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Development at Cuirt na Coiribe, Galway

Energy Statement

Exeter Property III Limited

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Quality information

Prepared by	Checked by	Verified by	Approved by
Eoin Doohan Associate Director	Keith Fitzpatrick Associate	Raymond Reilly Associate Director	Raymond Reilly Associate Director

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Prepared for:

Exeter Property III Limited

Prepared by:

Eoin Doohan
Associate Director
T: +35312383100
E: Eoin.Doohan@aecom.com

AECOM Ireland Limited
4th Floor
Adelphi Plaza
Georges Street Upper
Dun Laoghaire
Co. Dublin A96 T927
Ireland

T: +353 1 238 3100
aecom.com

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1. Introduction

The purpose of this document is to outline the proposed energy conservation approach / strategy for the Cuirt na Coiribe Development, Headford Road, Galway. The goal of this strategy will be to provide high efficiency, low energy, sustainable student accommodation to minimise the carbon footprint of this development and provide an exceptional living environment.

Reducing carbon dioxide emissions into the atmosphere to reduce impact on climate change is one of the major objectives of sustainable development. This document will outline the energy efficiency measures, on site generation and embedded renewable energy strategies that could be adopted to substantially reduce the energy demands and carbon emissions, arising from fossil fuel use, from the proposed development at Cuirt na Coiribe.

2. Design Basis

2.1 Part L of the Building Regulations & Nearly Zero Energy Buildings (NZEB)

The EU Energy Performance of Buildings Directive (EPBD), transposed into Irish Law from 2006 onwards, contains a range of provisions to improve the energy performance of new and existing buildings. It is the main European legislative instrument to improve energy performance of buildings within the EU. In 2010 the EPBD was recast to include the requirement that member states should ensure that all new buildings are 'Nearly Zero- Energy Buildings' by the 31st December 2020.

'Nearly Zero-Energy Buildings', or NZEB, means a building that has a very high energy performance, as determined in accordance with Annex I of the EPBD. 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 actual energy performance to meet NZEB standards are set by the member states using cost optimal analyses and guidelines set by the EU Commission.

To meet these requirements the Department of Housing, Planning and Local Government (DHPLG) have updated Part L of the Building Regulations for Domestic and Non Domestic Buildings as follows:

- A revised Part L of the Building Regulations (to incorporate NZEB) for Buildings Other Than Dwellings was issued and transposed in to Irish law in 2017.
- A revised Part L of the Building Regulations (to incorporate NZEB) for Dwellings was issued and transposed in to Irish law in 2019.

Some of the improvements over previous Part L Regulations include:

- For building other than dwellings an improvement in performance of the order of 50% to 60% over TGD Part L 2008
- For buildings other than dwellings provision of a renewable Energy Ratio of 20% (i.e. 20% of all energy used on site must come from renewable sources on site or nearby)
- For dwellings a reduction in the Energy Performance Coefficient (EPC) from 0.4 to 0.3 (an improvement in performance of 25%)
- For dwellings amendments to the renewable energy provisions
- Increased thermal performance of the building fabric (lower U values and air permeability)
- Changes in the Dwelling Energy Assessment Procedure (DEAP) including more emphasis on hot water efficiency
- Changes to the Non-Domestic Energy Assessment Procedure (NEAP)

- More emphasis on energy efficient lighting design
- Increased requirements for renovation projects
- Improved Mechanical & Electrical Services and Lighting specifications.

The regulations represent a marked improvement in building standards with respect to energy efficiency. The revised Part L Regulations will heavily influence the design of Cuirt na Coiribe and will form the main design basis for the project. Where economically and practically feasible the design will aim to exceed the requirements of the revised Part L.

The implementation of Part L regulations appropriate to either Dwellings or Buildings Other than Dwellings will be dependent on the final servicing strategy for the development, and will be confirmed at the next phase of the design.

2.2 Galway City Council Development Plan

Galway City Council (GCC) has published an extensive development plan for the city covering the period 2017 - 2023. Chapter 9 'Environment and Infrastructure' outlines the council's objectives and policies in improving energy efficiency in the built environment and promoting the use of renewables. The design for Cuirt na Coiribe will include allowances to meet the Councils policies outlined in the development plan, particularly Policy 9.5 (Sustainable Building Design and Construction). Some of the design options to deliver the objectives and policies are outlined in this report.

2.3 Other Standards

Other design standards which will be used in the design include:

- CIBSE guides, technical notes and other documentation
- ASHRAE guides
- Relevant Irish Building Regulations
- Relevant Irish, British and European standards

3. Approach

3.1 Introduction

Building energy efficiency and sustainability involves all designers and stakeholders from the start of the design process. The most successful sustainable sites are those which keep energy efficiency and sustainability at the core of the project from design through to construction.

The 4 main principles to achieve energy efficient buildings are:

Reduce: Reduce energy consumption by passive and active means, for example improving building fabric and utilising low energy equipment.

Reuse: Reuse energy where possible by recovering waste energy where possible.

Renewables: Utilise renewable technologies to offset energy from fossil fuel technologies.

Rethink: Constantly rethink and refine the energy strategy and approach.

The potential strategies outlined in this report are based around these principles.

