St Vincent's Hospital Redevelopment,

Richmond Road, Fairview
Dublin 03

Climate Action Energy Statement

IN2 Project No. D2116

27-03-2023

Planning Issue

Revision History

Date	Revision	Description
27-03-2023	00	Planning Issue

Registered Office:. Unit E, Mount Pleasant Business Park, Upper Mount Pleasant Avenue, Dublin 6

Company Registration No.: 466565

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1.0 Executive Summary

This report compiles the climate action energy statement and the results of Part L Compliance analysis undertaken for the proposed Residential and Hospital development at St Vincent's Hospital, Fairview Dublin 3. The analysis is based on information as received from Scott Tallon Walker Architects.

The subject site is located at St. Vincent's Hospital, Richmond Road and Convent Avenue, Fairview, Dublin 3. The site contains protected structures under RPS Ref.: 2032 (St. Vincent's Hospital), 8788 (Richmond House) and 8789 (Brooklawn).

In summary, the proposed development comprises of the following.

- Provision of a new part two and part three storey hospital building, providing mental health services, accommodating 73 no. beds, associated facilities, a single storey facilities management building, plant rooms and service areas, associated car and cycle parking, access roads, and open space, all on a proposed hospital site of c. 2.67 ha.
- Refurbishment and repurposing of existing buildings on site including Brooklawn (RPS Ref.: 8789), Richmond House, including chapel and outbuildings (RPS Ref.: 8788), the Laundry building and Rose Cottage for ancillary uses associated with the new hospital. The existing gate lodge building will remain in residential use and used by visiting members of staff to the new hospital.
- Change of use, refurbishment, alterations and extensions, to the existing hospital building (part protected structure under RPS Ref.: 2032), to provide residential amenity areas, a gym, a café, co-working space, a library, a childcare facility, and a community hall (referred to as Block K).
- The proposal includes the demolition of existing structures on site with a GFA of 5,872 sq.m, including the (1) westernmost range of the hospital building, which includes St. Teresa's and the Freeman Wing, (2) extensions to the south and north of the main hospital building, including the conservatory extension, toilet block extension, an external corridor, toilet core, lift core, and stair core (which are all part of / within the curtilage of RPS Ref.: 2032), (3) hospital buildings and outbuildings located to the north of the existing main hospital building, (4) St. Joseph's Adolescent School located in the southeast of the site, (5) Crannog Day Hospital located in the southwest of the site, and (6) extensions to the Old Laundry Building and Rose Cottage.
- Provision of 9 no. residential buildings (Blocks A, B, C, D-E, F, G, H, J, and L) providing a total of 811 no. residential units, including 494 no. standard designed apartments (in Blocks A, B, C, G, H, J, and L) and 317 no. Build to Rent apartments (in Blocks D-E and F). Residential amenities and facilities are proposed in Block C, D-E, J and K. A retail unit is proposed in Block A and a café in Block F. Block J is proposed as an extension of the existing hospital buildings (protected structure RPS Ref.: 2032- referred to as Block K).
- The building heights of the proposed residential blocks range from part 2 to part 13 storeys. A proposed basement / lower ground level, containing car and cycle parking and plant areas, is located below and accessed via Blocks C, D-E and F.
- Access to the new hospital and associated grounds is provided from Richmond Road and Convent Avenue, with separate internal access points. A separate vehicular access to the residential development is provided from Richmond Road. The development includes a proposed pedestrian / cycle connection to Griffith Court, requiring alterations to the service yard of the Fairview Community Unit, pedestrian / cycle connections to the Fairview Community Unit campus to the north (providing an onward connection to Griffith Court), a pedestrian / cycle connection to Grace Park Wood, and makes provision internally within the site for a potential future connection to Lomond Avenue / Inverness Road.
- The proposal includes public open space, including allotments, children's play areas, a central park, a linear park and an entrance plaza, with a set down area at Richmond Road, and communal open space at surface level. The proposal includes communal roof terraces on Block C and Blocks D-E and private balconies / terraces for the apartments.
- The proposal also includes provision of internal access roads, car and cycle parking, pedestrian and cycle infrastructure, associated set down areas, alterations to existing landscape features, landscaping, boundary treatments, lighting, telecommunications infrastructure at roof level of Block B, green roofs, lift overruns and plant at roof level, site services, including a watermain connection / upgrade via Griffith Court, Philipsburgh Avenue and Griffith Avenue, site clearance, and all associated site works.

Policy CA9 of the Dublin City Development Plan 2022-2028 requires that 'All new developments involving 30 or more residential units or more than 1,000 m^{-2} or more of commercial floor space, or as otherwise required by the Planning Authority, will be required to submit a Climate Action Energy Statement as part of the overall Design Statement to demonstrate how low carbon energy and heating solutions, have been considered as part of the overall design and planning of the proposed development'

Chapter 3 and 15.7 of the Dublin City Development Plan 2022-2028 sets out the steps involved in the planning process and documentation requirements in relation to Climate Action. This Climate Action Energy Statement forms part of those documentation requirements.

Section 2.0 details how the scheme confirms to these requirements. In terms of the "Re-Use of Existing Buildings" requirement, please refer to Passive Dynamics' Demolition Works Justification Report.

Energy analysis has been undertaken in order to demonstrate how low carbon, low energy and heating solutions have been considered and how they are appropriate for this development to achieve compliance to Building Regulations Technical Guidance Document (TGD) Part L 2021 and aligned with Dublin City Climate Action Plan. Section 3.0 outlines the requirements to ensure compliance: outlining the overarching EU Directive for Near Zero Energy Buildings (NZEB) and how this is implemented in Ireland and detailing associated requirements within Part L 2021 and Action Plan. The project has committed to complying with the requirements set out in the EU Taxonomy alignment for 10% lower than NZEB.

The report then examines the methodology in terms of Primary Energy, Renewable Technologies, illustrating how electrically based technologies (Air Source Heat Pumps) are increasingly favoured within Part L and associated Building Energy Rating (BER) calculations techniques within the approved software Dwelling Energy Assessment Procedure (DEAP).

