RED

Equinix DB8, Dublin, Ireland

Energy Statement & Part L Compliance Report

Client	Equinix Profile Park Grangecastle Dublin
Date	23 June 2021
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Revision

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Project Description

Equinix (Ireland) Ltd. intend to apply for permission for development at this site of c.2.65ha on lands known as Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (the site is bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue). The development will consist of the following:

- Construction of a 3 storey (part 4 storey) data centre known as "DB8" to include data halls, electrical/plant rooms, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level. The total gross floor area excluding hot air plenums and external staircase is c.9,601sqm. The overall height of the data centre ranges from c.16m to c.20m to roof level and c.20m to c.24m including roof top plant, flues and lift overrun
- Provision of 5 no. external generators, 8 no. fuel tanks and ancillary plant contained within a plant yard to the north of DB8
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8
- Provision of a sprinkler pump room (c.23sqm), 2 no. sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm). Total floor area of ancillary structures and plant (c.303sqm)
- Provision of a delivery yard and loading bays, 64 no. car parking spaces, 5 no. motorcycle spaces, bicycle shelter serving 14 no. spaces, smoke shelter, internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of an existing vehicular entrance from Falcon Avenue
- All associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing
- No buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site
- The area to the southwest of the site is reserved for a future data centre, subject of a separate application to South Dublin County Council
- This application is accompanied by a Natura Impact Statement

Executive Summary

This report outlines regulated and unregulated energy usage of the proposed new build **Equinix DB8** in **Dublin**. A regulated energy assessment is provided pursuant to the requirements regarding conservation of fuel and energy laid out in Part L of the Building Regulations 2017 (S.I. No 538 of 2017). The calculations in this report are based on IES VE software, calculation engine version **7.0.13.**

As a new non-domestic building, compliance shall be demonstrated against Part L of the Building Regulations.

The results of our assessment predict the following:

- The Energy Performance Coefficient (EPC) was calculated as **0.88**. The calculated EPC of the building was found to be less than the Maximum Permitted Energy Performance Coefficient (MPEPC). The MPEPC is **1.0**.
- The Carbon Performance Coefficient (CPC) was calculated as **0.88**. The calculated CPC being less than the Maximum Permitted Carbon Performance Coefficient (MPCPC). The MPCPC is **1.15**.
- The Renewable Energy Ratio (RER) was calculated as **0.1**, which is considered a significant level energy provision from renewable energy technologies. This target is achieved through use of **heat pumps** and **photo-voltaic panels.**

The primary unregulated energy use in the development consists of the IT server loads and the associated mechanical and electrical systems. An overview of these systems is outlined in the report.

Contents

1.0 Introduction

This report provides a detailed assessment of the energy performance of the proposed new build **Equinix DB8 in Dublin**, pursuant to the requirements of Part L of the Building Regulations 2017 of Ireland.

Additional information is provided on the unregulated energy use in the development and the associated mechanical and electrical systems.

This section of the report introduces the regulatory background and its requirements with respect to Part L assessment.

Section 2 presents and comments upon the Part L assessment results in detail with respect to the relevant regulatory criteria.

Section 3 notes the approved[1] modelling software used to undertake the Part L assessment and introduces the standard output documentation which includes a preliminary version of the 'BRIRL Output Document'[2].

Section 4 presents information of the unregulated energy usage as well as additional information on the mechanical and electrical systems in the data centre design.

Section 5 presents information on additional compliance of recognised industry standards in relation to data centres.

Appendix A provides detailed information pertaining to modelling assumptions, input data and methodology for the Part L assessment.

Appendix B provides 3D views of the modelled building in IES VE software.

Appendix C shows preliminary BRIRL output document.

[1] All software used to undertake Part L assessments must be formally approved

[2] The BRIRL Output Document provides a prediction of building annual energy performance.

1.1 Building Regulations Part L

Part L requires that a building shall be designed and constructed to ensure that the energy performance of the building is such as to limit the amount of energy required for the operation of the building and the amount of Carbon Dioxide (CO_2) emissions associated with this energy use insofar as is reasonably practicable.

New Buildings:

For new buildings other than dwellings, the requirements shall be met by:

a) providing that the energy performance of the building is such as to limit the calculated primary energy consumption and related Carbon Dioxide (CO_2) emissions to a Nearly Zero Energy Building level insofar as is reasonably practicable, when both energy consumption and Carbon Dioxide emissions are calculated using the Non-domestic Energy Assessment Procedure (NEAP) published by Sustainable Energy Authority of Ireland;

b) providing that, the nearly zero or very low amount of energy required is covered to a very significant extent by energy from renewable sources produced on-site or nearby;

c) limiting the heat loss and, where appropriate, availing of the heat gains through the fabric of the building;

d) providing and commissioning energy efficient space heating and cooling systems, heating and cooling equipment, water heating systems, and ventilation systems, with effective controls;

e) ensuring that the building is appropriately designed to limit need for cooling and, where air-conditioning or mechanical ventilation is installed, that installed systems are energy efficient, appropriately sized and adequately controlled;

f) limiting the heat loss from pipes, ducts and vessels used for the transport or storage of heated water or air;

g) limiting the heat gains by chilled water and refrigerant vessels, and by pipes and ducts that serve air conditioning systems;

h) providing energy efficient artificial lighting systems and adequate control of these systems; and

i) providing to the building owner or occupants sufficient information about the building, the fixed building services, controls and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable.

Whole building performance: Primary energy consumption and related CO_2 emissions: providing that the calculated primary energy consumption associated with the operation of the building and the related CO2 emissions when calculated using the Non-domestic Energy Assessment Procedure (NEAP) published by the Sustainable Energy Authority of Ireland do not exceed a target value specified in this document.

2.0 Assessment Results

2.1 Part L

A building shall be designed and constructed to ensure that the energy performance of the building is such as to limit the amount of energy required for the operation of the building and the amount of Carbon Dioxide (CO_2) emissions associated with this energy use insofar as is reasonably practicable.

2.1.1 Carbon Dioxide (CO_2) emissions

Primary energy consumption and CO2 emissions for both the proposed building and the reference building were calculated using NEAP.

The calculated primary energy consumption of the proposed building was divided by the reference building, to calculate the energy performance coefficient (EPC) of the proposed building.
EPC = 0.88

An acceptable Primary Energy consumption rate has been achieved due to the calculated EPC of the building being less than the Maximum Permitted Energy Performance Coefficient (MPEPC). The MPEPC is 1.0.

The calculated CO_2 emission rate of the proposed building was divided by that of the reference building, to calculate the carbon performance coefficient (CPC) of the proposed building. The CPC is 0.88

An acceptable CO_2 emission rate has been achieved due to the calculated CPC being less than the Maximum Permitted Carbon Performance Coefficient (MPCPC). The MPCPC is 1.15

2.1.2 Renewable Energy Technologies

Renewable Energy Ratio (RER) is the ratio of the primary energy from renewable energy sources to total primary energy as defined and calculated in NEAP.

- Where the MPEPC Maximum Permitted Energy Performance Coefficient (MPEPC) of 1.0 and Maximum Permitted Carbon Performance Coefficient (MPCPC) of 1.15 is achieved an RER of 0.20 represents a very significant level of energy provision from renewable energy technologies.

