LIFE CYCLE REPORT
IRES RESIDENTIAL PROPERTIES LTD
RB CENTRAL, ROCKBROOK ESTATE

ME18022-RP05

Rev	Status	Date	By	Checked	Approved
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Distribution (X)

Client	PM	Arch	QS	CS	PSDP	PSCS	MC	Sub	Other	Other
X	X	X								

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1 INTRODUCTION

1.1 OBJECTIVE

This report outlines the operation and maintenance of the various mechanical and electrical engineering services and systems for the proposed 428 apartments at the RB Central, Rockbrook Estate, Sandyford Business District, Dublin 18.

The purpose of this report is to address new Planning Guidelines [28], Sustainable Urban Housing: Design Standards for new Apartments, Guidelines for Planning Authorities.

These guidelines state the following;

“6.11 Certainty regarding the long term management and maintenance structures that are put in place for an apartment scheme is a critical aspect of this form of residential development. It is essential that robust legal and financial arrangements are provided to ensure that an apartment development is properly managed, with effective and appropriately resourced maintenance and operational regimes.

6.12 In this regard, consideration of the long-term running costs and the eventual manner of compliance of the proposal with the Multi- Unit Developments Act, 2011 are matters which should be considered as part of any assessment of a proposed apartment development.

6.13 Accordingly, planning applications for apartment development shall include a building lifecycle report which in turn includes an assessment of long term running and maintenance costs as they would apply on a per residential unit basis at the time of application, as well as demonstrating what measures have been specifically considered by the proposer to effectively manage and reduce costs for the benefit of residents.”

2 ENERGY STARTEGY

2.1.1 OUTLINE

The strategy for energy and sustainable design for the new apartments at the RB central development is to use robust, passive, cost effective measures to create environmentally sound and energy efficient apartments by using an integrated approach to design, planning and construction. Improving the environmental performance of buildings is one of the most cost effective ways to reduce greenhouse gas emissions and respond to the growing threat of global climate change. By implementing appropriate measures at the design and construction phases of development projects, the potential exists to significantly improve the operational performance of Ireland's future building stock. The design strategies employed will include a cradle to grave approach to management and planning, energy efficiency, material selection, waste management, sustainable transport and enhancing the ecological value of the site.

2.1.2 CENTRAL BOILER PLANT COMBINED WITH AIR SOURCE HEAT PUMPS

The proposed energy strategy for this development is to design a central district boiler system which is supplemented by an air to water heat pump system. The boiler system will be the lead system with the LPHW return water preheated by the ASHP (Air Source Heat Pump) system. An air to water heat pump extracts energy from the air via a refrigerant circuit which in turn transfers the heat to the water in the system. The system consists of four major elements that allow the refrigerant to pass from the liquid state to the gas: a compressor, a condenser, an expansion valve and an evaporator.

1. A fan passes air over the evaporator; the refrigerant absorbs heat from the outside air. The refrigerant boils and evaporates at a low temperature giving us vapour.
2. The vapour passes into the compressor and compression increases the temperature.
3. The warm vapour is condensed is the heat exchanger and the rejected heat is passed onto the heating and hot water system
4. The condensed vapour returns to liquid, passes back through expansion valve, reducing pressure and temperature, ready to start cycle again

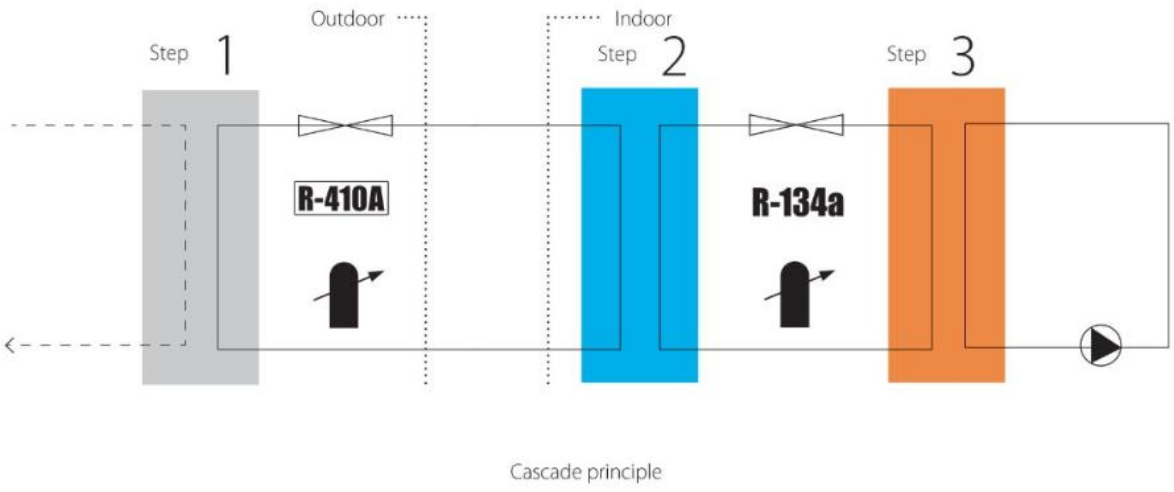

Image 2.1 – Air to Water Refrigerant Cycle

By extracting renewable energy from the air to heat the LPHW return circuit this reduces the overall boiler load therefore providing the apartment complex with heating and hot water in a sustainable way. It is powered by 65% renewable energy extracted from the air and 35% electricity.