3.2 Passive Energy Reduction

3.2.1 New Build Elements and Extensions

The first step to implementing a low energy design on the Cuirt na Coiribe development will be to reduce the energy required to heat the development using passive means. The main passive energy reduction measure on new build elements and extensions will be the specification of a high performance building fabric including high specification u values for building elements such as walls, glazing, roof and floors. Infiltration losses account for a significant proportion of the total heat loss of buildings and the air tightness details of the development will be carefully developed to minimise infiltration losses. Thermal bridges also contribute a significant proportion of building heat loss and thermal bridges at junctions will be carefully detailed to reduce these losses.

Careful design of glazing (particularly on south facing facades) has the potential to reduce the heating consumption of the development by maximising solar heat gain. The glazing specification shall maximise solar gain while minimising heat loss. While maximising solar gain can reduce heating consumption it can cause overheating issues. In recognition of this overheating assessments will be carried out during the design and mitigation measures (for example blinds) will be provided where required to prevent overheating.

3.2.2 Existing Buildings

For existing elements upgrade of the building fabric, including the wall, floor & ceiling insulation and the glazing specifications, will be reviewed at the next stage of design. Upgrades will be considered where it is economically and practically feasible.

3.3 Heating & Renewable Strategies

The heating and renewable energy strategy will have the most significant impact on the energy conservation approach for the Cuirt na Coiribe development. For new build and extended areas heating and renewable energy systems will be provided in a modular fashion (with dedicated heating and renewable systems per dwelling / apartment). For existing areas the existing modular systems will be retained or, where applicable, upgraded in line with the requirements of Part L of the Building Regulations.

In this section some of the heating and renewable solutions that will be considered for the Cuirt na Coiribe development are described. All of these systems will be examined in detailed during the design stage to examine plant space requirements, fuel sources, cost benefit analyses and life cycle analyses.

3.3.1 Heat Pumps

A number of different heat pump technologies are available. All of the heat pump technologies will deliver all or a proportion of the renewable energy of the development as required under Part L of the Building Regulations.

A Mono-Bloc heat pump (MBHP) will provide the apartments / dwellings with heating and hot water. Hot water is provided indirectly via a hot water storage cylinder. No refrigerant pipework enters the apartments / dwellings if a Mono-Bloc heat pump is installed. An external heat pump unit is required.

A Split-Bloc heat pump (SBHP) will provide the apartments / dwellings with heating and hot water. Hot water is provided indirectly via an integrated hot water storage cylinder. There is an indoor unit and an outdoor unit when a Split-Bloc heat pump is installed with connecting refrigerant pipework entering the apartments / dwellings. The integrated hot water cylinder offers energy efficiency benefits over the Monobloc heat pump.

An Exhaust Air Heat Pump (EAHP) unit works by passing the warm extract air from the ‘Wet Rooms’ across the heat exchanger of the heat pump to generate hot water. The EAHP is typically a self-contained unit within the apartments / dwellings. No external equipment is required.

An Air to Air Heat Pump (AAHP) will provide the apartments / dwellings with heating using a ducted system. Hot water is provided indirectly via an integrated hot water storage cylinder. There are an indoor units and outdoor units when an Air to Air heat pump is installed with connecting refrigerant pipework entering the apartments / dwellings. The integrated hot water cylinder offers energy efficiency benefits over the Monobloc heat pump.

3.3.2 Other Renewable Systems

Photovoltaic (PV) systems use solar energy to generate electricity for use in the development or for export to the grid. PV panels can be fixed on the roof tiles or integrated into the roof. PV systems could be used in conjunction with electric heating in both new and existing areas or be supplementary to heat pump systems.

Solar thermal systems utilise solar energy to generate domestic hot water using either 'Evacuated Tube' or 'Flat plate collectors'. These collectors can be fixed on the roof tiles or integrated into the roof. As with PV systems, solar thermal could be used in conjunction with electric heating in both new and existing areas or be supplementary to heat pump systems.

All of the options above will be able to provide heating and/or hot water to the apartments / dwellings whilst having relatively low maintenance requirements. They will also significantly contribute towards meeting Part L Requirements.

3.4 Domestic Water Usage

One of the notable characteristics of modern high efficient residential developments is that domestic hot water use now accounts for a much larger proportion of total heating consumption as fabric heating requirements reduce. Therefore there is significant energy saving potential by implementing strategies to reduce domestic hot water usage. The design for Cuirt na Coiribe will seek to reduce hot water consumption insofar as possible. Some of the measures that will be considered included minimising domestic hot water storage losses, the use of low use water fittings and the reduction of circulation losses.

To reduce overall water use rainwater harvesting will be considered to provide water for toilet flushing and other suitable uses (e.g. irrigation if applicable). This will be examined further at the next stage of design.

3.5 Lighting

Lighting also accounts for a significant proportion of energy consumption in buildings. The strategies that will be employed in the design of Cuirt na Coiribe to reduce the energy consumption from lighting will be:

- Careful lighting design in apartments / dwellings and common areas to provide adequate lux levels while eliminating over provision / over design of lighting
- Selection and specification of low energy use light fittings through including LED's where practical
- Careful specification of lighting controls which may include occupancy sensing, daylight sense and smart lighting control systems.

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