- Where an energy performance coefficient (EPC) of 0.9 and a carbon performance coefficient (CPC) of 1.04 is achieved an RER of 0.10 represents a very significant level of energy provision from renewable energy technologies.

$$if\ EPC \leq 0.9\ and\ CPC \leq 1.04$$
$$then\ RER \geq 0.1$$
$$else\ RER \geq 0.2$$

Renewable technologies comprising heat pumps and photovoltaics (200m^2) were considered and the RER was calculated. RER = 0.1

Due to the criteria above, the RER of 0.1 is considered a significant level energy provision from renewable energy technologies.

2.1.3 Limiting Heat Loss and Gains

Guidance was followed on four main issues: -

1. insulation levels

2. thermal bridging
3. limitation of air permeability
4. limiting the effects of solar gain and overheating

The building fabric is specified in Appendix A, these values comply with the requirements in Table 1 Maximum elemental U-value.

2.1.4 Energy Efficient Systems

Energy efficiency standards for heat generator boiler systems are provided in Tables 2-6 in the Part L 2017 Guidance.

- *Table 2 Minimum energy efficiency standards for boiler systems*
- *Table 3 Minimum controls packages for new boilers and multiple boiler systems*
- *Table 4 Minimum controls packages for new heat pump systems*
- *Table 5 Minimum controls packages for new primary and secondary electric heating systems other than electric boilers*
- *Table 6 Maximum specific fan power in air distribution systems*

Heat pumps (electric) were selected for heat generation with a CoP of 4.5 and an SEER of 4.2 with Local time and temperature controls meeting the requirements set out above.

2.1.5 Limiting Heat Loss and Gains

Provision of insulation to pipes, ducts and storage vessels, will be in accordance with the standards specified in BS 5422: 2009, which adequately limit heat loss or heat gain, as appropriate. The appropriate insulation level for storage vessels are taken as that given in BS 5422: 2009 for flat surfaces.

2.1.6 Efficient Lighting

Table 8 Lighting Efficacy with controls in new buildings states the minimum requirements for lighting installations in new buildings. **Appendix A** sets out the performance of the proposed lighting systems used for **Equinix DB8**.

An initial luminaire lumens/circuit watt of 60 was used for the notional building. The final values used are tabulated in Appendix A.

2.1.7 Limiting the effects of Solar Gains in Summer

Buildings should be designed and constructed so that:

a) Those occupied spaces that rely on natural ventilation do not risk unacceptable levels of thermal discomfort due to overheating caused by solar gain, and
b) Those spaces that incorporate mechanical ventilation or cooling do not require excessive plant capacity to maintain the desired space conditions.

The building complies with the Limiting the effects of Solar Gains criteria.

3.0 Assessment Software and Output Documentation

3.1 Part L

Non-domestic building energy calculation software packages to calculate building asset rating must be approved by the Sustainable Energy Authority of Ireland (SEAI) before they could be available for commercial use in the Republic of Ireland.

The document outlines details of the approval scheme and elaborates on the validation procedure necessary to achieve approval from SEAI. Relevant to the following non-domestic software classification:

- Interface for SBEMie

The Part L assessment upon which this report is based has been produced using IES VE software, calculation engine version **7.0.13.**

IES VE produces the following key Part L output document which is included within this report:

- BRIRL Output Document

Note that the Compliance Report included in this report does not constitute final evidence of compliance with Building Regulations Part L since it is not based upon as-built data.

4.0 Unregulated Energy Use

4.1 Regulated and Unregulated Loads

Energy consumption can be split into regulated and unregulated energy as follows.

4.1.1 Regulated Energy

Regulated energy refers to building energy consumption resulting from the operation of controlled, fixed building services and fittings, including space heating and cooling, hot water, ventilation, fans, pumps and lighting. Regulated Energy is assessed under Building Regulations Part L and is described in the previous sections of this report.

4.1.2 Unregulated Energy

Unregulated energy is building energy consumption resulting from a system or process that is not 'controlled' i.e., energy consumption from systems in the building on which the Building Regulations do not impose a requirement. For example, this may include energy consumption from systems integral to the building and its operation, e.g., IT equipment, lifts, escalators, refrigeration systems, external lighting, ducted-fume cupboards, servers, printers, photocopiers, laptops, cooking, audio-visual equipment and other appliances. In the case of data centres, both the IT load and the associated cooling load are unregulated. The most common metric for assessing unregulated energy consumption for datacentres is Power Usage Effectiveness (PUE).

$$\mathbf{PUE} = \frac{\mathbf{Total\ Energy\ Consumption}}{\mathbf{IT\ Equipment\ Energy\ Consumption}}$$

All systems in the development will be selected to reduce the PUE figure as much as is practical and therefore reduce energy consumption.

The main mechanical and electrical unregulated loads are described in the following sections.

4.2 Mechanical Design Elements

4.2.1 IT Cooling Equipment

The primary supporting load for the data centre is for the IT cooling system which is the major unregulated process load. The data centre cooling system design has been selected and optimised to provide a high

performing cooling solution appropriate to the site and local climatic conditions. The IT cooling system is a water-cooled system which cools water via free cooling air cooled chillers. From the chillers water is circulated into data hall fan arrays which distribute cooled recirculated air back into the data hall. The configuration is shown in figure 1 below.

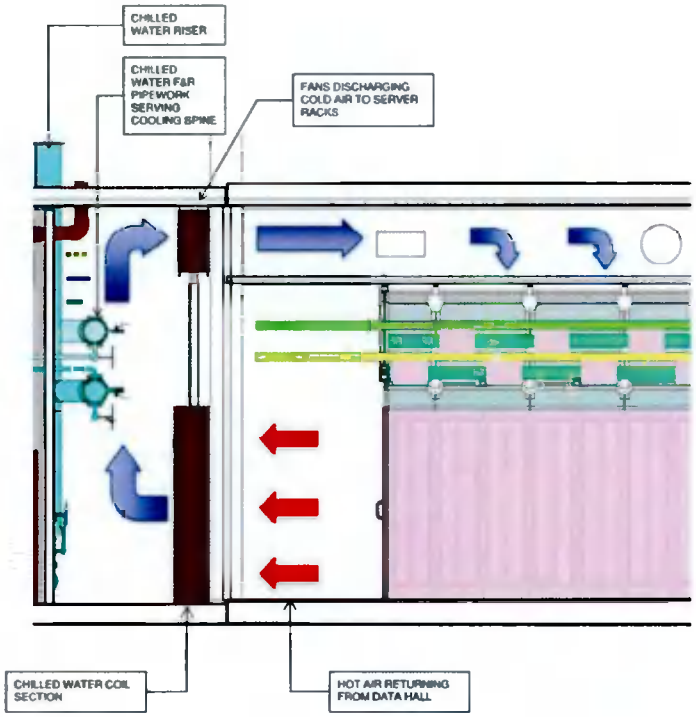


Figure 1 – Data hall cooling diagram

The cooling of the IT equipment is based on the requirements outlined in the standard ASHRAE TC9.9 that defines the recommended operating range as shown within the green dotted line on the chart below:

