Ringwood Blarney, Phase 2

Proposed Residential Development

CLIMATE ACTION and ENERGY ANALYSIS REPORT

Ringwood,
Shean upper,
Blarney,
Co. Cork.

Client
Clockstrike Ltd.

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Contents

Section		Page
1	Introduction	4
2	Executive summary	5
3	Geographical project overview	7
4	Approach, methodology and calculation results	9
5	Calculation results & conclusion	15
Appendix	A) Average dwelling unit BER certificate	Attached
Appendix	B) Average dwelling unit Part L report	Attached

1 Introduction

1.1 Report purpose.
This report gives information on the projects energy status and carbon dioxide emissions, the statutory compliance requirements and energy/CO2 reduction achievements based on the proposed building / construction specifications.

1.2 DKPartnership (DKP) have been commissioned Clockstrike Limited to carry out the analysis and report for the proposed development at Ringwood, Shean upper, Blarney, Co. Cork.

1.3 Development detail
The proposed development will consist of a largescale residential development (LRD), representing Phase 2 of development in the Blarney East / Ringwood Expansion Area, and comprising the construction of (i) 323 no. residential dwellings comprising of 157 no. terraced, end-of-terrace, and detached houses; 52 no. duplexes provided in 5 no. 3-storey buildings; and 114 no. apartments provided in 2 no. 5-storey buildings (ii) a primary care centre, over 2 stories and 1,724sqm in area, incorporating GP services (iii) the refurbishment and redevelopment of existing farm outbuildings for conversion to a retail/pharmacy use, 80sqm in area, and café/restaurant use, 380sqm in area; (iv) a new access roadway into the site from the R617 with associated pedestrian and cyclist infrastructure, which will form the 1st phase of the proposed Stoneview Access Link Road, (v) a new signalised junction on the R617 road which will provide a single lane approach to the west and a two lane approach to the east, comprising one lane for through traffic on the R617 and a right turn lane for traffic turning into the site, and associated footpath improvements and cycle lane provision (vi) a new signalised junction on Station Road that reflects the junction permitted under the Phase 1 LRD scheme (Reg. Ref. 2443031) (vii) private, communal, and public open spaces and hard and soft landscaping, boundary treatments and amenity areas, including a new wetland public amenity area, (viii) drainage works and nature-based SuDS measures (ix) foul sewer infrastructure, including 1no. pump station, the diversion of existing foul and water sewers and other new network works, (x) car parking, including EV charging points, bicycle parking, and motorcycle parking bays (xi) 2no. substations all associated ancillary site, drainage and development works.

1.4 Policy and building regulation requirements
The project is subject to the following statutory and policy energy usage and CO2 emission target requirements:
a) TGD Part L 2022
b) Governments Climate Action Plan 2025

1.5 Approach
The energy usage and carbon emissions are calculated using the DEAP software and approached using the basic DKP energy reduction steps in the following order:
a) Reduce energy usage
b) Produce energy efficiently
c) Provide on-site energy

2 Executive summary

2.1 Analysis conducted

In this report the primary energy usage and carbon dioxide emissions have been analysed to provide an energy efficient building in compliance with the current standards and regulations and national and global climate impact.

2.2 Policy and building regulations applied

TGD Part L : Given its time frame currently known the new development's requires compliance (energy) to new Part L 2022. Compliance to the above would deem the development and developments residential units to be "Nearly Zero Energy Buildings" (NZEB) in accordance with the EU Energy performance of Buildings Directive Recast 2013/31/EU.
CAP25 : The governments Climate Action Plans 2025 and in particular the Built Environment sector comprises the residential, public and commercial sectors, and accounted for 11.1% of Ireland's economy-wide operational GHG emissions in 2023 according to the EPA. The residential sector is on track to meet its 2021-2025 sectoral emissions ceiling and is ahead of its 2025 indicative reduction target of -20%.

2.3 Compliance target and achieved calculation data

For this report the calculation data provided in the tables below is based on residential Part L 2022 and covers the main compliance criteria; a) Primary energy, b) Carbon dioxide, c) Renewable energy. To comply to Part L the residential unit(s) requires to achieve a primary energy reduction of 70% (0.30 MEPC factor), a carbon emission reduction of 65% (0.35 MCPC factor) and a 20% renewable energy contribution on a reference residential unit. This reference residential unit is identical to the actual proposed residential unit but applies pre-fixed Part L stipulated calculation parameters, U-values, insulation levels, boiler efficiency, controls etc. Whereas all house types at all proposed orientations have been assessed the table below represents the overall development average calculations based on the average house type, volume, floor area, exposed façade area, glazed area, etc .to limit the amount of data for this report. The table details the primary energy, CO2 and renewable energy data of the reference building, the minimum Part L (to-be-achieved) targets and development achievements.

Single average unit: 92.1 m2

Element	Unit	Reference	Required	Rate m2	mp epc/cpc	Achieved	Rate m2	epc/cpc
Primary Energy	kWh/y	13,859	4,158	45.2	0.30	**3,711**	40.3	0.268
Carbon Dioxide	kg/y	2,711	949	10.3	0.35	**473**	5.1	0.175
Renewable energy	kWh/y	-	832	9.0	0.20	**3,893**	42.3	0.505

Copy of Table 5.1

From the table above we note that the proposed building services solutions resulted in a primary energy reduction of 73.2%, a carbon dioxide emission reduction of 82.5% and a renewable primary energy equivalent of 50.5%

BER rating **A2** 40.3 kWh/m2/y

Overall Ringwood Phase 2 Development achievements for the 323 units

Element	Unit	Reference	Required	Rate m2	mp epc/cpc	Achieved	Rate m2	epc/cpc
Primary Energy	kWh/y	4,476,360	1,342,908	45.2	0.30	1,198,605	40.3	0.27
Carbon Dioxide	kg/y	875,588	306,456	10.3	0.35	152,825	5.1	0.17
Renewable energy	kWh/y	0	268,582	9.0	0.20	1,257,439	42.3	0.51

Copy of Table 5.2

Overall combined differences:

Primary Energy	kWh/y	Reduction	**-3,277,756**
Carbon Dioxide	kg/y	Reduction	**-722,763**
Renewable energy	kWh/y	Contribution	**1,257,439**

Copy of Table 5.3

We note from the table above that the overall development achieved an annual energy reduction in energy of -3,277,756 kWh resulting in an annual carbon dioxide (CO2) reduction of -722,763 kg CO2. The combined total development annual renewable contribution with the proposed systems stands at 1,257,439 kWh which would be deemed a great benefit to the global environment

2.4 Policy and building regulation compliance overview

The table below summarises the requirements of Part L for primary energy, CO2 and renewable energy.

Regulation	Requirement	Achievements (Table 4.4, column 9)
Primary Energy	To achieve a primary energy reduction factor (EPC) of 0.30 or less over the 2022 energy reference building.	An EPC of 0.27 was achieved which is lower than the maximum MEPC of 0.30 and is therefore compliant.
Carbon Dioxide	To achieve carbon dioxide emission reduction factor of 0.35 or less over the 2022 energy reference building.	An CPC of 0.17 was achieved which is significantly lower than the maximum MCPC of 0.35 and is therefore compliant.
Renewable	To achieve at least a 20% renewable primary energy equivalent contribution.	An overall contribution of renewable energy of 51% was achieved which is significantly more than the minimum 20% requirement and is therefore compliant.

Table 2.2: Requirements of Part L for primary energy, CO2 and renewable energy.

Government Climate Action Plan 2025.

The governments Climate Action Plan 2025 refers to greenhouse gasses (including carbon dioxide) periodical reduction target to be achieved within 2021-2025 of -20% and with the proposed developments CO_2 reductions of 82.5% the proposed development is well in excess of the CAP25 targets.

2.5 National and global climate impact

To give some guidance on the environmental impact of the proposed development we have compared the achieved carbon emissions with our national emissions and the global emissions. The tables below shows the current national emissions, the EPA forecasted 2030 emissions, the EPA target emission with proposed additional national reduction measures to combat global carbon emissions and the global equivalents.. We note that the carbon emissions for the proposed development year 1 (2023/2024) are higher than following years as a result of the added carbon emissions of the construction element. For the purpose of the carbon emission calculations the carbon factor from the national electricity grid being the source of energy for the development is maintained at the same carbon factor rate through to 2030 whereas in real terms the carbon factor of the national grid would be less in 2030 as a result of the governments target to de-carbonised the grid and therefore the quoted impact would actually be less.

