BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

LEAN Greville Street Offices

As built

Date: Tue Oct 04 10:21:20 2022

Administrative information

Building Details

Address: Offices, 20-23 Greville Street, London, EC1N 8SS

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.4"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.4

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

Certifier details

Name: Audley Franklin

Telephone number: 07939171969

Address: 20 - 22 Wenlock Road, London, N1 7GU

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	22.2
Target CO_2 emission rate (TER), kgCO_2/m^2.annum	22.2
Building CO_2 emission rate (BER), kgCO_2/m^2.annum	14.6
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	0.5	0.54	External Wall
Floor	0.25	0.16	0.55	Exposed Floor
Roof	0.25	0.19	0.23	Roof
Windows***, roof windows, and rooflights	2.2	1.06	1.07	New Window 2-3 (1)
Personnel doors	2.2	2.1	2.1	Door
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

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

* There might be more than one surface where the maximum U-value occurs.
** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
*** Display windows and similar glazing are excluded from the U-value check.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m^3/(h.m^2) at 50 Pa	10	5.8

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	YES
Whole building electric power factor achieved by power factor correction	0.9 to 0.95

1- Cooling (B1 0 2 Telecoms)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	4.36	-	-	0.9
Standard value	N/A	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

2- Cooling (00 0 6 Reception)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	2.87	-	-	0.9
Standard value	0.91*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

3- EF-02 (28 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

4- NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

5- EF-01 (B1 0 8 Bin Store)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

6- AHU 2 (12 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3.28	-	1.7	0.87
Standard value	0.91*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

7- AHU 1 (B1 0 1 B1C Unit)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	4.36	-	-	0.9
Standard value	0.91*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

8- MVHR 4 (8 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	2.87	-	-	0.85
Standard value	0.91*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

9- MVHR 3 (7 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	2.87	-	1.1	0.85
Standard value	0.91*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

10- MVHR 2 (6 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	2.87	-	1.1	0.85
Standard value	0.91*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

1- New HWS Circuit

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.91	0
Standard value	0.9*	N/A
* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.		

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
B1 0 1 B1C Unit	-	-	-	0.8	-	-	-	0.2	-	-	N/A
B1 0 2 Telecoms	-	-	-	0.8	-	-	-	0.2	-	-	N/A
B1 0 4 Shower	-	-	0.3	-	-	-	-	-	-	-	N/A
B1 0 5 Shower	-	-	0.3	-	-	-	-	-	-	-	N/A
B1 0 6 Accessible WC	-	-	0.3	-	-	-	-	-	-	-	N/A
B1 0 8 Bin Store	-	-	0.5	-	-	-	-	-	-	-	N/A
00 0 6 Reception	-	-	-	0.8	-	-	-	0.2	-	-	N/A
00 0 13 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
00 0 14 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
00 0 15 Accessible WC	-	-	0.3	-	-	-	-	-	-	-	N/A
01 0 9 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
01 0 10 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
01 0 11 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
01 0 12 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
02 0 1 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
02 0 2 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
02 0 3 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
02 0 4 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
02 0 5 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
02 0 6 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
02 0 9 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
02 0 10 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
02 0 11 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
02 0 12 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
03 0 1 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
03 0 2 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
03 0 3 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
03 0 4 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
03 0 5 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
03 0 6 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
03 0 7 B1 Unit	-	-	-	1.1	-	-	-	0.2	-	-	N/A
03 0 10 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
03 0 11 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
03 0 12 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
03 0 13 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
04 0 1 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
04 0 2 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
04 0 3 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
04 0 4 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
04 0 5 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
04 0 6 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
04 0 7 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
04 0 8 B1 Unit	-	-	-	1.7	-	-	-	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
04 0 11 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
04 0 12 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
04 0 13 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
04 0 14 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
05 0 1 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
05 0 2 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
05 0 3 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
05 0 4 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
05 0 5 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
05 0 6 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
05 0 7 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
05 0 10 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
05 0 11 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
05 0 12 Accessible WC	-	-	0.3	-	-	-	-	-	-	-	N/A
06 0 1 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
06 0 2 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
06 0 3 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
06 0 4 B1 Unit	-	-	-	1.7	-	-	-	0.2	-	-	N/A
06 0 9 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
06 0 10 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
06 0 11 Accessible WC	-	-	0.3	-	-	-	-	-	-	-	N/A
06 0 5 B1 Unit	-	-	-	1.7	-	-	-	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	
B1 0 1 B1C Unit	144	-	-	468
B1 0 2 Telecoms	-	-	-	99
B1 0 4 Shower	-	86	-	14
B1 0 5 Shower	-	86	-	14
B1 0 6 Accessible WC	-	86	-	34
B1 0 7 Bicycle Store	137	-	-	33
B1 0 8 Bin Store	137	-	-	12
B1 0 10 Lift Lobby	-	104	-	23
B1 0 11 Stairs	-	104	-	125
B1 0 12 Stairs Lobby	-	104	-	10
B1 0 13 Circulation	-	104	-	10
00 0 6 Reception	-	144	144	178
00 0 7 Reception Stairs	-	104	-	118
00 0 9 Bicycle/Bin Circulation	-	104	-	30
00 0 10 Substation	-	-	-	147
00 0 12 Entrance	-	104	-	61
00 0 13 WC	-	86	-	28

