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APPENDIX 4-2

CLIMATE SCHEME SUSTAINABILITY STATEMENT

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CONSULTING ENGINEERS

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PROJECT NO. 26.3145

CLIMATE SCHEME SUSTAINBILITY STATEMENT

(MECHANCIAL AND ELECTRICAL SERVICES)

KNOCKNACARRA WEST LRD

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1.0 INTRODUCTION

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It has become imperative to prioritize sustainability in the design of mechanical and electrical systems within residential buildings. The efficient operation of these systems is vital not only for the comfort and well-being of residents but also for minimizing environmental impact.

The mechanical and electrical systems in apartments play a crucial role in ensuring a comfortable and efficient living environment. Sustainable design principles focus on optimizing these systems to reduce energy consumption, minimize carbon emissions, and enhance the overall environmental performance of buildings.

Energy efficiency is a cornerstone of sustainable design. Upgrading to high-efficiency HVAC (Heating, Ventilation, and Air Conditioning) systems, using advanced insulation materials, and implementing smart controls for lighting and temperature regulation can significantly reduce energy consumption and associated greenhouse gas emissions. This not only benefits the environment but also results in cost savings for residents through reduced utility bills.

To achieve sustainability in mechanical and electrical systems, several key principles and strategies should be considered during the design and implementation phases.

Renewable Energy Integration: Incorporating renewable energy sources, such as solar photovoltaic panels, and heat pumps, into the electrical systems of apartments / landlord Areas can help reduce reliance on fossil fuels and lower carbon emissions.

Utilizing energy-efficient lighting technologies, such as LED (Light-Emitting Diode) bulbs, and employing smart controls, occupancy sensors, and daylight harvesting systems can optimize lighting energy consumption.

Implementing water-efficient fixtures, such as low-flow toilets and showerheads, can reduce water consumption.

Net-Zero Energy Buildings: The concept of net-zero energy buildings, which generate as much energy as they consume, is gaining traction. These buildings often employ a combination of energy-efficient measures, renewable energy integration, and energy storage systems.

The integration of apartments with smart grids allows for dynamic energy management, demand response programs, and optimal utilization of renewable energy resources.

As the electrification of the energy sector gains momentum, heat pumps and electric heating systems are becoming popular alternatives to fossil fuel-based heating systems.

As part of the design development, we shall pay particular attention to the Galway City Development Plan 2023 -2029, and in particular Chapter 2 of the development plan in relation to Climate Change.

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2.0 NZEB REQUIREMENTS

The Definition: 'Nearly Zero Energy Buildings', nZEB means a building that has a very high energy performance where 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 order to achieve this, a target of 20% Renewables Energy Ratio (RER) has been set as the NZEB energy from renewable sources onsite or nearby target. The software tool provided by SEAI will be provided to support the calculation of the RER. It is recognised that in certain confined situations it may not be possible to achieve the full 20% RER.

In addition to the reduced energy usage, all new buildings must generate 20% of their energy from renewable energy sources, although this may be reduced to 10% where the energy performance of the building is more than 10% better than the reference building. This option of further reducing energy use is likely to be selected for most buildings.

As part of the design process, consideration shall be taken in account with regards to the requirements of nZEB to ensure the building meets with its requirements.

The 20% or 10% requirement can be provided by Heat Pumps or Heat pumps / PV's.

The building will be constructed to meet the latest building regulations and U-Values for each element of the envelope:

Building Fabric / Specification

Floor	0.12 W/m²k
Walls	0.18 W/m²k
Roof	0.15 W/m²k
Doors	1.6 W/m²k
Windows	1.2 W/m²k
Thermal Bridging Factor	0.08 (ACDs must be adhered to)

Ventilation

Ventilation Method	Demand Controlled Ventilation (DCV)
Ventilation openings	-
Air Permeability Test Result	3ac/h | 0.15 adj (assumption)

These target values shall achieve an A2 rating dwelling using a heat pump solution with no PV panels.

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3.0 DESIGN INTENT FOR APARTMENTS

The apartments will be heated by means of exhaust air heat pump systems. It is proposed to utilize exhaust air heat pumps. The unit is A++ rated. Aluminium radiators will be provided in each space complete with thermostatic radiator valves (TRVs) as required. These radiators are specifically designed to work with low temperature heating systems and have quicker heat up periods and transfer rates than standard steel panel radiators.

The unit is complete with an integral 210 litre hot water calorifier and will provide both domestic heat and hot water generation. We estimate the apartments will require a 3.5kw unit.