Low surface temperature heat emitters will be utilised throughout the development. The ASHP's work more efficiently at lower water temperatures so this adds to the overall energy efficient and sustainable approach of the Rockbrook complex

2.1.3 PASSIVE DESIGN MEASURES

Enabling the use of passive design measures through consideration of the balance of glass to wall ratios to minimise unwanted heat loss and maximise daylight to the spaces. Enhancing the building fabric thermal efficiency through increased insulation levels to meet the maximum elemental U-Values required for Part L compliance. Emphasis on air tightness to limit air infiltration rates

2.1.4 MECHANICAL VENTILATION WITH HEAT RECEVORY

Modern air-tight construction methods can result in poor indoor air quality as condensation and pollutants remain trapped inside the home.

MVHR (Mechanical Ventilation with Heat Recovery) offers year-round ventilation that will improve indoor air quality whilst recovering the heat that would otherwise be lost outside. The MVHR system individual to each apartment will provide optimised, balanced ventilation with heat recovery with 95% efficiency. Each system will quietly and efficiently provide each apartment with fresh, filtered air all year round, improving the indoor air quality and reducing dust and allergen levels.

2.1.5 LED LIGHTING

The use of LED lighting will ensure long operational life > 50,000 Hours which will minimize the replacement timeframe compared to fluorescent lighting as an example. In addition, the energy efficiency of the LED lighting compared to fluorescent will mean lower running costs for the building residents.

2.1.6 BUILDING MANAGEMENT SYSTEM (BMS)

The development will be managed by a BMS (building management system) that will allow the facilities management team to analyse the buildings energy performance. By monitoring the building as a whole with electricity, water and heat metering of each individual apartment a greater understanding of the buildings peak loads, maintenance requirements etc. can be ascertained allowing the facilities management team better manage the district heating system allowing it run as efficiently as possible.

3 ESTIMATED ANNUAL RUNNING COSTS

Based on the DEAP (Dwelling Energy Assessment Procedure) methodology, the estimated annual heating and lighting energy costs are tabulated below. A selection of ten apartments from the development are included in the analysis. The selection consists of a mix of ground, mid and top floor apartments with various orientations and layouts. The methodology used was in line with TGD Part L Domestic 2018 and SEAI DEAP Manual.
Overall the building design achieves A rated BER's. Each apartment is achieving on average A2. While certain one bedroom top floor apartments are achieving an A3 rating due to the increased external envelope of the apartment relative to the apartments floor area. BER's are subject to change as the design development progresses.

Unit No.	DEAP Floor Area	Primary Energy Consumption(KWh /Year)	Number of Apartments of Same Type	Energy Rating
Apt - 0004	92.1	3824	8	A2
Apt - 0017	50.4	2147	3	A2
Apt - 0324	91	3128	76	A2
Apt - 0405	81.4	3011	88	A2
Apt - 0410	86.2	3396	17	A2
Apt - 0712	100.8	3795	8	A2
Apt - 0717	45.4	2029	69	A2
Apt - 0720	76.6	2776	15	A2
Apt - 0745	57.4	3239	2	A3
Apt - 1303	86.9	3962	1	A2

Unit No.	Estimated Annual Heat Demand (KWh/Year)	Estimated Space Heating Running Costs (€)	Estimated Lighting Demand (KWh/Year)	Estimated Lighting Running Costs (€)
Apt - 0004	937	131.18	431	103.44
Apt - 0017	127	17.78	250	60
Apt - 0324	228	31.92	475	114
Apt - 0405	344	48.16	389	93.36
Apt - 0410	527	73.78	431	103.44
Apt - 0712	719	100.66	475	114
Apt - 0717	75	10.5	246	59.04
Apt - 0720	158	22.12	387	92.88
Apt - 0745	998	139.72	292	70.08
Apt - 1303	1046	146.44	438	105.12

Table 3.1 – Estimated Annual Running Costs

3.1.1.1 ASSUMPTIONS

- Actual running costs will vary depending on occupant habits
- Design figures based on district heating system with gas fired boiler supplemented by ASHP's and MVHR
- Space Heating Efficiency 3.49
- Percentage of heating costs are based on SEAI Commercial Fuel Cost Comparison dated 01-Oct- 2018 (Electricity Band IC @ €0.14/kWh)
- Percentage of heating costs are based on SEAI Commercial Fuel Cost Comparison dated 01-Oct- 2018 (Gas @ €0.043kWh)
- Lighting costs are based on SEAI Domestic Fuel Cost Comparison dated 01-Apr-2018 (Electricity Band DE @ €0.167/kWh)
- Heating kWh rates based on commercial rates due to district heating system, savings may not be passed on to the end user.
- Heating figures do not include for domestic hot water costs.
- All figures subject to change as the design development progresses

4 RECOMMENDED MAINTENACE SCHEDULES

The Applicant and the project design team have fully considered the long term running and maintenance costs associated with the proposed apartment scheme. In considering various energy strategies for this development a centralised system of gas fired boilers supplemented with air source heat pumps provides the most energy efficient solution ensuring reduced energy bills for future tenants. A central plant location ensures one location for all plant maintenance reducing the need for facilities management to enter tenants apartments. This approach ensures that effective and appropriately resourced maintenance and operational regimes can be carried out with minimal disruption to individual tenants.

System	Service Interval	Estimated Lifespan
Air to water heat pump (Outdoor Unit)	Ensure face of condenser is clear obstruction (leaves, debris etc.) every 6 months	15-20 Years
Floor Standing Gas Boilers	Annual service including routine maintenance	20 Years
Mechanical Ventilation Heat Recovery Units (MVHR)	Clean filters every 3-6 months (Vacuum only) Replace filters every year	20 years
Heat Interface Unit	Clean Strainer once a year	20 years

Table 4.2 – Recommended Maintenance Schedules