

**D1861
PARKGATE STREET
DUBLIN 2**



**NON - DOMESTIC
NZEB COMPLIANCE**

28th June 2019
Rev01

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1.0 EXECUTIVE SUMMARY

This report outlines the assumptions made for the non-domestic areas of the Parkgate Street Development and assesses them for Part L NZEB (Near Zero Energy Building) compliance. The report further summarises the PV requirement for each spaces type.

The current shell & core floor plans of the development require a provisional analysis to be made in order to comply with NZEB. Under the methodology, a provision for renewable technology, contributing to reduction in the overall primary energy usage of the building, must be allowed for.

In order to comply with Part L 2017 of the building regulations, a new building must have a 20% renewable energy contribution or RER of 0.2 (Renewable Energy Ratio) for an EPC of <1, and CPC <1.15, or a RER of 0.1 where the EPC <0.9. Photovoltaic panels are the most viable option in order to achieve compliance in this regard.

Calculations were undertaken to determine the amount of PV panels for each of the following areas:

- A1.1 Restaurant
- B1.1 Food & Beverage
- B1.2 Office
- B1.3 Gym
- B2.1 Co-working
- B3.1 Leisure Rooms

Table 1.1 indicates building area, PV requirement and the Part L compliance parameters for each area as calculated using the SEAI SBEM software.

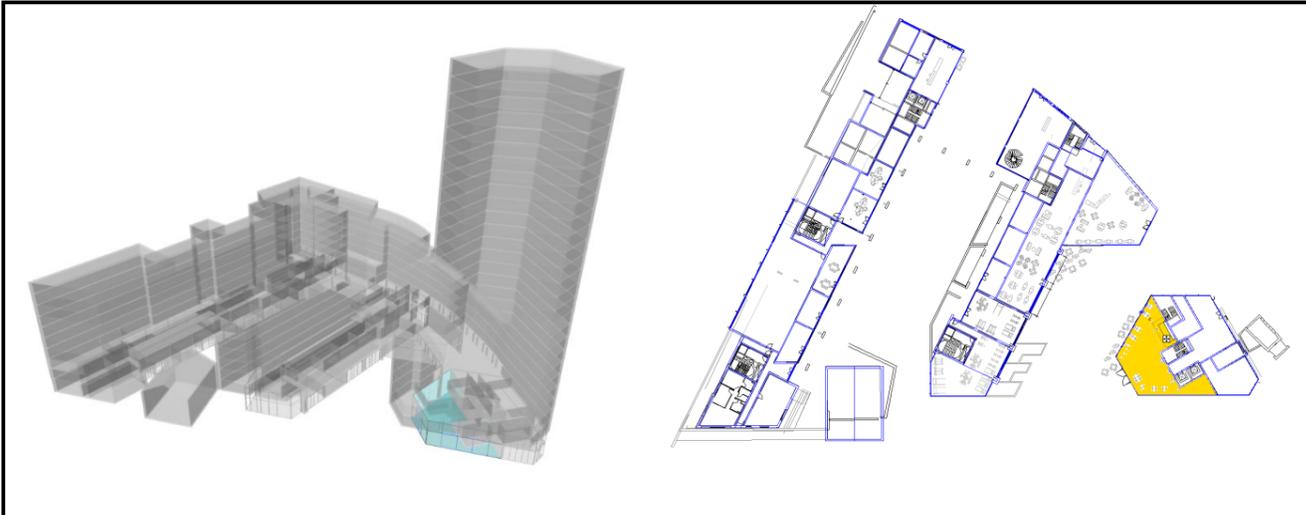
This report outlines the assumptions made for the building fabric, heating and hot water systems, cooling and HVAC systems, lighting, controls and renewable technologies for each of the areas mentioned above with extent of PV determined as below ranging from 2.5% to 20% of the floor areas of the Office and Restaurant respectively.