NATIONAL EMISSIONS IMPACT

GHG CO2 eq	Unit	National	Development	Fraction
Year 2024	Mt-CO2/year	59.50		
Year 2025	Mt-CO2/year	59.25	0.0003515	0.0005932
Year 2030 * target	Mt-CO2/year	58.00	0.0001528	0.0002635
Year 2030 + Measures targ	Mt-CO2/year	48.00	0.0001528	0.0003184

Copy of Table 4.6 Mt=Million tonnes i.e.; 152,825 kgCO2/y = 0.0001528 MtCO2/y

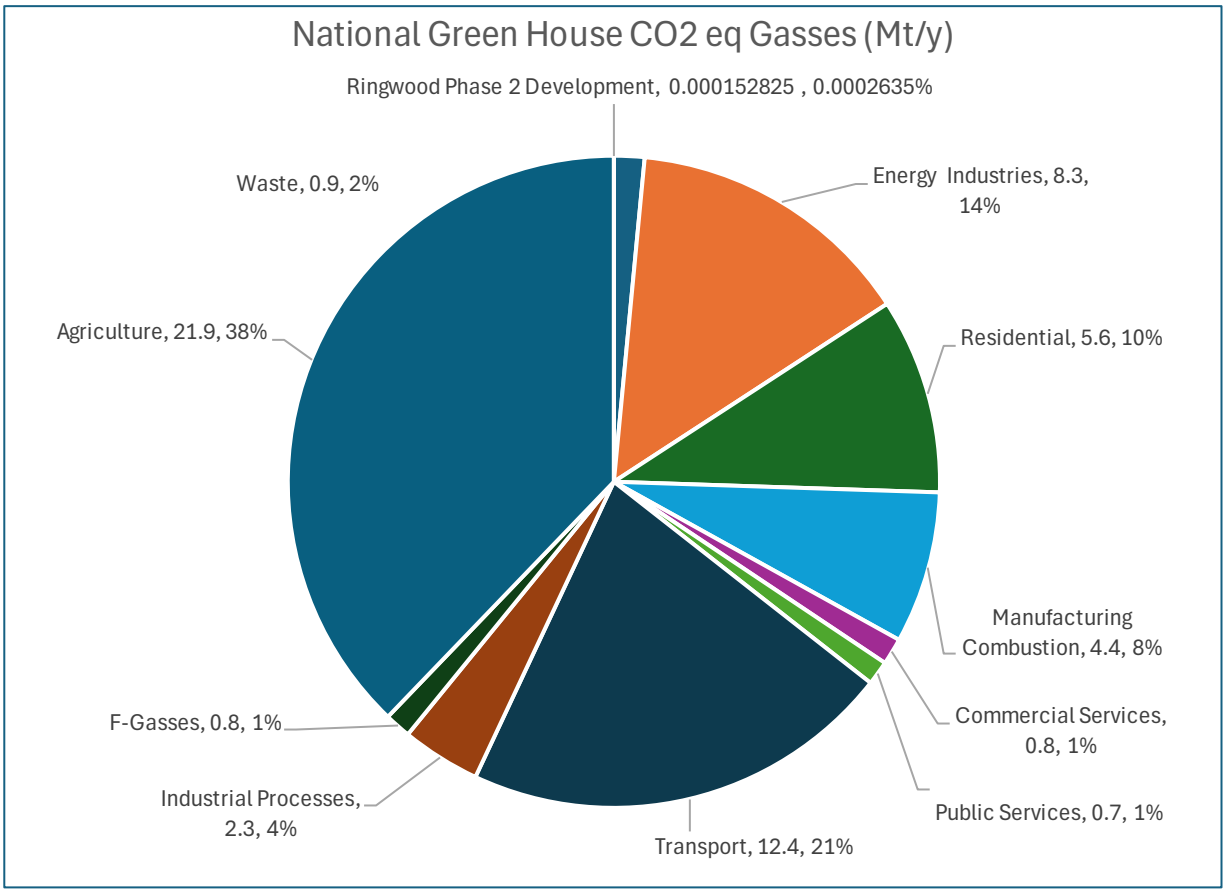
We note from the table above that the overall development impact on our national greenhouse emissions is 0.0005932 % in 2025 and 0.0002635% in 2030 and would be deemed absolutely minimal.

GLOBAL EMISSIONS IMPACT

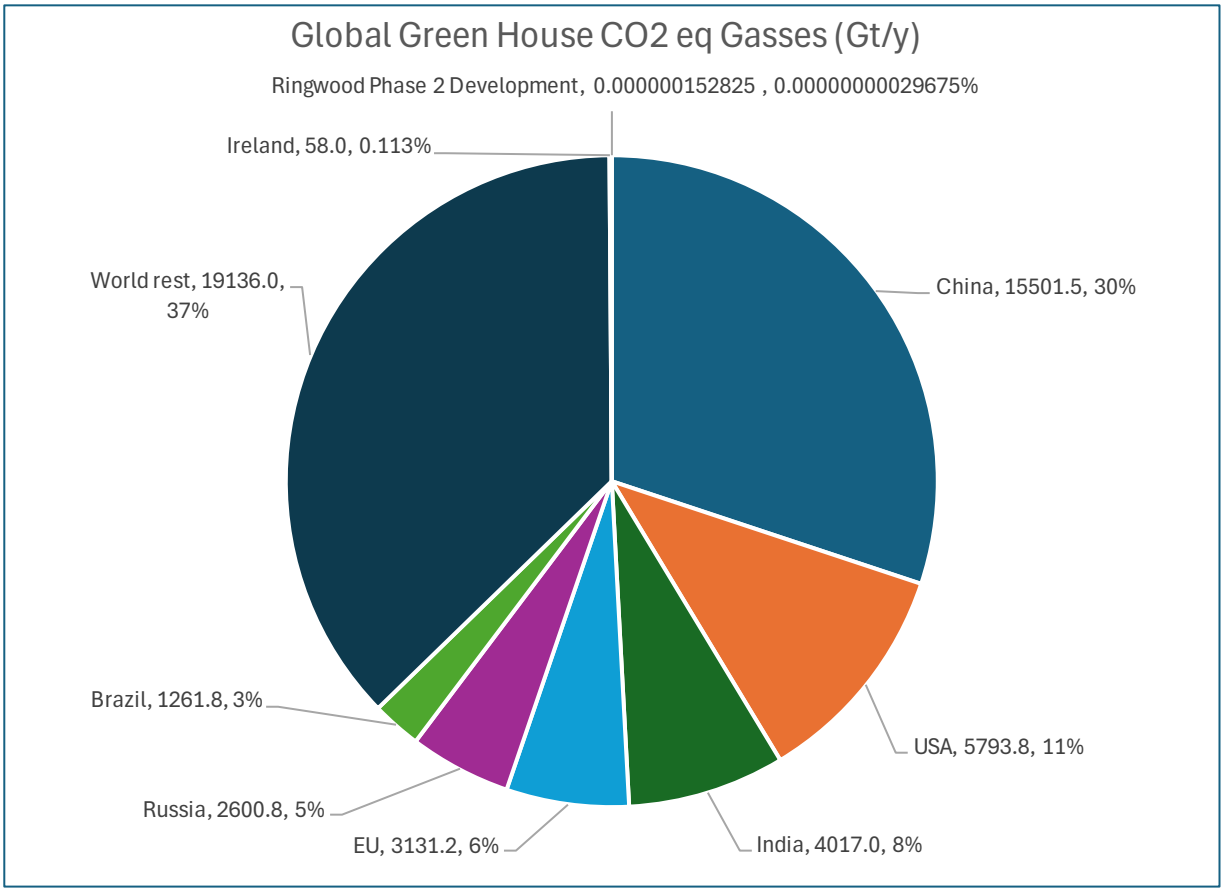
GHG CO2 eq	Unit	Global	Development	Fraction (%)
Year 2024	Gt-CO2/year	53.80		
Year 2025	Gt-CO2/year	53.50	0.0000003515	0.000000657006
Year 2030 * target	Gt-CO2/year	51.50	0.0000001528	0.000000296748

Copy of Table 4.7 Gt=1000 Million tonnes (Mt)

We note from the table above that the overall impact of the Ringwood Phase 2 Development on the global green house emissions is 0.0000006570 % in 2024 and 0.0000002967% in 2030 and would be deemed under any other situations other than CO2 emissions to be negligible. Irelands estimated 2024 global contribution of 0.05925 Gt/y stands at ca 0.11% from the global emissions



Copy of illustration 5.1: Irelands (EPA) national annual sectorial CO2 (GHG) emissions.



