-	-	-	-	-	0.2	-	-	N/A
01-114	-	-	-	-	-	-	-	0.2	-	-	N/A
01-115	-	-	-	-	-	-	-	0.2	-	-	N/A
01-116	-	-	-	-	-	-	-	0.2	-	-	N/A
01-117	-	-	-	-	-	-	-	0.2	-	-	N/A
01-118	-	-	-	-	-	-	-	0.2	-	-	N/A
01-119	-	-	-	-	-	-	-	0.2	-	-	N/A
01-Circ 1	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210-Dormer	-	-	-	-	-	-	-	0.2	-	-	N/A
02-210-Dormer	-	-	-	-	-	-	-	0.2	-	-	N/A
02-211	-	-	-	-	-	-	-	0.2	-	-	N/A
02-211-Dormer	-	-	-	-	-	-	-	0.2	-	-	N/A
02-212	-	-	-	-	-	-	-	0.2	-	-	N/A
02-212-Dormer	-	-	-	-	-	-	-	0.2	-	-	N/A
02-213	-	-	-	-	-	-	-	0.2	-	-	N/A
02-214	-	-	-	-	-	-	-	0.2	-	-	N/A
02-Circ 1	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-005	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-006	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-007	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-008	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-009	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-010	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-012	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-013	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-014	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-015	-	-	-	-	-	-	-	0.2	-	-	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
GF-016	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-017	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-018	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-Circ 1	-	-	-	-	-	-	-	0.2	-	-	N/A
GF-011	-	-	-	-	-	-	-	0.2	-	-	N/A
LG-Changing	-	-	-	-	-	-	-	0.2	-	-	N/A
LG-Lobby	-	-	-	-	-	-	-	0.2	-	-	N/A
LG-Office	-	-	-	-	-	-	-	0.2	-	-	N/A
LG-Physio	-	-	-	-	-	-	-	0.2	-	-	N/A
LG-Gym	-	-	-	-	-	-	-	0.2	-	-	N/A
LG-Pools	-	-	-	-	-	-	-	0.2	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
01-106	-	90	-	57
01-107	-	90	-	81
01-108	-	90	-	62
01-109	-	90	-	67
01-110	-	90	-	77
01-111	-	90	-	66
01-112	-	90	-	66
01-113	-	90	-	61
01-114	-	90	-	59
01-115	-	90	-	61
01-116	-	90	-	74
01-117	-	90	-	69
01-118	-	90	-	73
01-119	-	90	-	75
01-Circ 1	-	100	-	330
01-Linen	110	-	-	24
01-Stair 1	-	110	-	29
01-Stair 2	-	110	-	32
02-210	-	90	-	27
02-210	-	90	-	76
02-210	-	90	-	63
02-Stair 2	-	110	-	30
02-210	-	90	-	65
02-210	-	90	-	72
02-210	-	90	-	78
02-210	-	90	-	41
02-210	-	90	-	69
02-210	-	90	-	67

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
02-210	-	90	-	71
02-210	-	90	-	64
02-210	-	90	-	78
02-210-Dormer	-	90	-	0
02-210-Dormer	-	90	-	0
02-211	-	90	-	64
02-211-Dormer	-	90	-	0
02-212	-	90	-	63
02-212-Dormer	-	90	-	0
02-213	-	90	-	62
02-214	-	90	-	59
02-Circ 1	-	100	-	339
02-Stair 1	-	110	-	29
GF-005	-	90	-	61
GF-006	-	90	-	73
GF-007	-	90	-	69
GF-008	-	90	-	67
GF-009	-	90	-	71
GF-010	-	90	-	55
GF-012	-	90	-	81
GF-013	-	90	-	59
GF-014	-	90	-	61
GF-015	-	90	-	81
GF-016	-	90	-	64
GF-017	-	90	-	78
GF-018	-	90	-	76
GF-Circ 1	-	100	-	331
GF-Linen	110	-	-	15
GF-011	-	90	-	64
GF-Stair 2	-	110	-	32
GF-Stair 1	-	110	-	29
LG-Bike Store	110	-	-	29
LG-Bin Store	110	-	-	12
LG-Changing	-	100	-	64
LG-Lobby	-	100	60	615
LG-Office	110	-	-	108
LG-Physio	-	110	-	309
LG-Stair 1	-	110	-	22
LG-Stair 2	-	110	-	24
LG-Store	110	-	-	17
LG-Gym	-	110	-	240
LG-Pools	-	110	-	268

