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# CLIMATE ACTION ENERGY STATEMENT
# FOR THE
# PROPOSED LARGE SCALE RESIDENTIAL DEVELOPMENT
# AT
# BOREEN BRADACH, KINNEGAD, CO. WESTMEATH

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# Table of Contents

# 1.0 INTRODUCTION

This Climate Action Energy statement has been prepared to accompany the planning application.

The development will comprise a Large-Scale Residential Development (LRD) on a site at Boreen Bradach, Kinnegad, Co. Westmeath.

The proposed development will comprise 129 no. houses (1 bed, 2 beds, 3 beds and 4 beds) and the provision of a crèche facility. Provision of car, cycle and motorbike parking.

Provision of a new vehicular access and additional pedestrian/cyclist access from L-5014 (Boreen Bradach Road) and associated upgrades to the local road.

All associated site development works and services provision, bin stores, residential private open space, public open space, substation, boundary treatments, landscaping and all associated site development works.

# 2.0 ENERGY & CARBON EMISSIONS STRATEGY

This report outlines the energy performance of the proposed new development and compares the standards prescribed in the building regulations TGD Part L. As part of the development's efforts to further reduce energy consumption, the residential units shall target a minimum BER energy rating of 'A2'/'A3'.

The built environment has been designed to maximise the quality of life within the development, with the health and wellbeing of the user in mind. Generous open spaces surrounding the housing units have been defined and orientated for this purpose.

The garden design of each unit in the scheme is integral to the health and wellbeing approach of the development and has been maximized in specific units where possible.

Passive surveillance is incorporated into the design of the proposed buildings on the development. This reduces the risk of crime to all residents within the scheme, littering, and loitering of green spaces.

The proposed dwellings shall be designed to meet the requirements set out in the Sustainable Residential Development in Urban Areas Guidelines for Planning Authorities; Urban Development and Building Heights Guidelines for Planning Authorities and the "Sustainable Residential Development and Compact Settlement Guidelines for Planning Authorities".

The dwellings shall include several energy conservation measures to achieve a high energy rating for each dwelling:

- High-performance thermal envelope with low U-values for the fabric
- Low thermal bridging construction details
- Airtight construction
- Energy efficient ventilation system
- Energy efficient heating and hot water generation system
- Energy efficient lighting to be used throughout.
- On-site energy generation (where required)

The sustainable design of the proposed development ensures that each dwelling in the development performs efficiently and complies with the NZEB criteria.

# 3.0 LEGISLATIVE BACKGROUND

The Planning and Development Act 2000 (as amended) sets out clear requirements for the monitoring and review of local authority housing strategies. Section 95 subsection (1)(b) requires that a planning authority's development plan should include objectives to ensure that the housing strategy is implemented. The stated objective is as follows:

*"To support the development of quality residential schemes with a range of housing options having regard to the standards, principles and any specific planning policy requirements (SPPRs) set out in the Sustainable Residential Development in Urban Areas Guidelines for Planning Authorities; Urban Development and Building Heights Guidelines for Planning Authorities and the "with Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities*".

## 3.1 CLIMATE ACTION PLAN 2024

The government is creating and implementing policies and strategies to achieve its long-term goal of transitioning to a low-carbon, climate resilient and environmentally sustainable economy by 2050.

By 2030, the government aims to achieve the following.

- Cutting greenhouse gas emissions by at least 30%
- Reaching a target of at least 32.5% energy efficiency
- Delivering 70% renewable electricity

The climate action and low carbon development act 2024 sets Ireland on the path to a 51% reduction in emissions by 2030 and to net-zero emissions no later than 2050.

This will require the introduction of a range of further measures, in addition to those already committed to in the 2021 Climate Action Plan, including:

- Improving the fabric and energy efficiency of our existing buildings
- Rolling out zero-carbon heating solutions, predominantly heat pumps and district heating networks.
- Planning for a full phase out of fossil fuels in buildings by 2050
- Progressive strengthening of building standards for all types of buildings
- Promoting the use of lower carbon alternatives in construction
- Promoting behavioural change in how households use energy.

## 3.1 WESTMEATH COUNTY COUNCIL – DEVELOPMENT PLAN 2021-2027

The development is subject to the Westmeath development plan 2021-2027.

