Residential Energy Efficiency and Climate Change Adaptation Design Statement provided as per OCC DMS-31

COFFEY CONSULTING ENGINEERING

Puttaghan Lands LRD

Residential Energy Efficiency and Climate Change Adaptation Design Statement

COFFEY CONSULTING ENGINEERING
BLOCK A, MARLINSTOWN BUSINESS PARK, MULLINGAR, CO. WESTMEATH

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1-0 INTRODUCTION

This report by Coffey Consulting Engineering highlights how the overall energy strategy for the proposed large scale residential development (LRD), located in Puttaghans Lands, Tullamore, Co. Offaly will be addressed within the design in order to achieve compliance with Technical Guidance Document (TGD) Part L – Conservation of Fuel and Energy - Dwellings 2022.

With the current emphasis placed on energy conservation and the use of Low and Zero Carbon (LZC) technologies, the applicant is keen to enhance the development's sustainability credentials. The overall energy strategy for the building has been developed holistically utilising the energy hierarchy "Be Lean, Be Clean, Be Green".

The proposed design follows a "fabric first" approach. The building envelope of the dwellings will be designed to ensure that its thermal performance will exceed that of TGD Part L 2022.

High efficiency lighting, heating and ventilation systems shall be carefully selected to reduce running costs.

LZC technologies will be incorporated into the design, as deemed appropriate, as part of an integrated services strategy, as opposed to a 'bolt-on' approach.

The energy performance of the building will be assessed during the detailed design stage, in accordance with the Dwelling Energy Assessment Procedure (DEAP) methodology to demonstrate compliance with TGD Part L 2022.

1-1 CCE EXPERIENCE

This report was written by Ronan Kerrigan on behalf of CCE. Ronan is a Chartered Engineer, with over 18 years post graduate experience following his graduation from Bolton Street, D.I.T. with an honours degree in Building Services Engineering. Ronan has been working with thermal dynamic energy modelling software (IES VE) since 2002, developing energy strategies on a range of building types including residential, commercial, pharmaceutical and industrial.

2-0 PROPOSED DEVELOPMENT

Application for planning permission for the demolition of existing buildings and the construction of Large scale Residential Development comprising 148 dwellings which will consist of: 90no. houses (comprising 08 no. 2 bedroom houses, 58 no. 3 bedroom houses and 24 no. 4 bedroom houses. 89 no. of the houses are 2 storey with 1 no. 3 bed bungalow); 20 dwelling apartments (comprising 4 no. 1 bed units and 16 no. 2 bed units over 4 storeys); 38 no. age friendly assisted living units (comprising of 28 no. 1 bed units and 10 no. 2 bed units with associated communal and administrative facilities); a Creche; and all ancillary site development works including access, roads and footpaths, landscaping and boundary treatments, public and private open space areas, car parking, bicycle parking, ESB substations, bin and bicycle stores, replacement waste water pumping station and drainage connections; and all ancillary site development works on land at Wellwood Housing site at Tyrells Road, Puttaghan, Tullamore.

3-0 ENERGY EFFICIENCY OF BUILDINGS

The proposed building design will follow a “fabric first” approach, with the aim of minimising energy demand through good envelope design. This approach will be further enhanced by the selection of energy efficient services.

This approach offers genuine long-term energy savings by reducing the inherent energy demand of the dwellings in the first instance. These benefits are described and quantified as follows:

3-1 BUILDING DESIGN – ENERGY EFFICIENCY

The general construction design standards to be adopted must exceed the requirements of Technical Guidance Document (TGD) Part L of the Building Regulations - Dwellings (2022 Edition). As mentioned previously, the building design will follow to the “Be Lean, Be Clean, Be Green” philosophy. The first stage of the design s “Be Lean”, where the building fabric was improved over and above the requirements of TGD Part L 2022. The services strategy for the dwellings will be developed following the “Be Clean” philosophy, ensuring that the lighting, heating and ventilation designs are as effective as possible. Renewable energies will then be considered as part of the “Be Green” philosophy.

