McElligott

CONSULTING ENGINEERS

Energy Statement
for the
SHD Application, Lord Mayor SHD
at
THE LORD MAYOR'S PUBLIC HOUSE, MAIN STREET, SWORDS, CO. DUBLIN

Document No:	**21043-M-RP-100**
Issue:	**D**
Date:	**19TH March 2022**
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1. ENERGY STATEMENT

1.1 Introduction

Jacko Investments are applying for planning to develop the “Lord Mayor’s” site in Swords(i) demolition of the existing 1-3 storey public house, restaurant, off-licence and associated storage buildings (totalling 1,197sq.m) and removal of associated surface car park; (ii) construction of a residential development of 146 no. apartments (69 no. one-bedroom, 68 no. two-bedroom and 9 no. three-bedroom) in 4 no. blocks (ranging in height from four to six storeys over basement level) as follows:

- Block A containing 15 no. apartments (3 no. one bedroom, 9 no. two bedroom and 3 no. three-bedroom) and measuring four storeys in height;

- Block B containing 41 no. apartments (23 no. one bedroom, 17 no. two bedroom and 1 no. three bedroom) and measuring part-five part-six storeys in height;

- Block C containing 54 no. apartments (33 no. one bedroom, 16 no. two bedroom and 5 no. three bedroom) and measuring part-five part-six storeys in height; and,

- Block D containing 36 no. apartments (10. no one bedroom and 26 no. two bedroom) and measuring part-four part-five storeys in height.

(ii) all apartments will have direct access to an area of private amenity space, in the form of a terrace/balcony, and will have shared access to internal communal amenities including a gym (211sq.m), communal store rooms (158sq.m) and a cinema/playroom (89sq.m), 3,551sq.m of external communal amenity space and 2,041sq.m of public open space;(iii) provision of 109 no. vehicular parking spaces (including 5 no. mobility parking spaces, 5 no. car-share spaces and 11 no. electric charging spaces), 6 no. set-down parking spaces and 332 no. bicycle parking spaces at basement level accessible via new vehicular access from Church Road; (iv) provision of 5 no. commercial units (746sq.m total) located at basement/ground floor level in Blocks A and B; and 1 no. childcare facility (424sq.m) located within the basement level of Block C; (v) removal of existing culverts, installation of new culverts to facilitate pedestrian/vehicular access and diversion of the Glebe Stream on site; and, (vi) all ancillary works including public realm/footpath improvements, landscaping, boundary treatments, internal footpaths, provision of surface level bicycle parking (56 no. spaces), bin storage, foul and surface water drainage, green roofs, ESB substation and all site services, site infrastructure and associated site development works necessary to facilitate the development. A Natura impact statement has been prepared in respect of the proposed development.

All of the apartments will be subject to the NZEB requirements of the 2019 Part L Regulations, that is in effect. In terms of energy ratings the units on site will have a BER rating A2.

To meet the targets of the 2019 Part L regulations a wholistic approach to the building has to be taken with loses minimised through well insulated and air tight fabric elements, as well as high efficiency methods to deliver hot water within the apartments. Less than 30% of the thermal energy used in an apartment is for space heating and therefore the gains to be made through improvements in fabric insulation, air tightness and thermal bridging are now at a level of rapidly diminishing returns.

The measure of compliance with Part L of the Regulations is demonstrated using the DEAP software. Later this year a revised version 4.2 of the software will be issued and this will formally allow assessors to confirm the NZEB standard had 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/m^2 per year but based on the simulations run to date this appears to be working out to the same level.

2. ENERGY REDUCTION

The primary aim of Part L 2019 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.

Building Fabric

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

- Walls 0.18 W/m^{2}K
- Roof 0.16 W/m^{2}K
- Windows 1.4 W/m^{2}K
- Floors 0.14 W/m^{2}K

The specified air tightness for the apartments is to achieve an air tightness level of 3 air changes an hour or better. Based on previously project experience with Jacko Investments we know this figure will be comfortably exceeded. 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.

Passive Solar

The proposed scheme is medium density and the various blocks are well spaced out and not excessively tall. All of 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 needs to be 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 needed for the glazing depending on the percentage of 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 looked at the optimise its performance against these different variables.

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.

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.