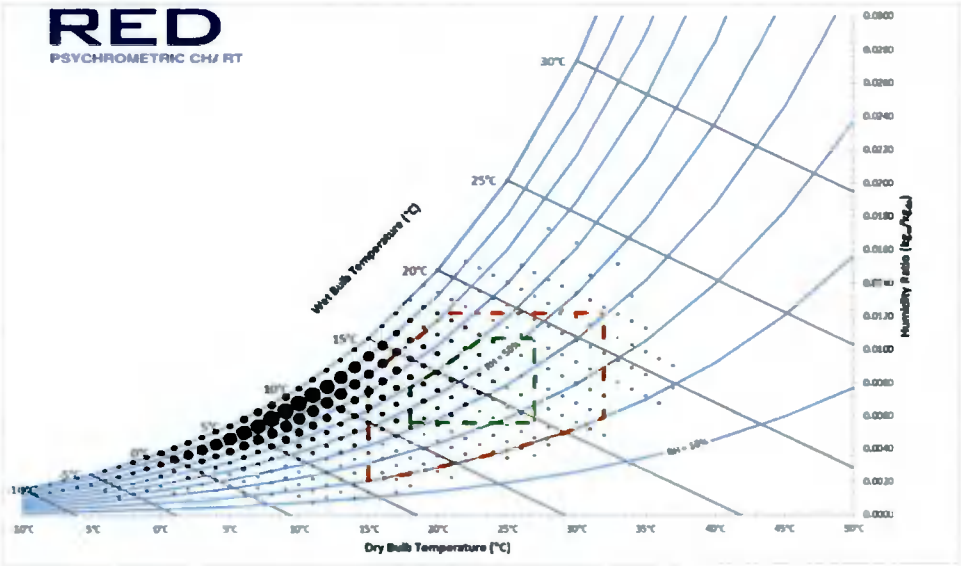


Figure 2 – Psychometric Chart

This environment can be achieved using air at a supply temperature of 25°C into data halls utilising hot and cold aisle containment thereby minimising hot and cold air mixing. To achieve this supply air temperature the system is designed to operate at water flow and return temperatures of 22°C and 28°C respectively.

A large component of the cooling throughout the year can then be achieved directly using free cooling technology without the need to run chiller compressors. Where full free cooling cannot be achieved a mixture of free cooling and reduced compressor operation can be utilised. When external temperatures demand, the use of high efficiency compressors act to minimise the energy consumption of the chillers. The use of variable speed control pumps and fans all further act to minimise energy usage.

4.2.2 Direct Drive EC Fans

All air supply and extract systems serving the data centre rooms are provided with high efficiency direct drive fans. The EC direct drive fan is the most efficient fan solution available to facilitate demand control. These fans are lighter in weight and require less power than a traditional centrifugal fan with variable speed drive (VSD). Typically, savings of 10-20% in power consumption is achievable with an EC fan versus a centrifugal fan.

4.2.3 Pump Variable Speed Drives (VSDs)

Pumps will be specified with VSDs to control their speed as required to achieve design conditions. The cooling water system will be a variable flow system and pump speed will modulate as needed to meet demand.

4.2.4 Potential Waste Heat Recovery

Low grade waste heat energy is available from the cooling water system serving the data halls. Typically, this heat is dissipated to atmosphere. However, some of this heat could be recovered from the cooling water as it returns from the data halls to the chillers. This heat could be recovered via a plate heat exchanger.

Presently there is no district heating network in the vicinity of the site. However, should a local district heating network become available the cooling system has been designed so that it can supply to supply heat into the district heating network.

It should be noted that to benefit from heat recovery that district heating infrastructure external to the site including plate heat exchangers, pumps and distribution networks would need to be developed by others.

4.3 Electrical Design Elements

4.3.1 Utility Power Supply

The power requirements for the proposed development will be provided through a directly metered 10kV supply from the local energy provider ESB.
This supply will be distributed through the site to the various electrical load centres and where step down transformers will be utilised to provide 415V electricity to all loads within the building.
The distribution system described above represents the safest, efficient and most economical method of site wide electricity for the facility.

4.3.2 Transformers

To reduce electrical losses between voltage transformation from 10kV/415V, the applicant will install low loss transformers which comply with current IEC Directives.

4.3.3 Emergency Back Up Generators

Standby power to each electrical room will be provided by generators located externally in acoustically treated containers or located within the building in acoustically treated rooms. The generators will provide emergency power in the event of the loss of the utility supply and therefore will be non-operational for the vast majority of the time.

4.3.4 External Lighting

An external lighting report has been prepared to accompany this planning application. The external lighting will make use of high efficiency, low energy LED luminaires and the design has been optimised to glare, spillage, or other lighting nuisance to adjacent sites and or public roads.

4.3.5 Internal Lighting

Internal lighting shall be provided by high efficient, low energy LED luminaires combined with presence detection controls or local switching where appropriate. The lighting design meets the illumination level requirements as outlined in IS EN 12464 Part 1.

LED luminaires are also used for the emergency lighting installation, which is designed to comply with the requirements of EN1838 and IS3217:2013+A1:2017.

5.0 Compliance with Recognised Standards

This section presents details of the basis of the design of the data centre and its ongoing operation as reflected by international standard and best practice protocols specifically, the ***2021 Best Practice Guidelines for the EU Code of Conduct on Data Centre Energy Efficiency*** as issued by the Joint Research Centre on behalf of the European Commission.

The following are extracts of the reference document identifying the fundamental and critical areas of compliance that are required to exhibit the attainment of best practice status:

No	Name	Description	Expected	Value	*Observation*
3.1.1	Group involvement	Establish an approval board containing representatives from all disciplines (software, IT, M&E, procurement). Require the approval of this group for any significant decision to ensure that the impacts of the decision have been properly understood and an effective solution reached. For example, this could include the definition of standard IT hardware lists through considering the M&E implications of different types of hardware. This group could be seen as the functional equivalent of a change board	Entire Data Centre	5	*Development of the site and the facility has been subject to the design works of an extensive professional team including the applicant, architectural, structural and engineering teams.*
3.2.1	Consider the embodied environmental impact of installed devices	Carry out an audit of existing equipment to maximise any unused existing capability by ensuring that all areas of optimisation, consolidation and aggregation are identified prior to new material investment. The most important element to this in terms of impact is the IT equipment. The severity of impact is related to the frequency of refresh and replacement	Entire Data Centre	3	*The design of the new facility includes consideration of best practice construction and engineering techniques*
3.2.2	Mechanical and electrical equipment environmental operating ranges	Recommend the selection and deployment of mechanical and electrical equipment which does not itself require cooling in normal operation (the exception to this being UPS batteries). Note: UPS batteries require to be kept at lower temperatures to preserve performance and reliability and to maximise operational lifetime.	New build or retrofit	4	*The data hall space operating temperature is set at 25°C supply air temperature allowing maximisation of free cooling. Plant rooms and associated equipment rooms, with the exception of rooms housing battery installations are, where possible, free cooled and where not possible provisioned with minimal mechanical cooling.*

No	Name	Description	Expected	Value	Observation
3.2.6	Energy Management	Introduce a plan for Energy Management in accordance with emerging EU guidelines and internationally standardised methodologies. An example of which would be ISO 50001. Note: The Code of Conduct can be used effectively to underpin the expectations and reporting requirements specifically for data centres in relation to ISO 50001.	Entire Data Centre	3	*The data centre facility incorporates state of the art BMS and EMS systems enabling operational optimisation and control strategies to be deployed.*
3.2.13	Consider technical areas of data centres as industrial space	The data centre technical areas and plant rooms should be considered as an industrial space, designed built and operated with the single primary objective of delivering high availability IT services reliably and efficiently. Note: This objective aims to prevent the energy efficiency of the technical space being compromised by the need for human comfort other than to comply with local statutory requirement and law (Health and Safety etc.). Note: Data Centres are primarily technical spaces, not office space, and should therefore only require the control make up air volumes and environmental conditions to pressurise the spaces in order avoid ingress of particles and contaminants rather than for seated human comfort. This only relates to those areas of the centre intended to hold operational IT equipment or supporting mechanical or electrical infrastructure. These areas should not contain desks or workstations. Note: This is not intended to reduce or impose conditions on dedicated and purpose built office space within the data centre building.	Entire Data Centre	3	*The data hall areas have designed for construction and build as industrial areas.*
3.3.1	Build resilience to business requirements	Only the level of resilience and therefore availability actually justified by business requirements and impact analysis should be built, or purchased in the case of a collocation customer. 2N infrastructures are frequently unnecessary and inappropriate. If only a single level of resilience is available in the data centre an increased resilience or availability for critical services might be obtained by splitting the IT platform across multiple sites and making applications resilient to the loss of an individual site.	New build or retro fit	3	*The design concept for all major critical systems is N+1 block redundant, thereby minimising redundant components.*