This DEAP software was used to undertake energy analysis for Part L and BER for the development. Section 3.0 details the assumptions made in terms of Building Construction, Mechanical and Electrical Systems and Renewable Technologies, before confirmation of compliance is confirmed in terms of Primary Energy, Carbon Emissions and Renewable Energy Ratio for the entire development.

The analysis determined that the following energy and servicing strategy should enable compliance for the Apartments to Part L 2021/ NZEB and that a mix of A2/A3 BER's should be obtainable:

- Improvements to building thermal transmittance (U-Values), air permeability and thermal bridging with respect to Part L defaults.
- Centralised Heating and Hot Water Plant arrangement with Heat Interface Units (HIU's) local within every apartment.
- Renewable technologies comprising of Air Source Heat Pumps (ASHP's) plant delivering primary contribution to the annual heating and domestic hot water load.
- Local Heat Recovery Ventilation extracting stale air from apartment and supply fresh air to space within every apartment.

Finally, the detailed DEAP report, compiling all assumptions and calculations undertaken within the software, is included as an Appendix. It may be noted also that whilst this report analyses and confirms Part L compliance for all dwellings (individual apartment units), the centralised energy strategy would also ensure compliance for the non-domestic areas of the building (Landlord areas/ circulation etc.) by ensuring thermal energy provided by renewable energy sources ie. Air Source Heat Pump technology.

2.0 Climate Action Requirements

2.1 Background

Climate change is one of the most pressing global challenges facing this, and future generations. As acknowledged in the Dublin City Climate Action Plan (CCAP) (2019-2024), the effects of climate change are already impacting Dublin City at a significant rate and are very likely to increase in their frequency and intensity.

The CCAP demonstrates Dublin City Council's commitment to transitioning to low carbon society and economy. The CCAP sets out four key targets the council is undertaking in the areas of energy and buildings, transport, flood resilience, nature-based solutions, and resource management.

Figure 2.1.1 - Action Area's in the Dublin City Climate Action Plan

This report outlines how St Vincent's Fairview Hospital redevelopment complies with the policies set out in Dublin City Development Plan 2022-2028 under 'The Built Environment' and 'Energy' element of the plan.

2.2 Re-Use of Existing Buildings

The development includes re-use of existing building (Block K). Please refer to Passive Dynamics' Report with regards to Embodied Carbon.

2.3 District Heating Enabled Development

As noted within the Dublin City Development Plan 2022-2028 any significant new residential and commercial develop in Strategy Development and Regeneration Areas (SDRAs) will require in investigation of local heat sources and networks, and where feasible, to demonstrate that the proposed development will be 'District Heating Enabled'. The allowance for 'District Heating Enabled' infrastructure is in order to future proof the scheme and connect to any available or future district heating network. Heat demand density map in Figure 2.1.2 shows the overall heat demand density in each CSO electoral district in the Dublin City Area.

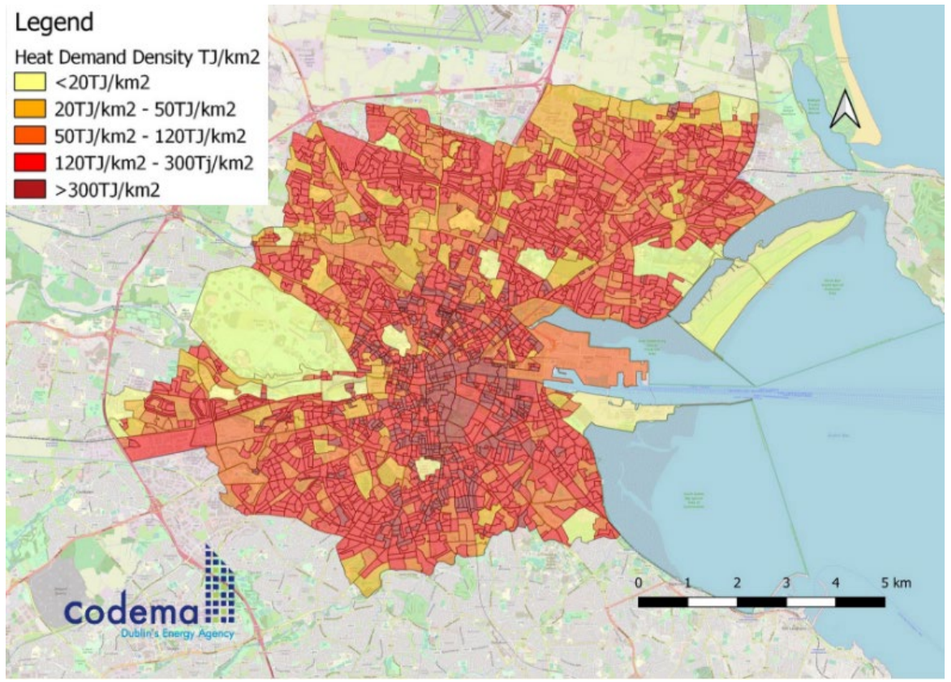


Figure 2.1.2 - Heat Demand Density Map

While the St Vincent's Hospital Development scheme is not within the SDRA's zone, the Dublin City Action Plan, with specific reference to policies CA7 and CA9, have been assessed and applied within this report, refer to Section 3.0 of this report for further detail.

The scheme has been designed to be served by centralised plant, providing heating to all residential blocks. A particular advantage of this configuration is that should district heating become available to the site in the future, infrastructure could be installed up to a single point to connect to the system. Similarly, the hospital site has been designed with a single plant room arrangement, facilitating also future connection.

3.0 City Development Plan and Building Regulations

The key design parameters are addressed as part of this Climate Action Energy Statement including those set out in CA7 Climate Mitigation Actions in the Built Environment and CA9 Climate Action Energy Statements of the Dublin City Development Plan 2022-2028.

