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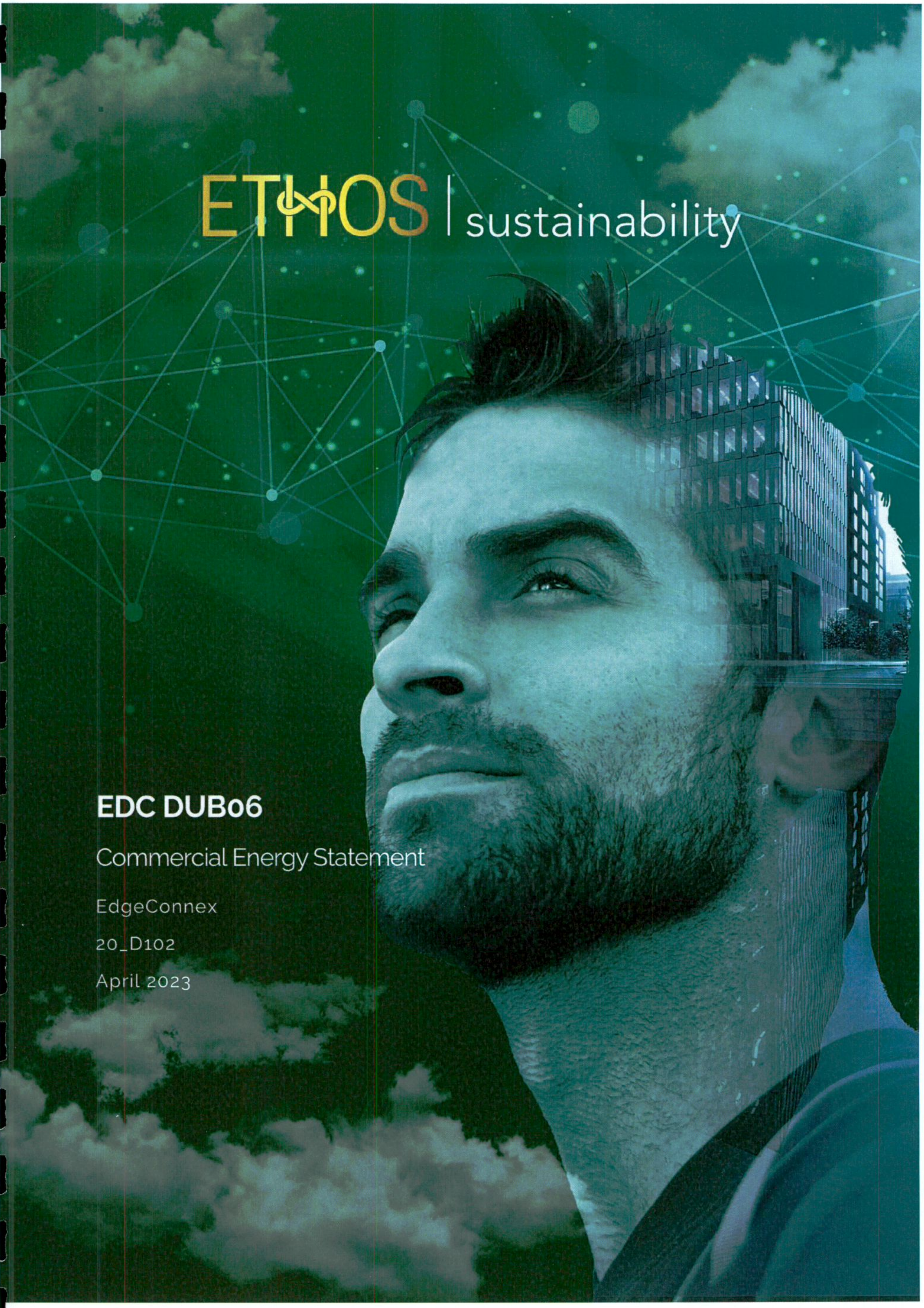

EDC DUB06

Commercial Energy Statement

EdgeConnex

20_D102

April 2023

EDC DUB06

Energy Statement

EdgeConnex

20_D102

CURRENT ISSUE			
Issue No:	P1	Issue Date:	25th April 2023
Sign Off	Originator:	Checker:	Reason For Issue:
Print Name:	Vincent Collins	Abdulhamid Alrehaili	Planning Issue

PREVIOUS ISSUES (Type Names)				
Issue No:	Date:	Originator:	Checker:	Reason For Issue:
P0	11th August 2022	Gary O'Keefe	PJ Ryan	Planning

Executive Summary

This report prepared by Ethos Engineering demonstrates how the energy performance and the sustainability of construction of the proposed Datacentre meets or exceeds legislative/planning requirements.

The report outlines how the proposed development meet the following policies and regulation:

1- South Dublin County Development Pan 2022-2028
2- EU Legislative Initiatives
3- TGD Part L 2022: Conservation of Fuel and Energy - Buildings Other Than Dwellings.

The energy strategy has been approached in a holistic manner using the energy hierarchy "Be Lean, Be Clean, Be Green," in order to comply with the regulations above including NZEB, Part L 2022 requirements for energy performance and greenhouse gas emissions. The energy hierarchy outlines the proposed strategy to incorporate the suitable renewable energy technologies such as photovoltaic along with the available heat recovered from the proposed development to be utilised i.e district heating system (subject to the Council development of district heating networks in the area).

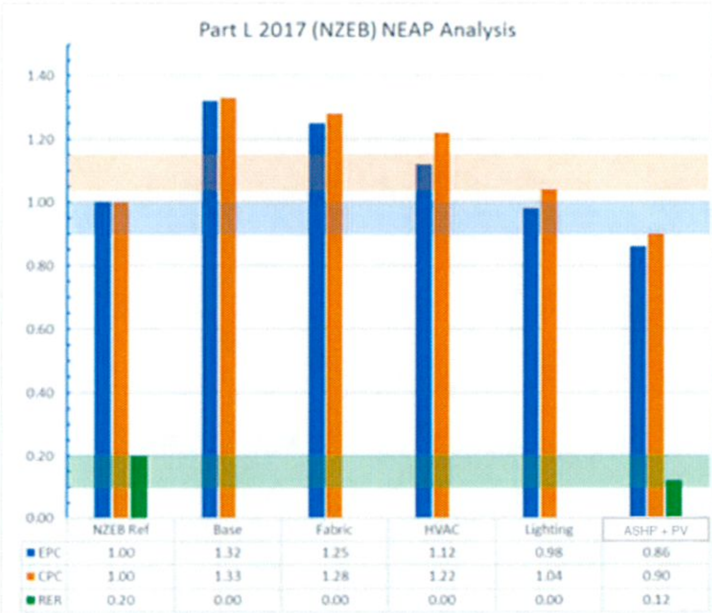

Figure 1: Indicative EPC, CPC and RER for typical design measures

Sustainable design features of these units include enhanced building fabric performance, high efficiency HVAC systems and high efficacy lighting with occupancy and daylight control where applicable. Renewable technologies including both heat pumps and photovoltaic panels are proposed. Subject to a detailed design assessment with final construction details a final BER assessment will be completed.

The proposed development target BER rating of "A3" has been assessed using the SBEM interface VE Compliance 7.0.20 in the IES software version 2022 which demonstrates Part L compliance in accordance with NEAP. (BERs could change in the future with updates to software due to improvements in methodology and revised Electricity Primary Energy Factor)

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1. Introduction

This report prepared by Ethos Engineering demonstrates how the energy performance and the sustainability of construction of the proposed datacentre of the EdgeConnex will meet or exceed legislative/planning requirements. This report is to form part of the planning submission documentation to the South Dublin City Council (SDCC).

The proposed design must comply with national building regulations for energy performance and carbon dioxide (CO_2) emissions set out in 'Technical Guidance Document Part L - Conservation of Fuel and Energy 2022 - Buildings other than Dwellings'.