No	Name	Description	Expected	Value	*Observation*
3.3.3	Lean provisioning of power and cooling for a maximum of 18 months of data floor capacity	The provisioning of excess power and cooling capacity in the data centre drives substantial fixed losses and is unnecessary. Planning a data centre for modular (scalable) expansion and then building out this capacity in a rolling program of deployments is more efficient. This also allows the technology 'generation' of the IT equipment and supporting M&E infrastructure to be matched, improving both efficiency and the ability to respond to business requirements.	New build or retrofit	3	*The facility is designed to enable phased installation. Phase 1 includes the provision of the first two data halls with further halls to follow when required.*
3.3.4	Design infrastructure to maximise part load efficiency	All areas of the data centre should be designed to maximise the energy efficiency of the facility under partial fill / partial load and variable IT electrical and cooling loads. This is in addition to one off modular provisioning and should consider the response of the infrastructure to dynamic loads. E.g. Appropriately controlled Variable Frequency (or speed) Drive for pumps, fans and compressors	New build or retrofit	3	*The data centre design is designed to maintain best in class PUE factors at all part load conditions.*

Appendix A Modelling Assumptions, Input Data & Methodology

The software used to produce Part L and EPC assessments makes use of a single set of input data to describe both the building thermal fabric and its engineering services.

A.1 Modelling assumptions

The following is a list of modelling assumptions that have been used for the inputs to the IES VE software.

Important, where parameters used for the building fabric and the building services are better than the Part L limits, if the final design does not achieve these values then there is a risk that the as built SBEM/IES-VE DSM will show that the building is non-compliant.

- Building air permeability is 3.0 $m^3/h/m^2$
- The following U-values have been supplied by the architect, calculated or are default values and have been used for the IES VE calculations:

BUILDING ELEMENT	U-VALUES, W/m^2K	NOTES
External Wall	0.18	Provided by design team
Floor	0.15	Provided by design team
Roof	0.15	Provided by design team
Glazing	1.5 (g-value = 0.3)	Provided by design team

ROOM ACTIVITY	DESIGN ILLUMINANCE (LUX)	LIGHTING DENSITY (W/m^2)	LIGHTING EFFICIENCY (W/m^2/100 LUX)
Offices	500	7.5	1.5
Data Halls	400	6	1.5
Plant Rooms	250	4	1.6
Circulation	150	2.5	1.7
Storage	250	4	1.6
WC	250	4	1.6

A.2 Model Input Data

The IES model was built based upon the following architectural drawings by **RKD architects.**

1. DB081-RKD-ZZ-04-DR-A-PLAN-1104 Proposed Roof Plan
2. DB081-RKD-ZZ-0G-DR-A-PLAN-1100 Proposed Floor Plan
3. DB081-RKD-ZZ-ZZ-DR-A-ZZZZ-2100 Proposed Elevations
4. DB081-RKD-ZZ-ZZ-DR-A-ZZZZ-3100 Proposed Sections

A.3 Modelling methodology

The following notes on the methodology used in and by the IES VE software apply to this project and should be taken into consideration when reading this report. Best fit descriptions within the IES VE software have been used in the model.

A.3.1 Heating and ventilation systems

Heating and cooling to process areas is excluded.

The HVAC system serving the offices is a split/multi-split system of Air Source Heat Pumps (electric), with a CoP 0f 4.5 and an SEER of 4.2. Seasonal performance is estimated based upon typical manufacturer performance data. Local time and temperature controls were selected.

Air is supplied to the occupied areas using heat recovery ventilation with a specific fan power of 1.2 W/L/s SFP.

DHW is supplied by instantaneous point of use electric water heaters.

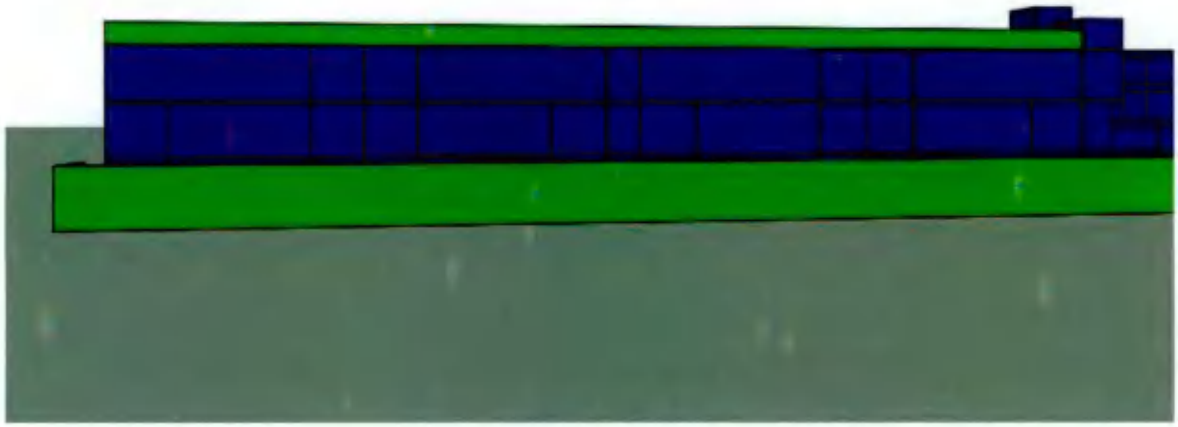
A.3.2 Photo-Voltaic Panels

Panels with the following characteristics shall be installed on the roof:

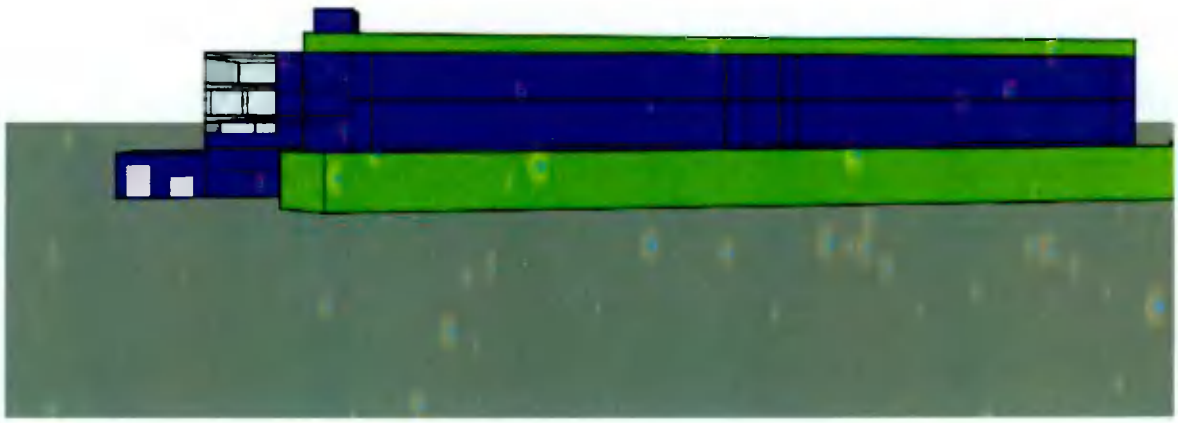
PHOTO-VOLTAIC PANEL DETAILS	
Area	200m^2
Panel type	Monocrystalline
PV module efficiency	20.1%
Electrical conversion efficiency	96.0%