The Plan's Strategic Aims are:

Climate Action: To transition to a low carbon and climate resilient County, with an emphasis on reduction in energy demand and greenhouse gas emissions, through a combination of effective mitigation and adaptation responses to climate change.

The following Westmeath Council policies have been considered as part of the proposed Climate Action Energy strategy, relevant policies including the below:

Energy Policy Objectives CPO 10.139 Support local, regional, national and international initiatives for limiting emissions of greenhouse gases through energy efficiency and the development of renewable energy sources which make use of the natural resources in an environmentally acceptable manner and having particular regard to the requirements of the Habitats Directive.

CPO 10.140 Facilitate measures which seek to reduce emissions of greenhouse gases and support the implementation of actions identified in the Westmeath County Council Climate Change Adaptation Strategy 2019-2024 and any future amendments.

CPO 10.141 Promote and support the use of renewable forms of energy as a contribution to the energy demand of all new buildings where it is consistent with the proper planning and sustainable development of an area.

## 3.2 BUILDING REGULATIONS – PART D

The practical implementation of the Design and Material principles has informed the design of the building envelope, internal layouts, facades and detailing has informed the materiality of the proposed development.

The proposed dwellings are designed in accordance with the Building Regulations, in particular Part D 'Materials and Workmanship', which includes all elements of the construction. The Design Principles and Specification are applied to the units of the development.

The dwellings are designed with sufficient width in the party walls so that that construction can be completed using a timber frame construction, subject to detailed design.

## 3.3 BUILDING REGULATIONS – PART L

The current edition of the Building Regulations Technical Guidance Document Part L – Conservation of Fuel and Energy – Dwellings sets out the requirements for the minimum fabric and air permeability requirements, maximum primary energy use and carbon dioxide (CO2) emissions as well as the minimum amount of energy derived from renewable sources, as calculated using the Domestic Energy Assessment Procedure (DEAP) methodology. The compliance with the requirements of this document is compulsory for all new dwellings.

Three design aspects demonstrate compliance:
1. The quality of building fabric
2. The limitation of primary energy use and $CO_2$ emissions
3. The use of energy from renewable sources

The table below outline the maximum fabric U value for each element as outlined in the Building Regulations TGD-L:

**Maximum Building Fabric U-values**

| **Building Fabric Element** | **TGD-L-2022 / NZEB**<br>**U-value ($W/m^2K$)** |
|---|---|
| Pitched Roof | 0.16 |
| Flat Roof | 0.20 |
| External Walls | 0.18 |
| Ground Floor / Exposed Floor | 0.18 |
| External doors, Windows, Rooflights | 1.40 |
| Air Permeability (Air Tightness) | 5.0 $m^3/h$ $m^2$ @ 50Pa |

The table below outline the minimum energy values for the dwelling as outlined in the Building Regulations TGD-L:

**Energy / Carbon Performance Limits and Renewable Energy Target**

| Element | TGD-L-2022 / NZEB | Reduction vs Reference building |
|---|---|---|
| Maximum Permitted Energy Performance Coefficient (MPEPC) | 0.30 | 70% |
| Maximum Permitted Carbon Performance Coefficient (MPCPC) | 0.35 | 65% |
| Minimum Amount of Energy from Renewable Sources | 0.20 | - |

The current edition of the Building Regulations "TGD-L" sets out the design requirements for Nearly Zero Energy Buildings (NZEB). In accordance with the requirements of The European Energy Performance of Buildings Directive Recast (EPBD) all new buildings must achieve the Nearly Zero Energy Building (NZEB) standard.

# 4.0 SUITABILITY OF ENERGY TECHNOLOGIES

To provide energy in a resource efficient manner, various low energy and zero carbon technologies have been assessed to determine suitability for the proposed development.

## 4.1 District Heat Networks

District heat networks use a combination of excess heat generated from large-scale commercial, industrial, or medical processes and heat generated from a centralised source to heat buildings connected to the network.

At present there are two large district heating schemes available in the Greater Dublin Area:

- District Heating Scheme (DHS) in Tallaght, Dublin 24, associated with large data centre in the area, utilising waste energy to heat some offices, local library, with a possibility of future extension to heat affordable dwellings in the area. As the proposed development site in question is located in North Co Dublin region, it is out of reach for the Tallaght DHS.

