DK Partnership

RIALTO STUDENT ACCOMODATION

ENERGY STATEMENT REPORT

STUDENT ACCOMODATION DEVELOPMENT

South Circular Road
Rialto
Dublin

ShipseyBarry

DK-J79-105
Issue : (2N)
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Document control

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Client			☐	☐	☐	☐	☐	☐
Architects	Shipsey-Barry		☑	☑	☐	☐	☐	☐
Planning consultants	Tom Philips		☐	☑	☐	☐	☐	☐
Local authority			☐	☐	☐	☐	☐	☐
Structural engineer	MMOS		☑	☐	☐	☐	☐	☐
Quantity surveyor			☐	☐	☐	☐	☐	☐

Issue 1 : Draft
Issue 2 : Planning stage information

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Contents.

Introduction 1

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 Project details.

This report is in lieu of proposed student accommodation building located in South Circular Road, Rialto Dublin and consists of 314 student rooms with 319 bed spaces and other social spaces spread over 7 floors including a basement level.

1.3 Policy and building regulation requirements.

The project is subject to the following statutory and policy energy usage and CO2 emission target requirements :

a) Dublin City Council development plan 2016-2022

b) TGD Part L 2008 or part L 2017.

1.4 Methodology.

The energy usage and carbon emissions are calculated using the NEAP software and follow the basic DKP energy reduction steps in that order :

a) Reduce energy usage

b) Provide energy efficiently

c) Produce on-site energy

Summary 2

2.1 Policy and building regulation compliance.

With the proposed building specifications / design parameters as detailed in section 5 the building **complies** to both Part L 2017 and to the Dublin City development plan which has been achieved on the basis of compliance to the Part L 2017 the latter being more onerous then the DCC policy standards.
The building is deemed a “Nearly Zero Energy Building” (NZEB) in accordance to the EU Energy performance of Buildings Directive Recast 2013/31/EU.

2.2 Calculation results.

The calculation results using the Part L / building parameters proposed are as follows ;
To achieve compliance the proposed dwelling has to exceed the “reference” dwelling calculation results.
The reference building is the same building but with pre-fixed Part L and building services parameters set out under part L 2017.

		REFERENCE	/ M2	ACHIEVED	/ M2	MP PC
Primary energy	kWh/yr	746,651	68.8	648,488	59.8	0.78
Carbon dioxide	kg/yr	142,218	13.1	124,055	11.4	0.78
Renewable energy (pe)	kWh/yr	74,665	6.9	124,567	11.5	19.2%
BER label		A3		A3		

2.3 Policy and building regulation compliance overview.

Dublin City Council requires new developments to incorporate sustainable design and construction measures.
The table below summarises the requirements and general achievement illustrated.

Policy/Regulation	Requirement	Achievements/Result/Notes
Building regulations	To achieve a primary energy usage equal or less then the Part L 2017 reference building. MPEPC=1.0 This represents an approximate 60% primary energy reduction over Part L 2008.	A MPEPC of 0.78 was achieved representing a 22% betterment on the minimum requirement or reference building.
	To achieve carbon dioxide emissions equal or less then 1.15 times the Part L 2017 reference building. MPCPC=1.15 This represents an approximate 51% carbon reduction over Part L 2008.	A MPCPC of 0.78 was achieved representing a 31% betterment on the minimum requirement or reference building.
	An overall (primary energy) contribution of renewable energy of : 20% if the MPEPC=1.0 10% if the MPEPC<=0.9	An overall contribution of (primary energy) renewable energy of 14.3% was achieved with the proposed PV panel array.
Dublin City Council	New commercial / public developments to have at least a 33% primary energy reduction over the current Part L 2008 by 2022	Achieved by means of complying to part L 2017

3.1 Building regulations requirements.

a) Current Part L : 2008 can be applied if :
- The work commences before 31-12-2018 or
- Where planning permission has been applied for before 31-12-2018 and substantial works will be completed by 31-12-2019. (substantial=all external wall erected/completed).

b) New Part L 2017 **:** Applies generally to all works commencing after 31-12-2018 or as stated above..