Appendix B 3D Views of the Modelled Building

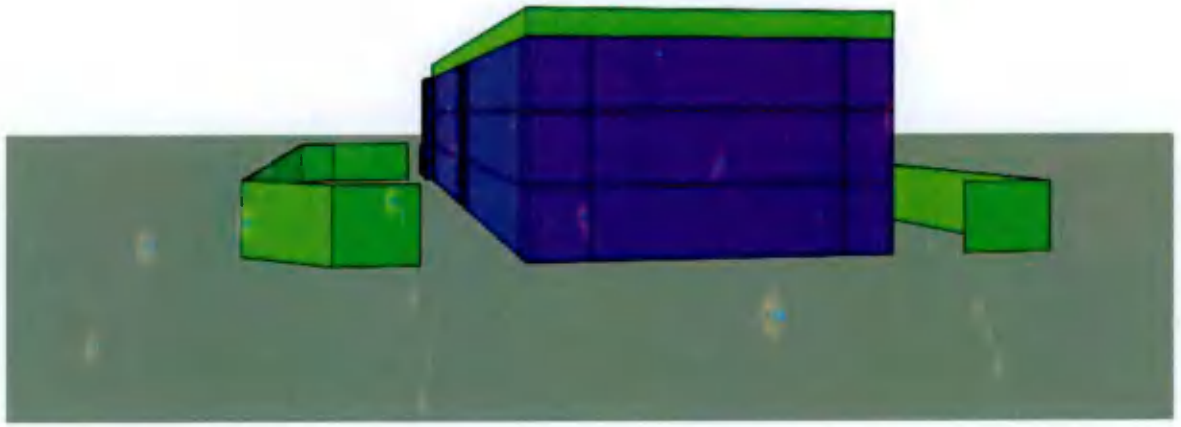
B.1 North View



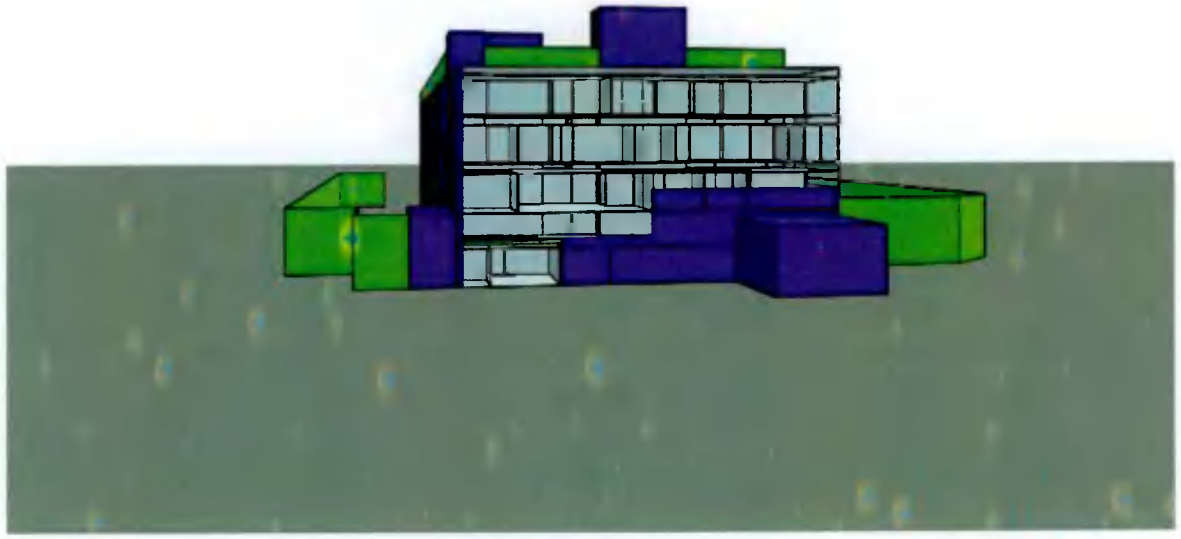
B.2 South View



B.3 East View



B.4 West View



Appendix C BRIRL Output Document (Design Stage)

BRIRL Output Document

Compliance Assessment with the Building Regulations (Ireland) TGD-Part L 2017

This report demonstrates compliance with specific aspects of Part L of the Building Regulations. Compliance with al aspects of Part L is a legal requirement. Demonstration of how compliance with every aspect is achieved may be sough from the Building Control Authority.

DB8

Date: Tue Jun 15 20:49:20 2021

Administrative Information

Building Details

Address: Profile Park, Grangecastle, Empty, Empty, Dublin 22, Eircode

NEAP

Calculation engine: SBEMIE

Calculation engine version: v5.5.h.2

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: 7.0.13

BRIRL compliance check version: v5.5.h.2

Client Details

Name: Name

Telephone number: Phone

Address: Street Address, Co. Carlow, Eircode

Energy Assessor Details

Name: RED Engineering

Telephone number: Phone

Email: you@yourISP

Address: 1 Lower Farm barns, Bainton Road, Bucknell, Bicester, Co. Carlow, Eircode

Primary Energy Consumption, CO2 Emissions, and Renewable Energy Ratio

The compliance criteria in the TGD-L have been met.

Calculated CO2 emission rate from Reference building	12.6 kgCO2/m2.annum
Calculated CO2 emission rate from Actual building	11.1 kgCO2/m2.annum
Carbon Performance Coefficient (CPC)	0.88
Maximum Permitted Carbon Performance Coefficient (MPCPC)	1.15
Calculated primary energy consumption rate from Reference building	64.7 kWh/m2.annum
Calculated primary energy consumption rate from Actual building	56.6 kWh/m2.annum
Energy Performance Coefficient (EPC)	0.88
Maximum Permitted Energy Performance Coefficient (MPEPC)	1
Renewable Energy Ratio (RER)	0.1
Minimum Renewable Energy Ratio	0.1

Heat Transmission through Building Fabric

Element	$U_{b\,Limit}$	$U_{b\,Calc}$	$U_{i\,Limit}$	$U_{i\,Calc}$	Surface with maximum U-value*
Walls**	0.21	0.18	0.6	0.18	00000002_W1
Floors (ground and exposed)	0.21	0.16	0.6	0.18	00000002_F
Pitched roofs	0.16	-	0.3	-	"No heat loss pitched roofs"
Flat roofs	0.2	0.15	0.3	0.15	00000002_C
Windows, roof windows, and rooflights	1.6	1.4	3	1.4	0000003A_W0_O0
Personnel doors	1.6	-	3	-	"No ext. personnel doors"
Vehicle access & similar large doors	1.5	1.5	3	1.5	00000002_W3_O0
High usage entrance doors	3	-	3	-	"No ext. high usage entrance doors"

$U_{b\,Limit}$ = Limiting area-weighted average U-values [W/(m2K)] $U_{i\,Limit}$ = Limiting individual element U-values [W/(m2K)]
$U_{b\,Calc}$ = Calculated area-weighted average U-values [W/(m2K)] $U_{i\,Calc}$ = Calculated individual element U-values [W/(m2K)]

* There might be more than one surface with the maximum U-value ** Automatic U-value check by the tool does not apply to curtain walls whose area-weighted average and individual limiting standards are 1.8 and 3 W/m2K, respectively

Air Permeability	Upper Limit	This Building's Value
m3/(h.m2) at 50 Pa	5	3

Building Services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Building Regulations documents 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	>0.95

1- Office HVAC

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.5	4.2	-	-	-
Standard value	2.75	4.14**	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 split and multi-split air conditioners <6 kW. For systems 6-12 kW, limiting efficiency is 3.87.