- Dublin District Heating Project (DDHP) associated with the waste incinerator in Ringsend, Dublin 2, with a potential to heat up to 80,000 homes. The project is at the development stage and has yet to become operational. Due to its nature, it is likely to start locally near the source and grow organically. According to Dublin City Council website, there are plans for the DDHP to reach the Docklands in Dublin City.

At present there are no large district heating schemes available near the residential development at Boreen Bradach, Kinnegad, County Westmeath it seems unlikely that there would be a feasible district heating solution for this development in the foreseeable future.

For the above reason District Heat networks is not feasible for the proposed development.

## 4.2 Communal Heat Network

Communal heat networks use heat generated from a centralised source to heat dwellings connected to the network.

It requires a relatively large plant room, heat distribution pipework, heat metering and billing arrangements. The additional investment and operational requirements do not seem to be sufficiently offset by energy savings, when compared to individual heating systems.

For the above reason Communal Heat network is not feasible for the proposed development.

## 4.3 Combined Heat and Power

Combined Heat & Power (CHP) is a system that utilises an internal combustion engine to mechanically drive an electric generator and produce electricity. At the same time the waste heat emitted from the engine is utilised for space or hot water heating purposes, resulting in an improved overall energy efficiency over a traditional electricity generation in power plants. Generally suitable for communal / district heating schemes only.

The CHP plant requires large heat demand to operate effectively and requires large plant room spaces for CHP and back up boilers.

For the above reason Combined Heat at Power is not feasible for the proposed development.

## 4.4 Ground Source Heat Pump

Ground Source Heat Pump (GSHP) utilised the natural heat of the ground. A refrigeration cycle is used to draw energy from the low-temperature medium (ground) and heat the higher-temperature medium (heating water). The amount of energy transferred is much higher than the amount of energy required to power the system. The energy efficiency of a GSHP is generally higher than that of an ASHP especially during the coldest weather, however the additional capital cost required to install the ground energy collector typically cannot be offset by the higher efficiency and lower running cost, given that spells of cold weather are not very often occurrence in the relatively mild climate in Ireland.

For the above reason Ground Source Heat Pump is not feasible for the proposed development.

## 4.5 Air Source Heat Pump

Air Source Heat Pump (ASHP) utilise the natural heat of the ambient air. A refrigeration cycle is used to draw energy from the low-temperature medium (air) and heat the higher-temperature medium (heating water). The amount of energy transferred is much higher than the amount of energy required to power the system. The energy efficiency of an ASHP is generally lower than that of a GSHP especially during the coldest weather, and it may require supplementation with electric heater at peak heat demand times, however such occurrences are not very often in the relatively mild climate in Ireland.

The air source heat requires that each dwelling is provided with private outdoor space.

For the above reason Air Source Heat Pump appear to be feasible for the proposed development. It is proposed to consider the use of Air Source Heat Pump units in individual heating systems subject to further assessment at the detailed design stage.

## 4.6 Exhaust Air Source Heat Pump

Exhaust Air Heat Pump (EAHP) is a certain type of an ASHP which draws energy from the air being extracted from the house through the ventilation system. As the temperature of this air is constant throughout the year, the output and energy efficiency of an EAHP also stays constant, i.e. it is not affected by low ambient air temperatures. Another advantage of an EAHP is that it can help in ventilating the house with its constantly running fan. The downside of EAHPs is the limited output that is related to the ventilation requirements of the house – EAHPs are deemed suitable for relatively small and well insulated houses or apartments.

For the above reason Exhaust Air Heat Pumps is not feasible for the proposed development.

## 4.8 Wind Turbines

A mast mounted wind turbine can generate significant amounts of electrical energy. However due to the physical size and clearances required from buildings or trees, they are suitable for sites with large open areas. Also not deemed suitable for a suburban location due to size, aesthetical and noise implications.

For the above reason wind turbines is not feasible for the proposed development.

## 4.9 Solar Photovoltaic

Solar Photovoltaic (PV) collectors convert the energy of the sun into electricity that can be used within the household reducing the amount of electricity imported from the grid. PV collectors can be installed on the roof or integrated with external walls. While only up to 20% of the sun irradiation available is recovered, this energy form (electricity) comes with the flexibility of being suitable for many uses.

For the above reason Solar PV collectors are feasible for the proposed development. It is proposed to use Solar PV collectors for this project subject to further assessment at the detailed design stage.

