Energy Statement

for

Proposed Development

at

Barnhill, Dublin 15

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Prepared By:	**Richard McElligott**
Email:	**richard@mcelligott.ie**
Tel:	**01 426 0099**
Website:	**www.mcelligott.ie**

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1. Introduction

Alanna Homes and Alcove Ireland Four Limited are applying for planning permission to develop lands at Barnhill, Dublin 15 south of the Hansfield Strategic Development Zone and the Dunboyne to Clonsilla Railway Line. The proposed development comprises the demolition of existing vacant industrial buildings, construction of 1,243 no. residential units, a creche, village centre, railway plaza providing access to Hansfield railway station; land set aside for a primary school, a public park, a series of pocket parks, plus all ancillary site development works. A full description of the development is provided in the Planning and Design Statement which accompanies the planning application.

The residential units consist of a mix of unit types as detailed below with buildings ranging in height from 2-storeys to 12-storeys.

Unit Type	No. of Units
1 bed apartment	148
2 bed apartment	589
3 bed apartment	63
4 bed apartment	4
1 bed duplex	5
2 bed duplex	20
3 bed duplex	92
3 bed house	286
4 bed house	36

This report identifies the energy standards with which the proposed development will have to comply with and also sets out the overall strategy that will be adopted to achieve these energy efficiency targets. The dwellings will be required to minimise overall energy use in accordance with Part L of the Building Regulations, Conservation of Energy & Fuel.

This design input provided by McElligott Consulting Engineers during the pre-planning design stage and the production of this report represents compliance with Objective EN09 of the Fingal Development Plan 2017 to 2023.

2. Building Regulations Part L & NZEB

Part L of the Building Regulations sets out requirements in relation to the conservation of fuel and energy. Part L was updated in 2019 to include the Energy Performance in Buildings Directive ('EPBD') requirement for Nearly Zero Energy Buildings.

The definition for Nearly Zero Energy Buildings in the EPBD is:

"a very high energy performance, as determined in accordance with Annex 1. 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".

In line with the EPBD directive, a cost-optimal analysis was carried out to define NZEB requirements. Part L of the Building Regulations defines the requirements in legislation and DEAP (Dwelling Energy Assessment Procedure) software demonstrates compliance with the nearly zero energy performance requirements.

The Energy Performance of Buildings Regulations 2021 (S.I. 393 of 2021) came into effect on 27th July 2021. The main provisions of these regulations are:

- Electric Vehicle (EV) Recharging Infrastructure for new buildings and buildings undergoing Major Renovation with more than 10 parking spaces.
- Building Automation and Control Systems (BACs) and EV Recharging Points (for buildings with more than 20 car parking spaces), for existing non-residential buildings by 2025.
- Self-regulating devices in new buildings, and in existing buildings when heat generators are replaced.

Building energy has been long understood as contributing a major component of greenhouse gas emissions which was acknowledged within the 2030 Communication published by the European Commission (2014) which stated that "*the majority of the energy-saving potential (for the EU) is in the building sector.*" The EU Energy Performance of Buildings Directive (the 'EPBD') set out the target that all new developments should be Nearly Zero-Energy Buildings (NZEB) by the end of 2020, with the intention having been that all public buildings be in accordance with this by the end of 2018. A Nearly-

Zero Energy Building is defined as having *"very high energy performance*", with Article 2 of the EPBD outlining that "*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 latter understood to refer to district heating systems and centralised plant arrangements.

Interpretation and implementation of these statements within the directive are at the discretion of each EU Member State in accordance with their "*National, Regional or Local considerations*" and thus the definition of NZEB itself varies greatly between different countries. For new dwellings in Ireland, NZEB is equivalent to a 25% improvement on the 2011 Building Regulations. It requires the following as calculated in DEAP:

- Maximum Permitted Energy Performance Coefficient (MPEPC) of 0.3
- Maximum Carbon Performance Coefficient (MPCPC) of 0.35
- Renewable Energy Ratio (RER) of 20%

These requirements are set out in the Technical Guidance Document supporting Part L of the Building Regulations.

All of the apartments and houses in the proposed development will be subject to the NZEB requirements of the Part L of the Building Regulations, that will be in effect. In terms of energy ratings all of the units on site will have a BER rating A2 / A3. With the fabric performance of the materials to be used in construction there are no more energy reductions gains to be achieved. The majority of the thermal energy used within the residential units will be for the generation of HWS for sanitary purposes and a number of solutions are being considered. The benefits of each system are outlined later in this report.

The measure of compliance with Part L of the Building Regulations is demonstrated using the DEAP software. A revised version 4.2 of the software has now been issued and this will formally allow Building Energy assessors to confirm the NZEB standard has been achieved. Carbon generation and energy consumption figures for all new dwellings have been revised downwards with the net result that these apartments will have to use 30% of the energy that the equivalent unit, built to the prevailing 2005 standard would have used. The renewables contribution in each house is now a percentage, 20%, of the overall energy density that the dwelling requires. This is rather than the flat rate of 10 kWh/m2 per year but based on the simulations run to date this appears to be working out to the same level.