3.1 NZEB

Building energy has been long understood as contributing a major component of greenhouse gas emissions which was acknowledged within the 2030 Communication published by the European Commission (2014) which stated that "the majority of the energy-saving potential (for the EU) is in the building sector." Figure 3.1.1 above illustrates comparative Primary Energy (see Section 3.3) for Dwellings in Ireland from 1970's through to NZEB,

The EU Energy Performance of Buildings Directive set out the target that all *new* developments should be Nearly Zero-Energy Buildings (NZEB) by the end of 2020, with the intention having been that all Public buildings be in accordance with this by the end of 2018. The project has committed to complying with the requirements set out in the EU Taxonomy alignment for 10% lower than NZEB.

A Nearly-Zero Energy Building is defined as having "very high energy performance", with Article 2 of the EPBD outlining that "the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby"; the latter understood to refer to district heating systems and centralised plant arrangements.

Interpretation and implantation of these statements within the directive are at the discretion of each EU Member State in accordance with their "National, Regional or Local considerations" and thus the definition of NZEB itself varies greatly between different countries.

For new dwellings in Ireland, NZEB has been defined was being (primarily) associated with demonstrating the following characteristics are achieved:

- Primary Energy/ Carbon Emissions: 70% reduction against Part L 2005
- Renewable Energy: 20% of this Primary Energy required

Figure 3.1.2 above illustrates the NZEB targets for Primary Energy (and Carbon Emissions) and Renewable Energy. The Part L 2005 benchmark could be expected to be achieving a B3 BER, in comparison to A2 for NZEB compliance.

These NZEB targets have been now incorporated within the Technical Guidance Document (TGD) Part L 2021, as discussed below.

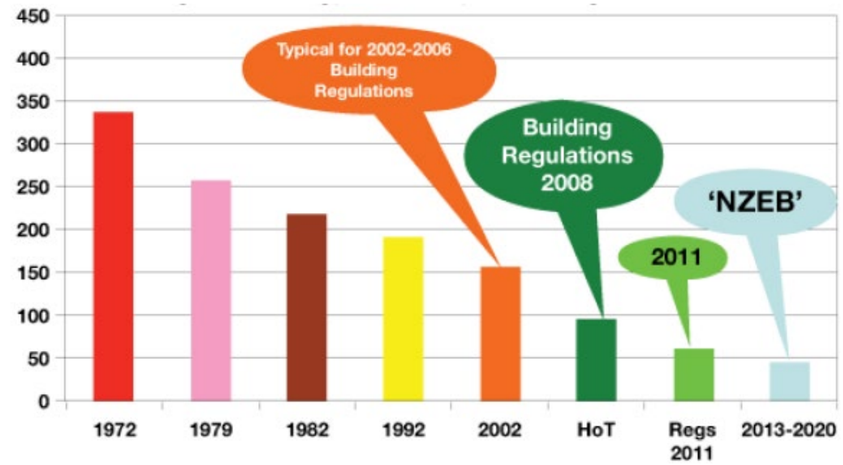


Figure 3.1.1 - Primary Energy Consumption in Irish Housing 1972-2020

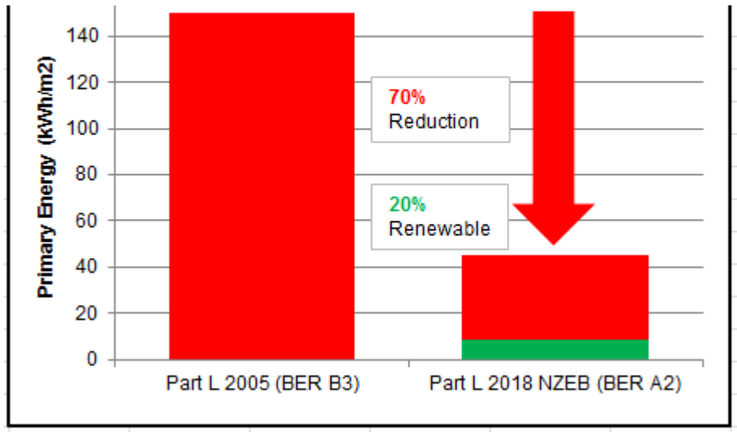


Figure 3.1.2 - NZEB Targets

3.2 Part L 2021

Technical Guidance Document (TGD) Part L Conservation of Fuel and Energy – Dwellings outlines how compliance to this element of the Building Regulations can be demonstrated through the utilisation of the Dwelling Energy Assessment Procedure (DEAP) software, which analyses comparative energy usage for a particular residence.

The energy assessment is determined annually on a floor area basis (kWh/m^2.ann) for the following usages, known as "regulated loads":

- Heating
- Hot Water
- Auxiliary (Fans, Pumps and Controls)
- Lighting

It may be noted therefore that considerable energy usages within dwellings; particularly equipment associated with cooking, washing etc. are excluded from DEAP analysis and associated Part L Compliance/ BER calculations. These energy usages, known as "unregulated loads" are deemed to be associated with *operational* usage, as opposed to the building's fabric and services performance.

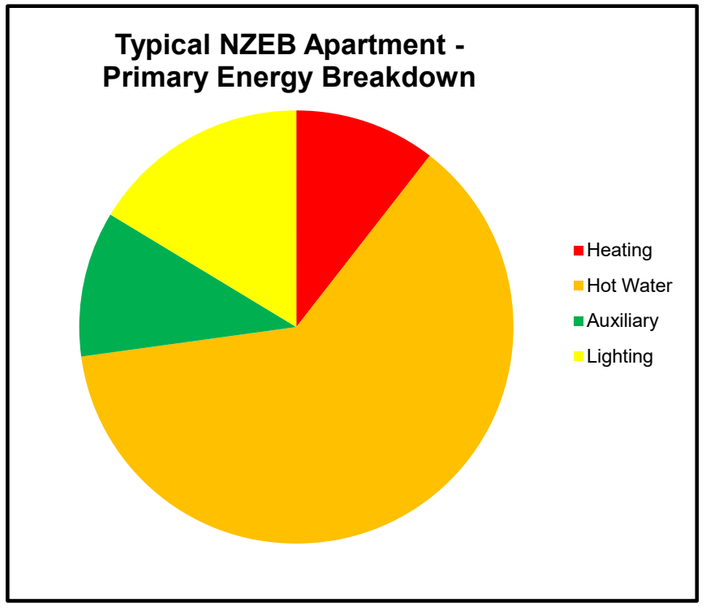


Figure 3.2.1 -Primary Energy Breakdown

Figure 3.2.1 above indicates an energy breakdown for a typical apartment (100m^2, local gas-fired boiler) compliant to NZEB/ Part L 2021. It can be seen that Hot Water Energy consumption pre-dominates, with Heating Energy considerably lower; reflective of the extensive improvement in insulation/ air permeability/ thermal bridging/ glazing/ heating system efficiency etc. through successive Building Regulations improvements.

