

Bernard Smith Consulting Engineers Ltd.
Bracetown Business Park
Clonee
Dublin 15.

T. +353 (0)1 8014127
E. info@bernardsmith.ie
W. www.bernardsmith.ie



Bernard Smith
Consulting
Engineers

Sustainability / Energy Statement

for the proposed New Residential Developments at

Windmill, Clonsilla, Dublin 15

Table of Contents

1	Introduction	2
2	Proposed Engineering Strategy.....	3
2.1	Regulatory Requirements	3
2.2	Minimising Energy Requirements & Maximising Energy Efficiency	4
2.3	Building Energy Rating Assessment	4
3	Renewable Energy Technology.....	6
3.1	Heat Pump Technologies	6
3.2	Photovoltaic (PV) Panels.....	6
3.3	Ventilation System	7
4	Electric Vehicle Infrastructure.....	8
4.1	Electric Car Charging Infrastructure.....	8
5	Conclusion	9

1 Introduction

This Energy Statement aims to provide an overview of the energy strategy for the proposed development at Windmill, Clonsilla, Dublin 15. The statement looks at the key objectives set out by The Fingal Development Plan 2017 - 2023 in terms of sustainability and energy and how they will be implemented into this development.

In an effort to minimise energy consumption, a number of sustainable design features will be included. The objective is that the development will be designed in an energy efficient manner that minimises energy demand through passive strategies, such as, an energy efficient envelope.

For the purposes of this report a Building Energy Rating (BER) assessment has been carried out on a typical apartment in the development. This allows targets to be set for the development in terms meeting Part L Building Regulations by achieving A2 rated dwellings which are NZEB compliant. It also sets targets for renewable energy, energy efficient lighting and sustainable heating and ventilation systems. The BER assessment has been based on the new Technical Guidance Document L – Conservation of Fuel and Energy – Dwellings (2019) which has been derived from the EU Energy Performance of Buildings Directive (2010/31/EU) which promotes energy performance of buildings and contains an objective that all new buildings shall be nearly zero energy consumption buildings by 31st of December 2020.

This energy statement describes the technologies used in the BER assessment and shows how the development ties in to the over all Fingal Development Plan.

2 Proposed Engineering Strategy

The following outline of the proposed engineering strategy shows how we aim to achieve objective EN04 of The Fingal Development Plan 2017 – 2023

Objective EN04

To seek to improve the energy efficiency in developments in accordance with the Building Regulations Part L (Conservation of Fuel and Energy) and exceeding these standards where possible.

2.1 Regulatory Requirements

All dwellings within the development will be designed and constructed to ensure that the energy performance of the building is such as to limit the amount of energy required for the operation of the dwelling and to limit the amount of carbon dioxide emissions associated with this energy. This will be achieved by ensuring the dwellings are designed in accordance with Part L Technical Guidance Document.

The new Part L Technical Guidance Document 2019 has just been published. The new version requires all new dwellings to be 'Nearly Zero Energy Building (NZEB)' standard which means they must have a very high energy performance. The new regulations apply to works, or dwellings in which a material alteration or change of use or major renovation commences or takes places, as the case may be on or after 1st of November 2019. The following design for this development will be based on the new Part L Technical Guidance Document 2019.

The new Part L of the Building Regulations is aimed at improving the energy performance of dwellings in Ireland. For new dwellings the requirements of Part L are met by:

1. Achieving a nearly zero energy performance dwelling.
2. Limiting the amount of heat loss through the building fabric by improving window u-values and introducing methods of reducing thermal bridging and air permeability.
3. Requiring that the heating system is highly energy efficient and that the following minimum levels of control are provided:
 - Automatic control of space heating on basis of room temperature
 - Automatic control of heat input to stored domestic hot water
 - Separate and independent automatic time control of space and hot water heating
 - Shut down of heating system when there is no demand for heating.
4. Limiting the heat loss from pipes, ducts and vessels used for the transport or storage of heated water or air.

The basis of the design proposal is to ensure that the dwellings will be as energy efficient as possible. The dwellings will be designed to have highly insulated and air-tight thermal envelopes. The installation of renewable energy technologies will further improve the energy efficiency of the dwelling and minimise energy costs and CO₂ emissions.

To minimise the energy use of dwellings the following measures will be implemented:

- U-values to meet or improve on current building regulations.
- Improved level of air tightness.