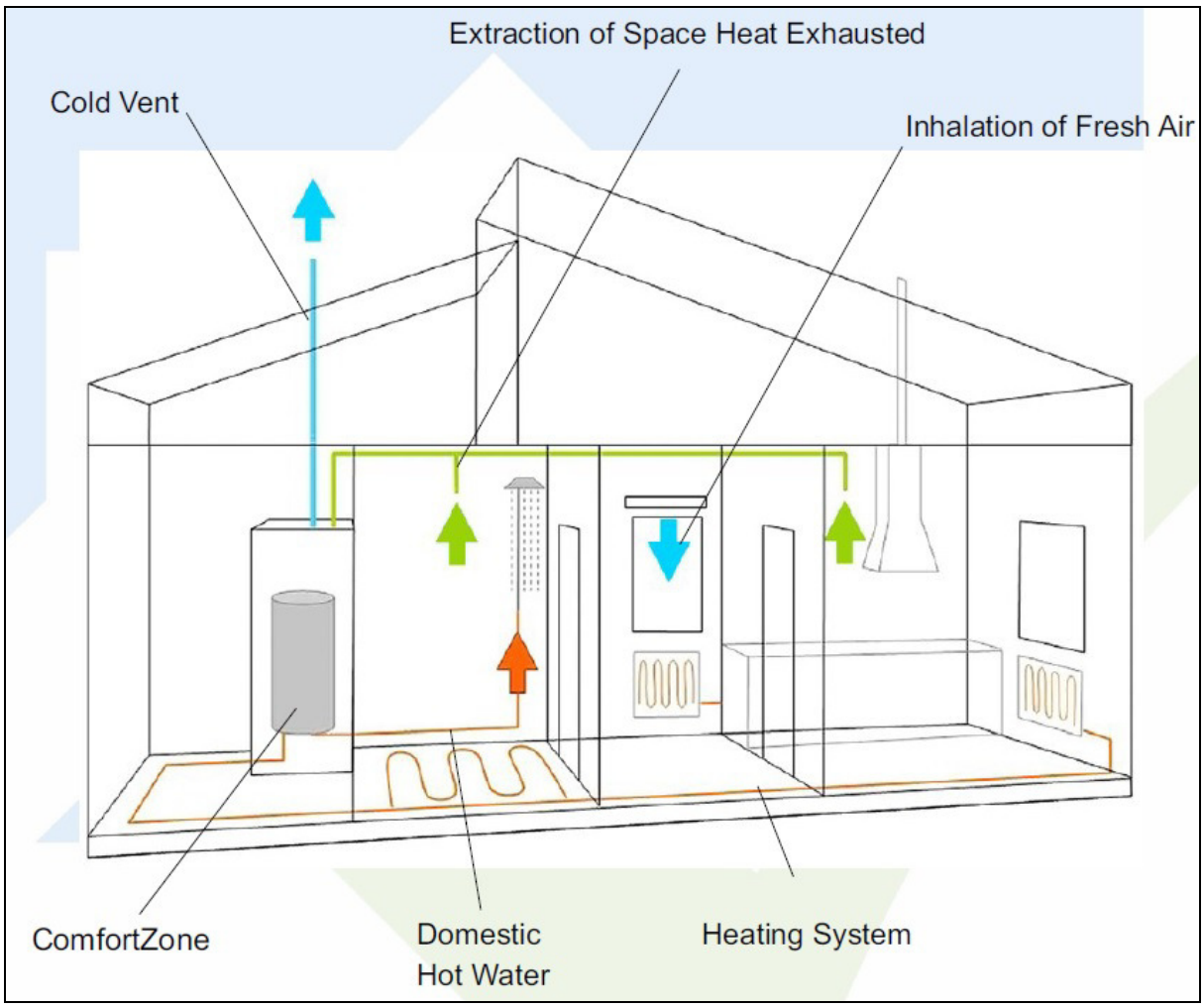


Figure 1: Proposed Heating System Schematic

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Demand Control Ventilation will be provided to provide controlled natural ventilation to each dwelling.

Demand Control Ventilation (DCV) is an energy-saving strategy used in building ventilation systems to optimize the amount of fresh air brought into a space based on its actual occupancy and ventilation requirements. DCV systems improve indoor air quality while reducing energy consumption by delivering the right amount of ventilation air when and where it is needed.

DCV systems utilize sensors and controls to monitor various factors such as occupancy, carbon dioxide (CO2) levels, temperature, humidity, and volatile organic compounds (VOCs) in the space. These sensors provide feedback to the ventilation system, allowing it to modulate the amount of fresh air supplied accordingly.