However, as both Hot Water and Lighting Energy consumption are effectively fixed within the calculation methodology (as based on standardised databases of hot water usage etc.), further improvements to Heating related items (insulation etc.) are generally required to ensure overall compliance can be achieved.

In summary, DEAP analysis must demonstrate the following to ensure compliance to Part L 2021:

- Energy Performance Coefficient (EPC): 0.30 or lower (i.e. 70% reduction in Primary Energy against Part L 2005 benchmark)
- Carbon Performance Coefficient (CPC): 0.35 or lower
- Renewable Energy Ratio (RER): 0.20

In addition, minimum Fabric Performance is defined as follows in Part L 2021:

Building Construction and U-Values		
Element Type	Part-L 2021 Regulations	Residential Targeted
Roof	0.16 W/m^{2}k	0.15 W/m^{2}k
External Wall	0.18 W/m^{2}k	0.18 W/m^{2}k
Ground/Exposed Floors	0.18 W/m^{2}k	0.12 W/m^{2}k
Windows/Doors/Rooflights	1.4 W/m^{2}k	1.3 W/m^{2}k
Heat Transmission Coefficient	0.15 W/m^{2}k	0.08 W/m^{2}k (ACD)

Glazing Parameters	
Total Solar Heat Transmittance (G-Value)	0.50
Light Transmittance	0.68
Framing Factor	0.70
Overshadowing	Very Little

Miscellaneous Building Parameters	
Element	Value Targeted
Air Leakage Rate	3m^3/hr.m^2 @ 50Pa
Shower Flow Rates	8 l/min
Water Usage	110 l/person/day
Lighting	100% LED

In terms of apartments or other terraced residential buildings, Part L allows that the compliance can be demonstrated based on the *average* of all dwellings for each of the parameters associated with Part L, namely Primary Energy (EPC), Carbon Emissions (CPC) and Renewable Energy (RER). Therefore, for the purposes of analysis, an apartment representative of the average attributes of the dwellings has been selected.

3.3 Primary Energy

In assessing energy performance for dwellings, Part L (and BER) utilises *Primary Energy* as a means of comparative analysis. This relates to the energy *at source* as required for the dwelling, as opposed to that consumed within the actual building. For example, electrical Primary Energy relates to that required for both generation (based on average of power plant fuels and efficiencies) and transmission for electricity through the ESB grid.

Primary Energy Factor (PEF) conversions for main fuel types are as follows

- Electricity: 2.08
- Natural Gas/ LPG/ Oil/ Biomass: 1.10

It can be seen from the above that the Primary Energy conversion for Electricity is twice that of Natural Gas (as well as other fossil fuels and biomass); therefore, a direct electric heater would consume double the Primary Energy of a LPHW radiator. However, as can be seen from Figure 2.3.1 above, the underlying trend over time has been that the Primary Energy of electricity with respect to Natural Gas (and other fuels) has been reducing (due to the increased "greening" of the ESB grid with Wind and Solar renewables and more efficient plant operation), with the following impacts in terms of technologies and associated Part L compliance, as PEF for electricity reduces.

Heat Pump technology, both Air Source and Geothermal, are becoming increasingly viable.