In Table 1 below, the targeted improvement on current Part L U-values for this development is outlined:

Table 1: Current 2019 Part L Regulations against targeted improvements

Element	U-values (W/m ² .K)	
	Current Part L	Targeted
Walls	0.18	0.18
Floors	0.18	0.15
Roofs: Pitched	0.16	0.16
Roofs: Flat	0.20	0.18
Windows	1.4	0.8
Air infiltration	5m ³ /(h.m ²)@50pa	3m ³ /(h.m ²)@50pa
Thermal bridging	0.15	0.08

2.2 Minimising Energy Requirements & Maximising Energy Efficiency

The thermal envelope of all units will be designed to minimise the heat loss from the building and therefore minimise the annual heating requirements. When heating is required, high energy efficient heat pumps will supply heat at efficiencies above 400%.

A highly insulated and air-tight thermal envelope will ensure the heating requirements for the residential units are minimal. The heating system for each unit will be designed with an appropriately sized heat pump to help minimise running costs and plant space requirements.

2.3 Building Energy Rating Assessment

A BER assessment was carried out on one apartment in this development to look at the most suitable energy efficient technologies which will achieve compliance with the Part L Building Regulations 2019. A schedule of Energy Works has been completed showing the outline of materials which achieve compliance with Part L Building Regulations 2019 in terms of Energy Efficiency, Carbon Emissions and Renewable Contribution.

The BER was carried out on a Mid Floor Apartment which has a partial flat roof.

Schedule of Works Required to Achieve a BER of a minimum A2 and Compliance with Part L Building Regulations 2019	
PROJECT:	Apartment Development at Windmill, Clonsilla, Dublin 15
PROJECT No.:	18-023
Design Criteria	Apartment No. 17
Ventilation	An Exhaust Air Heat to be used in conjunction with all vents.
Air-tightness test	Final air-tightness test to be carried out when the building is fully completed. The final test to have a maximum air leakage result of 3m³/m²/hr at 50 Pa.
Thermal bridging and air infiltration	Thermal bridging factor, y = 0.08 W/m²K . All construction details shall be carried out in accordance with the Dept. of Environment, Community and Local Government's "Limiting Thermal Bridging and Air Infiltration – Acceptable Construction Details" (www.environment.ie) as referenced in Building Regulations 2008 and 2011 TGD L. All construction details must be designed by an NSA registered Thermal Modeller (e.g. Xtratherm). The developer/builder, site engineer or architect will be responsible for signing off on all construction details.
Floor insulation	N/A
Flat Roof	120mm PIR insulation above timber / concrete deck. Roof to achieve a u-value of 0.18W/m²K or better.
Wall insulation	Construction to be confirmed. Minimum U-value of 0.18 W/m²K to be achieved.
Doors	External doors to achieve an overall u-value of 1.2W/m²K or better. Note: U-value should be for door unit and not just the glazing element. Fully glazed door to achieve the same u-value as windows.
Windows & Roof lights	Windows to achieve an overall u-value of 0.8W/m²K or better. Windows shall be triple glazed, argon filled with Low-E, en=0.15 hard coat glazing. Note: U-value should be for window unit and not just the glazing element.
Heat source	Exhaust Air heat pump. Heat Pump must comply with Eco Design Energy Labelling Directives EN 14825 for Space Heating and EN 16147 for Domestic Hot Water. The heat pump controls shall allow weather compensation, priority hot water, defrost cycle, separate time and temperature control of space heating and hot water and sterilisation of stored DHW on a bi-weekly basis. The heat pump must be capable of heating the hot water to 60 degrees Celsius without the use of electric elements. Efficiency of Main Heating System to be a minimum of 490% . Efficiency of hot water system to be a minimum of 202% .
Hot water cylinder	A 200l Cylinder to be installed as part of exhaust air heat pump system
Heating pipework	Insulate all primary pipework from the heat pump to the hot-press.
Heating controls	Heating system shall be configured with a separate space heating circuit and domestic hot water circuit. Min of 2 No. spacing heating circuits and 1 No. DHW, time and temperature control.
Photovoltaic Panels (PV)	3 no. 280W Photovoltaic Panels to be mounted South Facing at a 30° pitch on the flat roof. Minimum calculated electricity produced by PV module shall be 720kWh/Year .
Lighting	Energy efficient lamps to be installed in all fixed lamp holders.
BER A2 & NZEB compliant	

3 Renewable Energy Technology

The following outline of the proposed engineering strategy shows how we aim to achieve objective EN06 and objective EN09 of The Fingal Development Plan 2017 – 2023.