The proposed design must comply with national building regulations for energy performance and carbon dioxide (CO2) emissions set out in 'Technical Guidance Document Part L - Conservation of Fuel and Energy 2021 - Buildings other than Dwellings'. Additionally, a provisional Building Energy Rating (BER) must also be produced in line with the EU Directive on Energy Performance in Buildings (EPBD).

Located in Newcastle Road, Lucan, Co.Dublin, the development is subject to the planning requirements set out in the South Dublin City Development Plan 2022-2028

In order to meet the legislative and planning requirements the overall energy strategy of the proposed design has been approached in a holistic manner using the adopted energy hierarchy "Be Lean, Be Clean, Be Green". Energy performance will be assessed in accordance with the Non-Domestic Energy Assessment Procedure (NEAP) methodology to demonstrate the systematic improvement in energy performance.

Assessments carried out in this report are based on latest floor plans and elevations received from the architect and all design parameter figures and assumptions stated are based on the current preliminary design received from the design team; these are subject to change during detailed design.

1.1. Site and Development Summary

The development will consist of the construction of two no. single storey data centres with associated office and service areas with an overall gross floor area of 15,274sqm that will comprise of the following:

Construction of 2 no. adjoined single storey data centres with a gross floor area of 12,859sqm that will include a single storey goods receiving area / store and single storey office area (2,415sqm) with PV panels above, located to the east of the data centres as well as associated water tower, sprinkler tank, pump house and other services;

The data centres will also include plant at roof level; with 24 no. standby diesel generators with associated flues (each 25m high) that will be located within a generator yard to the west of the data centres;

New internal access road and security gates to serve the proposed development that will provide access to 36 no. new car parking spaces (including 4 no. electric and 2 no. disabled spaces) and sheltered bicycle parking to serve the new data centres;

New attenuation ponds to the north of the proposed data centres; and

Green walls are proposed to the south and east that will enclose the water tower and pump house compound.

The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042. The site will remain enclosed by landscaping to all boundaries. The development will be accessed off the R120 via the permitted access granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SD21A/0042.

An Environmental Impact Assessment Report (EIAR) has been submitted with this application.

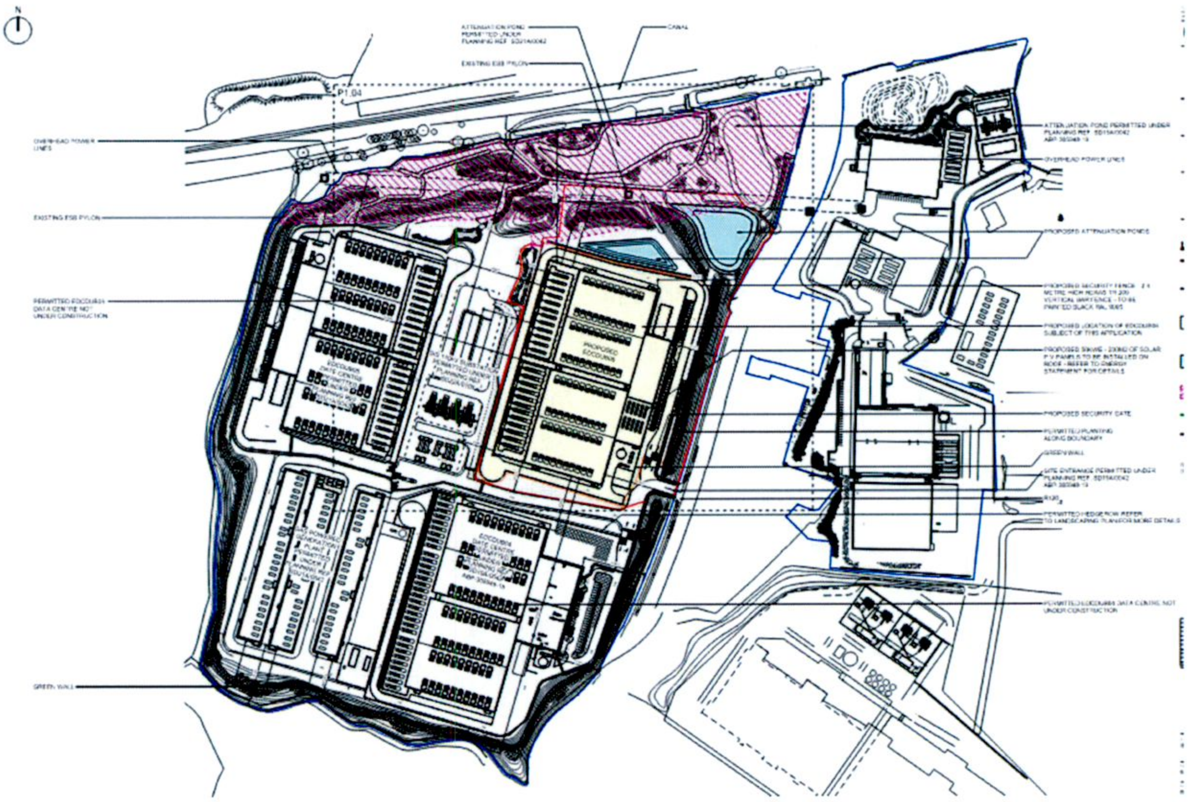


Figure 2: Proposed site layout

2. Legislative/Planning Requirements

2.1. Part L/ Nearly Zero Energy Buildings (NZEB)

The European Energy Performance of Buildings Directive Recast (EPBD) requires all new buildings to be Nearly Zero – Energy Buildings (NZEB) by 31st December 2020 and all buildings acquired by public bodies by 31st December 2018.

'Nearly Zero – Energy Buildings' means a building that has a very high energy performance, Annex 1 of the Directive and in which "the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby".

The European Commission issued recommendations on 29th July 2016 (EU 2016/1318) on guidelines for the promotion of nearly zero-energy buildings and best practices to ensure that, by 2020, all new buildings are nearly zero-energy buildings.

Specifically, for the Oceanic zone which applies to Ireland the guidance proposes the following recommendation.

- Offices: 40-55 kWh/(m².y) of net primary energy with, typically, 85-100 kWh/(m².y) of primary energy use covered by 45 kWh/(m².y) of on-site renewable sources.

A combination of some of the following likely needed to achieve a 60% improvement.

- Building insulation levels will be greatly improved
- Glazing ratios may need to be considered
- Insulation value of the glazing itself will be considerably improved
- Airtightness standards will be introduced including mandatory airtightness test on every building
- Enhanced calculation of linear thermal bridging probably required particularly for the 60% improvement
- The use of renewables and free cooling will be required
- The use of solar shading will need to be considered
- Renewables will need to cover a substantial part of energy use
- Much more efficient lighting and services will be needed

Article 9(1) of the EPBD requires Member States to ensure that by the relevant dates, 'all new buildings are NZEBs'. As a result, citizens buying newly constructed buildings or apartments in 2021 would expect the market to have evolved in line with these targets, and buildings to be NZEBs.

The construction sector shows that the timing of the end of construction or completion of a building might be uncertain and may suffer delays. Member States would need to factor in the period of validity of building permits, the length of construction and completion of building works and the targets in Article 9(1) of the EPBD to avoid falling short of the obligation to ensure that 'by January 2021 all new buildings are NZEBs'.

2.2. South Dublin County Development Pan 2022-2028

The energy strategy will consider the following council policies and objectives as outlined in the South Dublin County Development Plan 2022-2028.

ENERGY (E) Policy 1 - Responding to European and National Energy Policy & Legislation

It is the **policy** of South Dublin County Council

- Respond to the European, National and Regional Climate Action Programme and UN Sustainable Goal 13 through the integration of climate action policies and objectives which promote renewable energy and energy conservation and an increase in energy efficiency;

ENERGY (E) Policy 2 - South Dublin Spatial Energy Demand Analysis

It is the **policy** of South Dublin County Council:

- Further develop and implement climate action and energy related initiatives in the County in conjunction with EMRA, the Dublin Energy Agency (Codema), Climate Action Regional Office (CARO) and all relevant stakeholders, promoting energy efficiency and renewable energy measures across the County

E2 Objective 1:

- To seek to reduce the reliance on fossil fuels in the County by reducing the energy demand of existing and new development.