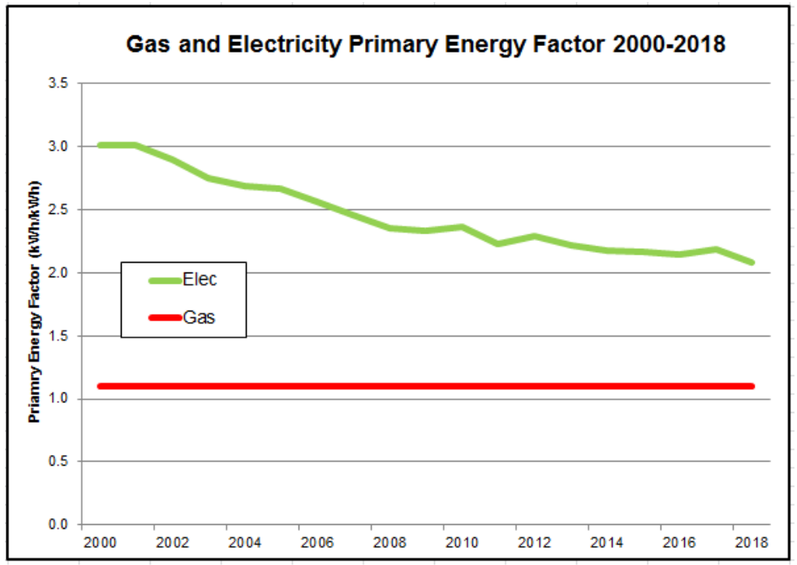


Figure 3.3.1 -- Primary Energy Factors

3.4 Renewable Technologies

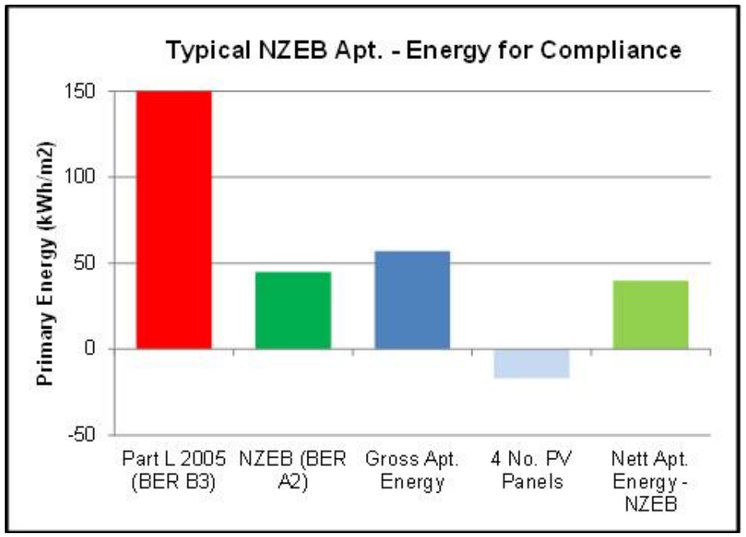


Figure 3.4.1 -EPC Compliance for Typical Apartment

In addition to improving heating energy related aspects, renewable technologies can be utilised to significantly reduce Primary Energy requirements (in addition to ensuring the renewable energy percentage is achieved). Figure 3.4.1 above indicates how, for a typical apartment (notional 100m^2) designed to ensure NZEB compliance, 4 no. (250W) PV panels would offset the excess energy within the gross consumption. This extent of renewable energy must be at least 20% of the overall Primary Energy (RER =0.20+).

With regards to renewable energy technology types, the most effective for integration within apartment design to ensure compliance to Part L in a cost-effective manner are as follows:

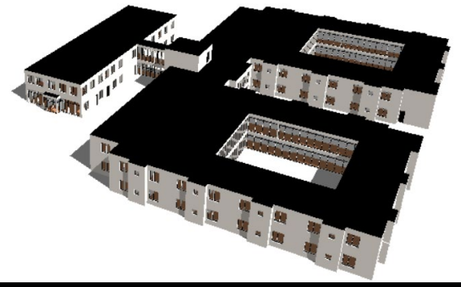
- Air Source Heat Pumps (ASHP)
  Reduces Primary Energy associated with both Heating and Hot Water compared to gas boilers.

- Exhaust Air Heat Pump (EAHP)
  Reduces Primary Energy associated with both Heating and Hot Water compared to gas boilers.

- Photovoltaics (PV)
  Offsets Primary Energy associated with electricity. Most cost-effective where installed as part of Centralised plant arrangement, with single array interlinked to Landlord electricity supply (as opposed to individual units).

- Wind Energy
  Offsets Primary Energy associated with electricity. Not consider feasible for this development within a high-density urban environment.

4.0 Hospital Building – Proposed Building and HVAC Assumptions



Building Fabric -			
Element	U-Value W/m²K	General Fabric Details	
External Walls	0.18	Glazing Performance	
Roof	0.15	Glazing Light Transmittance	0.70
Ground Floor	0.15	Glazing g-Value 1	0.35
Exposed Floor	0.15	Glazing g-Value 2	0.26
Glazing (Centrepane)	1.4	Air Permeability	m³/hr.m²@50Pa
Glazing (Centrepane)	1.0	New Building	3.0

Thermal Bridges			
Junction	Ψ Value W/m K	Junction	Ψ Value W/m K
Roof to Wall	0.12	Lintel above Window or Door	0.300
Wall – Ground Floor	0.16	Sill below Window	0.040
Wall – Wall (Corner)	0.09	Jamb at Window or Door	0.050
Wall – Floor (int not ground floor)	0.070		

Heating System - Heating- ASHP with radiators Space Heating			
Fuel Type	Grid Electricity	ASHP Seasonal Efficiency	275%
Heating Water Pumps	Variable Speed	Distribution System Efficiency	92.5%
Heating- VRF Space Heating -Activity,-Consultants, Café, Dining, Nurse stn, Managers Office			
Fuel Type	Grid Electricity	ASHP Seasonal Efficiency	400%
Heating Water Pumps	NA	Distribution System Efficiency	NA

Hot Water System - HWS – ASHP Heating to all areas			
Fuel Type	Grid Electricity	ASHP Seasonal Efficiency	278%
Heating Water Pumps	Variable Speed	Distribution System Efficiency	95%
Storage Capacity l	15,000	Factory Insulated	100 mm

VRF Cooling - Activity,-Consultants, Café, Dining, Nurse stn, Managers Office			
Fuel Type	Grid Electricity	ASHP Seasonal Efficiency	500%
Chilled Water Pumps	NA	Distribution System Efficiency	NA

HVAC System - Natural Ventilation - all Perimeter areas				
Natural Ventilation	Manually Openable Windows 5% (of floor area) free area opening required to all rooms in accordance with TGD Part F			
Mechanical Ventilation with heat recovery - Ensuite and Changing areas				
Mechanical Ventilation (MVHR)	Supply Air Fan Specific Fan Power (W/l.s)			0.9
	Extract Fan Specific Fan Power (W/l.s)			1.0
	Heat Recovery Type	Run around Coil	Efficiency	70%
	CO2 Sensor			NA
Extract Only - Kitchens and stores				
Extract Ventilation (Ex)	Extract Fan Specific Fan Power (W/l. s)			0.3

Lighting - Proposed				
Space Type	Presence Detection Switching	Daylight Control	Lamp and ballast Efficacy (lumens/W)	Light Output ratio
Activity	Manual	Photocell / Dimming	100	0.85
Café	Manual	Photocell / Dimming	100	0.85
Changing	Manual	Photocell / Dimming	100	0.85
Circulation	Manual	Photocell / Dimming	100	0.85
Day room	Manual	Photocell / Dimming	100	0.85
Quiet Room	Manual	Photocell / Dimming	100	0.85
Dining	Manual	Photocell / Dimming	100	0.85
Ensuite	Manual	Photocell / Dimming	100	0.85
Hairdresser	Manual	Photocell / Dimming	100	0.85
Kitchen/Laundry	Manual	Photocell / Dimming	100	0.85
Nurses Station	Manual	Photocell / Dimming	100	0.85
Office / Consultant	Auto On/Off	Photocell / Dimming	100	0.85
Store / Housekeeping	Auto On/Off	Manual	100	0.85
Toilet/Assisted WC/ Bath	Manual	Manual	100	0.85
Utility	Auto On/Off	Photocell / Dimming	100	0.85
Comms	Auto On/Off	Photocell / Dimming	100	0.85

Controls - Proposed	
Automatic monitoring and targeting with alarms for out-of-range values	Yes
Power factor correction to achieve a whole building power factor of at least	>95%
Time Control on Secondary Circulation	Yes

Additional Renewables			
System	Annual Yield MWh	No. of Panels	Area of Panels m²
Photovoltaic Panels (PV)	48.7	250	400

5.0 Residential Buildings - Proposed Building and HVAC Assumptions

5.1 DEAP Parameters – Residential Element

The St Vincent's Hospital Redevelopment scheme will avail of a centralised air source heat pump (ASHP) arrangement, consisting of centralised wet based heat network serving the entire residential development. A low-energy design was developed and analysed for the mechanical and electrical installations, comprising of heat generators, heating and hot water systems, ventilation, and lighting.