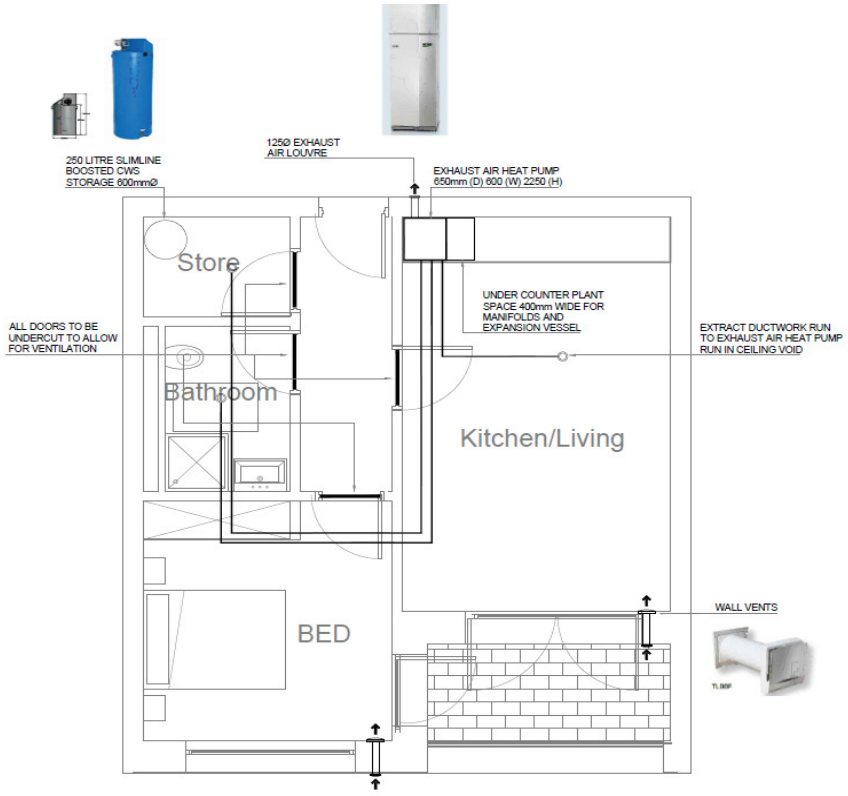


Figure 2: Proposed Ventilation System Schematic

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3.1 DESIGN INTENT FOR HOUSES

It is proposed that the houses will be heated by means of an air to water heat pump heating systems.
It is proposed to utilize a mono-block unit to heat each individual house. The mono-block unit is A+++ rated and uses the latest refrigerant gas. The unit will provide heat energy for heating and hot water generation.
We estimate the houses will require either 4-6kw units depending on the house type and size.

