NZEB & Part L Planning Compliance

For the

Mechanical and Electrical Services Installations

At

32A-35 James Street, Dublin 8

For

Cherry Core Limited &
Jasmine Perfection Limited

Date of Issue: 19/11/2020 Version: 0.0

axiseng. consulting engineers 47 Mount Street Upper, Dublin 2, DO2 AC95, Ireland. Phone +353 1 491 0044 info@axiseng.ie

Document History

Version No.	Description	Prepared By	Reviewed By	Date
0.0	Planning Submission	EN	RMK	19/11/2020

Contents

1. Planning Overview

Cherry Core Limited & Jasmine Perfection Limited intend to apply to An Bord Pleanala for permission for a housing development.

The development consists of demolition of the existing 2-3 storey industrial and commercial buildings on site and construction of a 'build-to-rent' development comprising 189 no. apartments (151 no. 1-bedroom apartments, 34 no. 2-bedroom apartments and 4 no. 3-bedroom apartments) and associated ancillary facilities accommodated in 3 no. blocks ranges in height from 3-8 storeys.

2. Executive Summary

With consideration to the EU energy performance of Buildings Directive (EPBD), the Building Regulations Technical Guidance Document, Part L (NZEB), and Dublin Local Authorities strategy for sustainable design and reductions in energy and carbon emissions; the building services design strategy in the proposed development building is to utilise sustainable design options and energy efficient systems that are technically, environmentally and economically feasible for a project of this kind.

Nearly Zero Energy Building (NZEB) means a building that has a very high energy performance and is designed to nearly zero or very low amount of energy required to be covered by energy from renewable sources produced on-site or nearby.

The NZEB compliance assessment is based on following on the Building Regulation 2019 Part L, Conservative of Fuel and Energy – Dwellings. Where the different requirement is included the setting of minimum energy performance requirement for buildings to achieve Nearly Zero Energy Buildings.

The current Dwelling Energy Assessment Procedure (DEAP) software preliminary calculation software and Part L of the 2019 Building regulation were used as the basis of this exercise.

3. Introduction

Axiseng were commissioned by Cherry Core Limited & Jasmine Perfection Limited to carry out Nearly Zero Energy Building (NZEB) assessment on proposed Build to Rent apartment building site at 32A-35 James' Street, Dublin 8.

The building includes the following number of energy conservation measure in aiming to achieving best energy performance as possible as following;

- High-performance construction envelope including low u-value and g-value
- Air tightness construction
- Localised Heat Pump system to each apartment
- Mechanical ventilation with Heat Recovery
- Low installed lighting power

The inputs used to perform the analysis are summarised in the following section. This report details the proposed design solution used in the analysis and the calculation of the building performance metrics used to show indicative results whether it is in compliant with the NZEB under the regulation.

The department of housing, planning and local government have released a Part L of the 2019 Building regulation which proposes an amendment to Regulation L3 (b), available to be downloaded from below link;

https://www.housing.gov.ie/sites/default/files/publications/files/tgd_l_dwellings_2019.pdf

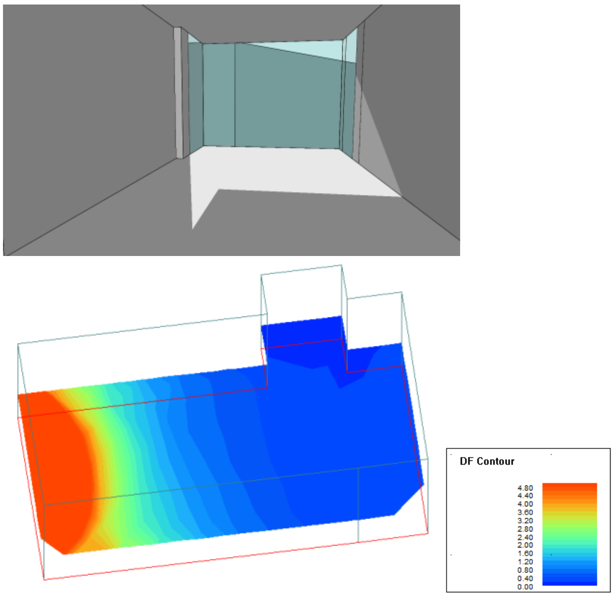
Based upon new Part L, the new version of the Dwelling Energy Assessment Procedure (DEAP) software v4 is released by the Sustainable Energy Authority of Ireland (SEAI). For the purpose of NZEB assessment, the calculation workbook spreadsheet aligned to DEAP software v4 has been published and has been used to assess the NZEB requirement for Marmalade proposed development.