Details of the proposed plant and system configuration for the development are illustrated in the table below:

Centralised Option	
Element	Apartments
Method of Heat Generation	Air Source Heat Pump (ASHP)
Model(s)	Flaktwood ASHP[1] in Plantroom with HIU located in each apartment.[2]
Ventilation Method	Heat Recovery Ventilation Unit
Fuel	Electricity
Heating Flow Temperature	60°C
Hot Water Flow Temperature	50°C

Table 5.1.1 – Centralised Parameters

5.2 Part-L Compliance (Centralised) – Residential Element

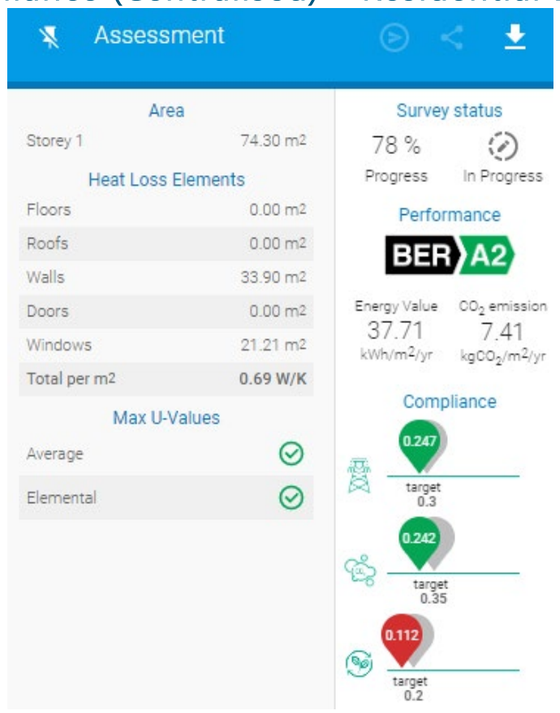


Figure 5.2.1 –Part-L Compliance – Primary Energy Breakdown (Apartment)

Figure 5.2.1 above, indicates confirmation of compliance to Part-L for a mid-storey North facing apartment with the following parameters achieved:

- Energy Performance Coefficient (EPC) < 0.30
- Carbon Performance Coefficient (CPC) < 0.35
- Renewable Energy Ratio (RER) > 0.20

Detailed results of the BER analysis undertaken using DEAP software for this apartment are provided in the Appendix below.

[1] Units mentioned within table 3.1.1 are indicative for the purposes of analysis only and may be subject to change

[2] Units mentioned within table 3.1.1 are indicative for the purposes of analysis only and may be subject to change

6.0 Appendix

6.1 DEAP Results – Mid Floor North Facing Apartment

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Dwelling Details Report
Date report created: 21/09/2022
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Property details

MPRN	0	**Shared MPRN**	
BER Number	N/A	**BER number assigned to shared dwelling**	N/A
Address line 1	St Vincents		
Address line 2	Fairview	**Type of Rating**	New Dwelling - Provisional
Address line 3		**Purpose of Rating**	New dwelling for owner occupation
County	Dublin 3	**Building Regulations**	2019 TGD L
Eircode		**Planning Reference**	
Dwelling Type	Mid-floor apartment	**Date of Plans**	
Year of construction	2022	**Assessor Name**	
Dwelling Extension	N/A	**Date of Assessment**	01/11/2021
Storeys	1	**Assessor Comments**	
		Assessor Description	St.Vincents Fairview - ASHP - 2Bed Middle Block D

Dimension details

	Area [m^2]	Height [m]	Volume [m^3]
Ground floor	74.30	3.30	245.19
First floor	0.00	0.00	0.00
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
Totals	74.30		245.19

Living Area	34.51 m^2
Living Area Percentage	46.45 %

Ventilation details

	Number	Air Change Rate [m3/h]
Chimneys	0	0.00
Open Flues	0	0.00
Fans & vents	1	10.00
Flueless combustion room heaters	0	0.00

Manufacturer	Vent-Axia Kinetic Advance
Model	Kinetic Advance

Has a permeability test been carried out	Yes	Is there a draught lobby on main entrance?	Yes
Infiltration rate due to structure [ac/h]	0.15	Draught lobby air change [ac/h]	0.00
Intermediate infiltration rate	0.19	Openings infiltration [ac/h]	0.04
Number of sides sheltered	2	Structure type	N/A
Adjusted infiltration rate [ac/h]	0.16	Is there a suspended wooden ground floor?	No
Effective air change rate [ac/h]	0.20	Windows/doors/attic hatches draught stripped [%]	N/A
Ventilation heat loss [W/K]	16.36	Ventilation method	Balanced whole-house mechanical ventilation with heat recovery
Adjusted result of air permeability test [ac/h]	0.15	How many wetrooms (inc. kitchen)? Is the vent. ducting flexible/rigid/both?	K + 2
Specific fan power [W/(l/s)]	0.46	Is MVHR ducting uninsulated where outside of insulated envelope?	No
Heat exchanger efficiency [%]	92.00	Adjusted heat exchanger efficiency	92.00
Electricity for ventilation fans [Kwh/y]	137.60		
Heat gains from ventilation fans [W]	6.77		