The primary aim of Part L is to further reduce the energy used in homes. After transport the residential sector is the biggest energy sector in the country. In 1990 domestic units accounted for 31% of the energy demand in the country but by 2016 this had dropped to 23% and over the next 10 years between new builds and deep retro fits this figure could drop by the same again. Aside from the residential aspect to the project the applicant is applying for a number of ancillary non domestic units (creche, medical centre, retail outlets, office hub, café and community centre). These units are subject to the non-domestic Part L Building Regulations but these will be constructed to the higher residential fabric performance values. Most of these units will be completed to a shell and core finish by the developer, as the final occupier requirements will be specific to their activities.

3. Building Fabric

The building fabric elements that will be used in the construction of the apartments will achieve the following performance

- Walls 0.18W/m2K
- Roof 0.16 W/m2K
- Windows 1.4 W/m2K
- Floors 0.16 W/m2K

The specified air tightness for the dwellings is to achieve an air tightness level of 3 air changes an hour or better. With the heat recovery ventilation systems to be fitted in each unit the gains in thermal performance become quiet marginal below this level. In a similar vein the approved construction details will achieve a minimal thermal bridging factor of 0.08. The net impact of these combined criteria is that the heat losses associated with the apartments will be below 25% of the total thermal demand.

3.1 Passive Solar

The proposed development in Barnhill has good exposure to daylight and this feeds in to the setting out and extent of the windows to be provided. There are a number of confliction aspects to daylight that have been balanced by the architect. Adequate daylight needs to penetrate the apartment to support the wellness of the environment and this needs to be balanced against the U values impact of the openings. At the same time there is a growing awareness of the level of solar gain that windows allow into the space and while solar gain is welcome in reducing the energy needed for space heating, during the summer can lead to prolong period of overheating internally. The quality and performance of the glass will be investigated prior to construction to optimise its performance against these different variables. Please refer to the Daylight/Sunlight Analysis undertaken by 3D Design Bureau which accompanies the planning application.

3.2 Lighting

Currently there is a bias, encouraged by the DEAP software to fit low energy bulbs, but this is revised in the new 4.2 version to reward the installation of LED light fittings. This is one of the more accessible routes to gaining NZEB compliance. An LED light source will last at least twice as long as a low energy bulb and use about half of the energy. Another advantage of the LED bulbs is that their low energy demand correlates with less heat rejected to the space and adding to the potential of overheating.

3.3 Space Heating and Controls

Demand associated with space heating is now a minor aspect of energy demand, especially in apartments. In order to effectively and accurately manage these losses while still maintaining comfort conditions it is necessary to have accurate and fast acting heating controls. The controls will be at a level to get the highest DEAP rating (time and temperature control) and we expect with the systems to be used on site that this will be achieved on a room-by-room basis.

4. Renewable Energy

Since 2008 and the introduction of the European Performance of Building Directive it has been mandated that each dwelling unit must generate a portion of their energy demand. From that time to this the proportion of energy to be delivered has been at a fixed rated of 10 kWh/m2 per year. For the standard of build and resulting energy rating this equated to about 10 to 15% of the DEAP assessed energy demand of the house. In 2019 this fixed deliverable now represents over 20% of the energy needed in a dwelling.

With this in mind the NZEB Regulations are calling up a percentage of the primary energy used in a dwellings and this will reward the better built houses. In reality designers and builders will still need to over supply the renewable energy contribution in order to meet the Energy Performance Criteria of 0.3 as compliance hinges around either the ability to generate hot water (for sanitary purposes) using a heat pump with a related COP of over 230% or providing sufficient photovoltaic capacity to lower the imported energy into the unit. A summary of the various renewable solutions available is:

- Solar Thermal
- Solar Photovoltaic (PV)
- Wind power
- Combined Heat and Power
- Heat pumps

5. Windows

When assessing the energy efficiency of a window, the frame has a bigger impact on the U value than the glass, effectively it is the weakest link in the thermal performance of the overall assembly. PVC framing material performs better than aluminium, having improved insulation qualities. At the point of manufacture the embodied energy of uPVC is 80 MJ/kg whereas the equivalent aluminium figure is 170 MJ/kg, a reduction of over 50%. Both aluminium and u PVC windows have similar U values but on a like for like basis uPVC is better, this is related to the previous point about energy efficiency performance.

A typical uPVC window will have a U value of 1.2 W/mK and its aluminium equivalent will be 1.33 W/mK. Another consideration is the impact of the window system on the overall building is sound. uPVC frames have a better noise attenuation property than aluminium. The party walls in the apartments need to comply with acoustic criteria in Part E of the Building Regulations and it makes sense that the windows should contribute to the quiet ambience within. uPVC frames will facilitate less sound transfer into the apartment than the equivalent aluminium frame.

The lifespan of both aluminium and PVC is similar at circa 35 years. Aluminium frames depend on their paint cover, minimum of 70 microns, for protection whereas the PVC frame material is designed to be exposed and does not require an outer protective layer. There is an initial cost differential between aluminium and PVC windows. The aluminium units are more costly but this is compounded over the lifetime of the units.