E2 Objective 2:

- To promote the generation and supply of low carbon and renewable energy alternatives, having regard to the opportunities offered by the settlement hierarchy of the County and the built environment.

E2 Objective 3:

- To support the recording and monitoring of renewable energy potential in the County in partnership with other stakeholders including the East Midlands Regional Assembly EMRA, the Dublin Energy Agency (Codema), Climate Action Regional Office (CARO).

ENERGY (E) Policy 3 - Energy Performance in New and Existing Existing Buildings

It is the **policy** of South Dublin County Council:

- Support high levels of energy conservation, energy efficiency and the use of renewable energy sources in new and existing buildings including the retro fitting of energy efficiency measures in the existing building stock in accordance with relevant building regulations, national policy and guidance and the targets of the National and South Dublin Climate Change Action Plans.

E3 Objective 1:

- To reduce the need for energy, enhance energy efficiency and secure the use of renewable energy sources in refurbished and upgraded dwellings, and other buildings through the design and location of new development, in accordance with relevant building regulations and national policy and guidance.

E3 Objective 3:

- To reduce the need for energy, enhance energy efficiency and secure the use of renewable energy sources in refurbished and upgraded dwellings, and other buildings through the design and location of new development, in accordance with relevant building regulations and national policy and guidance.

E3 Objective 4:

- To support and facilitate the actions and targets of the National and South Dublin Climate Action Plans where they relate to private and public buildings in the County.

ENERGY (E) Policy 4 – Electric Vehicles

It is the **policy** of South Dublin County Council:

- Promote the delivery of EV charging facilities in accordance with relevant regulations and national and regional policy and guidance

E4 Objective 1:
- To support the implementation of the EV charging strategy for the Dublin Region.

E4 Objective 2:
- To ensure that EV charging points are installed such that they do not cause significant obstruction to lower carbon forms of transportation

ENERGY (E) Policy 5 – Low Carbon District Heating Networks

It is the **policy** of South Dublin County Council:
- Support the delivery of low carbon district heating networks at appropriate locations across the County and subject to proven feasibility. Support also complementary technologies such as combined cooling, heat and power (CCHP), large scale heat pumps, and renewable energy opportunities, including geothermal energy, energy from waste, biomass and bio-gas;
- Support the investigation of both deep and shallow geothermal energy sources throughout the County. Deep geothermal projects are particularly suited to areas demonstrating high heat densities;
- Support the delivery of District Heating Proposals subject to proven feasibility within areas demonstrating heat demand density in excess of 150TJ / km2 (including for the identified areas of Low Carbon District Heating Potential in Tallaght, Clonburris / Grange Castle and Clondalkin). Future developments within these areas should connect into existing or confirmed District Heating Systems. Where a District Heating scheme has not been confirmed new development should be designed so that it can connect into such a scheme when one is delivered;
- Support for low carbon district heating networks is subject to the appropriate environmental assessments being undertaken to ensure no significant impact on the wider environment including human health.

E5 Objective 1:
- To future proof the built environment in Low Carbon District Heating Areas of Potential to enable the delivery of local energy networks and a move towards de-centralised energy systems.

E5 Objective 2:
- To ensure that all development proposals in Low Carbon District Heating Areas of Potential carry out an Energy Analysis and explore the potential for the development of low carbon district heating networks

E5 Objective 3:
- To support deep and shallow geothermal projects at appropriate locations across South Dublin subject to environmental assessment

E5 Objective 4:
- To support community energy grids and micro grids in the generation of electricity by renewable sources.

E5 Objective 5:
- To support the recording and monitoring objectives of the plan by incorporating an 'Energy Assessment Form' into the planning application process providing information relating to energy use within larger developments of over 20 residential units or 3000 sq m commercial or equivalent mixed use to include annual and peak demand for heat and electricity, floor area, BER rating, heating system details, details of renewables on site, EV charging details.

E5 SLO 1:

- To prioritise the development of low carbon district heating networks in the identified areas of potential for Low Carbon District Heating at Tallaght, Grange Castle / Clonburris and Clondalkin in line with Policy E5 and supporting objectives in the written statement.

ENERGY (E) Policy 6 - Waste Heat Recovery & Utilisation

It is the **policy** of South Dublin County Council:

- Promote the development of waste heat technologies and the utilisation and sharing of waste heat in areas where feasibility is proven for its use in the delivery of low carbon district heating technology.

E6 Objective 1:
- To require future proofing of and promote the development of waste heat technologies and the utilisation and sharing of waste heat where feasibility is proven for its re-use as part of a low carbon district heating network

E6 Objective 2:
- To promote the circular economy by generating energy through waste subject to environmental considerations.

ENERGY (E) Policy 7 – Solar

It is the **policy** of South Dublin County Council:

- Promote the development of solar energy infrastructure in the County, including the building of integrated and commercial-scale solar projects subject to a viability assessment and environmental safeguards including the protection of natural or built heritage features, biodiversity and views and prospects.

E7 Objective 1:
- To encourage and support the development of solar energy infrastructure for on-site energy use at appropriate locations in the County.

E7 Objective 2:
- To encourage and support the development of commercial-utility solar energy infrastructure for local distribution at suitable locations in the County

E7 Objective 3:
- To support and encourage the ongoing delivery of solar technology on Council owned buildings and sites in accordance with the South Dublin Climate Action Plan.

E7 Objective 4:
- To explore the potential for the development of solar PV Strategic Energy Zones in the County in accordance with the requirements of RPO 7.35.

E7 Objective 5:
- To ensure that planning applications for solar energy infrastructure which may impact on the operation of airports are referred to the IAA / Department of Defence or relevant airport authority

E7 Objective 6:

- To establish a GIS database of PV installations in the County at the appropriate time in tandem with the roll out of solar PV development. This should include data on the size (area of site in m2, total area of panels per m2), type (monocrystalline, tracking, PV, concentrated solar panels, domestic / commercial, etc.), grid connection details (location, kV, two-way metering, etc.) and energy generation (kW peak, annual kWh) of each installation.

E7 Objective 7:

- To support the provision of solar farms in the County in areas zoned RU subject to protecting environmental sensitivities.

E7 Objective 7:

- To support the installation of solar panels on up to 100% of residential roof space.

ENERGY (E) Policy 8 - - Wind Energy

It is the **policy** of South Dublin County Council:

- Recognise that wind energy has significant potential to help meet renewable energy targets at a national level subject to ensuring no adverse impact on the wider environment and review the wind energy potential for South Dublin having regard to the relevant guidelines and landscape character

E8 Objective 1:

- To review the current Wind Energy Strategy for the County during the lifetime of the Plan having regard to any updated Wind Energy Guidelines.

E8 Objective 2:

- To continue to assess planning applications against the current wind energy strategy (2016) until such time as a review of the strategy has been completed and approved, recognising that large scale wind energy developments are contrary to the strategy.

E8 Objective3:

- To encourage and support the provision of wind farms as part of an agricultural mix in suitable viable land areas zoned RU within the county in accordance with South Dublin County's Wind Energy Strategy

ENERGY (E) Policy 9 – Small to Medium Scale Wind Energy Schemes

It is the **policy** of South Dublin County Council:

- Encourage small and medium scale wind energy developments within industrial or business parks and support small community-based proposals for domestic use in urban areas that can encourage self-consumption on a community scale whilst feeding any surplus back to the grid, provided they do not negatively impact upon the environmental quality and visual or residential amenities of the area.

ENERGY (E) Policy 10 - Small Scale Hydro – Electrical projects

It is the **policy** of South Dublin County Council:

- Support the development of small-scale hydroelectric schemes in the County

E10 Objective 1:

- To support the roll-out of small-scale hydroelectric projects on the rivers, watercourses, freshwater dams and weirs across the County, where projects do not impact negatively on freshwater species, biodiversity and natural or built heritage features and to support and investigate potential sites.