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
00 0 14 WC	-	86	-	28
00 0 15 Accessible WC	-	86	-	38
00 0 16 WC Circulation	-	104	-	14
01 0 9 WC	-	86	-	27
01 0 10 WC	-	86	-	27
01 0 11 WC	-	86	-	25
01 0 12 WC	-	86	-	27
01 0 13 WC Circulation	-	104	-	14
02 0 1 B1 Unit	144	-	-	344
02 0 2 B1 Unit	144	-	-	312
02 0 3 B1 Unit	144	-	-	421
02 0 4 B1 Unit	144	-	-	418
02 0 5 B1 Unit	144	-	-	207
02 0 6 B1 Unit	144	-	-	332
02 0 9 WC	-	86	-	27
02 0 10 WC	-	86	-	27
02 0 11 WC	-	86	-	25
02 0 12 WC	-	86	-	27
02 0 13 WC Circulation	-	104	-	14
03 0 1 B1 Unit	144	-	-	153
03 0 2 B1 Unit	144	-	-	193
03 0 3 B1 Unit	144	-	-	312
03 0 4 B1 Unit	144	-	-	421
03 0 5 B1 Unit	144	-	-	418
03 0 6 B1 Unit	144	-	-	207
03 0 7 B1 Unit	144	-	-	332
03 0 10 WC	-	86	-	27
03 0 11 WC	-	86	-	27
03 0 12 WC	-	86	-	25
03 0 13 WC	-	86	-	27
03 0 14 WC Circulation	-	104	-	14
04 0 1 B1 Unit	144	-	-	153
04 0 2 B1 Unit	144	-	-	193
04 0 3 B1 Unit	144	-	-	222
04 0 4 B1 Unit	144	-	-	63
04 0 5 B1 Unit	144	-	-	421
04 0 6 B1 Unit	144	-	-	418
04 0 7 B1 Unit	144	-	-	207
04 0 8 B1 Unit	144	-	-	332
04 0 11 WC	-	86	-	27
04 0 12 WC	-	86	-	27
04 0 13 WC	-	86	-	25
04 0 14 WC	-	86	-	27

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
04 0 15 WC Circulation	-	104	-	14
05 0 1 B1 Unit	144	-	-	92
05 0 2 B1 Unit	144	-	-	198
05 0 3 B1 Unit	144	-	-	270
05 0 4 B1 Unit	144	-	-	186
05 0 5 B1 Unit	144	-	-	254
05 0 6 B1 Unit	144	-	-	287
05 0 7 B1 Unit	144	-	-	283
05 0 10 WC	-	86	-	27
05 0 11 WC	-	86	-	28
05 0 12 Accessible WC	-	86	-	36
05 0 13 WC Circulation	-	104	-	15
05 0 14 Store	137	-	-	6
06 0 1 B1 Unit	144	-	-	127
06 0 2 B1 Unit	144	-	-	129
06 0 3 B1 Unit	144	-	-	198
06 0 4 B1 Unit	144	-	-	121
06 0 9 WC	-	86	-	27
06 0 10 WC	-	86	-	27
06 0 11 Accessible WC	-	86	-	32
06 0 12 WC Circulation	-	104	-	14
06 0 5 B1 Unit	144	-	-	73