Under new Part L document, the renewable energy ratio (RER) has been revised to 0.2, which mean 20% of the primary energy delivered to the proposed residential development must be contributed by renewable energy technologies, setting the precedent challenge for the proposed development.

4. Design Inputs

The sustainable design of the proposed development presents an opportunity for each apartment compartment performs energy efficiently and meets the NZEB challenges. The following table outline a list of different elements taken through passive and active measures, which has been design to reduce energy, carbon emission, and cost through buildings lifecycle. The following table highlights the proposed inputs utilised in the DEAP assessment for an apartment compartment identified in development building;

Measures	Description	Outcome
High Performance Construction Fabric	The construction u-values set out for dwelling building is lower than u-values requirement set out in the building regulation 2019. U-value (W/m²k) Window = 1.0 (g-value 0.5) Wall = 0.15 Roof = 0.15 Floor = 0.13 A number of passive solar design has been considered including the window design option to maximising daylight and solar heat gains during winter to reduce the artificial lighting and space heating load. The high-performance wall, roof, and glazing is being considered and selected to minimise the heat transfer into the internal spaces. Aside from the reduction in heating energy consumption and carbon emissions, the reduction in loads results in reduced central plant capacity and size. This has the net effect of reducing embodied energy consumption associated with manufacture and transportation associated with the plant, as well as the reduced input from the national electricity grid for heating	Minimise heat loss and gain impact on heating requirement all-time during year, thus lowering energy and carbon footprint impact.
Air Tightness Construction	The building will be designed to ensure it is in compliant with the building regulation and achieving air tightness between 2 - 3 m3/(h.m2) or 0.10 - 0.15 ach infiltration.	Minimise heat losses through the building fabric thus lowering heating load.
Thermal Bridging	The limitation of thermal bridging will be achieved in according with guidance under section 1.3.3 within technical guidance Part L regulation, where provision for thermal bridging is made in accordance with guideline. To account for thermal bridging allowances for additional heat loss, it is assumed construction elements between the junction will be designed to achieve allowance less than 0.08 (W/m2k) factor.	Minimise heat losses at junctions between construction element, thus lowering energy consumption and carbon emission. Air permeability and thermal bridging inputs should be reviewed

	When the detail of construction element between junction are known, the transmission heat loss coefficient shall be calculated using the psi values based on construction details.	to allow a reduction in thermal qualities of the façade elements.
Daylight & Lighting	Provision of natural daylight in buildings creates a positive environment by providing connectivity with the outside world, and assisting in the well-being of the building inhabitants. Daylight also represents an energy source - reducing the reliance on artificial lighting. The provision of full-height glazing on the elevations maximise the use of natural daylight to enhance visual comfort, without compromising thermal performance.  Figure: An example of Daylight modelling & daylight factor, in typical apartment room taken from radiance toolkit, IESVE software Majority of lamps selection will be based LED type (A+ Rated bulb) located externally, and internally in circulation spaces, bedroom, lobby, living/dining etc in 30-35% reduction in electrical energy usage. It is assumed the total wattage power for each apartment compartment is 395 watts.	Reducing lighting electricity energy consumption, thus reducing carbon emission footprint overall. Enhance healthier residence environment the use of natural daylight. Minimise the time in controlling the lighting system, thus reducing cost. Free heating from solar load, reducing heating load.
	Ventilation System Each apartment compartment is to be fitted with balanced mechanical ventilation with plate heat exchanger recovery. The plate heat exchanger efficiency is 85%.	Heat recovery via warm air from wet room and kitchen to allow for heat transfer to incoming air thus reduce the heating load requirement in the apartment compartment, thus

HVAC system	The specific fan power of mechanical ventilation box is to be selection upon based on rating of less than 0.29 (w/(l/s)).	increasing heating plant operating performance overall.
	Heating system Each apartment proposed to have air to water pump for hot water load and space heating. These units will sit locally within the apartment and utilising exhaust air from the apartment to pre-heat domestic hot water with immersion back up.	
	Hot Water System & Appliances All hot water taps including the shower head fitting in the proposed development are to be fitted with intelligent water flow regulators to all for full water flow until the discharge rate reaches six litres per minute, to allow for the conservation of water usage as well as energy used to heat hot water. The water use target for hot and cold will be less than 125 litres per day per person. This can be achieved by a combination of low water usage devices in apartment unit. Water storage tank will be fitted with factory insulation with thickness up to 40mm to minimise heat loss.	Minimise hot water usage, thus reducing heating energy load and increasing heating plant operating performance and reducing the cost.
Building Energy Management System	Central BMS – check metering (heating) of all individual floors to monitor & optimise substantive energy use. The energy management system will continuously review and fine-tune the operational efficiencies and strategy for the various building services, significantly reducing clients' overall energy consumption and carbon footprint, and reducing energy costs.	Continuously energy monitoring allows for further energy saving quantified through building lifecycle thus lowering overall cost and carbon footprint.
Result	BER	A2