# 5.0 BUILDING DESIGN

High-performance building fabric elements are being considered and selected to minimise unnecessary heat loss from the internal spaces.

In addition to the reduction in energy consumption and associated carbon emissions for space heating and ventilation through a high performance fabric, high efficiency heating systems are being proposed for use throughout the development, minimising heat losses through the buildings fabric as well as a lower then required air permeability rate, helps to ensure lower energy consumption rates and associated carbon emissions are achieved throughout the year thus reduces the overall cost of heating for the end user.

The buildings will be designed and constructed in accordance with the building regulations and best practices and can be summarised as follows:

**Fabric Insulation**

The following target U-values have been adopted for the project:

| Building Fabric Element | Backstop (max.) U-value TGD-L 2022 | Target U-value for this project |
|---|---|---|
| Floor | 0.18W/m$^2$K | 0.18W/m$^2$K |
| External walls | 0.18W/m$^2$K | 0.18W/m$^2$K |
| Roof | 0.16W/m$^2$K | 0.16W/m$^2$K |
| External doors | 1.40W/m$^2$K | 1.40W/m$^2$K |
| Windows & rooflights | 1.40W/m$^2$K | 1.40W/m$^2$K |

**Air permeability**

The level of air permeability should be achievable by adherence to the BR Part L 2022 Acceptable Construction Details and monitoring during the construction.

| | Backstop (max.) value TGD-L 2022 | Target value for this project |
|---|---|---|
| Air permeability @ 50Pa | 5.0m$^3$/h/m$^2$ | 3.0m$^3$/h/m$^2$ |

**Thermal bridging**

The adherence to the Building Regulations TGD Part L 2022 Acceptable Construction Details, adequate design considerations and monitoring during the construction stage should assist reducing thermal bridging.

# 6.0 BUILDING SERVICES SYSTEMS DESIGN

Energy technologies for this development shall be selected on the following basis:

- Compliance with the Building Regulations – Part L 2022 (NZEB)
- Operation strategy: individual vs communal
- Life-cycle cost

The selection of technologies will be confirmed at the detailed design stage; however, it is envisaged that a combination of technologies shall be required to achieve building regulation compliance on the residential development as follows:

## Renewable Technologies

To demonstrate the compliance with the Building Regulations Part L, each dwelling is required to have a portion of its energy requirements provided from a source of renewable energy.

In addition to heat pumps, additional Solar PV panels on the roofs of houses have been included in the submitted plans and will be considered to ensure building regulation compliance subject to detailed design.

## Heating System

Individual Air Source Heat Pump subject to detailed design.

The houses shall be heated by means of either underfloor heating or low temperature radiators.

Heating controls in the houses will consists of a two heating zones with individual time and temperature controls.

## Domestic Hot Water

Domestic hot water shall be generated in every house with individual time and temperature controls. The heat source shall be shared with the heating system.

## Ventilation

The ventilation solutions considered for the development are as follows:

i. Natural Ventilation + Intermittent Extract Fans. This is the least preferred solution as it is not fully compatible with the low air permeability targets.

ii. Continuous (Centralised or Decentralised) Mechanical Extract Ventilation (CMEV) or demand control ventilation (DCV), which operates by extracting warm, stale air from dwelling wet rooms either centrally or decentralised. Wall vents in the habitable rooms shall be provided and acoustically treated as required.

iii. Balanced Whole House Mechanical Ventilation (with or without Heat Recovery) as a whole dwelling approach with ‘mechanical ventilation with heat recovery system (MVHR). The unit works by extracting warm, stale air from ‘wet rooms’ (kitchen, utility, bathroom, etc.), and extracting the embodied energy (heat) from this exhaust air and re-introducing this captured energy into the incoming fresh air.

iv. Mechanical cooker extract hood ducted to the outside shall be installed in the Kitchen irrespective of the ventilation system type.

## Water Conservation Measures

The requirements for low flow sanitary ware (water restrictors) in each dwelling shall be considered during the detailed design stage. This is a water conservation initiative and reduces waste by restricting water flowrates to a shower within the dwelling.

The shower head fittings could be provided with a reduced flow to allow for the conservation of water use as well as reducing energy used to heat hot water.

## Lighting

Provision for natural daylight in modern buildings helps to create a better internal environment for occupants and helping to assist in the well-being of the inhabitants.