It is important that the paint on the aluminium frames is kept intact and the colour as initially selected. Realistically the frames will have to be painted every 10 years. This maintenance cost is not associated with the PVC frames. PVC is genuinely maintenance free and the colour of the frames is ingrained through the material.

6. Utility Infrastructure

A significant component to developing the setting out of large-scale residential schemes is accommodating the requirements of the ESB. There are a number of ESB parameters which are well established and influence the initial site development in tandem with this there are two other aspects that directly impact the sub-station configuration. Over the last couple of years, the ESB have adjusted and settled upon how they want electrical meters located and isolated. Basements are not acceptable and it is not always possible to accommodate the meter clusters adjacent to the core entrances in a manner that meets all the criteria (clearances, throwback distances, fire man's isolation, etc.).

More fundamentally the ESB are planning their sub stations to accommodate the electrical loads and profiles associated with new schemes. With electric car charging the associated power demand is greater than the internal domestic load and with the majority of cars being charged at night the profile is much less diversified. The net result of this is the ESB will require a number of substations and these will need to have an adjoining switch room to provide the isolation and distribution needed to serve the scheme.

The substations will need to be adjacent to a carriageway to allow the ESB to access them in the event there was a transformer failure. Incorporating the substation into the building is not viable as it would have a very adverse impact on the elevation, sterilise a corresponding footprint below it in the basement and unsettle occupier of units adjoining it. Please refer to the infrastructure layouts which accompany the planning application.

7. Electric Car Charging

Currently providing EV charging solutions to individual apartment dwellers with basement or surface parking areas is difficult as the car parking space is not in immediate proximity to the apartments metered supply. For this reason the EV charging point needs to be powered from an alternative source other than the individual apartments metered supply. An individual apartment dweller may also not hold two separate electricity supply accounts, this is due to the fact the ESB will only issue one MPRN per address. The only alternative viable option is to supply the EV charging point from a 3rd party (charging provider or landlord) supply.

Due to the fact the EV charging points are not tied to any apartment meters, an interface system such as "Go Charge" will need to be implemented in order to manage usage and payment for use of any given charging point. The proposed strategy will be that each EV customer wishing to avail of the on site car charging points will need to register with "Go Charge". Once the customer has an active account, they will be able to avail of any of the charge points open to the public by simply using an app on their phone to enable the charge point to activate.

The developer will provide car charging points at the outset to the quantity required by a planning authority, at a combination of allocated and non-allocated (visitor and disabled parking) spaces. Thereafter, where a resident wishes to install a charge point at their designated parking space, they can apply to the SEAI for the grant, this can be passed to the management company, who will then install the infrastructure required to complete the installation and setup of the EV charging point for the customer.

8. Proposed Systems Outline

Measure Proposed	Description	Benefit
Space Heating	For the apartments on the scheme there are a number of low energy solutions being assessed and will be either: • Install local exhaust air heat pumps for the generation of HWS. This is the majority energy burden in the apartments as space heating losses have almost been designed out. • Due to the high fabric performance levels there is the option of using small capacity electric heaters. These would give room by room control and are easily web enabled.	The local exhaust air heat pump would have the lowest operating cost, negligible transmission losses and can be incorporated fully within each unit. Cost effective solution without the need for piping. There is no renewable aspect to this system and would necessitate PV panels on the roof

Measure Proposed	Description	Benefit
Heat Recovery Ventilation	With the current best practise building methodology to be used at Barnhill, the units will achieve an air tightness level of $3m^3/m^2.hr$ or better. While this is advantageous for limiting heat loss it is still important to ensure a supply of fresh air and removal of stale and humid air. The heat recovery ventilation (HRV) unit does this by extracting air from the "wet" rooms and supplying fresh air to the living spaces via a ducting network. Each system is dedicated to the apartment it serves.	Ventilation has a significant bearing on well being and the sustained ventilation rates delivered by a HRV system give quantifiable air flow rates to rooms and this ensures humidity is controlled and carbon dioxide levels are low. The most obvious benefit is that the outgoing stale air heats up the incoming fresh air, reducing the heat load of the apartment. The importance of controlled ventilation by mechanical systems is now being reflected in the proposed new Part F Regulations but the solution proposed for the Northwood units will be at the top end of this scale.

Measure Proposed	Description	Benefit
Heat pumps	Air to water heat pumps are being considered and they have gained significant traction in the last 8 years in the Irish market. Heat pump operation would be optimise to improve seasonal efficiency and selected to have generate HWS at the top end of the scale to ensure NZEB targets are met.	As heat pumps are an all electrical solution they can utilise the sustainable electrical energy delivered to the grid by wind power. Occupiers are advised to have their heat pumps on standby all of the time, trickle charging the house, and this allows them to use electricity at night, when at a lower rate and may otherwise go to waste.
E Car charging	The adoption of electric cars is now in the main stream and with the proximity of this site to work and leisure destinations the occupiers are more likely to opt for electric cars. Please refer to the separate outline issued with this package on the e car charging strategy	Please refer to the separate outline issued with this package on the e car charging strategy .