# The Support Scheme for Renewable Heat

## Example Design Report

Version 1, July 5 2024

### *Investment Aid Example Design Report:*

The purpose of this document is it give an applicant for the SSRH grant an indication of what is expected in a design report and to provide a structure or layout for them to follow that will include every heading that needs to be addressed and provide a template for multiple applications for applicants that are doing them on behalf of clients.

# SSRH Design Report for Renewable Heat Installation

**Hotel Ireland**

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**Date:** July 2024

**Applicant:** Ireland Lux Hotels Ltd.

**Installation Address:** 1 Lane, Dublin, Ireland

**SSRH Application Number:** 123456

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**Prepared by:**

Joe Blogs
EcoH Solutions
[Address]
[City, Eircode]
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**Submitted to:**

Sustainable Energy Authority of Ireland (SEAI)

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**Project Overview:**

This design report outlines the proposed installation of a high-efficiency air-source heat pump system at Hotel Ireland. The new system aims to replace the existing oil-fired boilers, enhancing energy efficiency and significantly reducing carbon emissions. The report includes detailed descriptions of the current and proposed heating systems, scope of works, compliance with relevant regulations, and an energy performance and carbon emissions analysis benchmarked against CIBSE Guide F.

# Contents

# SSRH Design Report for Renewable Heat Installation at sample Hotel Ireland

**Date:** 15th July 2024

**Applicant:** Ireland Lux Hotels Ltd.

**SSRH Application Number:** 123456

**Design Engineer:** Joe Bloggs

**Company:** EcoHeat Solutions

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## 1. Details of Design Engineer

### 1.1 Credentials of Design Engineer

- **Name:** Joe Blogs
- **Company:** EcoH Solutions
- **Professional Indemnity Insurance:** [Attached Copy in appendix 1]
- **Evidence of Competence:** Mechanical and Electrical Engineer with a Level 8 degree, registered with Engineers Ireland. John Smith has over 15 years of experience in designing and implementing heating systems, with a focus on renewable energy solutions.

  **[Copies of my degree, PI insurance and Engineers Ireland membership in Appendix 1]**

### 1.2 Appointment and Commitment of Design Engineer

[ Input into Appendix 1]

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## 2. Executive Summary

### Project Overview

- **Applicant Name:** Ireland Lux Hotels Ltd.
- **Installation Address:** 1 Lane, Dublin, Ireland
- **SSRH Application Number:** 123456
- **Buildings/Processes Heated:** Main hotel building, spa, and conference centre.

## 2.1 Description of Heat Use and Heating Systems

- **Operation to be Heated:** The project involves heating the main hotel building, which includes 100 guest rooms, dining areas, conference rooms, a large spa, and wellness centre. The hotel aims to enhance energy efficiency and reduce carbon emissions by replacing the existing oil-fired boilers with a high-efficiency air-source heat pump system.
- **Existing Heating System:** The current system comprises two oil-fired boilers (Model: OilMaster 5000, Capacity: 500 kW each, Gross Efficiency: 75%). The system includes a network of radiators and underfloor heating in specific areas. Hot water is provided by the boilers through a series of storage tanks and distribution pipes.
- **New Heating System:** The new system will utilize air to water heat pumps (Model: EcoHeat ASHP 3000, Capacity: 300 kW each, Efficiency: SCOP 3.2). The heat pump will provide both space heating and domestic hot water, integrated into the existing distribution system. The heat pump system will include two units of EcoHeat ASHP 3000 to ensure redundancy and load management.