Building Area			PV Requirements				Part L Compliance		
Ref	Description	Floor Area (m ²)	PV (No.)	PV (kW)	PV (m ²)	PV (%)	EPC	CPC	RER
A1.1	Restaurant	174	22	6.4	34.8	20%	1.00	1.02	0.40
B1.1	Food & Beverage	211	13	3.8	20.8	10%	0.90	0.91	0.15
B1.2	Office	876	14	4.1	22.4	2.5%	0.82	0.83	0.16
B1.3	Gym	258	24	7.0	38.4	15.0%	1.00	1.02	0.27
B2.1	Co-Working	215	10	2.9	16	7.5%	0.99	1.02	0.55
B3.1	Leisure Rooms	183	6	1.7	9.6	5%	0.95	0.98	0.38
	Residential	TBC	TBC	TBC	TBC				
Total		1917	89	25.8	142				

Table 1: PV requirements and associated Part L Compliance Results

2.0 BUILDING AND HVAC ASSUMPTIONS

2.1 A1.1 Restaurant



HVAC System			
Variable Refrigerant Flow and Mechanical Ventilation with Heat Recovery (VRF + MV):	Supply Air Fan Specific Fan Power (W/l.s)		1.5
	Extract Fan Specific Fan Power (W/l.s)		1.5
	Terminal Fan Specific Fan Power (W/l.s)		0.8
	CO ₂ Sensor		Yes
	Heat Recovery Efficiency	Plate Heat Exchanger	70%
	Demand Controlled Ventilation	Demand Control Dependent on Gas Sensors - Speed Control	
Lighting			
Space Type	Presence Detection Switching	Daylight Control	Lighting Power (W/m ² per 150 Lux)
Food & Beverage (Restaurant)	Auto on / Auto off Local Manual Switching	Photocell Dimming	2
Controls			
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%
Renewable Technology			
System	Photovoltaic Panels (PV)		
Renewable Contribution	4.3 MWh/ann		
Peak PV	6.38 kW		
Estimated No. of Panels	22		
Estimated Area of Panels	34.8 m ²		
Area Panels to GIFA Ratio	20%		

Building Fabric			
Element	U-Value W/m ² K	Glazing Transmittance Details	
External Walls	0.21	Glazing Light Transmittance	70%
Roof	0.20	Glazing g-Value - General	40%
Ground Floor	0.15		
Glazing - (Centrepane)	1.4		
Whole Façade- Average Glazing and Frame	1.6		
Air Permeability m ³ /hr.m ²	3		

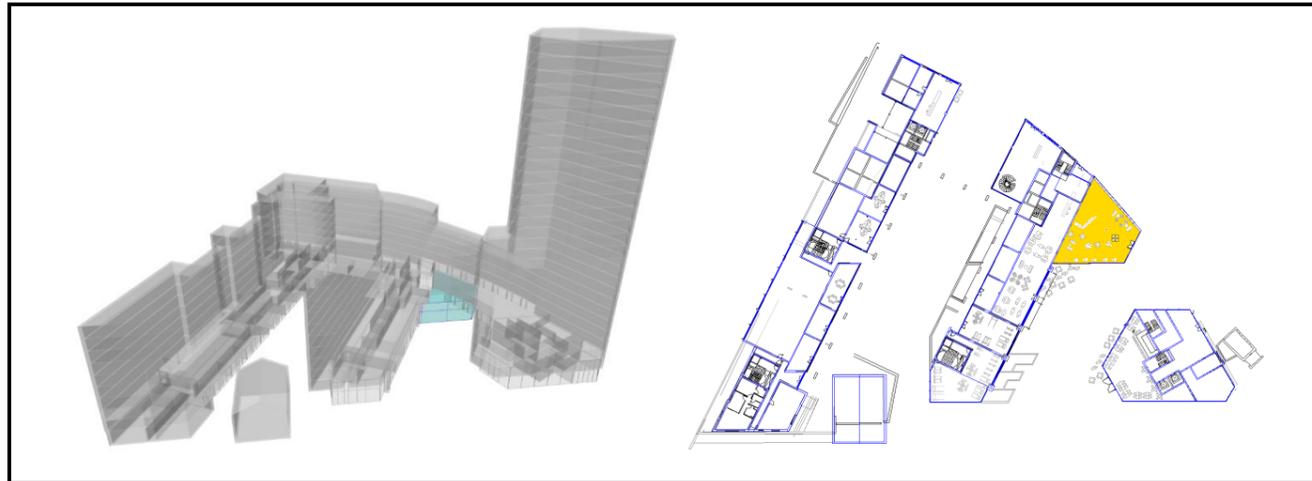
Heating System			
Heating - 100% ASHP			
Fuel (ASHP) (67%)	Grid Supplied Electricity	Air Source Heat Pump SEER	400%
Heating Water Pumps	NA	Distribution System Efficiency	NA