E10 Objective 2:

- To support and facilitate the investigation of potential sites in the County for the generation of small-scale hydro-power.

ENERGY (E) Policy 11 – Green Infrastructure

It is the **policy** of South Dublin County Council:

- Implement the Council's Green Infrastructure Strategy as an essential element of building resilience to climate change whilst ensuring healthy placemaking and delivering on the compact growth approach, in accordance with National and Regional Policy and the National Climate Action Plan.

E11 Objective 1:

- To ensure the implementation of policy and objectives on tree planting, protection of trees on site and development management standards in relation to new development as set out in the Green Infrastructure, Heritage and Implementation Chapters of this plan.

ENERGY (E) Policy 12 –Decarbonising Zones

It is the **policy** of South Dublin County Council:

- Support the identification and development of decarbonisation zones in South Dublin over the lifetime of the Development Plan.

E12 Objective 1:

- To promote the generation and supply of low carbon and renewable energy alternatives

E12 Objective 2:

- To work with stakeholders to advance and implement decarbonisation zones in the County

E12 Objective 3:

- To ensure that all developments within the decarbonising zone commit to the aims of those zones in areas where they are identified within the County.

2.3. EU Legislative Initiatives

The Directive on Energy Performance in Buildings (EPBD), adopted in 2002, primarily affects energy use and efficiency in the building sector in the EU. Ireland transposed the EPBD through the Energy Performance of Buildings Regulations 2003 (S.I. 666 of 2006) which provided for the Building Energy Rating (BER) system to be administered and enforced by the Sustainable Energy Authority of Ireland (SEAI).

The Recast EPBD, adopted in May 2010, states that reduction of energy consumption and the use of energy from renewable sources in the buildings sector constitute important measures needed to reduce the EU's energy dependency and greenhouse-gas emissions. The directive aims to have the energy performance of buildings calculated on the basis of a cost-optimal methodology. Member states may set minimum requirements for the energy performance of buildings. The directive was transposed by the European Union (Energy Performance of Buildings) Regulations 2012 (S.I. 243 2012).

The recast EPBD requires Ireland to ensure, among other obligations, that:

- Building energy ratings are included in all advertisements for the sale or lease of buildings;
- Display Energy Certificates (DECs) are displayed in public and privately-owned buildings frequently visited by the public;
- Heating and air-conditioning systems are inspected;
- Consumers are advised on the optimal use of appliances, their operation and replacement;
- Energy Performance Certificates and inspection reports are of a good quality, prepared by suitable qualified persons acting in an independent manner, and are underpinned by a robust regime of verification; and
- A national plan is developed to increase the number of low or nearly zero energy buildings (NZEB), with the public sector leading by example.

Part 2 of the EPBD deals with Alternative Energy Systems and applies to the design of any large new building, where a planning application is made, or a planning notice is published, on or after 1st of January 2007. This calls for a report into the economic feasibility of installing alternative energy systems to be carried out during the design of the building. Systems considered as alternative energy systems are as follows:

- Decentralised energy supply systems based on energy from renewables
- Cogeneration i.e. Combined heat and power systems
- District or block heating or cooling, if available, particularly where it is based entirely or partially on energy from renewable sources
- Heat pumps

3. Energy Strategy Methodology

The aspirations of the developer can be summed up as follows:

- Achieve (as a minimum) Building Regulations (Part L) compliance
- Further reduce, as far as is feasible and reasonable, the primary energy consumption and CO_2 emissions of the proposed development through design measures; to achieve a BER of A rating building (VE Compliance 7.0.12.0 or iSBEM V5.5.h).
- Consider the potential to make use of decentralised and/or renewable energy resources
- Maximise energy performance points achieved if Sustainability Accreditation Scheme is pursued

3.1. Energy Hierarchy

In order to achieve these objectives, the following energy hierarchy (referred to as "Be Lean, Be Clean & Be Green") was used to identify and prioritise effective means of reducing carbon emissions:

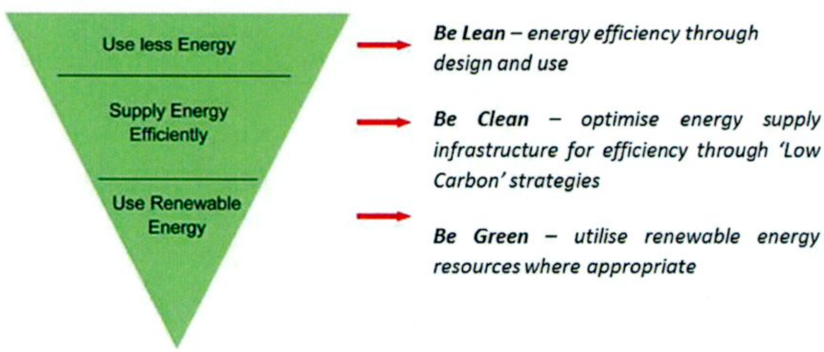


Figure 3: Energy Hierarchy

Ethos Engineering considers this hierarchy - a hierarchy proposed and/or endorsed internationally by many local authorities - to be well considered and an appropriate set of principles to adhere to in tackling climate change. In adopting the hierarchy, the primary energy use and CO_2 emissions reduction at each stage are maximised before strategies at the next stage are considered.

3.2. NEAP

The proposed development's primary energy consumption and carbon dioxide (CO2) emissions, including the services design, will be calculated using the NEAP (Non-Domestic Energy Assessment Procedure) methodology. The NEAP methodology sets out the procedures to reflect specialist processes when calculating the 'Energy Performance Coefficient' (EPC), 'Carbon Performance Coefficient' (CPC) and 'Renewable Energy Ratio' (RER).

Under Part L 2022, an NZEB Reference building has been specified, which defines the 'Maximum Permitted Energy Performance Coefficient' (MPEPC) and 'Maximum Permitted Carbon Performance Coefficient'(MPCPC). The Reference building is a high-performance building based on the same geometry as the actual design with 20% of its primary energy use met by renewables i.e. (heat pump)

In order to demonstrate that an acceptable primary energy consumption rate has been achieved, the calculated EPC will be no greater than the MPEPC of 1.0. Similarly, to demonstrate that an acceptable CO_2 emission rate has been achieved, the calculated CPC will be no greater than the MPCPC of 1.15.

The RER requires that 20% of the building primary energy use is met via renewable energy technologies. However, for higher performing buildings that achieve EPCs and CPCs ≤ 0.9 and 1.04 respectively, the RER is reduced to 10%.

3.3. SBEM

The Simplified Building Energy Model (SBEM) is a calculation engine designed for the purpose of indicating compliance with building regulations Part L with regard to primary energy usage from buildings other than dwellings. SBEM has certain limitations and is explicitly for benchmarking purposes; not a design tool.

Integrated Environmental Solutions (IES) Virtual Environment (VE) software provides an SBEM interface and has been used for the Part L and BER assessments conducted in this report. A detailed 3D model was constructed based on latest floor plans and elevations received from the architect and all building fabric and M&E inputs (detailed later in this report) are based on the current preliminary design received from the design team; these are subject to change during detailed design.

The proposed development has been assessed using the SBEM interface in the IES software which demonstrates Part L compliance in accordance with NEAP. SBEM inputs are detailed in Appendix 2 of this report.

3.4. Application of Part L to Industrial / Datahall Buildings in Campus setting

Applying Building Regulations Part L 2022 to industrial / warehouse / datahall buildings requires a nuanced approach.

There are several documents which should be considered and which provide guidance concerning the application of the regulation as follows:

- TGD Part L 2022 Conservation of Fuel and Energy

- SEAI NEAP Survey Guide
- TGF Part F 2019 Ventilation

3.4.1. TGD Part F 2019 Ventilation

TGD Part F Ventilation defines what is an 'occupiable space' in a building:

Occupiable room: A room in a building other than a dwelling, occupied as an office, workroom, classroom, hotel bedroom or similar room but does not include a bathroom, sanitary accommodation, utility room or rooms or spaces used solely or principally for circulation, building services, plant or storage purposes.