1- SYST0001-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

2- SYST0000-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Building Regulations documents
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
00_Security Room	-	-	-	1.2	-	-	-	-	-	0	N/A
00_Office	-	-	-	1.2	-	-	-	-	-	0	N/A
00_DDA WC 2	-	-	0.5	-	-	-	-	-	-	-	N/A
00_DDA WC 1	-	-	0.5	-	-	-	-	-	-	-	N/A
01_DDA WC/Shower Room	-	-	0.5	-	-	-	-	-	-	-	N/A
01_Female Toilets	-	-	0.5	-	-	-	-	-	-	-	N/A
01_Janitor Closet	-	-	0.5	-	-	-	-	-	-	-	N/A
01_Male Toilets	-	-	0.5	-	-	-	-	-	-	-	N/A
01_Conference 1	-	-	-	1.2	-	-	-	-	-	0	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_Conference 2	-	-	-	1.2	-	-	-	-	-	0	N/A
02_WC 1	-	-	0.5	-	-	-	-	-	-	-	N/A
02_DDA WC	-	-	0.5	-	-	-	-	-	-	-	N/A
02_WC 2	-	-	0.5	-	-	-	-	-	-	-	N/A
02_Janitor Closet	-	-	0.5	-	-	-	-	-	-	-	N/A
02_Operations Conference Room	-	-	-	1.2	-	-	-	-	-	0	N/A
02_Engineering + Operations Office	-	-	-	1.2	-	-	-	-	-	0	N/A
02_Office 2	-	-	-	1.2	-	-	-	-	-	0	N/A
02_Office 1	-	-	-	1.2	-	-	-	-	-	0	N/A
03_Customer Flex Office/Storage 1	-	-	-	1.2	-	-	-	-	-	0	N/A
03_WC 1	-	-	0.5	-	-	-	-	-	-	-	N/A
03_DDA WC	-	-	0.5	-	-	-	-	-	-	-	N/A
03_WC 2	-	-	0.5	-	-	-	-	-	-	-	N/A
03_Customer Flex Office/Storage 2	-	-	-	1.2	-	-	-	-	-	0	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	
00_Loading Bay	21	-	-	292
00_Stair A	-	200	-	62
00_Lift	-	361	-	12
00_Lift	-	175	-	79
00_Passage 2	-	185	-	18
00_Corridor 11	-	239	-	20
00_Lobby	-	74	-	48
00_Vestibule	-	69	-	62
00_Secure Lobby	-	54	-	226
00_Security Room	31	-	-	216
00_Goods Mantrap	-	62	-	93
00_Corridor 10	-	161	-	39
00_Temporary Secured Storage	19	-	-	401
00_Office	114	-	-	66
00_DDA WC 2	-	241	-	26
00_DDA WC 1	-	231	-	29
00_Passage 1	-	227	-	12
00_Corridor 9	-	137	-	137
01_Corridor 2	-	293	-	27
01_Stair A	-	200	-	62
01_Passage	-	175	-	21
01_Customer Lounge/Break Room	-	51	-	636
01_Corridor 11	-	144	-	140
01_DDA WC/Shower Room	-	226	-	30
01_Female Toilets	-	187	-	59

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
01_Janitor Closet	-	302	-	19
01_Male Toilets	-	196	-	49
01_Conference 1	90	-	-	202
01_Conference 2	91	-	-	182
01_Secured/Inventory Storage	20	-	-	210
02_Corridor 2	-	293	-	27
02_Stair A	-	196	-	70
02_Lift	-	271	-	12
02_Passage 1	-	178	-	20
02_Passage 2	-	175	-	21
02_Electricians Workshop	-	55	-	200
02_WC 1	-	313	-	15
02_DDA WC	-	221	-	35
02_WC 2	-	312	-	15
02_Janitor Closet	-	349	-	13
02_Operations Conference Room	100	-	-	117
02_Engineering + Operations Office	83	-	-	528
02_Office 2	111	-	-	75
02_Office 1	111	-	-	75
02_Corridor 11	-	132	-	145
02_Corridor 12	-	145	-	66
02_Technical Workroom	-	53	-	169
02_Engineering Workshop + Storage	21	-	-	92
03_Passage	-	178	-	20
03_Corridor 1	-	132	-	149
03_Corridor 2	-	146	-	62
03_Customer Flex Office/Storage 1	83	-	-	566
03_WC 1	-	313	-	15
03_DDA WC	-	221	-	35
03_WC 2	-	312	-	15
03_Customer Flex Office/Storage 2	82	-	-	886
03_Stair A	-	146	-	70
03_Lift	-	271	-	12
03_Lift	-	175	-	79
01_Lift A	-	175	-	79
02_Lift A	-	175	-	79
00_FOH MV Switch Room	116	-	-	137
00_Corridor 6	-	178	-	292
00_Corridor 2	-	178	-	291
00_White Space 1	74	-	-	4035
00_Corridor 7	-	195	-	180
00_White Space 2	74	-	-	4041
00_Corridor 8	-	195	-	180

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
00_Storage	29	-	-	145
00_NIR/NER	132	-	-	80
00_Corridor 4	-	290	-	29
00_Corridor 1	-	182	-	559
00_Corridor 3	-	240	-	50
00_Sprinkler Room	226	-	-	26
00_Plantroom 12	122	-	-	91
00_Plantroom 11	103	-	-	201
00_Plantroom 10	128	-	-	79
00_Plantroom 9	128	-	-	79
00_Plantroom 8	103	-	-	201
00_Plantroom 7	123	-	-	88
00_Fibre Entry Room	156	-	-	52
00_Plantroom 6	124	-	-	88
00_Plantroom 5	103	-	-	201
00_Plantroom 4	128	-	-	79
00_Plantroom 3	128	-	-	79
00_Plantroom 2	103	-	-	201
00_Plantroom 1	122	-	-	90
00_Fibre Entry Room A	88	-	-	82
00_NIR	88	-	-	82
00_Corridor 5	-	181	-	554
00_Corridor 12	-	255	-	33
01_Corridor 7	-	178	-	292
01_Corridor 3	-	178	-	291
01_White Space 1	74	-	-	4035
01_Corridor 9	-	195	-	180
01_White Space 2	74	-	-	4041
01_Corridor 10	-	195	-	180
01_Corridor 8	-	255	-	33
01_Sprinkler Room	226	-	-	26
01_Storage	29	-	-	145
01_NIR/NER	132	-	-	80
01_Plantroom 12	122	-	-	91
01_Plantroom 11	103	-	-	201
01_Plantroom 10	128	-	-	79
01_Plantroom 9	128	-	-	79
01_Plantroom 8	103	-	-	201
01_Plantroom 7	123	-	-	88
01_IDF Room B	156	-	-	52
01_Plantroom 6	124	-	-	88
01_Plantroom 5	103	-	-	201
01_Plantroom 4	128	-	-	79