Copy of illustration 5.2: Global by country / area annual CO2 (GHG) emissions.

2.6 Conclusion

In essence passive reduction measures and on-site produced renewable energy are most beneficial as they are a permanent reduction measures and alternative energy supply combatting not only the global climate change but also the inflation on energy cost. Compliance to part L 2022 is achieved by means of a 70% primary energy reduction on the reference dwelling or an EPC (primary energy) of 0.30 or less and 65% carbon diode reduction or a CPC (carbon dioxide) of 0.35 or less and an equivalent primary renewable energy contribution of 20% or more. The energy reduction proposals resulted in a much lower primary energy and carbon dioxide performance than required under Part L 2022 and achieved a renewable energy contribution in excess of 50% or half of the primary energy coming from a renewable source. These results were achieved by applying the proposed exposed element parameters in combination with air source heat pumps for space & hot-water heating and other reduction measures proposed. However as mentioned in the technical sections similar results or compliance can also be achieved by a number of other methods listed in section 4.8 in combination with proposed passive reduction measures outlined in section 4.7.

We conclude to state that until we globally manage to construct and operate at actual zero carbon emissions, any new development in theory will increase the global carbon output however, in the meantime, key to the energy approach of this development is to minimise the impact as demonstrated above.

3 Geographical overview

3.1 Project overview

Image 3.1 the (google maps) site is an overview of the site area with the proposed development approximately outlined in red.



Image 3.1: Proposed development with approximate site boundary in red.

4 Approach & methodology.

4.1 General approach

The target of the building's energy usage and carbon dioxide emissions is to comply to the current building regulations and to design the building and building services in line with the "Nearly Zero Energy Building" energy policy adapted in Part L 2022. Calculations have been conducted on all the developments dwelling/apartment units with the given data in this report representing the averages across all of the dwelling/apartment units.

4.2 General extend of the proposed site.

Image 4.1 represent the general architects layout of the site .



Image 4.1 Architects site layout.

4.3 Building regulations requirements

Building regulation (residential) Part L : 2022 will apply.

4.4 Part L 2022 general approach

Part L requires a new dwelling to make primary energy and carbon dioxide emission reductions on a reference dwelling by applying improved calculation parameters and technologies. Part L also requires the actual dwelling to provide at least 20% of its primary energy usage by means of renewable energy. The reference dwelling is exactly the same as the actual dwelling but uses fixed pre-set (by the SEAI) basic standard Part L calculation parameters, U-values / insulation levels, energy conversion efficiency, controls etc. to enable the actual dwelling to make substantial reductions. The reference dwelling has no renewable energy element.

To simplify the calculation data presented in this report, rather then issuing the calculated data of each house type, we applied the DEAP /BER calculation to a dwelling representing the average floor area, exposed external wall area, roof area, window/door (glass) area etc across all of the units and all of the dwelling types. For this report the average unit is represented by a single storey dwelling with a total floor area of 92.1m2, an exposed wall area of 99.9m2, window / door (glass) area of 15.5m2 and a roof area of 57.6.2m2 where appropriate.

Accomodation Schedule

Type	Type ID		Beds	Quantity	Area
House	1C2	2	3	22	114.4
House	1C3	2	3	22	114.4
House	1F1	2	3	25	106.6
House	1F2/1F3	2	3	28	105.9
House	1F2S/1F3S	2	3	28	106.8
House	1J3	2	4	16	129.0
House	1J3S	2	4	16	130.5
Apartments	1XX	1	1	54	49.5
Apartments	2XX	1	2	60	75.5
Duplex A/B/C	2XX	1	2	14	78.0
Duplex D/E	2XX	1	2	12	78.0
Duplex A/B/C	3XX	2	3	14	104.0
Duplex D/E	3XX	2	3	12	104.0
Total/Average		2.0	2.5	323	92.1

Illustration 4.1 Site accommodation schedule.

4.5 Reduction targets

The following are the reference building and target (required) values. The primary energy needs to a equal or better the maximum permitted energy performance coefficient (MPEPC) of 0.30 or in other words must achieve a 70% reduction or better. The carbon emission needs to a equal or better the maximum permitted carbon performance coefficient (MPCPC) of 0.35 or in other words must achieve a 65% reduction or better.

Single average unit: 92.1 m2

Element	Unit	Reference	mp epc/cpc	Required	Rate m2
Primary Energy	kWh/y	13,859	0.30	<= 4,158	45.2
Carbon Dioxide	kg/y	2,711	0.35	<= 949	10.3

Table 4.1

4.6 Reduction hierarchy

To target the Part L minimum required reductions DKP use the following reduction hierarchy ;
Step 1 - Reduce energy usage
Step 2 – Produce energy efficiently
Step 3 – Provide on-site energy

4.7 Step 1 - Reducing energy usage

Energy use reduction is mainly achieved by reducing the actual heat loss of the building by :
a - Lowering the heat loss through the floors, walls, roof by increasing the thermal resistance of the elements.
b - Lowering the heat loss through the glazed elements by using windows with a higher thermal resistance.
c - Lowing the heat loss by using insulated construction joints.
d - Increasing the air tightness to minimise the involuntary air infiltration rate.

The following parameters have applied as a means to achieve compliance

4.8 Building minimum elemental parameters

The following are the main building minimum target values for Part L 2022 ;

Element	Unit	2022	Proposed
External walls	U (W/m2K)	0.18	0.14
Windows/glazing	U (W/m2K)	1.40	1.20
Pitched roof horizontal	U (W/m2K)	0.16	0.11
Pitched roof pitched	U (W/m2K)	0.16	0.11
Flat roof	U (W/m2K)	0.20	0.11
Ground floor	U (W/m2K)	0.18	0.12
Cold bridging	U (W/m2K)	0.15 / 0.08	0.06
Air tightness	M3/m2*h	3	2.5

Table 4.2

- Ground floors: Part L minimum 0.18 W/m2K.

U = 0.14 – 0.16 W/m2K
120-150mm high density polyurethane foam board (HDPUF) floor insulation, k<=0.022/0.021 W/mK plus
12.5mm high density polyurethane foam board (HDPUF) edge insulation around the perimeter, k<=0.022W/mK
Used for this report & BER = 0.150 W/m2K

- External walls + walls to unheated common spaces: Part L minimum 0.18 W/m2K.

U= 0.16 - 0.18 W/m2K
135 - 160mm partial or full fill cavity high density polyurethane foam board wall insulation, k<=0.022/0.021 W/mK
Emissivity factor : =0.5
Used this report & BER = 0.178 W/m2K

- Party walls:

U= x.x W/m2K where appropriate.
Solid plastered or skimmed both sides and sealed on all edges and joints.
Used this report & BER = 0.00 W/m2K

- Roof: Part L minimum 0.18 W/m2K.

U= 0.12 – 0.16 W/m2K
Flat : 100-125mm high density polyurethane (HDPUF), cold side (roof) insulation, k<=0.022/0.021 W/mK +
50-60mm density polyurethane (HDPUF), warm side insulated plasterboard, k<=0.022/0.021 W/mK
Used this report & BER = 0.124 W/m2K

- Window & frame: Part L minimum 1.4 W/m2K.