Hot Water System			
Domestic hot Water - 100% NG Boiler			
Fuel	Natural Gas	Boiler Seasonal Efficiency	95%
Heating Water Pumps	Variable Speed	Distribution System Efficiency	95%

Cooling			
Fuel	Grid Supplied Electricity	Air Source Heat Pump SEER	360%
Chilled Water Pumps	NA	Distribution System Efficiency	NA

2.0 BUILDING AND HVAC ASSUMPTIONS

2.2 B1.1 Food & Beverage



Building Fabric

Element	U-Value W/m ² K	Glazing Transmittance Details	
External Walls	0.21	Glazing Light Transmittance	70%
Roof	0.20	Glazing g-Value - General	40%
Ground Floor	0.15		
Glazing - (Centrepane)	1.4		
Whole Façade- Average Glazing and Frame	1.6		
Air Permeability m ³ /hr.m ²	3		

Heating System

Heating - 100% ASHP			
Fuel (ASHP) (67%)	Grid Supplied Electricity	Air Source Heat Pump SEER	400%
Heating Water Pumps	NA	Distribution System Efficiency	NA

Hot Water System

Domestic hot Water - 100% NG Boiler			
Fuel	Natural Gas	Boiler Seasonal Efficiency	95%
Heating Water Pumps	Variable Speed	Distribution System Efficiency	95%

Cooling

Fuel	Grid Supplied Electricity	Air Source Heat Pump SEER	360%
Chilled Water Pumps	NA	Distribution System Efficiency	NA

HVAC System

Variable Refrigerant Flow and Mechanical Ventilation with Heat Recovery (VRF + MV):	Supply Air Fan Specific Fan Power (W/l.s)	1.5
	Extract Fan Specific Fan Power (W/l.s)	1.5
	Terminal Fan Specific Fan Power (W/l.s)	0.8
	CO ₂ Sensor	Yes
	Heat Recovery Efficiency	Plate Heat Exchanger 70%
	Demand Controlled Ventilation	Demand Control Dependent on Gas Sensors - Speed Control

Lighting

Space Type	Presence Detection Switching	Daylight Control	Lighting Power (W/m ² per 150 Lux)
Food & Beverage (Restaurant)	Auto on / Auto off Local Manual Switching	Photocell Dimming	2

Controls

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%

Renewable Technology

System	Photovoltaic Panels (PV)
Renewable Contribution	2.5 MWh/ann
Peak PV	3.77
Estimated No. of Panels	13
Estimated Area of Panels	20.8 m ²
Area Panels to GIFA Ratio	10%

2.0 BUILDING AND HVAC ASSUMPTIONS

2.3 B1.2 Office



HVAC System			
Variable Refrigerant Flow and Mechanical Ventilation with Heat Recovery (VRF + MV):	Supply Air Fan Specific Fan Power (W/l.s)		1.5
	Extract Fan Specific Fan Power (W/l.s)		1.5
	Terminal Fan Specific Fan Power (W/l.s)		0.8
	CO ₂ Sensor		Yes
	Heat Recovery Efficiency	Plate Heat Exchanger	70%
	Demand Controlled Ventilation	Demand Control Dependent on Gas Sensors - Speed Control	

Lighting			
Space Type	Presence Detection Switching	Daylight Control	Lighting Power (W/m ² per 400 Lux)
Food & Beverage (Restaurant)	Auto on / Auto off Local Manual Switching	Photocell Dimming	1.25

Controls	
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%

Renewable Technology	
System	Photovoltaic Panels (PV)
Renewable Contribution	2.7 MWh/ann
Peak PV	4.06 kW
Estimated No. of Panels	14
Estimated Area of Panels	22.4 m ²
Area Panels to GIFA Ratio	2.5 %