All light fittings are to be based on LED type (A+ Rated light bulb) located throughout each occupiable space, such as bedroom, lobby, living/dining etc. A significant reduction in electrical energy usage shall also be realised using high efficiency lights.

External Lighting shall be energy efficient and provided with LED type with photocell technology as outlined in the proposed public lighting layouts.

# 7.0 CLIMATE / ENERGY IMPACT CALCULATIONS

The below calculations are based on the results of a preliminary DEAP assessment for a typical dwelling, extrapolated for all 129 dwellings in the development based on the floor area. The typical dwelling was selected to demonstrate average energy consumption for the development.

The DEAP assessment results for the typical dwelling included in the development are available in Appendix A to this document.

| Typical dwelling: | | Area, $m^2$: | 112.85 | | BER: A2 | | |
|---|---|---|---|---|---|---|---|
| **Element** | **Reference Building Performance** | **Target** | | | **Achieved** | | |
| | | **Total** | **per $m^2$** | **Performance Coefficient** | **Total** | **per $m^2$** | **Performance Coefficient** |
| Primary Energy, kWh/a | 14,989 | 4,497 | 39.85 | 0.3 | 4,032 | 35.73 | 0.269 |
| Carbon Dioxide, kg/a | 2,930 | 1,026 | 9.09 | 0.35 | 516 | 4.57 | 0.176 |
| Renewable Energy, kWh/a | - | 948 | 8.40 | 0.2 | 2,304 | 20.42 | 0.486 |

Table 7.1

| Overall development: | | Area, $m^2$: | 14,578 | | | | |
|---|---|---|---|---|---|---|---|
| **Element** | **Reference Building Performance** | **Target** | | | **Achieved** | | |
| | | **Total** | **per $m^2$** | **Performance Coefficient** | **Total** | **per $m^2$** | **Performance Coefficient** |
| Primary Energy, kWh/a | 1,936,327 | 580,898 | 39.85 | 0.3 | 520,872 | 35.73 | 0.269 |
| Carbon Dioxide, kg/a | 378,531 | 132,486 | 9.09 | 0.35 | 66,621 | 4.57 | 0.176 |
| Renewable Energy, kWh/a | - | 122,503 | 8.40 | 0.2 | 297,683 | 20.42 | 0.486 |

Table 7.2

| Overall improvement: | | |
|---|---|---|
| Primary Energy, kWh/a | -1,415,455 | Reduction by 73% |
| Carbon Dioxide, kg/a | -311,910 | Reduction by 82% |
| Renewable Energy, kWh/a | 297,683 | Contribution |

Table 7.3

# 8.0 CONCLUSION

This Climate Action Energy Statement provides significant and relevant detail in relation to the nature of the energy profile for the proposed development, in support of the standards, principles and specific planning policy requirements (SPPR's) set out in the with Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities'.

As demonstrated in this report, the proposed development will be constructed to high building standards and will provide a sustainable, energy efficient development for future occupants.

# Appendix A

Typical sized dwelling: Preliminary BER and Part L compliance Report

The following preliminary BER and Part L compliance check was carried out by MandE Consulting Engineers for a typical sized dwelling in the development. The provisional inputs used are subject to confirmation at detail design stage.

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**Part L Report**
Date report created: 20/11/2024
Page 1/7

## Part L Specification

**BER IS NOT PUBLISHED**

### Property Details

| | | | |
|---|---|---|---|
| **Dwelling Type** | Mid-terrace house | **Type of BER rating** | New Dwelling - Provisional |
| **Address line 1** | TYPE B | **Year of Construction** | 2024 |
| **Address line 2** | KINNEGAD | **Date of Assessment** | 20/11/2024 |
| **Address line 3** | | **Date of Plans** | |
| **County** | Co. Westmeath | **Planning Reference** | |
| **Eircode** | | **Building Regulations** | 2019 TGD L |
| **BER Number** | | **MPRN No.** | 0 |
| **Purpose of Rating** | New dwelling for owner occupation | **Is MPRN shared with another dwelling?** | N/A |
| **Assessor Name** | Eamonn Brown | **Assessor Number** | 106085 |
| **Comment** | | **BER number assigned to shared dwelling** | N/A |