Building Elements - Floors

Type	Description	U/F Heating	Include in compliance check	In Roof	Age Band	Exposed Perimeter [m]	Area [m^2]	U-Value [W/m^2K]	Heat Loss (AU) [W/K]
Non-Heat Loss Floor		N/A	No	No	2010 onwards	N/A	74.30	0.00	0.00
Total area [m^2]									74.30

Building Elements - Roofs

Type	Description	Include in compliance check	Insulation Thickness [mm]	Age Band	Area [m^2]	U-Value [W/m^2K]	Heat Loss (AU) [W/K]
Total area [m^2]							0.00

Building Elements - Walls

Type	Description	Wall is semi-exposed	Include in compliance check	Age Band	Area [m^2]	U-Value [W/m^2K]	Heat Loss (AU) [W/K]
225mm Solid Brick		No	Yes	2010 onwards	33.90	0.18	6.10
Total area [m^2]							33.90

Building Elements - Doors

Count	Type	Description	Draught Stripped	Area [m^2]	U-Value [W/m^2K]	Heat Loss (AU) [W/K]
Total area [m^2]						0.00

Building Elements - Windows

Count	Glazing Type	Frame Type	Frame Factor	Solar Transm.	In Roof	Over shading	Orient.	Area [m^2]	U-value [W/m^2K]
1	Double-glazed, air filled (low-E, en = 0.2, hard coat)	Metal 8mm thermal Break	0.700	0.500	No	Average or Unknown	North	4.03	1.30
1	Double-glazed, air filled (low-E, en = 0.2, hard coat)	Metal 8mm thermal Break	0.700	0.500	No	Average or Unknown	North	4.03	1.30
1	Double-glazed, air filled (low-E, en = 0.2, hard coat)	Metal 8mm thermal Break	0.700	0.500	No	Average or Unknown	North	6.72	1.30
1	Double-glazed, air filled (low-E, en = 0.2, hard coat)	Metal 8mm thermal Break	0.700	0.500	No	Average or Unknown	West	2.40	1.30
1	Double-glazed, air filled (low-E, en = 0.2, hard coat)	Metal 8mm thermal Break	0.700	0.500	No	Average or Unknown	East	4.03	1.30
Total area [m^2]									21.21

Heat loss details

Total glazed area [m^2]	21.21	**Glazing ratio**	0.12
Total glazed heat loss [W/K]	24.29	**Summer solar gain [W/m^2**	529.17
Total effective collection area [m^2]	5.14	**Total element area [m^2]**	55.11
Total plane heat loss [W/K]	30.39	**Thermal bridging factor [W/m^2K]**	0.0800
Fabric heat loss [W/K]	34.80	**Total heat loss [W/K]**	51.15
Per m2	0.69		

Lighting and Internal Gains

Lighting Design Calculation Method	Lighting Design	**Average Efficacy [lm/W]**	83.30
		Top up lighting requirement [klmh/y]	432.68
Fixed lighting provision [klmh/y]	1192.91	**Energy required for top up lighting [kWh/y]**	20.31
Energy required for fixed lighting [kWh/y]	58.54		
Energy required for portable lighting [kWh/y]	114.48		
Basic energy consumption for lighting [kWh/y]	680.35	**Water heating (In watts [W])**	107.65
Annual energy used for lighting [kWh/y]	193.34	**Occupants (In watts [W])**	117.29
Internal gains from lighting during heating season [kWh/hs] (In watts [W])	147.90 (25.36)	**Mechanical ventilation (In watts [W])**	6.77
Lighting (In watts [W])	25.36	**Heat loss to the cold water network (In watts [W])**	-35.11
Appliance and cooking (In watts [W])	170.73	**Net internal gains (In watts [W])**	392.69

Lights

Count	Name	Description	Type	Efficiency	Power [W]
6	Default LED/CFL		LED/CFL	66.90	12.00

Water heating details

Are there distribution losses?	Yes	**Is supplementary electric water heating used in summer?**	N/A
Are there storage losses?	Yes	**Is there a combi boiler?**	No
Is there a solar water heating system?	No	**Total hot water demand [kWh/y]**	1829.49
Standard number of occupants	2.35	**Temperature factor unadjusted**	1.00
Number of mixer showers	1	**Temperature Factor Multiplier**	1.00
Number of electric showers	0	**Hot water storage loss factor [kWh/l d]**	0.00
Number of baths	1	**Volume factor**	0.00
Daily hot water use [Litres/d]	116.67	**Combi-boiler electricity consumption [kWh/y]**	0.00
Hot water energy reqs. at taps [kWh/y]	1555.06	**Adjusted storage loss [kWh/y]**	132.86
Distribution losses [kWh/y]	274.42	**Adjusted primary circuit loss [kWh/y]**	285.56
Water storage volume [Litres]	4.00	**Heat gains from water heating system [W]**	107.65
Is manufacturers declared loss factor available?	Yes	**Output from supplementary heater [kWh/y]**	0.00
Declared loss factor [kWh/d]	0.36		
Manufacturer and Model name			
Insulation type	N/A		
Insulation thickness [mm]	N/A		

Type of mixer shower	Flow restriction	Flow rate [l/min]	HW usage [l/day]	WWHRS Manufacturer/Model	WWHRS efficiency	WWHRS Utilisation Factor	Energy Savings [kWh/yr]
Unvented hot water system	No	8.000		Any / Any			
Total :			58.90				0.00

Combi-boiler Type	None	**Output from main water heater [kWh/y]**	2247.91
Combi-boiler loss [kWh/y]	0.00	**Annual Heat gains from water heating system [kWh/y]**	943.04
Keep Hot facility	None	**WWHRS input to main system [kWh/y]**	0.00
Storage Loss	132.86	**WWHRS input to supplementary system [kWh/y]**	0.00
Storage Type	Plate heat exchanger in a group heating system		
Primary Circuit loss type			Community heating
Primary circuit loss [kWh/y]	360.00	**Heat Pump Type of DHW**	Integral Hot Water Storage
Is hot water storage indoors or in group heating system	Yes		