Building Fabric

Element	U-Value W/m ² K	Glazing Transmittance Details	
External Walls	0.21	Glazing Light Transmittance	70%
Roof	0.20	Glazing g-Value - General	40%
Ground Floor	0.15		
Glazing - (Centrepane)	1.4		
Whole Façade- Average Glazing and Frame	1.6		
Air Permeability m ³ /hr.m ²	3		

Heating System

Heating - 100% ASHP			
Fuel (ASHP) (67%)	Grid Supplied Electricity	Air Source Heat Pump SEER	400%
Heating Water Pumps	NA	Distribution System Efficiency	NA

Hot Water System

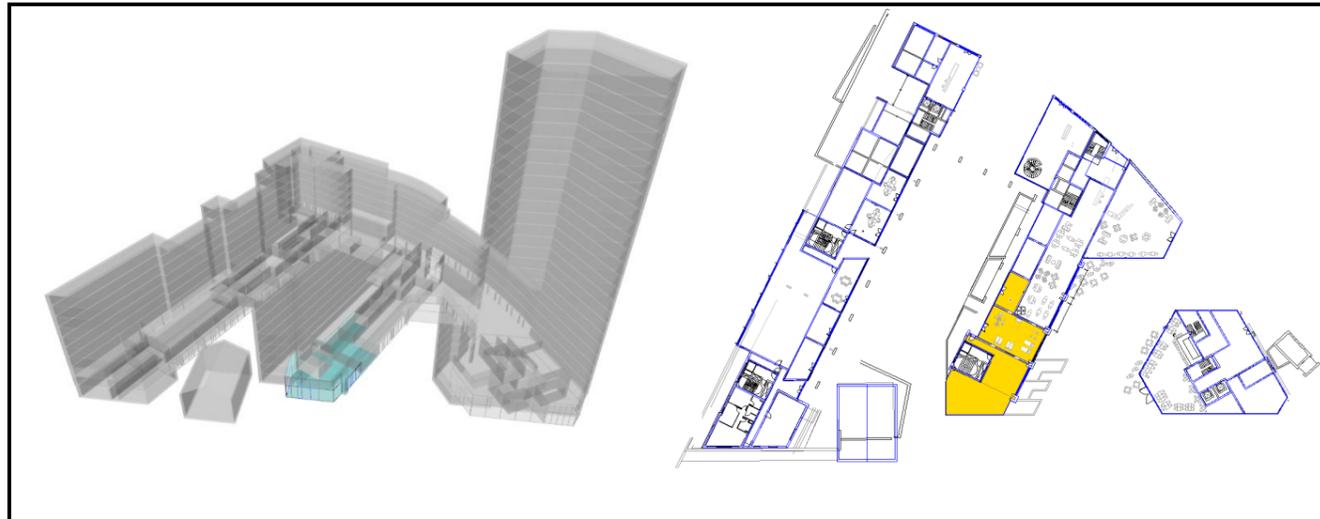
Domestic hot Water - 100% NG Boiler			
Fuel	Natural Gas	Boiler Seasonal Efficiency	95%
Heating Water Pumps	Variable Speed	Distribution System Efficiency	95%

Cooling

Fuel	Grid Supplied Electricity	Air Source Heat Pump SEER	360%
Chilled Water Pumps	NA	Distribution System Efficiency	NA

2.0 BUILDING AND HVAC ASSUMPTIONS

2.4 B1.3 Gym



Building Fabric

Element	U-Value W/m²K	Glazing Transmittance Details	
External Walls	0.21	Glazing Light Transmittance	70%
Roof	0.20	Glazing g-Value - General	40%
Ground Floor	0.15		
Glazing - (Centrepane)	1.4		
Whole Façade- Average Glazing and Frame	1.6		
Air Permeability m³/hr.m²	3		

Heating System

Heating - 100% ASHP			
Fuel (ASHP) (67%)	Grid Supplied Electricity	Air Source Heat Pump SEER	400%
Heating Water Pumps	NA	Distribution System Efficiency	NA