U<=1.2 – 1.4 W/m2/K,
Double or triple glazed Argon filled insulated frame
Solar transmittance 0.45
Light transmittance : 0.67
Frame factor : 0.7
Used this report & BER = 1.4 W/m2K

- External door & frame:

U = 1.4 W/m2K
Insulated solid door or as above.
Used this report & BER = 1.4 W/m2K

- Air tightness:

Design target 1.5 to 2.0 m3/m2*h
Design permeability is set at 1.5 m3/m2*h @ 50Pa or an approximate atmospheric exchange rate of 0.075 ach.

to be achieved with very good workmanship with taped and sealed construction joints and or purpose membrane.
Used this report & BER = 1.6 m3/m2h

- Cold bridging:

U<=0.08 – 0.15 W/m2K All construction joints to be insulated. Approved Part L joints as per appendix D.
The actual linear coefficient will be applied using the Part L appendix D approved construction details with some (15%) recalculated better insulated joints as listed below using ;

Used this report & BER = 0.06 W/m2K (ICF construction)

- Ventilation:

a) Natural ventilation by means of passive window or wall ventilators in combination with intermittent extract (fans) from bathrooms, en-suites, utilities, WC's and kitchens, or
b) Demand controlled 24 hour/365 operated central mechanical extract system (no heat recovery)
Requires +/- 60% natural ventilation openings typically 4,000mm^2 per habitable room. 100% permanent.
All wet rooms fully ducted from central location typically Ø80mm duct work. or
c) Demand controlled 24 hour/365 operated central mechanical supply and extract system (with heat recovery)
No natural ventilation opening. Sealed building. All habitable / wet rooms fully ducted typically Ø100mm duct work.

the above 3 options with separate manual operated on/off kitchen extract.

Used this report & BER = b) Demand controlled 24 hour/365 operated central mechanical extract system (no heat recovery) Requires +/- 60% natural ventilation openings typically 4,000mm^2 per habitable room. 100% permanent. All wet rooms fully ducted from central location typically Ø80mm duct work with separate manual operated on/off kitchen extract.

- Heating / hot-water controls:

a) 1no. (space heating / hot-water) time clock or
b) 1 no. (space heating / hot-water) temperature control or
c) 1 no. (space heating / hot-water) time clock and 1 no. (space heating / hot-water) temperature control or
d) 1 no. (space heating / hot-water) time clock and individual room temperature control. or
e) 1 no. (space heating / hot-water) time clock and individual room temperature & hot water temperature control or
f) Individual (space heating / hot-water) time clock and individual room temperature & hot water temperature control
- Used this report & BER = e) 1 no. (space heating / hot-water) time clock and individual room temperature & hot water temperature control.

- Lighting:

Low energy lighting 0%-100%.
All lighting point are either LED or compact fluorescent fittings or fittings with LED or compact fluorescent filaments.
- Used this report & BER = 100%.

- Circulation pumps:

Stand or Variable speed circulating pump(s)
Used this report & BER = Standard pump

- Avoided for this report; Chimney / open fire, Chimney / biomass stove, Biomass stove, Gas stove, Electric fire

4.9 **Step 2 and 3) Provide energy efficiently and provide on-site renewable energy.**
Energy and renewable energy can be provided in numerous ways.
Given the location of the project and its accessibility to grid utilities the following options could be considered for the provision of energy and renewable energy.

- Energy and alternative renewable on-site energy source.

a) LTHW (wet) Mains gas condensing system or instantaneous hot-water boiler (η>92%) + 5 PV 400Wp panels, or
b) LTHW (wet) Mains gas condensing hot-water storage boiler (η>92%) + 4 PV 400Wp panels, or

c) LTHW (wet) Split or mono block air source heat pump (η heating>540%, η hot-water >245%), or
d) Electric space heating (dry) + Hot water heat pump (η hot-water >485%) (units up to +/- 80m2 only), or
e) A communal form of heating system with any of the above options or a combination of any of the above options.

There are also other possible sources like city district heating networks CDHN, CHP heating networks, on site communal heating with CHP, geothermal heat or waste heat recovery from incineration or other industrial processes to be considered. As there are no city heating net works in close vicinity to the project site a local on-site energy source is to be applied. CHP is not efficient as the projects base load is not sufficient to maintain viability on a CHP plant. The project, as it is relatively dense, may suit a communal heating system fed by a combination of mains gas boilers and heat pumps however this needs to be economically assessed for viability and if applied does bring the additional requirement of heat energy metering and invoicing to apartment occupiers. For the report we have applied option c) = Air source heat pump.

4.10 Renewable energy

This means producing on-site renewable energy by using;
a) Thermal solar panels for hot water and/or space heating.
b) Photovoltaic (PV) panels for electrical energy for all electrical requirements.
c) Wind mill(s) for electrical energy for all electrical requirements.
d) Biomass (wood, pellet, chip) plant for hot water and/or space heating.
e) Incinerator(s) for waste heat production
f) Heat pump renewable energy.

Given the configuration of the development and the urban location wind power has not been considered. Biomass, although theoretically a good renewable option, has given issue's in other project's with similar use due to maintenance problems with the actual plant giving rise to complaints from occupants / users. PV is generally a good and passive option to be considered. For this report we have applied option f) = Heat pump renewable energy fraction.

The renewable energy requirement for a new dwelling is 20% or more of the primary energy or the dwelling expressed as the Renewable Energy Ratio (RER).

Single average unit: 92.1 m2

Element	Unit	RER	Required	Rate m2
Renewable energy	kWh/y	0.20	>= 832	9.03

Table 4.3

4.11 Calculation software

Primary energy and carbon dioxide performance calculations are executed using the National Calculation Methodology government approved Domestic Energy Assessment Procedure (DEAP version 4).

4.12 Over heating

Over heating can be an issue and an over heating analysis was conducted using the Passive House PPH analysis software which concluded that the risk to overheating was minimal in accordance to CIBSE TM37. Overheating can also be addressed by applying glass with a higher solar reflection factor or lower emittance factor.

5 Calculation results.

5.1 Calculation data.

The table below shows the calculation results from the average size dwelling with the average external wall area, glass area, orientation, floor * roof area etc. The table details the reference building primary energy, carbon dioxide and renewable energy data, the required reductions / contributions and what has been achieved using the more advanced building part L parameters from items 4.6 reduction parameters and 4.7 energy & renewable energy options.

Single average unit: 92.1 m2

Element	Unit	Reference	Required	Rate m2	mp epc/cpc	Achieved	Rate m2	epc/cpc
Primary Energy	kWh/y	13,859	4,158	45.2	0.30	**3,711**	40.3	0.268
Carbon Dioxide	kg/y	2,711	949	10.3	0.35	**473**	5.1	0.175
Renewable energy	kWh/y	-	832	9.0	0.20	**3,893**	42.3	0.505

Table 5.1

From the table above we note that the proposed building services solutions resulted in a primary energy reduction of 73.2%, a carbon dioxide emission reduction of 82.5% and a renewable primary energy equivalent of 50.5%

BER rating **A2** 40.3 kWh/m2/y

Overall combined development achievemer **323** Units

Element	Unit	Reference	Required	Rate m2	mp epc/cpc	Achieved	Rate m2	epc/cpc
Primary Energy	kWh/y	4,476,360	1,342,908	45.2	0.30	**1,198,605**	40.3	0.27
Carbon Dioxide	kg/y	875,588	306,456	10.3	0.35	**152,825**	5.1	0.17
Renewable energy	kWh/y	-	268,582	9.0	0.20	**1,257,439**	42.3	0.51

Table 5.2

Overall combined differences: **323** Units

Primary Energy	kWh/y	Reduction	**-3,277,756**
Carbon Dioxide	kg/y	Reduction	**-722,763**
Renewable energy	kWh/y	Contribution	**1,257,439**

Table 5.3

We note from the table above that the overall development achieved an annual energy reduction in energy of -3,277,756 kWh resulting in an annual carbon dioxide (CO2) reduction of -722,763 kg CO2. The combined total development annual renewable contribution with the proposed systems stands at 1,257,439 kWh which would be deemed a great benefit to the global environment

A decision on the final agreed energy supply solution will be made in due time after the proposed systems economical assessment.

5.2 National impact

To give some guidance on the environmental impact of the proposed development we have compared the achieved carbon emissions with our national and global emissions. The table below shows the current national emissions, the forecasted 2030 emissions and the EPA forecasted emission with proposed additional national measures to combat global carbon emissions. We note that year 2023 (current) has higher carbon emissions as a result of the added construction element carbon emissions. We also note that for the purpose of these calculations the carbon factor from our electricity grid being the source of energy for the development is maintained at the same carbon output rate through to 20230 whereas in real terms the carbon factor of the national grid would be less in 2030 as a result of the governments target to de-carbonised the grid.