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?
01-106	NO (-74.5%)	NO
01-107	NO (-75.8%)	NO
01-108	NO (-68.3%)	NO
01-109	NO (-80.2%)	NO
01-110	NO (-78.9%)	NO
01-111	NO (-79.2%)	NO
01-112	NO (-79.7%)	NO
01-113	NO (-85.6%)	NO
01-114	NO (-81.7%)	NO
01-115	NO (-69.4%)	NO
01-116	NO (-74.2%)	NO
01-117	NO (-68.9%)	NO
01-118	NO (-65.7%)	NO
01-119	NO (-67.8%)	NO
01-Circ 1	NO (-75.7%)	NO
02-210	N/A	N/A
02-210	NO (-64.5%)	NO
02-210	NO (-65.7%)	NO
02-210	NO (-84.9%)	NO
02-210	NO (-68%)	NO
02-210	NO (-61.1%)	NO
02-210	N/A	N/A
02-210	NO (-83.4%)	NO
02-210	NO (-74.7%)	NO
02-210	NO (-75.5%)	NO
02-210	NO (-59.9%)	NO
02-210	NO (-74%)	NO
02-210-Dormer	NO (-91.2%)	NO
02-210-Dormer	NO (-90.8%)	NO
02-211	NO (-83.9%)	NO
02-211-Dormer	NO (-90.8%)	NO
02-212	NO (-84.2%)	NO
02-212-Dormer	NO (-90.8%)	NO
02-213	NO (-85.9%)	NO
02-214	NO (-80.5%)	NO
02-Circ 1	NO (-76.6%)	NO
GF-005	NO (-59.2%)	NO
GF-006	NO (-65.7%)	NO
GF-007	NO (-64.4%)	NO
GF-008	NO (-63.8%)	NO
GF-009	NO (-68.7%)	NO
GF-010	NO (-83.7%)	NO
GF-012	NO (-76.3%)	NO
GF-013	NO (-84.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF-014	NO (-74.7%)	NO
GF-015	NO (-79.6%)	NO
GF-016	NO (-71.2%)	NO
GF-017	NO (-72.3%)	NO
GF-018	NO (-72%)	NO
GF-Circ 1	NO (-77.1%)	NO
GF-011	NO (-72.5%)	NO
LG-Changing	N/A	N/A
LG-Lobby	NO (-63.1%)	NO
LG-Office	NO (-81.4%)	NO
LG-Physio	NO (-79.9%)	NO
LG-Gym	NO (-73.9%)	NO
LG-Pools	NO (-76.2%)	NO

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]	1754.5	1754.5
External area [m^2]	2106.8	2106.8
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	533.9	1097.77
Average U-value [W/m^2K]	0.25	0.52
Alpha value* [%]	10.02	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
	B8 Storage or Distribution
96	**C1 Hotels**
4	**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/m^2]

	Actual	Notional
Heating	4.91	11.69
Cooling	2.15	3.43
Auxiliary	29.56	27.31
Lighting	9.07	13.16
Hot water	81.76	80.84
Equipment*	16.68	16.68
TOTAL**	**127.45**	**136.42**

* 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/m^2]

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

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	95.46	154.41
Primary energy* [kWh/m^2]	349.69	374.82
Total emissions [kg/m^2]	59.3	63.1

* 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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	126.2	68.8	9.4	5.5	36.5	3.71	3.47	4.1	4.4
	Notional	144.8	86.9	15.7	6.4	35.7	2.56	3.79	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	62.2	18.9	4.3	1.5	30.5	3.98	3.47	4.4	4.4
	Notional	112.6	42.2	12.2	3.1	28.8	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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.13	LG000012:Surf[1]
Floor	0.2	0.1	LG000025:Surf[4]
Roof	0.15	0.1	RM00000F:Surf[0]
Windows, roof windows, and rooflights	1.5	1.3	LG000012:Surf[0]
Personnel doors	1.5	1	LG000000:Surf[2]
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

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = 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	2.5

Appendix I – GLA Carbon Emission Reporting Spreadsheet SAP 10.

Baseline

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Building Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated TER 2012 (kgCO2 / m2)	VALIDATION CHECK: BRUKL TER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION BY END USE (kWh/m^2 p.a.) TER - SOURCE: BRUKL OUTPUT: Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water	Lighting	Auxiliary	Cooling	REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) TER - SOURCE: BRUKL.INP or *SIM.CSV FILE: Natural Gas	Grid Electricity		2012 CO2 emissions (kgCO2 p.a.)	REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) - TER BRUKL: Natural Gas	Grid Electricity		REGULATED CO2 EMISSIONS: SAP10 CO2 emissions (kgCO2 p.a.)	BRUKL TER SAP10 (kgCO2 / m2)
													##########	##########			##########	##########			
Refurb Building	*865.87*	*1*	*865.87*	**186.9**	**186.9**	*346.975*	*Natural Gas*	*313.063*	*Natural Gas*	*32.6785*	*52.7897*	*0*	**660**	**85**		**161,850**	**660**	**85**		**137,257**	**158.5**
New Building	*1832.37*	*1*	*1832.37*	**73.0**	**73.0**	*34.6842*	*Natural Gas*	*200.424*	*Natural Gas*	*13.1613*	*27.3067*	*3.42828*	**235**	**43**		**133,795**	**235**	**43**		**108,759**	**59.4**