The Admin Office in this building is an 'occupiable space' and because of this, it is expected to be heated and would therefore trigger the application Part L 2022. NEAP modelling would include this space. Even if heating was removed completely, the NEAP modelling guidance requires that a 'default' system be modelled as a worst case.

Part L provides guidance in relation to industrial buildings in section 0.1.4.3.

3.4.2. TGD Part L 2022 – Unheated Buildings

0.1.1.4 The guidance given in this Technical Guidance Document applies to buildings designed to be heated to temperatures appropriate for ***human occupancy****. Less demanding standards could represent reasonable provision in those buildings or* ***parts of buildings*** *with a low level of heating or where heating provision is not intended.*

Low level of heating is considered to be where there is an installed heating capacity of less than 10W/m² and zones are not designed to be heated to temperatures appropriate for human occupancy. This includes buildings where ***heating and cooling systems are not provided****, or are provided to only heat or cool a localized area rather than the entire enclosed volume of the space concerned e.g. localized radiant heaters at a workstation in a generally unheated space. A low level of heating can also be considered to apply where spaces are heated to a level substantially less than those normally provided for human comfort e.g. to protect a warehouse from condensation or frost. In these situations all fixed building services should meet the guidance for heating systems in section 1.4 or 2.2. Fabric should have a U value appropriate for the heating system provided and in no case greater than 0.7 W/(m²K) for opaque fabric.*

If a part of a building with low energy demand is partitioned off e.g. a ***heated office in an unheated warehouse then the fabric of the heated partitioned area should meet the guidance for fabric from sections 1.3 or 2.1.*** *Where the occupancy level or level of heating required when in use cannot be established at construction stage, the building should be treated as fully heated and the provisions of Part L applied accordingly. It should be noted that the provisions of Part L apply where a material change of use occurs and such a change of use may require specific construction measures to comply with Part L. These measures may prove more costly than if carried out at the time of initial construction.*

In all cases the energy consumption, Carbon Dioxide emissions and energy from renewable sources for new buildings should be modelled in NEAP.

This outcome of the above paragraph is that the whole building – Admin Office and Datahall – is modelled in NEAP, even though the warehouse can be considered as an unheated space. Other unheated spaces onsite such as Generator Plant space and any substations are also included in NEAP modelling,

3.4.3. TGD Part L 2022 – Specialist Process

0.1.1.5 The guidance provided in this document for space heating, cooling, ***lighting*** *and ventilation systems are appropriate for typical conditioned spaces intended for human occupancy. Where a building has* *specialist processes, alternative operational procedures or ventilation requirements other than those required for human occupancy different performance specifications may be appropriate.*

In the context of this section "specialist processes" can be taken to include any activity or operational profile where the resulting need for ***heating, hot water, ventilation or air conditioning*** *is significantly different to that required for human occupancy.*

The Energy Performance Coefficient (EPC), Carbon Performance Coefficient (CPC) and Renewable Energy Ratio (RER) calculations use the NEAP activities database for occupancy, heating, cooling, ventilation, air conditioning, lighting, equipment parameters and profiles.

The Renewable Energy Ratio calculation should exclude the ***heating, ventilation and air conditioning system*** *demands determined by specialist process requirements, together with the plant capacity, or proportion of the plant capacity, provided to service specialist processes.*

The NEAP methodology sets out the procedures to reflect specialist processes when calculating the Energy Performance Coefficient, Carbon Performance Coefficient and Renewable Energy Ratio.

It should be noted from the above that even where parts of the building have specialist process areas, the lighting associated with this still needs to be considered and regulated by Part L. While there are specialist process areas in this building, however, the NEAP modelling of the datahall area will include the lighting in this space. Generator Plant space and other substation plant space lighting are also included.

3.4.4. TGD Part L 2022 – Campus Developments

1.2.2 Where a building or campus contains more than one new building, reasonable provision would be to show that:

- every individual new building should meet the minimum provision from renewable energy technologies specified in paragraph 1.2.1 above; or
- the average contribution of renewable technologies to each new building other than a dwelling in the development or campus should meet that minimum level of provision.

This allows for the option of achieving compliance on a campus basis, i.e., all units can be modelled as one for Part L Compliance. Renewables could feasible be installed on certain buildings in the development, allowing other buildings to achieve compliance. However, the current approach is for standalone building unit compliance.

3.4.5. Industrial Building

Ethos considers this building as 'industrial' as per the definition below from the Planning and Development Regulations:

"industrial building" means a structure (not being a shop, or a structure in or adjacent to and belonging to a quarry or mine) used for the carrying on of any industrial process;

"light industrial building" means an industrial building in which the processes carried on or the plant or machinery installed are such as could be carried on or installed in any residential area without detriment to the amenity of that area by reason of noise, vibration, smell, fumes, smoke, soot, ash, dust or grit;

"industrial process" means any process which is carried on in the course of trade or business, other than agriculture, and which is-

(a) for or incidental to the making of any article or part of an article, or

(b) for or incidental to the altering, repairing, ornamenting, finishing, cleaning, washing, packing, canning, adapting for sale, breaking up or demolition of any article, including the getting, dressing or treatment of minerals,

and for the purposes of this paragraph, "article" includes-

(i) a vehicle, aircraft, ship or vessel, or

(ii) a sound recording, film, broadcast, cable programme, publication and computer program or other original database;

4. Be Lean: Demand Reduction

4.1. Passive Solar Design

Passive solar design is of upmost importance in large commercial buildings where cooling constitutes a significant portion of the energy demand. Minimising unnecessary/unwanted solar gains is one of the most effective ways to reduce cooling energy requirements. The building will be designed in line with section 1.3.5 of Part L 2022 "Limiting the effects of solar gain in summer" which requires that;

- Buildings should be designed and constructed so that:
  - those occupied spaces that rely on natural ventilation do not risk unacceptable levels of thermal discomfort due to overheating caused by solar gain, and
  - those spaces that incorporate mechanical ventilation or cooling do not require excessive plant capacity to maintain the desired space conditions.
- For the purposes of Part L, reasonable provision for limiting solar gain through the building fabric would be demonstrated by showing that for each space in the building that is either occupied or mechanically cooled, the solar gains through the glazing aggregated over the period from **April to September** inclusive are no greater than would occur through one of the following glazing systems with a defined total solar energy transmittance (g-value) calculated according to I.S. EN 410: 2011.
  - For side lit spaces, an east-facing façade with full width glazing to a height of 1.0m. having a framing factor of 10% and a G-value of 0.68.
  - For top lit spaces, a horizontal roof of the same total area that is 10% glazed (based on internal roof area) with roof lights having a 25% framing factor and a G-value of 0.68.

Meeting the solar gain criteria in Section 1.3.5 is not an assessment of the internal comfort condition of the building as many other factors have a bearing on comfort e.g. internal heat gains, occupancy level, thermal capacity and ventilation. For this reason, Section 1.3.6 of Part L 2021 "Limiting Overheating" recommends that the design should comply with the thermal comfort criteria set out in CIBSE TM52 to ensure overheating is avoided for normally occupied naturally ventilated spaces. A thermal comfort analysis for proposed naturally ventilated design will be carried out to demonstrate compliance with CIBSE TM52 as per solar part L report.

To achieve the criteria set out in sections 1.3.5 and 1.3.6 of Part L 2021 it is recommended that a glazing G-value of 30% as outlined with blinds as per the solar Part L report is specified while glazing VLT (Visible Light Transmittance) should be kept above 70%. This is to ensure that the reduction in solar heat gain has a minimal impact on daylight entering occupied spaces; as the design intent is to achieve adequate daylighting in perimeter zones. Thus, electric lighting will be a supplementary lighting source, reducing both the electricity demand for lighting and the associated internal heat gain from lighting, which further reduces the risk of overheating.