Hot Water System

Domestic hot Water - 100% NG Boiler			
Fuel	Natural Gas	Boiler Seasonal Efficiency	95%
Heating Water Pumps	Variable Speed	Distribution System Efficiency	95%

Cooling

Fuel	Grid Supplied Electricity	Air Source Heat Pump SEER	360%
Chilled Water Pumps	NA	Distribution System Efficiency	NA

HVAC System

Variable Refrigerant Flow and Mechanical Ventilation with Heat Recovery (VRF + MV):	Supply Air Fan Specific Fan Power (W/l.s)	1.5
	Extract Fan Specific Fan Power (W/l.s)	1.5
	Terminal Fan Specific Fan Power (W/l.s)	0.8
	CO ₂ Sensor	Yes
	Heat Recovery Efficiency	Plate Heat Exchanger 70%
	Demand Controlled Ventilation	Demand Control Dependent on Gas Sensors - Speed Control

Lighting

Space Type	Presence Detection Switching	Daylight Control	Lighting Power (W/m² per 150 Lux)
Food & Beverage (Restaurant)	Auto on / Auto off Local Manual Switching	Photocell Dimming	2

Controls

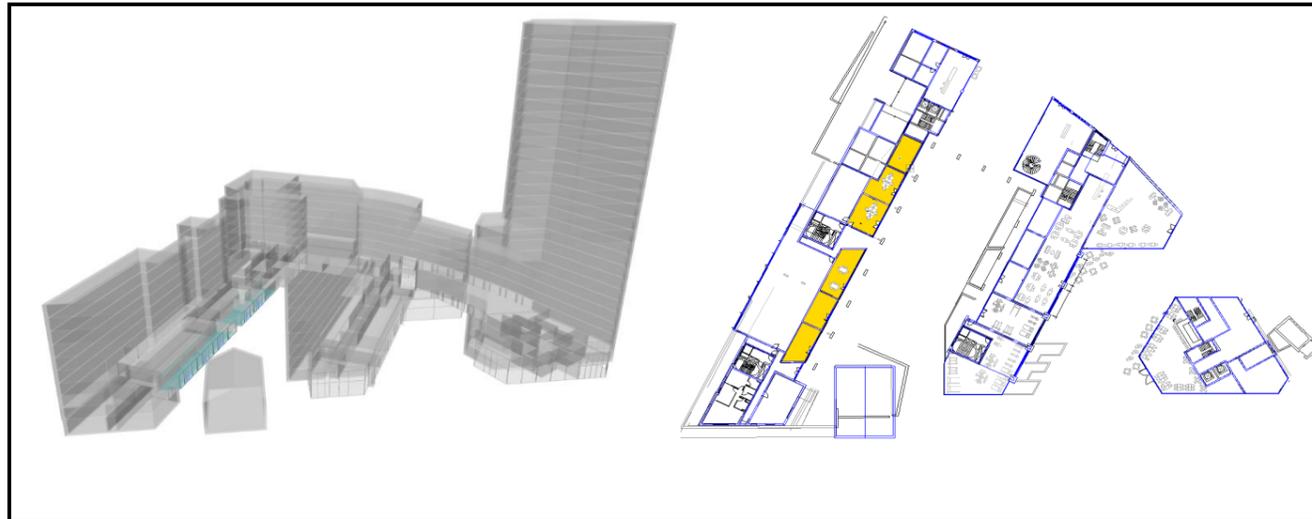
Automatic monitoring and targeting with alarms for out of range values	Yes
Power factor correction to achieve a whole building power factor of at least	>95%

Renewable Technology

System	Photovoltaic Panels (PV)
Renewable Contribution	4.6 MWh/ann
Peak PV	6.96 kW
Estimated No. of Panels	24
Estimated Area of Panels	38.4 m²
Area Panels to GIFA Ratio	15%