### Dimension Details

| | Area [m²] | Height [m] | Volume [m³] |
|---|---|---|---|
| Ground Floor | 57.10 | 2.70 | 154.17 |
| First Floor | 55.75 | 2.72 | 151.64 |
| Second Floor | 0.00 | 0.00 | 0.00 |
| Third and other floors | 0.00 | 0.00 | 0.00 |
| Room in roof | 0.00 | 0.00 | 0.00 |
| Total Floor Area | 112.85 | | 305.81 |

| | | | |
|---|---|---|---|
| **Living Area [m²]** | 14.80 | **Living area percentage [%]** | 13.11 |
| **No of Storeys** | 2 | | |

### Ventilation Details

| | Number | | |
|---|---|---|---|
| **Chimneys** | 0 | **Has permeability test been carried out?** | Yes |
| **Open Flues** | 0 | **Structure type** | N/A |
| **Fans & Vents** | 1 | **Is there a suspended wooden ground floor?** | No |
| **Number of flueless combustion room heaters** | 0 | **Percentage windows/doors draught stripped [%]** | N/A |
| **Is there a draught lobby on main entrance?** | No | **Number of sides sheltered** | 2 |
| **Ventilation method** | Whole-house extract ventilation | **Mechanical Ventilation Manufacturer** | N/A |
| **Specific fan power [W/(L/s)]** | 0.260 | **Mechanical Ventilation Model Name** | N/A |
| **Heat exchanger efficiency [%]** | N/A | **How many wetrooms (incl. kitchen)?** | N/A |

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## Building Elements - Floor Details

| Type | Description | Underfloor heating | U-Value [W/m²K] | Area [m²] |
|---|---|---|---|---|
| Ground Floor - Solid | | No | 0.18 | 57.1 |
| Non-Heat Loss Floor | | N/A | 0 | 55.75 |

## Building Elements - Roof Details

| Type | Description | U-Value [W/m²K] | Area [m²] |
|---|---|---|---|
| Pitched Roof - Insulated on Ceiling | | 0.16 | 55.75 |
| Flat Roof | | 0.2 | 1.35 |

## Building Elements - Wall Details

| Type | Description | U-Value [W/m²K] | Area [m²] |
|---|---|---|---|
| Unknown | | 0.18 | 34 |

## Building Elements - Door Details

| Description | Number of Doors | U-Value [W/m²K] | Area [m²] |
|---|---|---|---|
| | 1 | 1.4 | 2.200 |

## Building Elements - Window Details

| Glazing type | User defined u-value | U-Value [W/m²K] | Area [m²] |
|---|---|---|---|
| Double-glazed, argon filled | Yes | 1.400 | 10.100 |
| Double-glazed, argon filled | Yes | 1.400 | 9.450 |

## Other Details

| | | | |
|---|---|---|---|
| Thermal bridging factor [W/m²k] | 0.0800 | Thermal mass category of dwelling | Medium |

## Heating System - Solar Water Heating

| | | | |
|---|---|---|---|
| Solar Water Heating Present? | No | Aperture area of solar collector [m²] | N/A |
| Type, manufacturer, model | N/A | | |
| Zero loss collector efficiency, n0 | N/A | Collector heat loss coefficient, a1 [W/m²>K] | N/A |
| Annual Solar Radiation [kWh/m²] (Refer to Appendix H in DEAP) | N/A | Overshading factor | N/A |
| Dedicated storage volume [Litres] | N/A | Combined Cylinder | N/A |
| Solar fraction [%] | 0.000 | | |

## Heating System - Hot Water System

| | | | |
|---|---|---|---|
| Distribution Losses | 286.77 | Combi boiler present? | No |
| Supplementary electric water heating | N/A | Water Storage Volume [L] | 200 |
| Hot water storage manufacturer and model name | JOULE CYCLONE SMART | Declared loss factor [kWh/d] | 1.87 |
| Temperature factor unadjusted | 0.6 | Temperature Factor Multiplier | 0.9 |
| Primary Circuit loss type | Boiler / heat pump with insulated primary pipework and with cylinder thermostat | | |
| Is hot water storage indoors or in group heating system? | Yes | Insulation type | N/A |
| Insulation thickness [mm] | N/A | | |

## Heating System - Dist. system losses and gains

| | | | | | |
|---|---|---|---|---|---|
| Temperature adjustment [°C] | 0 | Control Category | 2 | Responsiveness category | 1 |
| Central heating pumps | 1 | Oil Boiler Pump | 0 | Oil boiler pump inside dwelling | No |
| Gas boiler flue fan | 0 | Warm air heating or fan coil radiators present | No | | |