Technical datasheets and eco-design information for the heat pump and existing boiler in appendix 2

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# 3. Description of Scope of Works

## 3.1 Scope of Works

- **Diagram and Description:** [Attach detailed diagram and description of the heating system, identifying old and new components]
    - **Heating System Layout:** A detailed schematic (see Appendix 3) shows the integration of new heat pumps with existing distribution networks. The schematic includes placement of heat pumps, connection points with existing systems, buffer tanks, thermal stores, and key control points.
    - **Old and New Components:** Existing oil boilers will be retained as a backup system. They will only operate during peak load times or if the new system fails. A clear diagram depicted in appendix 3 identifies the conditions and control strategy for the backup operation.
    - **Design Life and Durability:** The heat pump system is designed for a minimum operational life of 20 years, assuming regular maintenance. Major components such as compressors, heat exchangers, and control systems have a lifespan of 15-20 years. The durability of the existing components has been assessed and found to be in good condition, with necessary refurbishments included in the project scope.
    - **Basis of Design:** The heat profile for the hotel has been developed based on historical data and anticipated occupancy rates. The system is designed to handle a peak load of 600 kW, with average daily loads varying between 300 kW to 550 kW, depending on the season. Heat meters will be installed to monitor the performance and ensure accurate measurement of energy consumption and heat delivery.

## 3.2 Seasonal Coefficient of Performance (SCOP)

- **Heat Pump Details:**
  - **Model Number:** EcoHeat ASHP 3000
  - **Capacity:** 300 kW per unit
  - **Working Temperature:** Operating range between -20°C to +35°C
  - **SCOP:** 3.2 [Depending on system a detailed SCOP calculation may be required]
  - **Flow Temperature:** 55°C
  - **Eco-design compliant**: Yes, please see eco design certificate attached to appendix 2
  - **Sizing Calculations:** The sizing of the heat pumps is based on detailed thermal load calculations, which consider the thermal characteristics of the building (U-values), occupancy patterns, and climate data for Dublin. The calculations include the following steps:
    - **Step 1: Load Analysis:** A detailed analysis of the hotel's heating and hot water demand was performed. Historical energy consumption data over the past five years were reviewed to establish a baseline. Occupancy rates and peak usage periods were analysed to estimate peak and average loads.
    - **Step 2: Thermal Characteristics:** The building's thermal properties were assessed, including insulation levels, window types, and ventilation rates. The U-values for different building elements were calculated based on the Building Energy Rating (BER) certificate and supplemented with on-site inspections.
    - **Step 3: Climate Data:** Climate data for Dublin, including average temperatures, humidity levels, and seasonal variations, were incorporated into the calculations. The design temperature was set at -5°C, considering extreme weather conditions.
    - **Heat profile:**

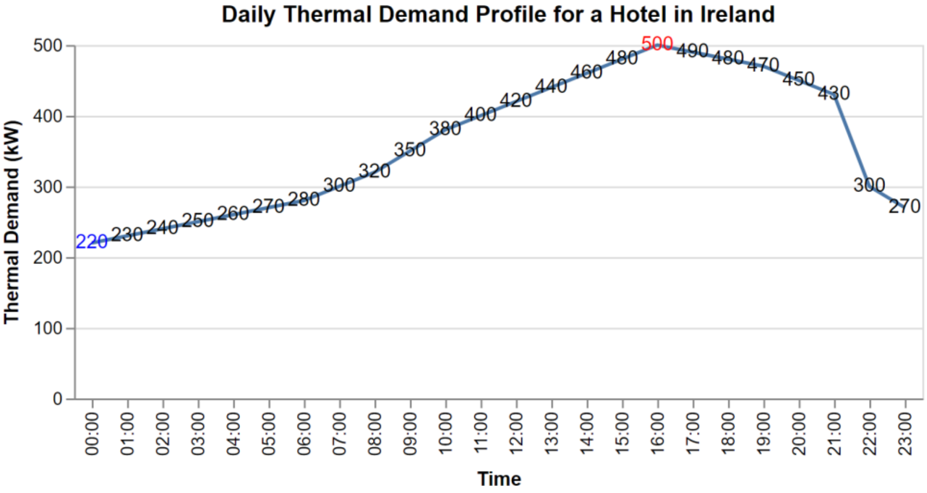


Figure 1

The thermal data from the hotel was analysed over the course of a year. The information presented in Figure 1 represents the day with the highest thermal energy demand, which occurred in January.