For the purpose of this energy statement to new part L 2017 has been applied for compliance target.

3.2 Dublin City Council policy requirements.

The DCC development plan 2016-2022 does not refer to any specific dwelling or commercial building requirements other then referring to the implementation of the forthcoming 'Climate Change Strategy for Dublin and Climate Change Action Plan for Dublin City and the National Energy Efficiency Plan (NEEAP) which sets out a policy road map to 2020 setting a higher target of 33% energy reductions in commercial building and the public sector by 2022.
For dwellings it refers to the relevance are the Irish Building Regulations.

3.3 Reduction methodology.;

For this energy statement all the energy and CO_2 data given are the project totals of the complete development.
The following 3 basic steps are used as the methodology to arrive at the NZEB development :

a) Step 1 - Reduce energy usage
b) Step 2 - Provide energy efficiently
c) Step 3 - Produce on-site energy

3.4 Reduction targets.

The following are the reference building or target values.

* Primary energy	kWh/yr	746,651	1.00	MP EPC	BER label A3
** Carbon dioxide	kg/yr	142,218	1.15	MP CPC	
*** Renewable energy (pe)	kWh/yr	74,665	10%	MP EPC <=0.9	
*** Renewable energy (pe)	kWh/yr	149.330	20%	MP EPC 1.0	

Item	Unit	Part L 2017
Primary energy	MPEPC *	1.00 - 60% reduction
Carbon emissions	MPCPC **	1.15 - 51% reduction
Renewable energy	RER (%) ***	10% / 20% contribution
External walls	U (W/m2K)	0.21
Curtain walling	U (W/m2K)	1.80
Windows/glazing	U (W/m2K)	1.60 0.5 / 0.7 solar / light transmittance,
Flat roof	U (W/m2K)	0.20
Ground floor	U (W/m2K)	0.21
Cold bridging	U (W/m2K)	(0.12)
Air tightness	M3/m2*h	3.0
Lighting energy	W/m2	(65)
Heat energy efficiency	%	(91%) (300% heat-pump)
Cooling energy efficiency	%	(450% / 360%)
Pumped circulation		(Variable speed)
HRU/MVHR	W/l/s	(1.8)
Single extract units	W/l/s	(0.3)

REDUCTION HIERARCHY.

3.5 Step 1 - Reducing energy usage.

Be lean is mainly reducing the actual heat loss of the dwelling / project by :
a. Lowering the heat loss through the exposed 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.
e. Using an ideal building mass to lower the impacts of temperature fluctuations.

Proposed :
All reductions options a,b,c,d. e. have been implemented to lower the buildings heat loss to a minimum.

- Ground floors : U<=0.110 W/m2K
- External walls : U<= 0.130 W/m2K
- Party walls : U<= 0.000 W/m2K
- Roof : U<= 0.095 W/m2K
- Window & frame : U<=1.0 W/m2/K, Solar transmittance <=0.50, Light transmittance >=0.65
- External door & frame : U<=1.0 W/m2K
- Cold bridging : U<= 0.08 W/m2K approved construction joints applied.
- Thermal mass : >= TP250 medium heavy. Concrete (solid) walls, floors,
- Ventilation 75% : Humidity controlled natural ventilation with humidity (demand) controlled intermitted extract ventilation SPF of <= 0.3 W/l/s.
- Ventilation 25% : MHRV, temperature recovery efficiency >=90%, SPF <= 1.2 W/l/s.
- Air tightness : <= 3.0 m3/m2*h
- Low energy lighting. 100% LED + partial occupational controls.