Be Lean

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Building Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated BER 2012 (kgCO2 / m2)	VALIDATION CHECK: BRUKL BER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION BY END USE (kWh/m^2 p.a.) 'BE LEAN' BER - SOURCE: BRUKL OUTPUT: Space Heating (kWh/m^2 p.a.)	Fuel type Space Heating	Domestic Hot Water (kWh/m^2 p.a.)	Fuel type Domestic Hot Water	Lighting (kWh/m^2 p.a.)	Auxiliary (kWh/m^2 p.a.)	Cooling (kWh/m^2 p.a.)	LATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) 'BE LEAN' BER - SOURCE: BRUKL.INP or *SIM.CSV: Natural Gas	Grid Electricity		2012 CO2 emissions (kgCO2 p.a.)	REGULATED CO2 EMISSIONS PER UNIT: Natural Gas	Grid Electricity		SAP10 CO2 emissions (kgCO2 p.a.)	BRUKL BER SAP10 (kgCO2 / m2)
													##########	##########			##########	##########			
Refurb Building	*865.87*	*1*	*865.87*	**85.9**	**85.9**	*62.8918*	*Grid Electricity*	*193.495*	*Grid Electricity*	*14.0343*	*41.9979*	*3.31254*	**256**	**59**		**74,355**	**256**	**59**		**58,473**	**67.5**
New Building	*1832.37*	*1*	*1832.37*	**72.6**	**72.6**	*23.1317*	*Grid Electricity*	*216.185*	*Grid Electricity*	*9.06604*	*29.561*	*2.14923*	**239**	**40**		**133,113**	**239**	**40**		**109,327**	**59.7**

Be Green

NON-DOMESTIC ENERGY CONSUMPTION AND CO_2 ANALYSIS

Use	Area per unit (m^2)	Number of units	Total area represented by model (m^2)	VALIDATION CHECK: Calculated BER 2012 (kgCO2 / m2)	VALIDATION CHECK: BRUKL BER 2012 (kgCO2 / m2)	REGULATED ENERGY CONSUMPTION BY END USE (kWh/m^2 p.a.) 'BE GREEN' BER - SOURCE: BRUKL OUTPUT: Space Heating	Fuel type Space Heating	Domestic Hot Water	Fuel type Domestic Hot Water
Refurb Building	*865.87*	*1*	*865.87*	**69.3**	**69.3**	*13.186*	*Grid Electricity*	*73.1804*	*Grid Electricity*
New Building	*1832.37*	*1*	*1832.37*	**59.3**	**59.3**	*4.91098*	*Grid Electricity*	*81.7639*	*Grid Electricity*

Electricity generated by CHP (-)	Electricity generated by renewable technology (-)	Lighting	Auxiliary	Cooling	REGULATED ENERGY CONSUMPTION BY FUEL TYPE (kWh/m^2 p.a.) 'BE GREEN' BER - SOURCE: BRUKL.INP or *SIM.CSV FILE: Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-)	Electricity generated by renewable technology (-)	SAP 10.1 Gas	SAP 10.1 Electricity	Enter Carbon Factor 3	2012 CO2 emissions (kgCO2 p.a.)	REGULATED CO2 EMISSIONS PER UNIT: Natural Gas	Grid Electricity	Bespoke DH Factor	Electricity generated by CHP (-)	Electricity generated by renewable technology (-)	SAP 10.1 Gas	SAP 10.1 Electricity	Enter Carbon Factor 3	SAP10 CO2 emissions	BRUKL BER SAP10 (kgCO2 / m2)
if applicable	if applicable				##########	##########	##########	*if applicable*	if applicable	##########	##########	##########		##########	##########	##########	if applicable	if applicable	##########	##########	##########		
0	*0*	*14.0343*	*41.9979*	*3.31254*	**19**	**126**							**59,991**	**19**	**126**							**28,746**	**33.2**
0	*0*	*9.06604*	*29.561*	*2.14923*	**21**	**106**							**108,693**	**21**	**106**							**53,086**	**29.0**

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