Net space heat demand

Required temp. during heated hours	21.00	**Length of one unheated period [h]**	8
Required temperature rest of dwelling	18.00	**Unheated periods per week**	14
Living area percentage	46.45	**Heat use during heating season [kWh/y]**	625.55
Required mean internal temperature [C]	19.39	**Heat use for full year [kWh/y]**	626.27
Thermal mass category of dwelling	Medium		

	Utilisation factor	Intermittent heating
Internal heat capacity of dwelling [per m^2]	0.20	0.11
Internal heat capacity [MJ/K]	14.86	8.17

Space heat demand details

Month	Mean Ext. Temp [C]	Adj. Int. Temp [C]	Heat Loss [W]	Heat Use [kWh]	Gain/Loss Ratio	Utilisation Factor	Heat Use [W]	Useful Gains [W]	Solar Gain [W]
January	5.3	18.60	680	172	0.68	0.97	232	448	69
February	5.5	18.61	670	116	0.78	0.94	173	497	133
March	7.0	18.69	598	52	1.05	0.84	69	529	234
April	8.3	18.77	535	15	1.38	0.69	20	515	349
May	11.0	18.92	405	1	2.13	0.47	2	403	469
June	13.5	19.06	284	0	3.16	0.32	0	284	505
July	15.5	19.17	188	0	4.56	0.22	0	188	464
August	15.2	19.16	202	0	3.88	0.26	0	202	393
September	13.3	19.05	294	1	2.29	0.44	1	293	280
October	10.4	18.88	434	17	1.29	0.73	23	411	168
November	7.5	18.72	574	93	0.83	0.93	129	445	86
December	6.0	18.63	646	159	0.69	0.97	214	433	54

Dist. System Losses and Gains

Temperature adjustment [C]	0.000	Additional heat emissions due to non ideal control and responsiveness [kWh/y]	75.36
Heating system control category	2	Gross heat emission to heated space [kWh/y]	700.91
Heating system responsiveness category	1	Mean internal temperature [C]	18.98
Mean internal temperature during heating hours [C]	19.66		

	Number present	Boiler controlled by thermostat	Inside dwelling	Electricity consumption [kWh/y]	Heat gain [W]
Central heating pumps	0	No	No	0	0
Oil boiler pumps	0	No	No	0	0
Gas boiler flue fan	0			0	
Warm air heating or fan coil radiators present	No			0	0
Totals				0	0

Note: Wet central heating systems are likely to have one or more central heating pumps.

Gains from fans and pumps associated with space heating system [kWh/y]	0	Is there underfloor heating on the ground floor?	No
Average utilisation factor, October to May	0.82	U-Value of ground floor [W/m^{2}K]	0.00
Useful net gain [kWh/y]	0	Fraction of heating system output from ground floor	1.00
Net heat emission to heated space [kWh/y]	701	Additional heat loss via envelope element [kWh/y]	0.00
Annual space heating requirement [kWh/y]	701		

Energy Requirements: Group Heating Systems

Is charging based on heat consumed?	Yes	Distribution loss factor	1.05
Heat for space heating delivered to dwelling [kWh/y]	700.91		
Percentage of heat from secondary system			
Efficiency of secondary system [%]			
Energy required for secondary space heating [kWh/y]	0		

	Fuel Type	Efficiency [%]	Percentage of Heat [%]	Primary energy conversion factor	CO_2 emission factor [kg/kWh]
Heating System 1	Electricity	371.25	24	2.08	0.409
Heating System 2	Electricity	299.26	76	2.08	0.409

	Primary energy conversion factor	CO_2 emission factor
Factors for CHP fuel	0.00	0.00
Factors for electricity displaced from grid	2.08	0.41
Factors for heat leaving CHP plant	1.10	0.02
Factors for waste heat from power stations	1.05	0.02
Factors for heat delivered to dwelling	0.70	0.14

	Fuel Type	Primary energy conversion factor	CO_2 emission factor
Main space heating system	group heating scheme	0.70	0.14
Secondary space heating system	None	0.00	0.00
Main water heating system	group heating scheme	0.70	0.14
Supplementary water heating system		0.00	0.00
Pumps, fans		2.08	0.41
Energy for lighting		2.08	0.41

	Type	Part L Total Contribution [kWh/y]	Delivered Energy [kWh/y]	Primary energy conversion factor	CO_2 emission factor [kg/kWh]
Energy produced or saved 1	N/A	0.000	0.000	0.00	0.000
Energy consumed by the technology 1			0.000	0.00	0.000
Energy produced or saved 2	N/A	0.000	0.000	0.00	0.000
Energy consumed by the technology 2			0.000	0.00	0.000
Energy produced or saved 3	N/A	0.000	0.000	0.00	0.000
Energy consumed by the technology 3			0.000	0.00	0.000

Summer internal gains

Dwelling volume [m^3]	245.190	Total gains in summer [W]	921.86
Effective air change rate for summer period [ac/h]		Temperature increment due to gains [C]	26.49
Ventilation heat loss coefficient [W/K]	0.00	Summer mean external temperature [C]	19.43
Fabric heat loss coefficient [W/K]	34.80	Heat capacity parameter	0.20
Heat loss coefficient under summer conditions [W/K]	34.80	Temperature increment related to thermal mass [C]	0.60
Total Solar Gain for Summer Period [W]	529.17	Threshold internal temperature [C]	46.09
Internal gains [W]	392.69		

Results

	Delivered energy [kWh/y]	Primary energy [kWh/y]	CO_2 emissions [kgCO_2/y]
Main space heating system	701	488	96
Secondary space heating system	0	0	0
Main water heating system	2248	1564	308
Supplementary water heating system	0	0	0
Cooling	0	0	0
Pumps and fans	167	348	68
Energy for lighting	193	402	79
CHP input (individual heating systems only)			
CHP electric output (individual heating systems only)			
Renewable and energy saving technologies			
Energy produced and saved	0	0	0
Energy consumed by the technology	0	0	0
Total	3309	2802	551
Per m^2 floor area	44.54	37.71	7.41
Energy Rating	A2		

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