3. 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/m^2 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 new NZEB Regulations being issued are calling up a percentage of the primary energy used in a dwelling 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
- Biomass
- Combined Heat and Power
- Heat pumps

Renewable Energy Technologies.

Technology	Description	Pro's / Con's
Solar Thermal	Solar energy is focus through either an evacuated tube or flat plate collector to raise the temperature of a water loop. This heated water passes through the hot water cylinder, similar to a boiler supply and indirectly heats the water in the cylinder.	In a typical dwelling a solar thermal array will energy enough hot water between April and September to meet to whole house demand unaided. The system is not practicably scalable to meet the renewable contribution for houses over circa 150m^2. More expensive than PV to install and requires more maintenance.
Photovoltaics Panels (PV)	This is the same technology that is on most calculators. A silicone wafer takes the sun's solar energy and converts this into a DC electrical supply. An invertor then converts this to an AC supply and streams it with the incoming electrical supply	The cost of PV panels has continued to drop over the last 5 years as the market demand has increased. Only limited by the amount to roof space available per unit. The Electrical energy must be used as it is generated, storage would require batteries that are expensive.

Technology	Description	Pro's / Con's
Wind Power	This approach is more commonly seen on a macro rather than micro level. Prevailing winds are used to turn the blades on a turbine and resulting rotor motion generates electricity	At a micro level there is poor return on investment and on the larger scale there is the height of the turbine, the clearances needed around it and the noise it generates. All of these issues are why local wind turbines are not installed for renewable energy contribution in domestic settings.
Biomass	Renewable crops / vegetation is used to fuel the combustion cycle on a boiler for the generation of heat that is used for space heating and hot water generation	Outside of Scandinavia, with their large manged forest resources, there is a move away from biomass. Growing crops for fuel rather than feeding is not sustainable and a poor use of land. Biomass systems need to be carefully operated to match demand and there can be issues with the supply and storage of the fuel.
Combined Heat & Power (CHP)	These are like package power stations that generate heat and electricity from the burning of fuel, most commonly natural gas. The net efficiencies of the CHP unit are greater than those associated with power off the rid and a local boiler and this margin is deemed renewable.	CHP engines can be installed on a modular basis to match the load. It is essential to utilise all of the heat and electricity generated on site and with the adoption of electrical cars there will be a ready demand for the electrical power off the units.

Technology	Description	Pro's / Con's
Heat pumps	Air to water heat pumps have gained significant traction in the last 5 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.

4. VENTILATION

In tandem with the Part L 2019 revisions the associated Regulation for ventilation, Part F and being updated. Core to this revision is the recognition that the ventilation provision in new dwelling needs to reflect the consequences of well insulated and airtight buildings. The mandatory air tightness level that a dwelling must achieve will be 5 m^3/m^2.hr or better and where the air tightness is 3 m^3/m^2.hr or below then a mechanical ventilation system must be used. The choice would be between whole house extract or full heat recovery ventilation. For this development the intention is to install the higher performing, more expensive, heat recovery ventilation (HRV) solution.

Ventilation has a significant bearing on wellbeing 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 Stocking Central units will be at the top end of this scale.

5. TRANSPORT

As noted earlier the energy demand associated with transport services is the biggest fuel consumer in the economy. While there has been a huge improvement in fuel efficiencies the carbon consequences and finite availability of fossil fuels is central to the current shift towards greener transport solutions.

The adoption of electric cars is now in the mainstream and the ultimate goal is to have these cars power by electricity sourced from renewable sources such as wind power. With the proximity of this site to work and leisure destinations the Stocking Central occupiers are more likely to opt for electric cars and current e car range issues are less likely to impact on their e car selection.

In order to provide the infrastructure to support e car charging a network of ducting will be provided to allow the deliver of charging points to the majority of car spaces. We do not believe it is viable to cable from each apartment and are proposing a supply off the landlord boards, in the undercrofts, will usage billed back to the apartment occupier.

While currently unregulated there has been an explosion is the up take of e scooters in the last 18 months and with their improved range and low energy demand it is envisaged that a lot of people will adopt these. With scooters being very portable, occupiers can easily bring them back to their own units and charge them. Equally a portion of the bicycle space could be made available to scooters and a charging hub provided therein. This

would be down to the management company, in the future, but the infrastructure would be provided now.