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
01_Plantroom 3	128	-	-	79
01_Plantroom 2	103	-	-	201
01_Plantroom 1	122	-	-	90
01_Corridor 5	-	290	-	29
01_Corridor 6	-	181	-	554
01_Corridor 1	-	184	-	529
01_Corridor 4	-	239	-	50
01_NIR	88	-	-	82
01_IDF Room A	88	-	-	82
02_Corridor 7	-	178	-	292
02_Corridor 3	-	178	-	291
02_White Space 1	74	-	-	4035
02_Corridor 9	-	195	-	180
02_White Space 2	74	-	-	4041
02_Corridor 10	-	195	-	180
02_Plantroom 8	98	-	-	292
02_Plantroom 7	128	-	-	79
02_Plantroom 6	128	-	-	79
02_Plantroom 5	98	-	-	289
02_IDF Room A	156	-	-	52
02_Plantroom 4	98	-	-	289
02_Plantroom 3	128	-	-	79
02_Plantroom 2	128	-	-	79
02_Plantroom 1	98	-	-	291
02_Corridor 8	-	255	-	33
02_Corridor 1	-	184	-	529
02_Corridor 6	-	181	-	554
02_Corridor 5	-	290	-	29
02_NIR/NER	132	-	-	80
02_Sprinkler Room	226	-	-	26
02_Corridor 4	-	240	-	50
02_Storage	29	-	-	145
02_NER	88	-	-	82
02_IDF Room B	88	-	-	82

Solar Gain in Summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00_Loading Bay	N/A	N/A
00_Stair A	N/A	N/A
00_Lift	N/A	N/A
00_Lift	N/A	N/A
00_Passage 2	N/A	N/A
00_Corridor 11	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00_Lobby	N/A	N/A
00_Vestibule	NO (-2.6%)	NO
00_Secure Lobby	NO (-11.2%)	NO
00_Security Room	N/A	N/A
00_Goods Manltrap	N/A	N/A
00_Corridor 10	N/A	N/A
00_Temporary Secured Storage	N/A	N/A
00_Office	N/A	N/A
00_DDA WC 2	N/A	N/A
00_DDA WC 1	N/A	N/A
00_Passage 1	N/A	N/A
00_Corridor 9	N/A	N/A
01_Corridor 2	N/A	N/A
01_Stair A	N/A	N/A
01_Passage	N/A	N/A
01_Customer Lounge/Break Room	NO (-9.7%)	NO
01_Corridor 11	N/A	N/A
01_DDA WC/Shower Room	N/A	N/A
01_Female Toilets	NO (-48.5%)	NO
01_Janitor Closet	N/A	N/A
01_Male Toilets	NO (-48.5%)	NO
01_Conference 1	NO (-54%)	NO
01_Conference 2	N/A	N/A
01_Secured Inventory Storage	NO (-52.1%)	NO
02_Corridor 2	N/A	N/A
02_Stair A	N/A	N/A
02_Lift	N/A	N/A
02_Passage 1	N/A	N/A
02_Passage 2	N/A	N/A
02_Electricians Workshop	NO (-59.5%)	NO
02_WC 1	N/A	N/A
02_DDA WC	N/A	N/A
02_WC 2	N/A	N/A
02_Janitor Closet	N/A	N/A
02_Operations Conference Room	NO (-9%)	NO
02_Engineering + Operations Office	NO (-9%)	NO
02_Office 2	NO (-0.3%)	NO
02_Office 1	NO (-13.2%)	NO
02_Corridor 11	N/A	N/A
02_Corridor 12	N/A	N/A
02_Technical Workroom	NO (-9%)	NO
02_Engineering Workshop + Storage	NO (-9%)	NO
03_Passage	N/A	N/A
03_Corridor 1	N/A	N/A
03_Corridor 2	N/A	N/A
03_Customer Flex Office/Storage 1	NO (-30.5%)	NO
03_WC 1	N/A	N/A
03_DDA WC	N/A	N/A
03_WC 2	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
03_Customer Flex Office/Storage 2	NO (-12.2%)	NO
03_Stair A	N/A	N/A
03_Lift	N/A	N/A
03_Lift	N/A	N/A
01_Lift A	N/A	N/A
02_Lift A	N/A	N/A
00_FOH MV Switch Room	N/A	N/A
00_Corridor 6	N/A	N/A
00_Corridor 2	N/A	N/A
00_White Space 1	N/A	N/A
00_Corridor 7	N/A	N/A
00_White Space 2	N/A	N/A
00_Corridor 8	N/A	N/A
00_Storage	N/A	N/A
00_NIR/NER	N/A	N/A
00_Corridor 4	N/A	N/A
00_Corridor 1	N/A	N/A
00_Corridor 3	N/A	N/A
00_Sprinkler Room	N/A	N/A
00_Plantroom 12	N/A	N/A
00_Plantroom 11	N/A	N/A
00_Plantroom 10	N/A	N/A
00_Plantroom 9	N/A	N/A
00_Plantroom 8	N/A	N/A
00_Plantroom 7	N/A	N/A
00_Fibre Entry Room	N/A	N/A
00_Plantroom 6	N/A	N/A
00_Plantroom 5	N/A	N/A
00_Plantroom 4	N/A	N/A
00_Plantroom 3	N/A	N/A
00_Plantroom 2	N/A	N/A
00_Plantroom 1	N/A	N/A
00_Fibre Entry Room A	N/A	N/A
00_NIR	N/A	N/A
00_Corridor 5	N/A	N/A
00_Corridor 12	N/A	N/A
01_Corridor 7	N/A	N/A
01_Corridor 3	N/A	N/A
01_White Space 1	N/A	N/A
01_Corridor 9	N/A	N/A
01_White Space 2	N/A	N/A
01_Corridor 10	N/A	N/A
01_Corridor 8	N/A	N/A
01_Sprinkler Room	N/A	N/A
01_Storage	N/A	N/A
01_NIR/NER	N/A	N/A
01_Plantroom 12	N/A	N/A
01_Plantroom 11	N/A	N/A
01_Plantroom 10	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01_Plantroom 9	N/A	N/A
01_Plantroom 8	N/A	N/A
01_Plantroom 7	N/A	N/A
01_IDF Room B	N/A	N/A
01_Plantroom 6	N/A	N/A
01_Plantroom 5	N/A	N/A
01_Plantroom 4	N/A	N/A
01_Plantroom 3	N/A	N/A
01_Plantroom 2	N/A	N/A
01_Plantroom 1	N/A	N/A
01_Corridor 5	N/A	N/A
01_Corridor 6	N/A	N/A
01_Corridor 1	N/A	N/A
01_Corridor 4	N/A	N/A
01_NIR	N/A	N/A
01_IDF Room A	N/A	N/A
02_Corridor 7	N/A	N/A
02_Corridor 3	N/A	N/A
02_White Space 1	N/A	N/A
02_Corridor 9	N/A	N/A
02_White Space 2	N/A	N/A
02_Corridor 10	N/A	N/A
02_Plantroom 8	N/A	N/A
02_Plantroom 7	N/A	N/A
02_Plantroom 6	N/A	N/A
02_Plantroom 5	N/A	N/A
02_IDF Room A	N/A	N/A
02_Plantroom 4	N/A	N/A
02_Plantroom 3	N/A	N/A
02_Plantroom 2	N/A	N/A
02_Plantroom 1	N/A	N/A
02_Corridor 8	N/A	N/A
02_Corridor 1	N/A	N/A
02_Corridor 6	N/A	N/A
02_Corridor 5	N/A	N/A
02_NIR/NER	N/A	N/A
02_Sprinkler Room	N/A	N/A
02_Corridor 4	N/A	N/A
02_Storage	N/A	N/A
02_NER	N/A	N/A
02_IDF Room B	N/A	N/A