The proposed façade design minimises solar heat gain via a combination of glazing specification, spandrel panels and local shading fins on the East, South and West façades. The proposed façade design was developed over an iterative process of verification against the Part L criteria in IES.

4.2. Building Fabric

The new development will be designed and constructed to limit heat loss and where appropriate, limit heat gains through the fabric of the building. In order to limit the heat loss through the building fabric the thermal insulation for each of the plane elements of the development will meet or exceed the minimum area weighted average elemental U-values as specified in Part L 2021. Table 1, lists the targeted U-values of the proposed design.

Table 1: Fabric U Values to meet Part L 2022

Building Element	U-value (W/m²K)
Roof (Office Area)	0.20
Roof (Warehouse)	0.20
Wall Cladding – Office - External (Inclusive of all cladding/rainscreen systems)	0.21
Wall Cladding –Warehouse - External (Inclusive of all cladding/rainscreen systems)	0.21
Semi exposed Wall from Office to adjoining Unheated Warehouse	0.21
Floor – Ground Contact – Office area [1]	0.21
Floor – Ground Contact – Warehouse	0.21
Curtain Wall - Glazed curtainwall screen	1.40
External windows	1.40
External personnel doors[2]	1.40
Warehouse Dock Door	1.50

[1] Semi-exposed floor/ceiling over unheated spaces such as plant areas, ESB substations, etc. must be insulated. **N.B.** The ESB will not permit insulation in the substation. Dropped slab required or else secondary slab to be installed over sub. "Nothing, other than painted concrete allowed in substation".

[2] A high-usage entrance door, as defined in Part L 2021, may achieve a relaxed U-value of 3.0W/m²K. High-usage entrance doors should be equipped with automatic closers and be protected by a lobby.

*Maximum elemental U-value detailed in Table 1 of Part L 2021
**As per the preliminary Solar Gain Assessment Result

4.2.1. Building Envelope Air Permeability

In addition to fabric heat loss/gain, reasonable care will be taken during the design and construction to limit the air permeability (or Infiltration). High levels of infiltration can contribute to uncontrolled ventilation. Part L 2022 requires an air permeability level no greater than 5m³/m²/hr @50Pa for new buildings. The design intent will be to achieve an air permeability of **3m³/m²/hr @50Pa** for the admin office area which represents a reasonable upper limit of air tightness.

Air Tightness in the warehouse to be carried out under 'Special Case Building' criteria under the ATTMA guidelines. The building will be inspected & letter of compliance issued for air permeability of less than **$5m^3/hr/m^2$@50Pa**.

4.2.2. Thermal Bridging

To avoid excessive heat losses and the risk of local condensation problems, reasonable care should be taken to ensure continuity of insulation and to limit local thermal bridging, e.g., around windows, doors and other wall openings, at junctions between elements and other locations. In general, thermal bridges should not pose a risk of surface or interstitial condensation which can lead to mould growth.

The key factor used in assessing the risk of mould growth or surface condensation in the vicinity of thermal bridges is the temperature factor (fRsi). To limit the risk of surface condensation or mould growth, fRsi should be greater than or equal to a critical value (fCRsi); dependent upon the internal and external environments and applies generally to the whole of the internal surface.

Additional heat loss associated with thermal bridges is accounted for in calculating energy use and CO2 emissions using the NEAP methodology via linear thermal transmittance (ϕ, Psi-value). See Appendix D of Part L 2022 for further information in relation to thermal bridging and its effect on building heat loss and how this is taken account of in NEAP calculations.

4.3. High Efficiency HVAC System

Full mechanical Heating, Ventilation and Air Conditioning (HVAC) systems will be utilised in this building due to the high occupancy level and deep floor plates which means that a natural ventilation strategy is not feasible. However, the mechanical HVAC strategy is to minimise energy associated with space conditioning through the use of high efficiency systems, heat recovery and the efficient control of both ventilation rates and of heating and / or cooling supply.

4.3.1. VRF System

Variable Refrigerant Flow (VRF) or Variable Refrigerant Volume (VRV) (depending on manufacturer) is an air source heat pump that increases operational efficiency by modulation of cooling capacity at room/zone level. The basic idea is that a large outdoor unit serves multiple indoor units connected by refrigerant pipework. Each indoor unit controls its refrigerant supply to match the demand of the space it serves. The outdoor unit also varies its output to match the communal demands of all the indoor units served by it. Thus, at any point in a system there will be a variable volume of refrigerant flowing.

The most sophisticated VRF systems can have indoor units, served by a single outdoor unit, in both heating and cooling modes simultaneously. This mixed mode operation leads to energy savings as both ends of the thermodynamic cycle are delivering useful heat exchange. It should be noted that this perfect balance of heating and cooling demand is unlikely to occur for many hours each year, but whenever mixed mode is used, energy is saved. Where deep floor plans are present, it is possible that internal units could be in cooling mode and perimeter units in heating mode which would allow for mixed mode operation and very high COPs. Units are now available to deliver heat removed from space cooling into hot water for domestic hot water.

VRF/VRV systems are not classed as a 'renewable' source of energy despite the use of heat pump technology but can be linked to other renewable sources of energy such as water based geothermal, solar thermal or solar PV. Typical VRF manufacturers state a cooling SEER of 6.0-8.0 and a heating Seasonal COP of 5.0-6.0 when installed in an office environment located in Ireland.

4.3.2. AHUs with 2 stage heat recovery

The admin office area in these Industrial / Warehouse units will be provided with fresh outdoor air via a Dedicated Outdoor Air System (DOAS). This Air Handling Unit (AHU) will have two stage heat recovery using a thermal wheel and an integrated heat pump.

Thermal wheel technology offers heat recovery between two air streams. A thermal wheel, also known as a 'rotary' or 'regenerative' heat exchanger, is a system of heat transfer which involves a single rotating wheel with high thermal capacity located within the supply and exhaust air streams of an Air Handling Unit (AHU). Its rotation allows the recovery of sensible and latent energy from air that would otherwise be lost to the atmosphere. This energy is used to pre-heat (or cool) the incoming fresh air.

This development will take the heat recovery thermal wheel technology a step further by gaining further heat recovery using an integrated heat pump. These AHU will combine thermal wheel technology with an air-to-air packaged heat pump. This means that levels of heat recovery within the AHU have removed any need for heating or cooling coils and reduces the capacity of the central plant by a significant margin. The integrated Air to Air heat pumps achieve very high SCOP and SEER efficiencies due to the almost constant temperature of the tempered air after the thermal wheel.

There is also the possibility to capture wate heat from the data hall and use to heat the administration block as part of an overall reuse of waste heats strategy with the potential to interface with future local authority developeddistrict heating networks

4.3.3. Domestic Hot Water (DHW) Production

An air to water heat pump system e.g. Mitsubishi Ecodan type system will provide domestic hot water via a dedicated calorfier. The hot water will be plumbed to the sanitary ware and will include a secondary hot water return pump. The efficiency of the system proposed will be certified to EN16147.

4.3.4. Specific Fan Power Reduction

All ductwork will be adequately sized and service routes optimised to minimise fan power requirements. All SFPs will comply with Part L 2022 Table 6.

4.3.5. Variable Speed Pumps and Ventilation Fans

All pumps and fans will be specified with variable speed drives and constant pressure control. This means that these items of mechanical plant will run at partial load most of the year rather than at the peak design load. This has obvious energy savings. Pumps will comply with the Energy related Products (ErP) Directive. All electric drives will be classed as IE3 'Premium efficiency' under EN60034-30:2009 which is a legal requirement since 1st January 2017.

4.3.6. Insulation of Hot Water Storage Vessels, Pipes and Ducts

All hot water storage vessels, pipes and ducts (where applicable) will be insulated to prevent heat loss and in accordance with Appendix G TGD Part L 2022. Adequate insulation of hot water storage vessels will be achieved by the use of a storage vessel with factory applied insulation tested to BS 1566, part 1:2002 Appendix B. Water pipes and storage vessels in unheated areas will be insulated for the purpose of protecting against freezing. Technical Guidance Document G and Risk report BR 262, Thermal insulation avoiding risks, published by the BRE will be followed.