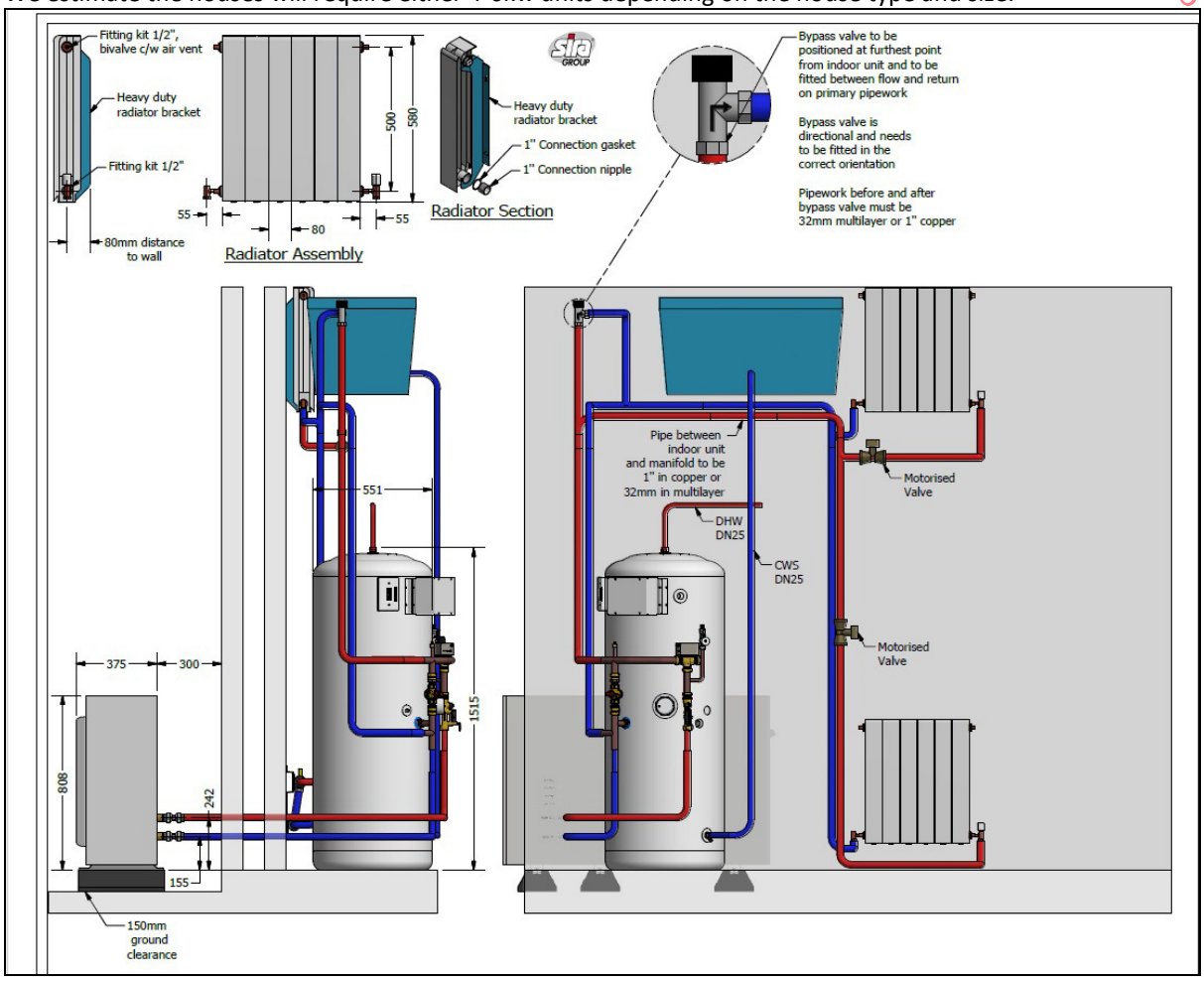


Figure 1: Proposed Heating System Schematic

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4.0 LIGHTING AND LIGHTING CONTROLS

LED lighting and advanced lighting controls shall be implemented into the houses and apartments.

LED Lighting: LEDs (Light Emitting Diodes) have become the lighting technology of choice in modern apartment buildings due to their numerous advantages over traditional lighting options.

Energy Efficiency: LED lights are highly energy-efficient, consuming significantly less electricity than incandescent or fluorescent bulbs. They convert a higher percentage of electrical energy into light, minimizing wasted energy as heat.

1. Longevity: LED lights have an impressive lifespan, lasting up to 25 times longer than traditional bulbs. This extended lifespan reduces maintenance costs and the frequency of bulb replacements.
2. Versatility: LEDs offer a wide range of color temperatures, from warm white to cool white, allowing for flexible lighting designs to suit different moods and activities within apartment spaces. They can also be dimmed smoothly without compromising the quality of light.
3. Eco-Friendliness: LED lighting is environmentally friendly as it does not contain hazardous materials like mercury, found in fluorescent bulbs. Additionally, their low energy consumption helps reduce carbon emissions and contribute to sustainability efforts.

Lighting Controls: Lighting controls complement LED lighting systems, providing enhanced functionality, convenience, and energy savings. The following lighting control systems are commonly employed in modern buildings:

1. Smart Lighting Systems: These systems utilize advanced technologies, such as wireless communication and Internet of Things (IoT) integration, to enable centralized control of lighting in individual apartments. Residents can adjust lighting settings, including brightness, color temperature, and even create customized scenes, using smartphone applications or voice commands.

Benefits and Applications: The combined use of LED lighting and lighting controls in modern houses offers several benefits:

1. Energy Efficiency: LED lighting, coupled with smart controls and sensors, significantly reduces energy consumption and lowers utility costs.
2. Enhanced User Experience: Lighting controls provide residents with personalized lighting settings, enabling them to create desired ambiances for different activities and moods.
3. Maintenance Cost Reduction: LED lights' long lifespan reduces the need for frequent bulb replacements, resulting in lower maintenance expenses.
4. Sustainability: LED lighting and efficient controls contribute to green building initiatives by reducing carbon footprints and promoting energy conservation.

LED lighting and lighting control systems have transformed modern buildings, offering energy-efficient illumination, improved user experiences, and sustainable practices. The combination of LED technology and advanced controls provides residents with flexibility, comfort, and cost savings while promoting environmental stewardship in residential communities