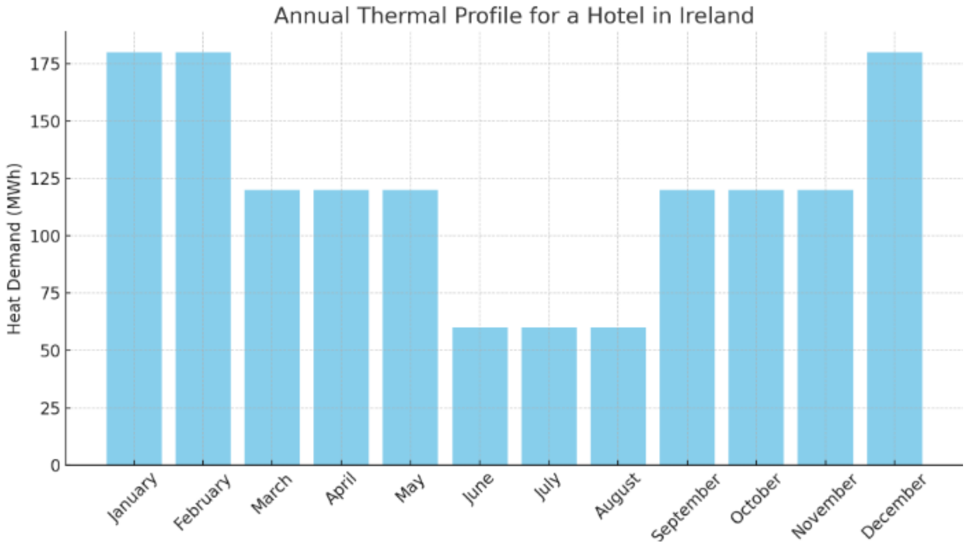


Figure 2: Thermal demand over one year.

**Seasonal Variation:** The heat demand follows a clear seasonal pattern, with higher demands during the winter months (January, February, and December) and lower demands during the summer months (June, July, and August). This is expected due to the need for heating during colder months.

**Transitional Periods:** The transitional periods (spring and autumn) show moderate heat demand, reflecting the changing weather conditions where heating might still be necessary but not as intensively as in the peak winter months.

**Peak Demand:** The peak heat demand is observed in January and February, indicating these months are the coldest and require the most heating.

- **Step 4: Heat Pump Sizing:** Using the load analysis and thermal characteristics, the required heating capacity was calculated. The total heating demand for the hotel was estimated to be 550 kW during peak periods. To ensure system reliability and efficiency, two heat pump units of 300 kW each were selected, providing a total capacity of 600 kW. This configuration allows for load management and redundancy.
- **Step 5: Efficiency Optimization:** The SCOP of 3.2 was factored into the sizing to ensure the heat pumps operate efficiently across different temperatures. This was verified against the Eco Design guidance for heat pumps.

- **Energy Demand and Consumption:**
    - **Annual Total Energy Demand:** 1,600 MWh
    - **Estimated Annual Energy Consumption:** 375 MWh/year for the heat pump system

- **Building U-values:** [BER compliance report see appendix 4] shows that the building complies with acceptable U-values dictated in Part L 2008 for building other than dwellings.

## 3.3 Carbon Emissions Analysis:

- **Current System Emissions:** The existing oil-fired boilers have an efficiency of 75% and burn oil (Kerosene) with a carbon intensity of approximately 0.264 kg CO2 per kWh. With an annual energy demand of 1,600 MWh, the current system's emissions are:
  - **Energy Input Required:** 1,600 MWh
  - **Delivered energy:** 1,600 MWh * 0.75 = 1,200 MWh
  - **Annual CO2 Emissions:** 1,600 MWh * 0.264 kg CO2/kWh = 422,400 kg CO2 (422.4 metric tons of CO2)
- **Proposed Heat Pump System Emissions:** The heat pumps have a SCOP of 3.2. The carbon intensity of electricity in Ireland is approximately 0.2 kg CO2 per kWh (based on current grid data). The annual energy consumption of the heat pumps is 375 MWh, therefore:
  - **Annual CO2 Emissions:** 375 MWh * 0.2 kg CO2/kWh = 75,000 kg CO2 (75 metric tons of CO2)
- **Annual CO2 Emissions Reduction:**
  - **Current System Emissions:** 422 metric tons of CO2
  - **Proposed System Emissions:** 75metric tons of CO2
  - **Reduction:** 422 - 75 = 347 metric tons of CO2 (approximately 82% reduction in CO2 emissions)