Objective EN06

Encourage and facilitate the development of renewable energy sources, optimising opportunities for the incorporation of renewable energy in large scale commercial and residential development.

Objective EN09

Require details of the requirements for alternative renewable energy systems, for buildings greater than 1000sq m or residential schemes above 30 units, under SI 243 of 2012 European Communities (Energy Performance of Buildings) to be submitted at pre planning stage for consideration. These should take the form of an Energy Statement or Feasibility Study carried out by qualified and accredited experts..

3.1 Heat Pump Technologies

All units within this development will be provided with an exhaust air heat pump as the primary heat source. Heat pumps are an attractive alternative to fossil fuel heating systems, offering lower running costs and reduced carbon emissions.

An exhaust air heap pump is considered a renewable technology as it works on the principle of extracting moist air from wet rooms and upgrading this energy to a useful temperature to be used in the building's space heating system and for domestic hot water heating. This also means it takes less energy to achieve optimal temperatures within apartments resulting in a heating system which is very efficient.

3.2 Photovoltaic (PV) Panels

Photovoltaic (PV) panels convert daylight into electricity. The panels capture the sun's energy using photovoltaic cells. The panels are most efficient when receiving direct sunlight but can also produce significant amounts of electricity on overcast days.

The two main components of equipment are the panels themselves (known as modules) and the inverter. The inverter converts electricity produce by the panels from direct current (DC) to alternating current (AC) for use within the dwelling.

To maximise renewable energy generation the panels should be mounted on a south facing roof.



Figure 1 - Roof Mounted Photovoltaic (PV) Panels

PV panels will be installed on the roof of the building. These panels will be connected into the dwelling's consumer unit and will reduce the amount of electricity required from the grid.

During the summer months, with longer days and direct sunlight, the PV system will contribute significantly to reducing the electricity supply from the grid. As many of the country's power generation stations are still fossil fuelled, the reduced demand from the grid will contribute to reducing the grid's CO₂ emissions.

In order to meet the renewable energy requirements of Part L, PV panels will supplement the heat pump renewable energy contribution where necessary. PV panels may be omitted if the heat pump can achieve the energy targets alone. A BER assessment will be carried out on all apartments to determine this.

3.3 Ventilation System

A mechanical ventilation system will ensure required ventilation is provided throughout the unit at all times. The mechanical ventilation unit will form part of the exhaust air heat pump system with warm stale air extracted from the kitchen, bathrooms and ensembles back to the heat pump unit. Fresh air will be drawn in from ceiling mounted discs ducted to external walls. The exhaust air heat pump is contributing towards the energy efficiency of the dwelling by acting also as the ventilation system.

4 Electric Vehicle Infrastructure

The following outline of the proposed engineering strategy shows how we aim to achieve objective MT10 and objective MT11 of The Fingal Development Plan 2017 – 2023.

Objective MT10

Facilitate the provision of electricity charging infrastructure for electric vehicles both on street and in new developments in accordance with car parking standards.

Objective MT11

Support the growth of Electric Vehicles and EBikes, with support facilities, through a roll-out of additional electric charging points in collaboration with relevant agencies at appropriate locations.

4.1 Electric Car Charging Infrastructure.

With new incentives and grants available, moving to low-carbon electric vehicles is becoming more popular. As more people start to drive electric vehicles it is important to have the right infrastructure in place.

Infrastructure will be installed for a number of electric charging points around the proposed development. Cable ducting will be installed from the electricity distribution boards to a number of designated electric car charging points in parking areas. This will allow the management company to install charging stations if there is a future demand.

5 Conclusion

The proposals considered in this document will ensure residential units will be energy efficient, have low CO₂ emissions impact, be comfortable and responsive to internal and external climates and have low operating cost. The development ties in to the over all Fingal Development Plan 2017 -2023 in terms of sustainability and energy.

The heat pump and PV technologies mentioned in this report are proposals at this project stage and may change to alternative renewable technologies prior to construction. The chosen technologies will still ensure compliance with building regulations in meeting renewable and CO₂ targets.