3.6 Step 2 – Provide energy efficiently.

This means producing or delivering the required energy for the dwelling / project as efficient as possible by using :
a. City district heating networks
b. City district CHP heating net works.
c. On site communal heating with CHP
d. On site communal heating with heat pumps.
d. On site communal heating with condensing boilers.
e. Individual condensing gas boilers
f. Individual heat pumps
There are also other possible sources like 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.
Geothermal heat or waste heat from any other sources are not present or viable.
The project, as it is relatively dense, would be suited to a communal heating system fed by mains gas condensing boilers.
Proposed :
- Communal heating 80% main gas condensing boilers Seasonal efficiency >=93.0%
- Communal heating 20% air source heat-pump Seasonal efficiency >=375%

3.7 Step 3 - Renewable energy.

This means producing on-site renewable energy by using ;
a. Thermal solar panels for hot water and/or space heating.
b. Photovoltaic 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

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 of this nature due to maintenance problems with the actual plant giving rise to complaints from occupants./users.
Proposed :
Proposed are 240 no 1 x 1.6m panels with a panel output of 260 Wp and a combined capacity of +/- 62 kWp.
The panels are mounted at 30 degree angle using a Southern orientation.
Total calculated electrical gain is +/- 56,000 kWh/y
The electricity generated by the PV has a significant effect on the primary energy as the primary energy factor for electricity is relevantly high at 2.19 kWh/kWh. Likewise the carbon dioxide emission is also high due to the relative high carbon factor of grid electricity at 0.437 kg/kWh.

3.8 Calculation software.

Primary energy and carbon dioxide performance calculations are executed using the National Calculation Methodology government approved None domestic Energy Assessment Procedure (NEAP).

3.9 Over heating.

Over heating can be an issue and an over heating analysis was conducted using the Hevacomb 3D analysis software which concluded that the risk to overheating was minimal in accordance to CIBSE TM37 mainly due to the relative conservative amount of glazed elements.
Overheating was to some degree addressed by applying solar absorbent glass with solar factor (g) of 0.55.
The solar absorbent glass unfortunately did effect the useful heat gains but we feel that this is a reasonable trade off against the lowering of the overheating risk of 26C for 4% of the occupied hours and 28C of only 0.9% of the occupied hours and well with the CIBSE TM37 parameters.

3.10 Calculation results.

The table below show the calculation results from the building using the proposed Part L and building service parameters.
We note the renewable energy achievement to be in excess of the originally targeted amount however this is necessary to achieve the primary energy reduction.

		REFERENCE	/ M2	ACHIEVED	/ M2	MP PC
Primary energy	kWh/yr	746,651	68.8	648,488	59.8	0.78
Carbon dioxide	kg/yr	142,218	13.1	124,055	11.4	0.78
Renewable energy (pe)	kWh/yr	74,665	6.9	124,567	11.5	19.2%

3.11 Part L compliance conclusion.

From the calculation result we note the following :

The achieved MPEPC (primary energy) of 0.78 is in excess of the minimum Part L 2017 requirement of 1.00
The achieved MPCPC (carbon dioxide) of 0.78 is in excess of the minimum Part L 2017 requirement of 1.15
The achieved renewable energy contribution of 19.2% is in access of the Part L 2017 minimum requirement of 10%
All the building and building services minimum parameters have been complied with.

We conclude therefore that the development with the proposed reduction measures and renewable energy