NATIONAL EMISSIONS IMPACT

GHG CO2 eq	Unit	National	Development	Fraction
Year 2024	Mt-CO2/year	59.50		
Year 2025	Mt-CO2/year	59.25	0.0003515	0.0005932
Year 2030 * target	Mt-CO2/year	58.00	0.0001528	0.0002635
Year 2030 + Measures targ	Mt-CO2/year	48.00	0.0001528	0.0003184

Copy of Table 4.6 Mt=Million tonnes i.e.; 152,825 kgCO2/y = 0.0001528 MtCO2/y

We note from the table above that the overall development impact on our national greenhouse emissions is 0.0005932 % in 2025 and 0.0002635% in 2030 and would be deemed absolutely minimal.

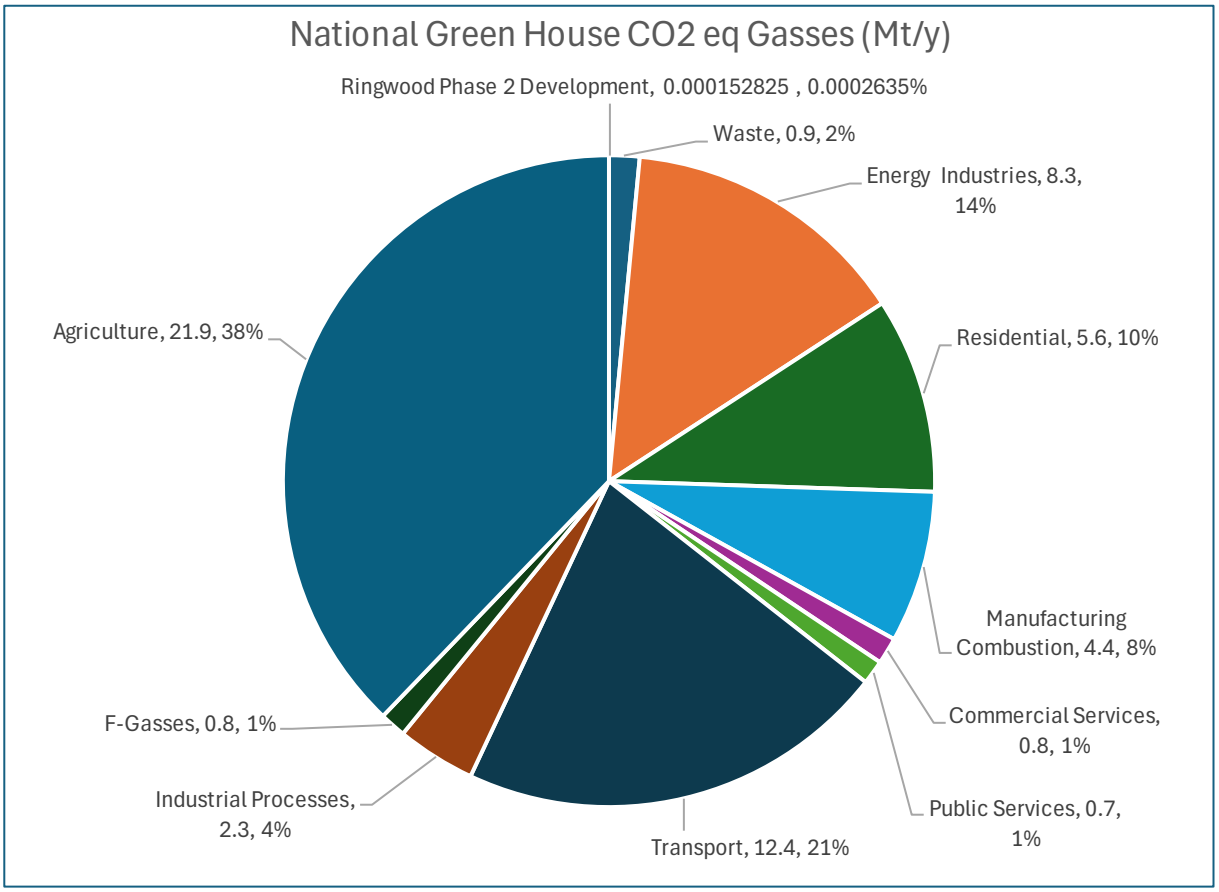


Illustration 5.1: Irelands (EPA) national annual sectorial CO2 (GHG) emissions.

5.3 Global impact

Irelands current impact on the +/- 53Gt current global GHG emissions represents a mere 0.11% fraction hence the impact of the proposed development on the global emissions is near impossible to express in a fraction. The table below gives guidance on the global emissions and future targets against the emissions of the national output and the proposed development.

GLOBAL EMISSIONS IMPACT

GHG CO2 eq	Unit	Global	Development	Fraction (%)
Year 2024	Gt-CO2/year	53.80		
Year 2025	Gt-CO2/year	53.50	0.0000003515	0.000000657006
Year 2030 * target	Gt-CO2/year	51.50	0.0000001528	0.000000296748

Copy of Table 4.7 Gt=1000 Million tonnes (Mt)

We note from the table above that the overall impact of the Ringwood Phase 2 Development on the global green house emissions is 0.0000006570 % in 2024 and 0.0000002967% in 2030 and would be deemed under any other situations other than CO2 emissions to be negligible. Irelands estimated 2024 global contribution of 0.05925 Gt/y stands at ca 0.11% from the global emissions

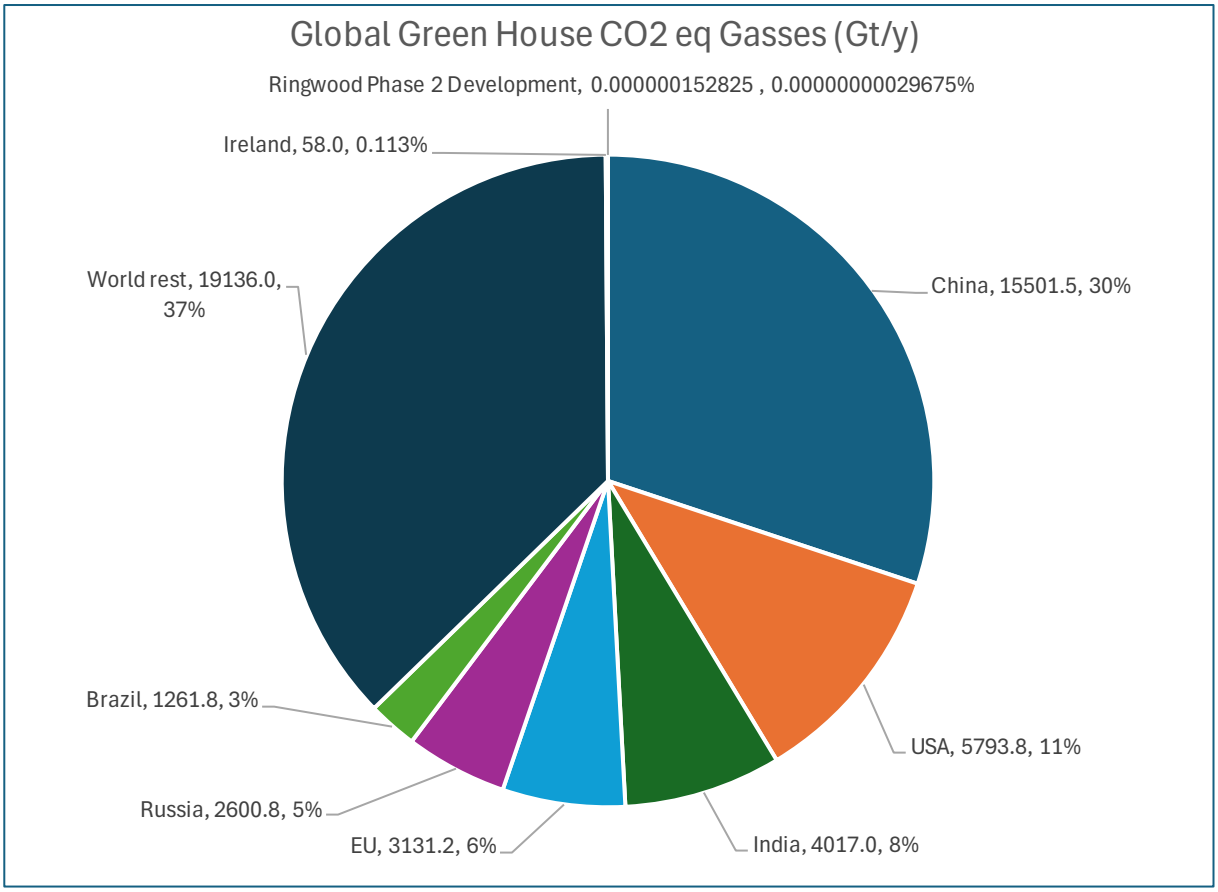


Illustration 5.2: Global by country / area annual CO2 (GHG) emissions.