Overheating

Zone	Risk of overheating
00_Loading Bay	N/A
00_Stair A	N/A
00_Lift	N/A

Zone	Risk of overheating
00_Lift	N/A
00_Passage 2	N/A
00_Corridor 11	N/A
00_Lobby	N/A
00_Vestibule	N/A
00_Secure Lobby	N/A
00_Security Room	N/A
00_Goods Mantrap	N/A
00_Corridor 10	N/A
00_Temporary Secured Storage	N/A
00_Office	N/A
00_DDA WC 2	N/A
00_DDA WC 1	N/A
00_Passage 1	N/A
00_Corridor 9	N/A
01_Corridor 2	N/A
01_Stair A	N/A
01_Passage	N/A
01_Customer Lounge/Break Room	N/A
01_Corridor 11	N/A
01_DDA WC/Shower Room	N/A
01_Female Toilets	N/A
01_Janitor Closet	N/A
01_Male Toilets	N/A
01_Conference 1	N/A
01_Conference 2	N/A
01_Secured Inventory Storage	N/A
02_Corridor 2	N/A
02_Stair A	N/A
02_Lift	N/A
02_Passage 1	N/A
02_Passage 2	N/A
02_Electricians Workshop	N/A
02_WC 1	N/A
02_DDA WC	N/A
02_WC 2	N/A
02_Janitor Closet	N/A
02_Operations Conference Room	N/A
02_Engineering + Operations Office	N/A
02_Office 2	N/A
02_Office 1	N/A
02_Corridor 11	N/A
02_Corridor 12	N/A
02_Technical Workroom	N/A
02_Engineering Workshop + Storage	N/A
03_Passage	N/A
03_Corridor 1	N/A
03_Corridor 2	N/A
03_Customer Flex Office/Storage 1	N/A

Zone	Risk of overheating
03_WC 1	N/A
03_DDA WC	N/A
03_WC 2	N/A
03_Customer Flex Office/Storage 2	N/A
03_Stair A	N/A
03_Lift	N/A
03_Lift	N/A
01_Lift A	N/A
02_Lift A	N/A
00_FOH MV Switch Room	Low risk
00_Corridor 6	Moderate risk
00_Corridor 2	Moderate risk
00_White Space 1	High risk
00_Corridor 7	Low risk
00_White Space 2	High risk
00_Corridor 8	Low risk
00_Storage	Low risk
00_NIR/NER	Low risk
00_Corridor 4	Low risk
00_Corridor 1	Low risk
00_Corridor 3	Low risk
00_Sprinkler Room	Low risk
00_Plantroom 12	Low risk
00_Plantroom 11	Low risk
00_Plantroom 10	Low risk
00_Plantroom 9	Low risk
00_Plantroom 8	Low risk
00_Plantroom 7	Low risk
00_Fibre Entry Room	Low risk
00_Plantroom 6	Low risk
00_Plantroom 5	Low risk
00_Plantroom 4	Low risk
00_Plantroom 3	Low risk
00_Plantroom 2	Low risk
00_Plantroom 1	Low risk
00_Fibre Entry Room A	Low risk
00_NIR	Low risk
00_Corridor 5	Low risk
00_Corridor 12	Low risk
01_Corridor 7	Low risk
01_Corridor 3	Low risk
01_White Space 1	High risk
01_Corridor 9	Low risk
01_White Space 2	High risk
01_Corridor 10	Low risk
01_Corridor 8	Low risk
01_Sprinkler Room	Low risk
01_Storage	Low risk
01_NIR/NER	Low risk

Zone	Risk of overheating
01_Plantroom 12	Low risk
01_Plantroom 11	Low risk
01_Plantroom 10	Low risk
01_Plantroom 9	Low risk
01_Plantroom 8	Low risk
01_Plantroom 7	Low risk
01_IDF Room B	Low risk
01_Plantroom 6	Low risk
01_Plantroom 5	Low risk
01_Plantroom 4	Low risk
01_Plantroom 3	Low risk
01_Plantroom 2	Low risk
01_Plantroom 1	Low risk
01_Corridor 5	Low risk
01_Corridor 6	Low risk
01_Corridor 1	Low risk
01_Corridor 4	Low risk
01_NIR	Low risk
01_IDF Room A	Low risk
02_Corridor 7	Moderate risk
02_Corridor 3	Moderate risk
02_White Space 1	High risk
02_Corridor 9	Low risk
02_White Space 2	High risk
02_Corridor 10	Low risk
02_Plantroom 8	Low risk
02_Plantroom 7	Low risk
02_Plantroom 6	Low risk
02_Plantroom 5	Low risk
02_IDF Room A	Low risk
02_Plantroom 4	Low risk
02_Plantroom 3	Low risk
02_Plantroom 2	Low risk
02_Plantroom 1	Low risk
02_Corridor 8	Low risk
02_Corridor 1	Low risk
02_Corridor 6	Low risk
02_Corridor 5	Low risk
02_NIR/NER	Low risk
02_Sprinkler Room	Low risk
02_Corridor 4	Low risk
02_Storage	Low risk
02_NER	Low risk
02_IDF Room B	Low risk

Note: The areas indicated in red as overheating will not overheat as they are in fact process areas which are cooled either directly or indirectly by the data centre IT process cooling system.

Primary Energy Contributions to RER

Technology	kWh/annum
Photovoltaic systems	21360.4
Wind turbines	0
Solar thermal for water heating	0
Biomass for space and/or water heating	0
Biogas for space and/or water heating	0
Heat pumps for space and/or water heating	40231.5
CHP generators for space and/or water heating	0
District heating for space and/or water heating	0
Process energy	0
Total for renewables	**61591.9**
Total for renewables & non-renewables	**609714.7**

Technical Data Sheet (Actual vs. Reference Building)

Building Global Parameters

	Actual	Reference
Area (m2)	9687	9687
External area (m2)	39769	39769
Weather	DUB	DUB
Infiltration (m3/hm2 @ 50Pa)	3	3
Average conductance (W/K)	7048.52	7547.55
Average U-value (W/m2K)	0.18	0.19
Alpha value* (%)	3.69	16.68

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

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] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	115.6	42.7	7.3	3.8	1.9	4.41	3.14	4.5	4.2
	Reference	135.8	40.9	46.1	3.2	5	0.82	3.6	---	---
[ST] No Heating or Cooling										
	Actual	101	96	0	0	0	0	0	0	0
	Reference	100.6	101.1	0	0	0	0	0	---	---

Building Use

% area	Building Type
	Retail/Financial and Professional services
	Restaurants and Cafes/Drinking Est./Takeaways
25	**Offices and Workshop businesses**
	General Industrial and Special Industrial Groups
75	**Storage or Distribution**
	Hotels
	Residential Inst.: Hospitals and Care Homes
	Residential Inst.: Residential Primary schools
	Residential Inst.: Universities and colleges
	Secure Residential Inst.
	Residential spaces
	Non-residential Inst.: Community/Day Centre
	Non-residential Inst.: Libraries, Museums, and Galleries
	Non-residential Inst.: Primary Education
	Non-residential Inst.: Primary Health Care Building
	Non-residential Inst.: Law Courts
	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
	Non-residential Inst.: Post primary Education
	Residential Inst.: Residential Post primary schools

Key to terms

Alpha value (%)	= percentage of the building's average heat transfer coefficient which is due to thermal bridging
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
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