## 3.4 Energy Performance Benchmarking:

- **Current System Performance:** The current oil-fired boiler system's energy performance can be benchmarked against the CIBSE Guide F energy benchmark for hotels. According to CIBSE Guide F table 20.16, typical energy consumption for heating in hotels ranges from 240-460 kWh/m² per year.
  - **Hotel Area:** 10,000 m²
  - **Current System Energy Consumption:** 1,600 MWh (equivalent to 160 kWh/m² per year, assuming all heating energy is used)
- **Proposed System Performance:** The proposed heat pump system's energy performance can be compared to the same benchmark.
  - **Proposed System Energy Consumption:** 375 MWh/year (equivalent to 37.5 kWh/m² per year)
- **Energy Performance Improvement:**
  - **Current System Energy Use:** 160 kWh/m² per year
  - **Proposed System Energy Use:** 37.5 kWh/m² per year
  - **Improvement:** 160 - 37.5 = 122.5 kWh/m² per year (approximately 76.6% reduction in energy consumption)

### 3.5 Estimated Project Costs

| Cost Category | Ex VAT (€) | Incl. VAT (€) |
|---|---|---|
| Equipment | 100,000 | 123,000 |
| Labour | 50,000 | 61,500 |
| External Project Management | 10,000 | 12,300 |
| Other Costs | 5,000 | 6,150 |
| **Total Cost Supplied & Fitted** | 165,000 | 202,950 |

- **Equipment Costs:** Includes the purchase and installation of two EcoHeat ASHP 3000 units, heat meters, control systems, and ancillary equipment.
- **Labour Costs:** Covers the installation, integration with existing systems, testing, and commissioning.
- **External Project Management Costs:** Fees for project oversight, ensuring adherence to timelines and quality standards.

As the SCOP of the system is 3.2 we will be requesting grant support of 30% for all measures.

**Note: Heat pump grant aid ranges from 10-40% depending on SCOP, ancillary equipment that improve the operational performance of may request up to 30% grant aid and building fabric improvements may also request up to 30% grant aid. Please see Grant Scheme Operating Rules and Guidelines for detailed information.**

[Appendix 6 for a full cost breakdown.]

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## 4. Heat Metering

**Factors to be Addressed:**

- **Selection and Location:** Heat meters will be selected based on their ability to measure flow rates and temperatures accurately within the operational range of the system. Suitable temperature sensors and flow sensors will be selected to ensure accurate data collection.
- **Environmental Conditions:** Heat meters and sensors will be installed in protected locations to avoid direct exposure to weather elements. Specific protective enclosures will be used for outdoor installations.
- **Tamper Evidence and Calibration:** The design includes tamper-evident features such as seals and locks on meter housings. Calibration will be conducted during installation, with a schedule for regular recalibration if required.
- **Maintenance and Servicing:** Isolation valves will be installed around heat meters to facilitate maintenance and replacement without system downtime.
- **Multiple Meters:** In cases where multiple meters are used, the methodology for calculating eligible heat will be as follows: HM1 (main building) + HM2 (spa) – HM3 (conference center) = HM eligible.
- **Accuracy class:** MID class 2 compliant.

We currently propose the [insert name of heat meter] , technical information can be found in appendix 4. Heat meter selection will be finalised post letter of offer.