5.4 Part L compliance conclusion

Compliance to part L 2022 is achieved by means of a 70% primary energy reduction on the reference dwelling or an EPC (primary energy) of 0.30 or less, a 65% carbon diode reduction or a CPC (carbon dioxide) of 0.35 or less and an equivalent primary renewable energy contribution of 20% or more. The compliance calculation results where achieved by the application of the suggested façade parameters in combination with an air source heat pump for space & hot-water heating and photovoltaic panels. As mentioned in the above sections this can be achieved by a number of methods listed in section 4.8 in combination with proposed passive reduction measures outlined in section 4.7.

We note that, until the moment we can construct at actual zero carbon emissions, any new construction will increase the global carbon output however key to this is minimising the impact as demonstrated in the sections above.

APPENDIX A

BER Prelim Certification

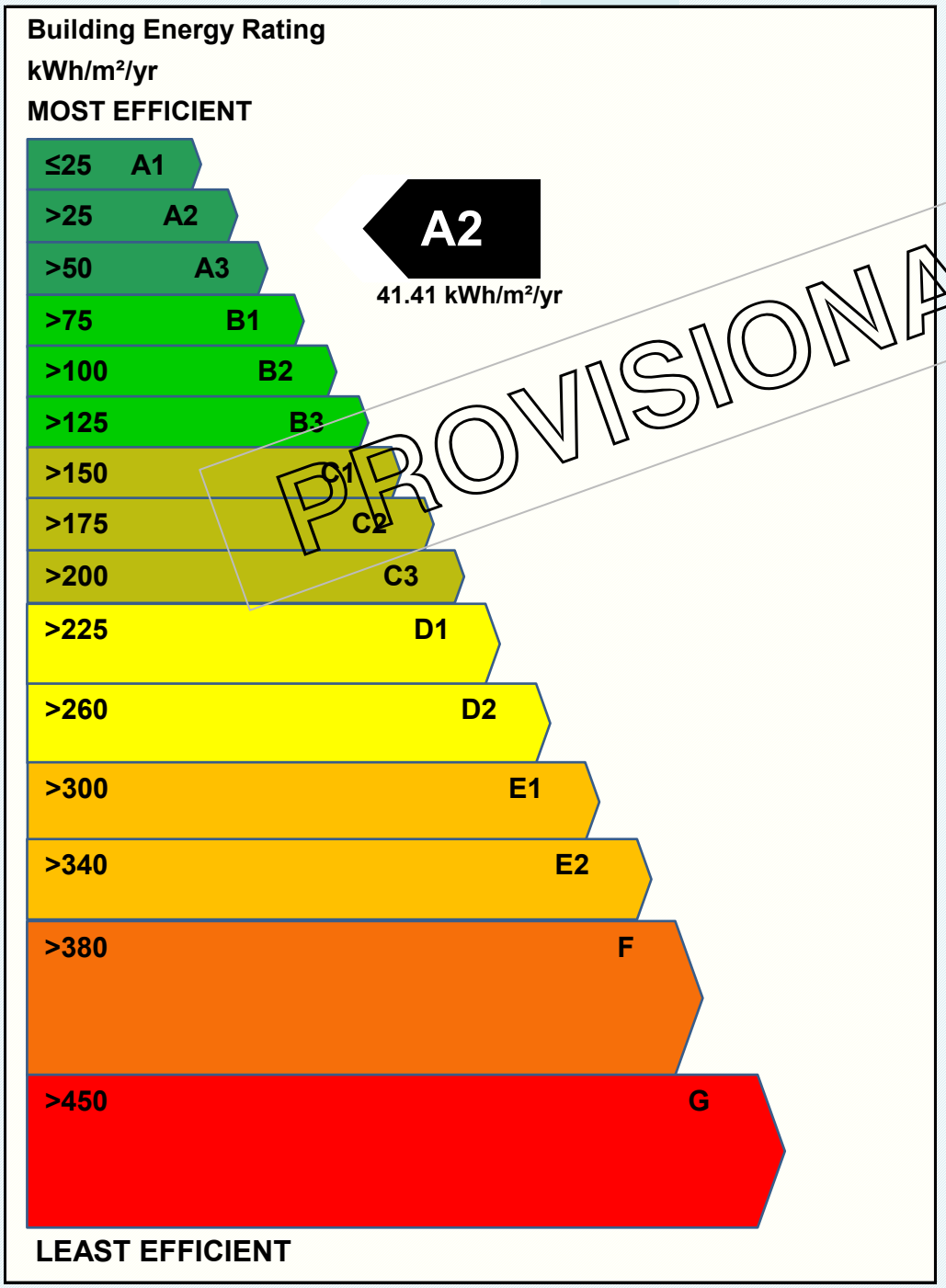
Building Energy Rating (BER)

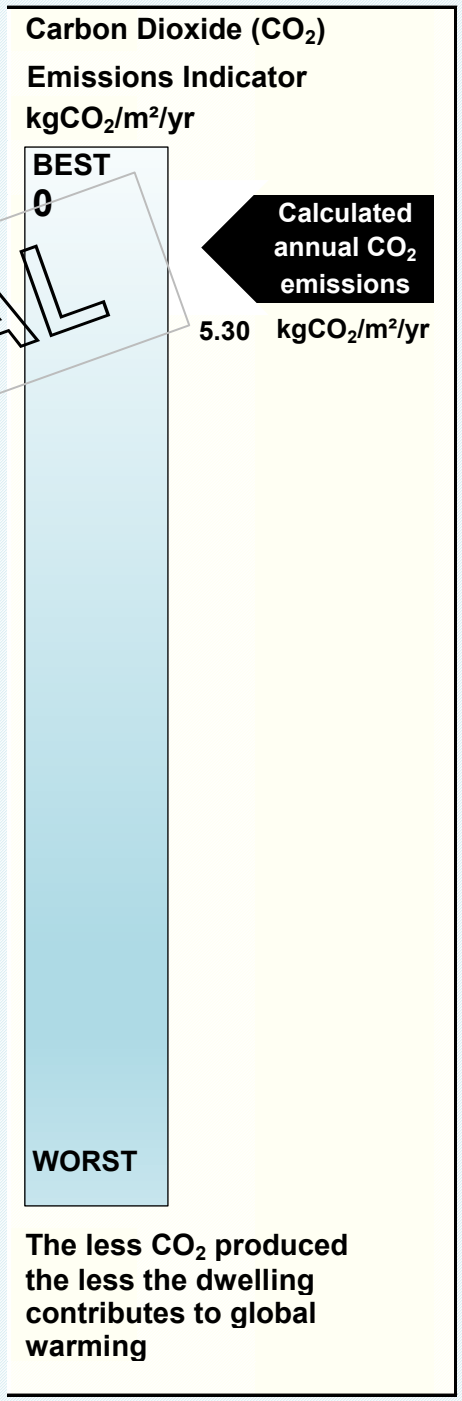
BER for the building detailed below is : **A2**

Address	Average unit Ringwood PH2 Shean upper Blarney Co.Cork
BER Number	999999999
Date of issue	21/11/2025
Valid untill	20/11/2027
Assessor number	266723
Assessor company No	337125

The building Energy Rating (BER) is an indication of the energy performance of this dwelling. It covers energy use for space heating, water heating, ventilation and lighting, calculated on the basis of standard occupancy. It is expressed as primary energy use per unit floor area per year (kWh/m²/yr)

A' Rated properties are the most energy efficient and will trend to have the lowest energy bills.