2.0 BUILDING AND HVAC ASSUMPTIONS

2.5 B2.1 Co-Working



Building Fabric

Element	U-Value W/m²K	Glazing Transmittance Details	
External Walls	0.21	Glazing Light Transmittance	70%
Roof	0.20	Glazing g-Value - General	40%
Ground Floor	0.15		
Glazing - (Centrepane)	1.4		
Whole Façade- Average Glazing and Frame	1.6		
Air Permeability m³/hr.m²	3		

Heating System

Heating - 100% ASHP			
Fuel (ASHP) (67%)	Grid Supplied Electricity	Air Source Heat Pump SEER	400%
Heating Water Pumps	NA	Distribution System Efficiency	NA

Hot Water System

Domestic hot Water - 100% NG Boiler			
Fuel	Natural Gas	Boiler Seasonal Efficiency	95%
Heating Water Pumps	Variable Speed	Distribution System Efficiency	95%

Cooling

Fuel	Grid Supplied Electricity	Air Source Heat Pump SEER	360%
Chilled Water Pumps	NA	Distribution System Efficiency	NA

HVAC System

Variable Refrigerant Flow and Mechanical Ventilation with Heat Recovery (VRF + MV):	Supply Air Fan Specific Fan Power (W/l.s)	1.5
	Extract Fan Specific Fan Power (W/l.s)	1.5
	Terminal Fan Specific Fan Power (W/l.s)	0.8
	CO ₂ Sensor	Yes
	Heat Recovery Efficiency	Plate Heat Exchanger 70%
	Demand Controlled Ventilation	Demand Control Dependent on Gas Sensors - Speed Control

Lighting

Space Type	Presence Detection Switching	Daylight Control	Lighting Power (W/m² per 400 Lux)
Food & Beverage (Restaurant)	Auto on / Auto off Local Manual Switching	Photocell Dimming	1.5

Controls

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%

Renewable Technology

System	Photovoltaic Panels (PV)
Renewable Contribution	1.9 MWh/ann
Peak PV	2.9 kW
Estimated No. of Panels	10
Estimated Area of Panels	16 m²
Area Panels to GIFA Ratio	7.5 %

2.0 BUILDING AND HVAC ASSUMPTIONS

2.6 B3.1 Leisure Rooms



HVAC System			
Variable Refrigerant Flow and Mechanical Ventilation with Heat Recovery (VRF + MV):	Supply Air Fan Specific Fan Power (W/l.s)		1.5
	Extract Fan Specific Fan Power (W/l.s)		1.5
	Terminal Fan Specific Fan Power (W/l.s)		0.8
	CO ₂ Sensor		Yes
	Heat Recovery Efficiency	Plate Heat Exchanger	70%
	Demand Controlled Ventilation	Demand Control Dependent on Gas Sensors - Speed Control	

Lighting			
Space Type	Presence Detection Switching	Daylight Control	Lighting Power (W/m ² per 150 Lux)
Food & Beverage (Restaurant)	Auto on / Auto off Local Manual Switching	Photocell Dimming	2

Controls	
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%

Renewable Technology	
System	Photovoltaic Panels (PV)
Renewable Contribution	1.2 MWh/ann
Peak PV	1.74 kW
Estimated No. of Panels	6
Estimated Area of Panels	9.6 m ²
Area Panels to GIFA Ratio	5%

Building Fabric

Element	U-Value W/m ² K	Glazing Transmittance Details	
External Walls	0.21	Glazing Light Transmittance	70%
Roof	0.20	Glazing g-Value - General	40%
Ground Floor	0.15		
Glazing - (Centrepane)	1.4		
Whole Façade- Average Glazing and Frame	1.6		
Air Permeability m ³ /hr.m ²	3		

Heating System

Heating - 100% ASHP			
Fuel (ASHP) (67%)	Grid Supplied Electricity	Air Source Heat Pump SEER	400%
Heating Water Pumps	NA	Distribution System Efficiency	NA

Hot Water System

Domestic hot Water - 100% NG Boiler			
Fuel	Natural Gas	Boiler Seasonal Efficiency	95%
Heating Water Pumps	Variable Speed	Distribution System Efficiency	95%

Cooling

Fuel	Grid Supplied Electricity	Air Source Heat Pump SEER	360%
Chilled Water Pumps	NA	Distribution System Efficiency	NA