## 5. Compliance with Building Regulations

- **BCAR Relevance:** BCAR is applicable to this installation due to the scale and impact of the project. A Design Certifier has been appointed to ensure compliance with all relevant regulations.
- **Building Assessment:** A non-intrusive assessment of the existing building confirms that it meets current regulations. Necessary upgrades identified during this assessment include improved insulation in the boiler room and reinforcement of structural elements supporting the new heat pump units.

## 6. Compliance with Health and Safety Regulations

- **PSDP Appointment:** The applicant has appointed EcoSafety Consultants as the Project Supervisor Design Stage (PSDP). Risk assessments have been conducted to ensure all health and safety considerations are incorporated into the design, installation, operation, and maintenance phases.
- **Health & Safety Integration:** The design includes safe access points for maintenance, appropriate labelling of hazardous areas, and integration of safety features such as emergency shut-off valves.

## 7. Compliance with Fire Safety Regulations

- **Fire Safety Certificate:** A fire safety certificate is required and will be obtained. The local fire officer has reviewed the design and provided recommendations, which include fire-resistant enclosures for heat pumps and ensuring adequate fire suppression systems in the boiler room.

## 8. Compliance with Planning Regulations

- **Planning Permissions:** Planning permission is required for the installation of the new heat pump system. An application has been submitted to the local authority, and preliminary feedback indicates that the project aligns with local zoning and environmental policies.
- **Change of Use:** The existing boiler room will undergo modifications to house the new heat pump units. A change of use application has been submitted and is pending approval.

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## 9. Compliance with Environmental Licensing

- **EPA Licence Compliance:** N/A
- **Additional Licenses:** No additional licenses are required. The installation will not trigger any new environmental licensing requirements.

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## 10. Level of Design Warranty

- **Warranty Coverage:** A minimum of 2 years full warranty will be provided for the heat pump and all ancillary works. Documentary evidence of warranty cover is included. The warranty includes repair and replacement of components in case of failure, ensuring the system remains operational and efficient.
- **Manufacturer's Warranty:** The heat pump manufacturer provides a warranty covering defects and performance issues for two years from the commissioning date.
- **Design Engineer Warranty:** The Design Engineer warrants the design's fitness for purpose and compliance with all regulatory requirements for five years.

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## 11. Subsequent Clarification of Design Detail

- **Clarification Process:** Specific details, such as the final planning permissions and environmental licences, will be finalized post-approval. Any pending issues will be addressed and documented before project completion.
- **Certification:** The Design Engineer will provide all necessary statutory certificates and coordinate certification of compliance from all involved professionals and specialists.

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## 12. Design Declaration by Design Engineer

"I, Joe Bloggs, acting as nominated Competent Design Engineer, declare that all information submitted in this design report is accurate to the best of my knowledge and I warrant the design and all aspects of the Design of the Eligible Installation which includes the renewable heat, all heat meters, distribution, and heat-emitting equipment, and all supporting infrastructure, electrical installation for a period of five years. I declare that the heating installation design is 'fit for purpose' and can deliver the required heat. This will be validated during an on-site inspection following system commissioning.

I confirm that the project design has considered all regulatory requirements including:

- Relevant Building Regulations
- Relevant Planning Permissions (including change of use)
- Relevant Environmental Licencing
- H&S Legislation and
- Manufacturer's Instructions

Documented confirmation of compliance with all regulatory requirements will be provided as part of the Completion Report."

Signed: ______________________ Date: ________________

"I, [Applicant's Name], confirm that the Design Engineer has explained to me the impact of all the items listed as requirements of the Design Report and the GSORG and their implications for the applicant and for the project as addressed in the Design Report."

Signed: ______________________ Date: ________________

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## Appendices:

- **Appendix 1:** [Letter of appointment of Design Engineer, PI insurance and Engineers Ireland membership, engineering degree, letter of appointment from applicant]
- **Appendix 2:** [Datasheets]
- **Appendix 3:** [Schematic/sitemap]
- **Appendix 4:** [BER compliance report]
- **Appendix 5:** [Heat meter datasheet]
- **Appendix 6:** [Commercial cost breakdown]