3-2 BE LEAN

The building envelopes will be designed to ensure that the fabric and form of the proposed dwellings encompasses the low energy sustainability strategy, with U-values equal, or better than those stated in Table 1 of TGD Part L 2022.

In accordance with the requirements of low energy buildings, the air tightness characteristics will also be addressed. With robust design, the target proposed for the dwellings is $3m^3/m^2/hr$ @ 50Pa.

3-3 BE CLEAN

The design will incorporate high efficiency LED lighting, heating and ventilation systems shall carefully selected to reduce running costs. Refer to Section 4-0 for further details.

3-4 BE GREEN

Renewable energy systems will then be considered in the form of solar photovoltaic (PV) panels. PV panels will only be considered if the heat pumps do not meet the renewable energy requirements stated in TGD Part L 2022.

4-0 ENERGY STRATEGY

4-1 HEATING AND DOMESTIC HOT WATER SYSTEMS

The heating and domestic hot water strategy will be finalised during the detailed design stage, but it is likely to incorporate the installation of Air to Water Heat Pumps in each house and Exhaust Air Heat Pumps in each apartment.

4-1-1 AIR TO WATER HEAT PUMP (AWHP)

There are two air to water options available; split systems and mono-bloc. With split systems, refrigerant pipework runs from an externally mounted condenser to serve an internal split unit. The split unit incorporates a heat exchanger which provides heating water to serve the radiators and hot water cylinder. Some manufacturers provide a combined split unit and hot water cylinder. The split unit is usually located in the kitchen/ utility room and is approximately the size of a small wall hung boiler. Combined split/ hot water cylinders are the same size of an American style fridge freezer and can be located in the utility room/ kitchen/ dedicated storeroom. Mono-bloc systems have the split unit incorporated into the external condenser and therefore do not have any refrigerant pipework within the dwelling. Heating flow and return pipework runs from the externally mounted condenser to serve the radiators and hot water cylinder. The hot water cylinders are generally located in the Hot Press.

The heat pump efficiency will provide all/ most of the required renewable contribution in the DEAP software for Part L compliance. No/ minimal additional renewable technology will be required to achieve the 20% Renewable Energy Ratio (RER) required on all new dwellings.

The heating in each dwelling will be split into two zones, with a temperature sensor will be located within each zone to control the heating. Thermostatic radiator valves (TRVs) will be installed on all radiators/ towel rails in rooms which do not contain a temperature sensor.

A hot water cylinder will be provided as part of the indoor unit.

All domestic water and heating pipework within the dwellings will be pre-insulated multilayer pipework.

4-2 EXHAUST AIR HEAT PUMP (EAHP)

Similar technology to the ASHP, however it uses the stale extract air from the kitchen and bathroom(s) as the heat source, rather than the external unit, therefore does not require an external unit.

Provides heating water to serve the heat emitters and hot water cylinder. The unit is approximately the size of an American style fridge freezer and can be located in the utility room/ kitchen/ dedicated storeroom.

The heat pump efficiency will provide all/ most of the required renewable contribution in the DEAP software for Part L compliance. No/ minimal additional renewable technology will be required to achieve the 20% Renewable Energy Ratio (RER) required on all new dwellings.

The heating in each dwelling will be split into two zones, with a temperature sensor will be located within each zone to control the heating. Thermostatic radiator valves (TRVs) will be installed on all radiators/ towel rails in rooms which do not contain a temperature sensor.

A hot water cylinder will be provided as part of the EAHP.

All domestic water and heating pipework within the dwellings will be pre-insulated multilayer pipework.

The EAHP incorporates a fan, which extracts stale air from the bathrooms and kitchen. All ductwork shall be installed in either 200 x 60mm flat rigid or 90/125mm diameter ductwork. The exhaust air duct between the EAHP and the external louvre shall be insulated, and exhaust air louvre carefully selected to take into consideration the potential -15ºC exhaust air.

A re-circulation type cooker canopy shall be provided in the kitchen.

4-3 MECHANICAL VENTILATION SYSTEMS

The mechanical ventilation system shall be selected in conjunction with the heating systems to ensure that the proposed dwellings comply with TGD Part L 2022.