IMPORTANT : This BER is calculated on the basis of data provided to and by the BER assessor, and using this version of the assessment software quoted below. A future BER assigned to this dwelling maybe different, as a result of changes to the dwelling or to the assessment software.

DEAP Version : 4.2.2

APPENDIX B

Part L Report

Ringwood Phase 2 Housing Development

Type AVRG

TGD Part L (2022) Report

DKP V-2022

End unit (3 exposed walls), No exposed roof, 2 Storey(s), 92.1m2 floor area
41.4kWh/yr/m2, A2

Space heating : Heat Pump, Hotwater heating : Heat Pump, Ventilation: CMEV

AVRG	**AVRG**

Average unit Ringwood PH2
Shean upper
Blarney
Co.Cork

Issue date
2025-11-21

DKP project file no
P35-DKP-5080-XL-XX-XX ¦ 1G

DKP document no
5080

5080

DKP BS Building Services Dublin Cork London
T : 01-813-1930 T : 064-664-1686
E : post@dkpartnership.com

DKP PART L REPORT

Space heating : Heat Pump, Hotwater heating : Heat Pump, Ventilation: CMEV

MAIN SUMMARY Part L 2022

Primary energy		TO BE ACHIEVED			ACHIEVED		Compliance	Margin
Energy performance (reduction %)		0.300	MEPC (70%)		0.275	EPC (72%)	☑	+ 8%
Annual primary energy		4,158	kWh/y		3,814	kWh/y	☑	+ 343.9
Annual primary energy / m2	A2	45.1	kWh/y/m2	A2	41.4	kWh/y/m2	☑	+ 3.73

Carbon dioxide emission					Compliance	Margin
Carbon performance coefficient	0.350	MCPC (65%)	0.180	CPC (82%)	☑	+ 49%
Annual carbon emission	949	kg/y	488	kg/y	☑	+ 460.6
Annual carbon emission / m2	10.30	kg/y/m2	5.3	kg/y/m2	☑	+ 5.00

Renewable energy					Compliance	Margin
Renewable energy ratio	0.20	RER	0.51	RER	☑	+ 153%
Annual renewable energy	1,541	kWh/y	3,893	kWh/y	☑	+ 2,351.7
Annual renewable energy / m2	16.7	kWh/y/m2	42.3	kWh/y/m2	☑	+ 25.53

MEASURES APPLIED

Exposed envelope thermal resistance		area		Part L limits		Actual dwelling		Compliance
Floors		46.1	m2	0.180	W/m2K	0.149	W/m2K	☑
Walls		99.9	m2	0.180	W/m2K	0.170	W/m2K	☑
Roofs Na		0.0	m2	0.160	W/m2K	0.000	W/m2K	☑
Glazing	Floor fraction: 16.8%	15.5	m2	1.400	W/m2K	1.400	W/m2K	☑
Door		2.1	m2	1.400	W/m2K	1.400	W/m2K	☑
Weighted opaque elements		146.0	m2	0.180	W/m2K	0.164	W/m2K	☑
Cold bridging				0.150	W/m2K	0.080	W/m2K	☑
Airtightness		0.10	ach	3.000	m3/m2h *	2.000	m3/m2h	☑

* Airtightness design target

Building services parameters

Space heating 1:	Electricity	Heat Pump	446%	4kW, System flow temperature 50C°
Space heating 2:	n/a		n/a	
Water heating 1:	Electricity	Heat Pump	258%	4kW, 230L, 1.4kWh/d Standing loss
Water heating 2:	n/a		n/a	
Ventilation:		Whole-house extract ventilation		EI ɲ=0.5W/l/s
Lighting:		16 x LEDs/ CFL		
Glazing solar / light transmittance:		0.45 / 0.80	Glazing orientation and over shadowing. See page 6.	
Water saving measures:		None +/- 11l/s per shower		
Space / Water heating load:		SH 2,638W @ -3C° / WH 2,025W @ 150min recovery for a 45C° rise (10C°- 55C°)		
On site produced energy:		n/a		

Comments

The dwelling is compliant to Part L 2022 with a BER label of A2

Compliance to Part L has a reasonable margin of 8.3% allowing for some construction adjustments if required.

Insulation data used for U value calculations;

Wall T1 (99.9m2) : Uv = 0.170W/m2K 110mm PIR @ 0.022 W/mK Foil faced

Roof T1 (57.6m2) : Uv = 0.127W/m2K 150mm Rockwool @ 0.04 W/mK + 150mm Rockwool @ 0.04 W/mK

Floor T1 (46.1m2) : Uv = 0.149W/m2K 160mm EPS @ 0.031 W/mK

Hierarchy

- ☒ Not compliant
- ☒ Within 5%
- ☑ Compliant **
- ☑ Compliant

DKP PART L REPORT Space heating : Heat Pump, Hotwater heating : Heat Pump, Ventilation: CMEV

DEAP CALCULATION DATA / RESULTS

Dwelling dimensions **TGD L version** 2022

	Area [m^2]	Height [m]
level 1	46.1	2.60
level 2	46.1	2.60
level 3	0.0	0.00
level 4	0.0	0.00
Total floor area [m^2]	92.1	
Dwelling volume [m^3]	239.5	
Living area [m^2]	15.0	

Ventilation

Number of chimneys	0	
Number of open flues	0	
Number of intermittent fans and passive vents	7	
Number of flueless gas fires	0	
Is there a draught lobby on main entrance?	no	
Number of storeys in the dwelling	2	
Has an air permeability test been carried out?	Yes	1
If no Not applicable		
Structure type	-	
Is there a suspended wooden ground floor?	-	
Percentage of windows and doors draughtstripped [%]	0	
If ye :		
Air permeability [m3/h.m2 at 50 Pa]	2	
End if		
Number of sides sheltered	2	
Ventilation method	Whole-house extract ventilation	4
Effective air change rate [ac/h]	0.63	
Ventilation heat loss [W/K]	49	
Permeability test carried out and meets guidelines in TGD L?	Complies	
For mechanical ventilation, other than positive input ventilation from loft:		:
Is measured "PCDB" data available?	Yes	
Manufacturer and model	TBA	
Specific fan power [W/(l/s)]	0.5	
Heat exchanger efficiency [%]	-	

Windows

Orientation	East/West	East/West	0	0	0	0	0	0	Horizontal
Orientation ID	3	3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	6
Area [m^2]	8.43	7.05	0	0	0	0	0	0	0
U-value [W/m^2 K]	1.40	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Is U-value a manufacturer's certified value?	yes	yes	yes	yes	yes	yes	yes	yes	yes
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
End if									
Correction for roof window and/or metal frame if applicable (Table 6a, notes 1 and 2).									
	0	0	0	0	0	0	0	0	0
Overshading ID	2	2	2	0	0	0	2	2	2
Frame factor (Table 6c) [-]	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Window type ID	2	2	2	2	2	2	2	2	2

DKP PART L REPORT

Space heating : Heat Pump, Hotwater heating : Heat Pump, Ventilation: CMEV

Fabric

Exposed element type	Area [m^2]	U-value [W/m^2 K]	*AU [W/K]*	Comment (optional)	Element type (for assessing TGD L conformity)
Windows/rooflights	15.48	1.326	20.52	1.4	
Doors	2.10	1.400	2.94	1.4	
Floor	46.05	0.149	6.87	0.18	No underfloor heating
Floor (type 2)	0.00	0.000	0.00	0.18	No underfloor heating
Floor (type 3)	0.00	0.000	0.00	0.18	No underfloor heating
Walls	99.94	0.170	17.04	0.18	Wall relevant for TGD L fabric compliance check
Walls (type 2)	0.00	0.000	0.00	0.18	Wall relevant for TGD L fabric compliance check
Walls (type 3)	0.00	0.000	0.00	0.18	Wall relevant for TGD L fabric compliance check
Walls (type 4)	0.00	0.000	0.00	0.18	Wall relevant for TGD L fabric compliance check
Walls (type 5)	0.00	0.000	0.00	0.18	Wall relevant for TGD L fabric compliance check
Roof	0.00	0.000	0.00	0.16	Flat roof
Roof (type 2)	0.00	0.000	0.00	0.16	Pitched roof - Insulation at ceiling
Roof (type 3)	0.00	0.000	0.00	0.16	Pitched roof - Insulation on slope
Roof (type 4)	0.00	0.000	0.00	0.2	Pitched roof - Insulation at ceiling
Roof (type 5)	0.00	0.000	0.00	0.16	Pitched roof - Insulation on slope
Total area of elements [m^2]	163.6				
Heat loss via plane elements [W/K]			47.37		
Factor for thermal bridging [W/m^2 K]			0.08		
Fabric heat loss [W/K]			60.46		
Dwelling heat loss coefficient [W/K]			109.92		
Heat loss parameter, HLP [W/K m^2]			1.19		