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## Heating System - Energy Requirements (Individual)

| | | | | | |
|---|---|---|---|---|---|
| Main space heating system efficiency [%] | 372.29 | Space heating efficiency adjustment factor | 1.0000 | Main space heating fuel | Electricity |
| Main water heating system efficiency [%] | 257.62 | Water heating efficiency adjustment factor | 1.0000 | Main water heating fuel | Electricity |
| Secondary heating system efficiency [%] | N/A | Fraction of heating from secondary heating system | N/A | Secondary space heating system fuel | None |
| Fraction of main space and water heat from CHP | N/A | Electrical efficiency of CHP | N/A | Heat efficiency of CHP | N/A |
| CHP Fuel type | N/A | | | | |

## Summary for Part L Conformance (Applies to TGD L 2008/2011/2019 for new dwellings only)

| | | | |
|---|---|---|---|
| BER Number | | Building Regulations | 2019 TGD L |
| BER Result | A2 | Energy Value kWh/m²/yr | 35.73 |
| $CO_2$ emissions [kg/m²/yr] | 4.57 | | |
| EPC | 0.269 | EPC Pass/Fail | Pass |
| CPC | 0.176 | CPC Pass/Fail | Pass |

## Part L Conformance - Fabric

| Conformity with Maximum avg U-value requirements | U-value [W/m²K] | Pass/Fail | Conformity with Maximum U-value requirements | U-Value [W/m²K] | Pass/Fail |
|---|---|---|---|---|---|
| Pitched roof insulated on ceiling | 0.16 | Pass | Roofs | 0.2 | Pass |
| Pitched roof insulated on slope | 0 | Pass | Walls | 0.18 | Pass |
| Flat Roof | 0.2 | Pass | Floors | 0.18 | Pass |
| Floors with no underfloor heat | 0.18 | Pass | External doors / windows / rooflights | 1.40 | Pass |
| Floors with underfloor heat | 0.00 | Pass | | | |
| Walls | 0.18 | Pass | | | |
| Percentage of opening areas [%] | 19.27 | | | | |
| Average U value of openings | 1.40 | Pass | | | |
| Permeability test carried out and meets guidelines in TGD L | | | | 0.25 \| Pass | |

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

**Part L Report**
Date report created: 20/11/2024
Page 6/7

## Part L Conformance - Renewables (applies to TGD L 2019)

| | Source | Renewables Primary Energy | Total Primary Energy | RER |
|---|---|---|---|---|
| + Delivered energy | PV/Wind | 0.00 | 0.00 | |
| + Delivered energy | Other | 0.00 | 0.00 | |
| + Delivered energy | Solar | 0.00 | 0.00 | |
| + Delivered energy | Biomass | 0.00 | 0.00 | |
| + Delivered energy | Biodiesel | 0.00 | 0.00 | |
| + Delivered energy | Bioethanol | 0.00 | 0.00 | |
| + Environmental energy | HP | 3805.91 | 3805.91 | |
| + Saved energy | CHP | 0.00 | 0.00 | |
| + District heating | District Heating | 0.00 | 0.00 | |
| + Delivered energy | Grid | 0.00 | 4032.08 | |
| + Delivered energy | Thermal | 0.00 | 0.00 | |
| SUBTOTAL | | 3805.91 | 7837.99 | 0.49 - Pass |
| Energy not used in Regulated Loads | PV/Wind/CHP | 0.00 | 0.00 | |
| TOTAL | | 3805.91 | 7837.99 | 0.49 |

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**Part L Report**
Date report created: 20/11/2024
Page 7/7

## Energy Requirements: Individual Heating Systems

| | Fuel Type | Electricity Fuel Factors Date | Primary energy conversion factor | $CO_2$ emission factor |
|---|---|---|---|---|
| **Main space heating system** | Electricity | Current | 1.75 | 0.224 |
| **Secondary space heating system** | None | Current | 0.00 | 0.000 |
| **Main water heating system** | Electricity | Current | 1.75 | 0.224 |
| **Cooling System** | None | Current | 0.00 | 0.000 |
| **Pumps, fans** | Electricity | Current | 1.75 | 0.224 |
| **Energy for lighting** | Electricity | Current | 1.75 | 0.224 |