4.3.7. Air Conditioning System Zone Control Strategy

The heating system will be zoned and sub circuited to allow for areas that are not in use to be turned off. The systems will be zoned to allow defined areas work outside normal hours and will have time scheduling on the intelligent control system.

4.3.8. Metering and Sub Metering

Metering is an effective way to raise awareness of energy use and to bring about behavioural change by the building owners and occupiers. Sub metering of all major HVAC energy uses will be integrated with the Building Management System (BMS). Metering will include automatic monitoring and targeting with alarms for out-of-range values.

4.4. High Efficiency Electrical Systems

4.4.1. Low Energy Lighting Solutions

Energy efficient lighting should maximise the use of natural daylight, avoid unnecessarily high illuminance, incorporate the most efficient luminaires, control gear and include effective lighting controls. These good practice design principles will be followed during the detailed design stage of the proposed development.

LED lighting will be considered for all building areas as the most energy efficient and practical solution, offering the lowest achievable Lighting Power Density (LPD). Table 3 indicates the LPDs that will be targeted by the design.

PIR occupancy control will be used for lighting in areas that will have intermittent occupancy. Daylight sensors will be applied to perimeter zones with high lux levels and generous glazing e.g. Reception. All lighting control will target a parasitic energy demand no greater than 0.05W/m².

The lighting system will have provision for metering with a warning for 'out of range' values.

Table 2: Lighting Power Densities and Control

Element	lumen per circuit Watt	Control	Parasitic Load (W/m²)
Data hall	133	PIRs in all applicable zones	0.05
Staircore areas	130		
Circulation & Storage areas	129		
Toilets & Showers areas	110		
Office Areas	124		

4.4.2. Power Factor Correction

Most electrical equipment creates an inductive load on the supply which requires a magnetic field to operate, and when this magnetic field is created, the electricity current will lag the electricity voltage, i.e. the current will not be in phase with the voltage. Power Factor Correction compensates for the lagging current by applying a leading current, reducing the power factor to close to unity. Power factor correction >0.95 will be installed on the incoming electricity supply.

4.5. Sustainable Energy Design Initiatives

4.5.3. Waste Heat Recovery

Data storage equipment generates heat and this heat must be removed from the space in order to prevent the space from overheating and damaging the equipment.

The data storage rooms are supplied with fresh air which is sufficient to cool the data storage rooms for the majority of the annual running hours. For a small number of hours during the peak cooling season, adiabatic cooling is required.

The system utilises Air Handling Units (AHU's) to supply air directly from outside to the data storage rooms. The air is warmed as it passes across the IT servers located in the data storage rooms, and subject to external ambient conditions, this air is either recirculated or exhausted to atmosphere.

The proposed development has the potential to introduce heat recovery coils within the AHU, the return air will exchange with the waste heat primary circuit, thereby reducing the supply air temperature to the hall and simultaneously providing hydraulic heat to a district heating network, which KIC will take to the site boundary for the benefit of neighbouring sites who want to avail of this.

4.5.4. Water demand reduction & Rainwater Harvesting

To reduce both energy and water use in its data centre facilities, the Operator utilises direct evaporative cooling systems, which predominately utilise outside air to cool servers.

Thanks to this innovative cooling solution, the proposed data centre buildings are projected to demand as little as 0.75 l/s of water on average for each of the three C buildings and 0.50 l/s for the B building. The proposed buildings are designed to harvest a significant portion of the annual cooling water requirements through rainwater harvesting, reducing the water used from the local supply from the first year of operation.

The data storage rooms are supplied with fresh air which is sufficient to cool the space for the majority of the annual running hours. For a small number of hours during the peak cooling season, adiabatic cooling is required.

Adiabatic cooling uses rainwater as primarily supply and mains water utility as a back-up at ambient temperature conditions to provide cooling on peak cooling days. The system does not require chillers/compressors which minimises the use of electrical power to maintain the data storage room environmental conditions.

The rainwater harvesting is considered and may be utilised from the data centre roof throughout the year for the water to be available during those hottest periods during summer months when adiabatic cooling may be needed. The harvested rainwater will be utilised to offset the demand from Irish Water. Subject to yield studies, this has the potential to reduce the demand on the Irish Water network significantly.

5. Be Clean: Reduce On-Site Fossil Fuel Reliance

With the greening of the ESB grid with increased levels of wind farm connectivity, the use of electricity as a fuel source for heating and cooling the building was examined, along with other options to reduce the reliance on fossil fuel use on-site. The use of biofuel Combined Heat and Power was examined. Biogas would need to be used in order for both heat and power to be accounted for in Part L. The availability of biogas is limited currently, and would require further investigation.

The use of the multi-pipe heat pump provides the opportunity to provide all heating and cooling efficiently using electricity. This reduces the reliance on fossil fuels, and is a 'green' technology under the TGD Part L 2022, listed as one renewable energy option to meet the requirements of NZEB.

5.1. District Heating Network

While the data center is designed to enable a district heating connection, it is worth noting that there are currently no local district heating networks in the area. This means that the building's heating system is currently not connected to a central heating plant that can supply heat using a network of pipes. However, it is important to note that the building's design is forward-thinking and adaptable, meaning that it can easily be connected to a district heating network should one become available in the future.

6. Be Green: Low or Zero Carbon Technologies

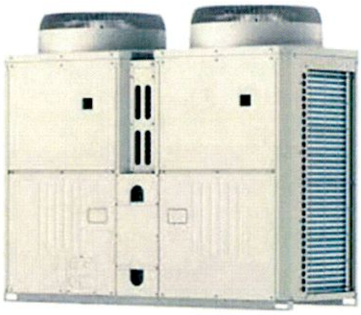
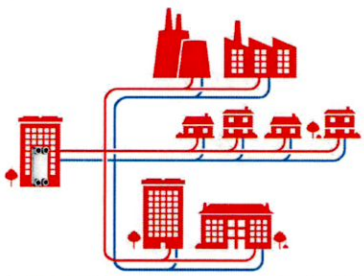
Following a low or zero carbon (LZC) technologies feasibility study it has been concluded that none of the LZC technologies considered were applicable or suitable to the proposed development.

Following a Low or Zero Carbon (LZC) technologies feasibility study, it has been concluded that 4-pipe heat pump chillers and solar Photovoltaic (PV) are the most suitable renewable energy technologies to the proposed development.

Table 3: LZC Feasibility

Technology	Feasibility			Comments
	H	M	L	
Micro Wind 			✓	Micro wind turbines can be fitted to the roof of a building but would contribute a negligible amount of energy to the development. Due to the urban nature of the site, these have been deemed unviable for this site. Vertical axis wind turbines may be more suited to this building, but there would be the obvious aesthetic and potential noise issues.
Wind Power 			✓	Mast-mounted wind turbines can be located in an open area away from obstructions such as buildings and tall trees. Due to the urban location of the site, and its location close to other tall buildings it is deemed that a large wind turbine installation is not feasible.
Solar PV - Roof mounted 	✓			Photovoltaic (PV) Cell technology involves the conversion of the sun's energy into electricity. PV panels can be discrete roof-mounted units or embedded in conventional windows, skylights, atrium glazing, façade cladding etc. Currently there is provision for 50kWe of Solar PV in the masterplan
Solar hot water systems		✓		Active solar hot water technology uses the sun's thermal radiation energy to heat fluid through a collector in an active process. Solar thermal would be considered feasible due to the low DHW demand for offices.