Water heating

Are there distribution losses?	yes		
Distribution loss [kWh/y]	350		
Are there storage losses?	yes	1	
If ye :			
Water storage volume [litres]		230	
Is manufacturer's declared loss factor available?		yes	1
If ye :			
Manufacturer and model name		tba	
Manufacturer's declared loss factor [kWh/day]		1.4	
If no Not applicable			
Insulation type on hot water store		Factory insulated	
Insulation thickness [mm]		70	
End if			
Temperature factor unadjusted (Table 2)		0.6	
Temperature factor multiplier (from Table 2 notes)		0.9	
End if			
Is there a solar water heating system?		No	0
If ye Not applicable			
Solar DHW input, Qs [kWh/y]		0	Solar fraction [%] 0
Is solar water heating pump PV powered?		-	
End if			
Primary circuit loss [kWh/y] (Table 3)			0
Additional loss for combi boiler [kWh/y] (Table 3a)			0
Electricity consumption of electric keep-hot facility of combi boiler [kWh/y] (Table 4f)			0
Is supplementary electric immersion heating is used in summer?			no
Output from main water heater [kWh/y]		2610	
Output from supplementary heater [kWh/y]		0	
Heat gains from water heating system [W]		114	
Is hot water storage indoors or in group heating scheme?		Yes	

DKP PART L REPORT

Space heating : Heat Pump, Hotwater heating : Heat Pump, Ventilation: CMEV

Lighting

Annual energy used for lighting, EL [kWh/y]	227

Internal gains

Net internal gains [W]	436

Heat use

Living area fraction [-]	0.16
Thermal mass category of dwelling	Medium
Heat use [kWh/y]	3014

Space heating

Control and responsiveness

Temperature adjustment (Table 4e), where appropriate [C]	0
Heating system control category (Table 4e)	3
Heating system responsiveness category (Table 4a or 4d)	1

Pumps/fans

	Enter number present	If present, is boiler controllec by room thermost	If present, inside dwelling?
Central heating pump (supplying hot water to radiators or underfloor system)	1	Yes	
Oil boiler - pump (supplying oil to boiler and flue fan)	0	Yes	Yes
Gas boiler - flue fan (if fan assisted flue)	0		
Is there a warm air heating system present?	no		

Emission efficiency

Is main heat emission system within an envelope element? (e.g. underfloor heating in ground floor)		no	0
If yes, U-value of envelope element [W/m^2 K]		0.1493	
Type of main heating system	Individual system	1	

Energy requirements - individual heating systems :

Space Heating

Efficiency of main heating system [%] (including Efficiency Adjustment Factor)	446.3
Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F)	0
Efficiency of secondary / supplementary heater(s) [%] (from Table 4a or Appendix E)	0

Water heating

Efficiency of main water heater [%] (from HARP or from Table 4a or 4b)	257.63

Fuel data	Fuel
Space heating - main	Electricity
Space heating - secondary	-
Water heating - main	Electricity
Water heating - supplementary	-
Photovoltaic/ Wind Turbine	0 kWh/y
Solar Thermal	0 kWh/y

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type	Description			
	Energy produced or saved	1.75	0.224	0
	Energy consumed	0.00	0.000	0
Type	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0
Type	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

DKP PART L REPORT

Space heating : Heat Pump, Hotwater heating : Heat Pump, Ventilation: CMEV

Energy requirements - group/community heating scheme Not applicable

Secondary space heating

Fraction of heat use from secondary / supplementary system (use value from Table 7, Table 10 or Appendix F)	0
Generation efficiency of secondary / supplementary heating system [%] (use value from Table 4a or Appendix E)	0

Main (group heating) system

Is charging based on heat consumed?	-
Distribution loss factor [-] (Table 9)	0
Fraction of heat from CHP unit or fraction of heat recoverd from power station	0

Boilers

(If the fraction of heat from boilers is zero, this section is irrelevant).

Heat source type	Fuel	Efficienc [%]	Percent of heat [%]
Other	-	0	0
Other	-	0	0
Other	-	0	0
Other	-	0	0
Solar heating system			0

Fuel data	Fuel	
Space heating - secondary	-	
Photovoltaics/ Wind Turbine	0	kWh/yr
Solar	0	kWh/yr

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0
Type	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0
Type	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

Results

	Delivere [kWh/y]	Primary [kWh/y]	CO_2 [kg/y]
Space heating - main	663	1,160	149
Space heating - secondary	0	0	0
Water heating - main	1,013	1,773	227
Water heating - supplementary	0	0	0
Pumps, fans	276	483	62
Energy for lighting	227	397	51
Renewable and energy-saving technologies			
CHP input (individual heating systems only)	0	0	0
CHP electrical output (individual heating system only)	0	0	0
Photovoltaic/ Wind Turbine	0	0	0
Type	0	0	0
Type -	0	0	0
Type -	0	0	0
Total	2,179	3,814	488
per m^2 floor area	23.7	41.4	5.3
Building Energy Rating [kWh/m^2 y]		41	A2

DKP PART L REPORT

Space heating : Heat Pump, Hotwater heating : Heat Pump, Ventilation: CMEV

Conformity with MPEPC and MPCPC requirements in TGD L 2022

		Max permitted	
EPC	0.275	0.30	Complies
CPC	0.180	0.35	Complies
RER	0.505	0.20	Complies

Window schedule ***8no.***	GF	GF
Overshadowing	2	2
	East/West	East/West
Width	1.80	2.00
Heigth	1.18	1.18
Area	2.12	2.35
U-value	1.40	1.40
Width	1.00	1.00
Heigth	2.10	1.18
Area	2.10	1.18
U-value	1.40	1.40
Width	1.80	2.00
Heigth	1.18	1.18
Area	2.12	2.35
U-value	1.40	1.40
Width	1.00	1.00
Heigth	2.10	1.18
Area	2.10	1.18
U-value	1.40	1.40

Glazing shadow status : 8no @ 2 : average or unknow shadow, East/West,

Heat energy load / Heat energy input :

Space heating load / input : 2,638 W @ -3C°

Hotwater heating load / input : 2,025 W @ 150min recovery for a 45C° rise (10C°- 55C°)
149 l per day hot water usage

HEAT PUMP SPACE HEATING DATA		A (88%) -7oC	B (54%) 2oC	C (35%) 7oC	D (15%) 12oC	E* (100%)	
Daiken 4kW / 230l hot-water		A-7	A2	A7	A12	A-10	Test Conditions EN 14825:2013
		W34	W30	W27	W24	W35	
Low Temperature Application (35oC)	kW	5.5	3.3	3.2	3.3	5.2	
	COP	2.9	4.33	6.19	7.78	2.56	
		A-7	A2	A7	A12	A-10	
High Temperature Application (55oC)	kW	W52	W42	W36	W30	W55	
	COP	5.3	3.3	3	3.3	4	
		1.97	3.23	4.4	6.1	1.37	

HEAT PUMP WATER HEATING DATA

Water heating energy efficiency, ηwh	133.0	%	Test Conditions EN 16147
Equivalent Coefficient of Performance	3.33	kW/kW	
Reference Hot Water Temperature	52.50	oC	
Required Source Temperature	7.00	oC	
Capacity of Heat Pump	4.00	kW	
Declared Load Profile	XL		
Standby Heat Loss	1.40	kWh/day	
Volume of DHW accounted for in test	288	litre	