There are three options to be considered for providing ventilation within the dwellings: -

- Mechanical Ventilation Heat Recovery (MVHR)
- Demand control centralised extract (MEV)
- Local intermittent extract fans

4-3-1 MECHANICAL VENTILATION HEAT RECOVERY (MVHR):

MVHR systems provide supply and extract ventilation to each dwelling and incorporate a high efficiency heat recovery device.

The heat reclaim unit provides mechanical supply and extract ventilation by way of low velocity ductwork with terminal diffusers providing supply air and extract grilles providing extract air. A mechanical supply air input is delivered to each living room and bedroom and extract is via the kitchen, utility and bathrooms.

The ventilation system operates continuously at low volumes to provide continuous background ventilation and then boosts when either the kitchen or bathroom is used.

Trickle ventilators are not required in the external façade since the system provides continuous background ventilation. Opening windows are still required for purge ventilation and summertime temperature control etc.

The heat reclaim unit captures heating energy from the return air and the heat is transferred to the supply air by way of a cross-plate heat exchanger within the fan unit. The unit would typically be located in a store or hot press, approximately 1.5m above floor level.

In terms of the kitchen ventilation itself, the cooker extract shouldn't be linked to the whole house ventilation unit due to the contaminants associated with the cooking (i.e. moisture, grease build-ups, etc) and therefore the cooker hood extract normally forms a 'recirculation' type unit, with the extract from the kitchen taken out via a local grille.

Since background ventilation is provided with benefit of heat recovery then this option would be considered most energy efficient and it could be considered to better support health / wellbeing since controlled background ventilation is continuously provided without draughts.

Since this is a higher level of specification it does however carry a cost premium compared with the other options.

4-3-2 DEMAND CONTROL CENTRALISED EXTRACT (MEV):

MEV centralized extract ventilation includes the provision of a single continuously operating extract fan unit per dwelling, which connects to extract grilles within each kitchen, utility and bathroom. The extract fan unit operates continuously to provide constant background extract from the bathroom area and boosts when the bathroom is used.

General background ventilation is provided via trickle ventilators.

The bedroom, lounge and dining areas would be entirely naturally ventilated via the trickle vents and opening windows.

4-3-3 LOCAL INTERMITTENT EXTRACT FANS:

Local extract fans would be provided within each bathroom and Utility room with a separate extract from the kitchen via an extracting cooker hood. The fan would operate independently and intermittently, when the bathroom is used, and then continue to operate after use for a set period (say 20 minutes).

Background ventilation is provided via trickle ventilators in the façade.

The bedroom, lounge and dining areas would be entirely naturally ventilated via the trickle vents and opening windows.

4-4 LIGHTING INSTALLATION

High efficiency LED lighting shall be installed throughout the development.

4-5 RENEWABLE ENERGY

As described above, heat pumps shall be installed in all dwellings, providing heating and domestic hot water, while also contributing towards the dwelling's renewable energy requirements.

In dwellings where the heat pump's renewable energy contribution is less than required to achieve a renewable energy ratio (RER) of 0.2, as calculated by the DEAP software, solar photovoltaic (PV) panels will be installed on the roof of the dwelling to ensure compliance with TGD Part L 2022.

Wherever solar PV panels are installed, a diverter switch to the immersion in the hot water cylinder will be provided, so that any electricity generated by the PV panels can be used to generate hot water in the event there is no electrical demand in the dwelling at the time.

5-0 ELECTRIC VEHICLE CHARGING (EVCH) POINTS

Provision for the future installation of an electric vehicle charge point will be incorporated into the electrical design of each house.

It will not be possible to duct each carpark space back to individual dwellings, as some parking spaces are not within the curtilage of the dwelling, therefore a communal type charging facility, with a payment facility would need to be installed in the future, should the need arise.

10% of parking spaces associated with the apartment building will be provided with EV chargers. Ducting for the future installation of EVCH points shall be provided to 100% of car parking spaces.

Please refer the Architect's site drawings for proposed locations of carpark spaces.