Technology	Feasibility			Comments
	H	M	L	
				Solar thermal systems typically have a payback greater than 10 years and also require regular maintenance. Additionally, they would not be compatible with the preferred ASHP solution. For these reasons, solar thermal has been discounted as an option.
Biomass Heating 			✓	Biomass boilers work on the principle that the combustion of wood chip or pellets can create heat for space heating and hot water loads. This technology requires space allowance in a boiler room, access for delivery trucks, a thermal accumulator tank and considerable space for fuel storage of wood chips or pellets. The system also requires regular maintenance to remove ash etc. The use of biomass calls for a continuous local supply of suitable fuel to be truly sustainable. Concerns exist over the level of NOx and particulate emissions from biomass boiler installations, particularly in urban areas. Moreover, such a system is most suitable as an alternative to oil or solid fuels where natural gas is not available.
Ground source heat pump (GSHP) Closed loop 		✓		GSHP technologies exploit seasonal temperature differences between ground and air temperatures to provide heating in the winter and cooling in the summer. GSHP systems are most efficient when delivering low temperature heat and high temperature cooling, suitable for underfloor heating or chilled beams. Additionally, there should be a good balance between heating and cooling loads to allow for high COPs and reasonable capital payback. Site restrictions would require the use of vertical boreholes as opposed to horizontal ground loops, increasing the capital cost of any GSHP system. GSHP technology would need further investigation during detailed design and would depend on a favourable ground Thermal Response Test.

Technology	Feasibility			Comments
	H	M	L	
				Additionally, capital costs are high and ideally, there should be a good balance between heating and cooling loads to allow for high COPs and reasonable capital payback. While a well-designed GSHP system operating under favourable conditions can achieve better efficiencies than an ASHP system, the capital cost difference may still outweigh potential energy savings.
Multi-Pipe Air source heat pump (ASHP) 	✓			ASHP technologies exploit seasonal temperature differences between external air and refrigerant temperatures to provide heating in the winter and cooling in the summer. ASHP systems use more electricity to run the heat pump when compared to GSHP, but as most of the energy is taken from the air, they produce less greenhouse gas than conventional heating systems over the heating season. Their COP can reduce to below 2.0 when outside air temperatures are ≤0°C and they can require additional energy for a defrost cycle. Additionally, they require access to outdoor air and need to be located either at ground or roof level. A VRF heat pump in heating mode is operating as an ASHP, thus heating from a VRF heat pump system contributes towards meeting the RER requirement under Part L 2021. An ASHP will also provide LPHW heating and also Domestic Hot Water to office areas.
District Heating 	✓			The building is capable of interfacing with district heating should the opportunity arise in nearby development. Heat can be recaptured from the data halls an utilise to heat the administration block and exported to local authority district heating networks should they become available

7. NEAP Calculation

The adoption of an energy hierarchy is an important step towards achieving sustainable and efficient building design. In this context, NEAP (National Calculation Methodology for Energy Performance of Buildings) calculations have been carried out for the EDC DUB06, with the aim of demonstrating compliance with Part L regulations and guiding the design towards achieving the targeted NZEB performance.

To accurately measure the effectiveness of proposed design measures, it is crucial to establish a baseline reference point. To this end, a base case scenario was assessed, which involved using the same building geometry, building fabric, and M&E services that meet the minimum requirements stipulated by Part L.

The NEAP analysis revealed an Energy Performance Coefficient (EPC) of 0.58 and a Carbon Performance Coefficient (CPC) of 0.58, along with a Renewable Energy Ratio (RER) of 0.17. These results are indicative of compliance with the Part L criteria for energy performance, and they set a benchmark against which the impact of design measures can be measured.

Overall, the NEAP calculations and analysis are an important step towards achieving a sustainable and efficient design for the EDC DUB06, with the ultimate aim of reducing energy consumption, minimizing carbon emissions, and achieving Part L compliance.

APPENDIX 2: SBEM INPUTS

The NEAP calculations are based on the following inputs:

- **Office Building Fabric Performance**
  - External Wall U-value = 0.21 W/m²K
  - Internal Partition to WH = 0.21 W/m²K
  - Ground/Exposed Floor U-value = 0.21 W/m²K
  - Flat Roof U-value = 0.20 W/m²K
  - Glazing U-value = 1.40 W/m²K
  - Glazing G-value Office = 0.32 (32%)
- **Office Building Air permeability** = 4.0 m³/m²/hr at 50 Pa
- **Warehouse Building Fabric Performance**
  - External Wall U-value = 0.21 W/m²K
  - Ground/Exposed Floor U-value = 0.21 W/m²K
  - Flat Roof U-value = 0.20 W/m²K
- **Warehouse Building Air permeability** = 5.0 m³/m²/hr at 50 Pa
- **Thermal Bridging** = Default (see table 2)
- **Ventilation Office area**
  - HRU = 1.30 W/l/s
  - Heat Exchanger Efficiency = 80%
  - Extract rate Toilets/Changing = As per Mechanical Specification
- **HVAC system in Office area / SER / ECX (VRF)**
  - Air conditioned via VRF PURY-P750YSNW-A1
  - SCOP Heating = 6.00 (Part L)
  - SEER Cooling = 8.5 (Part L)

- **HVAC system in WCs/ Service Corridor**
  - LPHW SUZ-SWM80VA
  - SCOP Heating = 3.275
- **Domestic Hot Water Heating**
  - DHW = Heat Pump
  - SCOP Heating = 3.7
    - Storage volume = 300L
    - Storage losses = 0.00870
- **Lighting**
  - Office building = As per Table 2
  - Warehouse = As per Table 2

- Sub metering of major M&E systems = Yes
- M&E metering warns "out of range" values = No
- Lighting systems have provision for metering = Yes
- Lighting metering warns "out of range" values = No (Monitoring & Targeting system)
- Power Factor correction = Yes (>0.95)

- **Photovoltaic** = **30 kWp**

APPENDIX 3: BRIRL Output Document

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 all aspects of Part L is a legal requirement. Demonstration of how compliance with every aspect is achieved may be sought from the Building Control Authority.

EDC DUB06

Date: Tue Apr 25 12:27:41 2023

Administrative information

Building Details

Address: EDC DUB06, Address 2, Address 3, Address 4, Co. Carlow, Eircode

NEAP

Calculation engine: SBEMIE

Calculation engine version: v5.5.h.2

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: 7.0.20

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: Vincent Collins

Telephone number: Phone

Email: vincentcollins@ethoseng.ie

Address: Apex Business Centre, Blackthorn Road, Sandyford, Co. Carlow, D18 DH76

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	7.1 kgCO2/m2.annum
Calculated CO2 emission rate from Actual building	4.2 kgCO2/m2.annum
Carbon Performance Coefficient (CPC)	**0.58**
Maximum Permitted Carbon Performance Coefficient (MPCPC)	**1.15**
Calculated primary energy consumption rate from Reference building	36.7 kWh/m2.annum
Calculated primary energy consumption rate from Actual building	21.2 kWh/m2.annum
Energy Performance Coefficient (EPC)	**0.58**
Maximum Permitted Energy Performance Coefficient (MPEPC)	**1**
Renewable Energy Ratio (RER)	**0.17**
Minimum Renewable Energy Ratio	**0.1**

Heat Transmission through Building Fabric

Element	**$U_{a\text{-}Limit}$**	**$U_{a\text{-}Calc}$**	**$U_{i\text{-}Limit}$**	**$U_{i\text{-}Calc}$**	**Surface with maximum U-value***
Walls**	0.21	0.21	0.6	0.21	L0000003_W1
Floors (ground and exposed)	0.21	0.15	0.6	0.21	L0000006_F
Pitched roofs	0.16	-	0.3	-	"No heat loss pitched roofs"
Flat roofs	0.2	0.2	0.3	0.2	L0000003_C
Windows, roof windows, and rooflights	1.6	1.4	3	1.4	L000000A_W1_O1
Personnel doors	1.6	1.4	3	1.4	L000000A_W1_O0
Vehicle access & similar large doors	1.5	-	3	-	"No ext. vehicle access doors"
High usage entrance doors	3	-	3	-	"No ext. high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m2K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m2K)]
$U_{i\text{-}Limit}$ = Limiting individual element U-values [W/(m2K)]
$U_{i\text{-}Calc}$ = 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	4.66

ETHOS | sustainability

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