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?
B1 0 1 B1C Unit	N/A	N/A
B1 0 2 Telecoms	N/A	N/A
00 0 6 Reception	NO (-58%)	NO
02 0 1 B1 Unit	NO (-87%)	NO
02 0 2 B1 Unit	NO (-56%)	NO
02 0 3 B1 Unit	NO (-5%)	NO
02 0 4 B1 Unit	NO (-70%)	NO
02 0 5 B1 Unit	NO (-74%)	NO
02 0 6 B1 Unit	NO (-74%)	NO
03 0 1 B1 Unit	NO (-87%)	NO
03 0 2 B1 Unit	NO (-88%)	NO
03 0 3 B1 Unit	NO (-55%)	NO
03 0 4 B1 Unit	NO (-11%)	NO
03 0 5 B1 Unit	NO (-71%)	NO
03 0 6 B1 Unit	NO (-74%)	NO
03 0 7 B1 Unit	NO (-74%)	NO
04 0 1 B1 Unit	NO (-87%)	NO
04 0 2 B1 Unit	NO (-89%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
04 0 3 B1 Unit	NO (-55%)	NO
04 0 4 B1 Unit	NO (-36%)	NO
04 0 5 B1 Unit	NO (-20%)	NO
04 0 6 B1 Unit	NO (-72%)	NO
04 0 7 B1 Unit	NO (-74%)	NO
04 0 8 B1 Unit	NO (-74%)	NO
05 0 1 B1 Unit	NO (-95%)	NO
05 0 2 B1 Unit	NO (-22%)	NO
05 0 3 B1 Unit	NO (-35%)	NO
05 0 4 B1 Unit	NO (-81%)	NO
05 0 5 B1 Unit	NO (-11%)	NO
05 0 6 B1 Unit	NO (-66%)	NO
05 0 7 B1 Unit	NO (-72%)	NO
06 0 1 B1 Unit	NO (-88%)	NO
06 0 2 B1 Unit	NO (-82%)	NO
06 0 3 B1 Unit	NO (-51%)	NO
06 0 4 B1 Unit	NO (-88%)	NO
06 0 5 B1 Unit	NO (-81%)	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]	2331	2331
External area [m^2]	3326	3326
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	6	3
Average conductance [W/K]	1545	1448
Average U-value [W/m^2K]	0.46	0.44
Alpha value* [%]	14.29	14.29

* 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
99	**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
1	**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	8.79	5.29
Cooling	6.61	9.26
Auxiliary	7.03	8.01
Lighting	8.44	21.66
Hot water	6.48	6.35
Equipment*	38.86	38.86
TOTAL**	**37.34**	**50.59**

* 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]	104.76	142.74
Primary energy* [kWh/m^2]	85.72	130.76
Total emissions [kg/m^2]	14.6	22.2

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	85.3	221.5	27.4	16.2	9.5	0.86	3.8	0.91	3.8
	Notional	33	273.5	11.2	21.1	16.5	0.82	3.6	----	----
[ST] Central heating using air distribution, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	60.7	0	19.5	0	6.6	0.86	0	0.91	0
	Notional	37.5	0	12.7	0	12.4	0.82	0	----	----
[ST] Other local room heater - unfanned, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	196.1	0	63	0	0	0.86	0	0.91	0
	Notional	102.8	0	34.9	0	0	0.82	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	82.2	0	26.4	0	12.7	0.86	0	0.91	0
	Notional	53.1	0	18	0	15.1	0.82	0	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	17.8	90.3	5.7	7.7	10.3	0.86	3.28	0.91	3.28
	Notional	13.5	145.9	4.6	11.3	9.3	0.82	3.6	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	5.8	2.4	1.9	0.2	2.2	0.86	4.36	0.91	4.36
	Notional	3.4	3.9	1.2	0.3	3.6	0.82	3.6	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	12.7	90	4.1	8.7	9.5	0.86	2.87	0.91	2.87
	Notional	7.7	156.7	2.6	12.1	9.2	0.82	3.6	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	13	91.2	4.2	8.8	7.2	0.86	2.87	0.91	2.87
	Notional	7.4	159.9	2.5	12.3	9.3	0.82	3.6	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	16.4	83.9	5.3	8.1	7.2	0.86	2.87	0.91	2.87
	Notional	9.4	144.1	3.2	11.1	9.3	0.82	3.6	----	----

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	0.23	CLT M (1)
Floor	0.2	0.15	Ground Floor
Roof	0.15	0.11	Roof (1)
Windows, roof windows, and rooflights	1.5	1.03	Rooflight
Personnel doors	1.5	2.1	Door
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project

$U_{i\text{-}Typ}$ = 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	5.8