4.1 Design Forecasting

While the current design model is based on hot water heat pump system solution to achieve Part L and NZEB compliance and taking into account design progress in energy efficient solutions a number of alternative solutions had been reviewed during the planning stage energy modelling process.
When the design moves into further detail stages the latest technologies will be further reviewed to ensure the most effective solution for the project is utilised. Adhering to planning conditions & building regulations, alternate M&E systems may be explored for the scheme.

5. Results

The results show that the number of proposed apartment units has an Energy Performance Coefficient (EPC) between 0.22 and 0.28 which is less than the maximum permitted energy performance coefficient

(MPEPC) of 0.3. The results show that the number of proposed apartment units has a Carbon Performance Coefficient (EPC) between 0.23 and 0.28 which is less than the maximum permitted energy performance coefficient (MPEPC) of 0.35. The result shows renewable energy ratio target is achieved with results ranging between 0.3 to 0.35 in a number of apartment units.

6. System Overview

6.1 Exhaust Air Heat Pump Overview

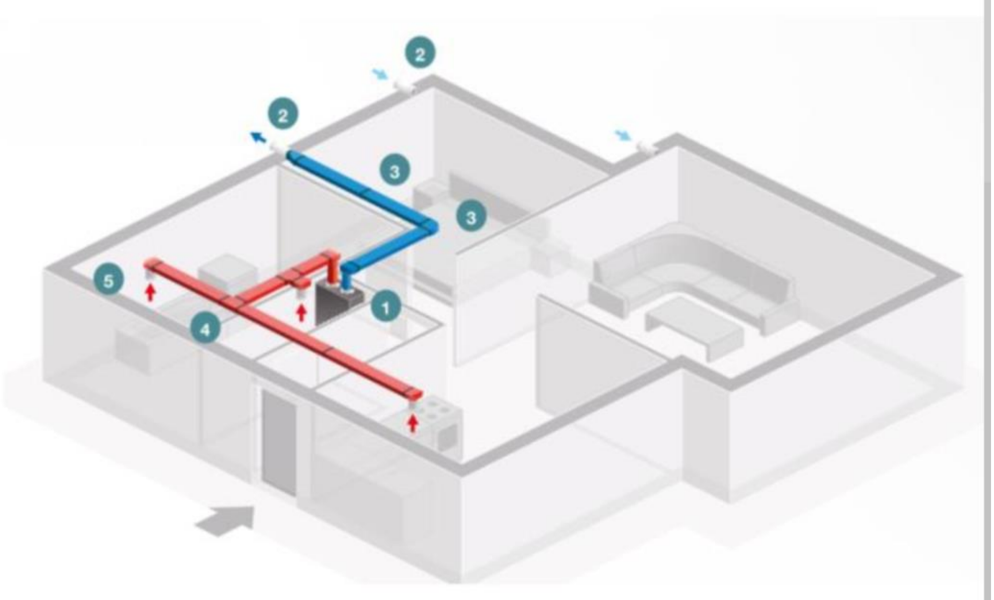
An exhaust air heat pump solution comprises of a heat pump unit located within the apartment which is ducted to outside. It uses heat from internal rooms such as bathroom and utility rooms to heat the water within a cylinder. This is then distributed to the hot water outlets within the apartment.

The operation of the heat pump varies seasonally. During winter when temperatures drop below a certain level, typically 4 degrees, it is more efficient to use the electrical immersion. During mid-season and summer months, hot water is typically generated over night to reduce energy costs.

The system does not require the same plant and riser space associated with a district heating scheme however it does require an area within the utility space to be installed.

The use of a heat pump solution means that the end user can control who they purchase their energy from.

Within the scheme there will be a requirement to access each apartment to carry out periodic routine maintenance.



An example of Joule Victorium A4 system built-in

6.2 Dimplex Electric Heating

During the detail design stage, the Dimplex system will be reviewed also, with the actual calculated Uvalues achieved and may be used as an alternate design solution to EAHP, once compliance is met.

The Dimplex system uses a combination of an air heat pump & mechanical heat recovery ventilation to meet the renewable elements of NZEB. The air heat pump is used for generating hot water and the mechanical heat recovery ventilation is used to provide ventilation whilst maintaining a high level of air tightness in the building.