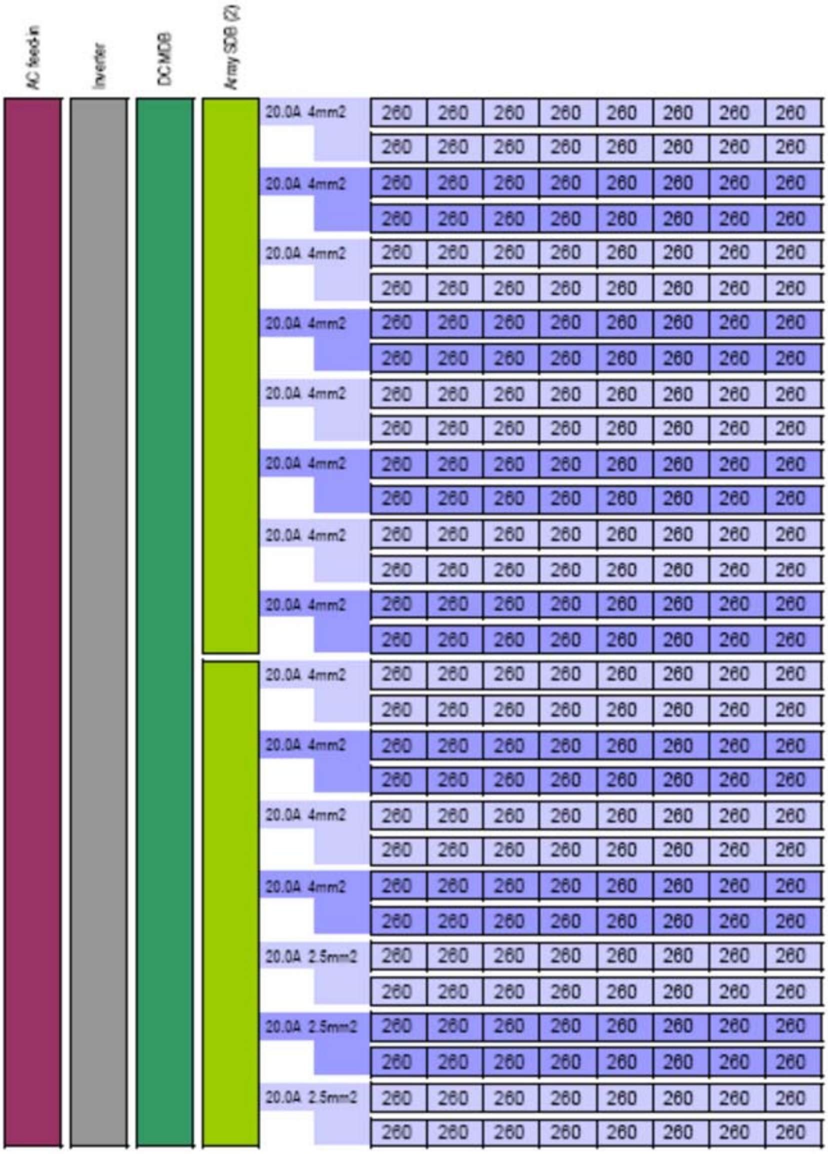
APPENDIX 1

PV PANEL ARRAY DATA

DC sub-boards	arrays no	panels no	load kw	current A	fuse A	cable mm2	cable type
PV DC SDB 1	8 x	128	33.3	138.7	160	70	xlp
PV DC SDB 2	7 x	112	29.1	121.3	125	50	xlp

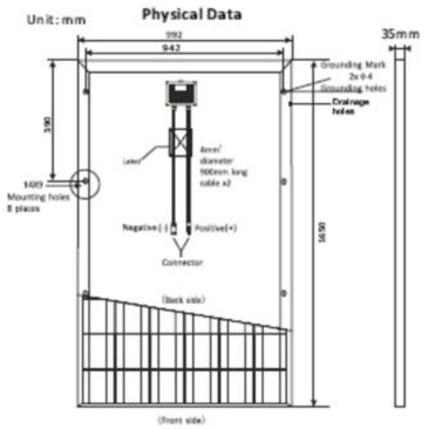
DC boards	SDBs no	panels no	load kw	current A	fuse A	cable mm2	cable type
PV DC MDB 1	2	240	62.4	260.0	315	150	xlp

Panel peak output	260 W	Location	Dublin	Annual gain	52,509 kWh/yr	Grid re-sell value (€/yr)	4,620.76
System capacity	62.4 kW	Irradiation	841 kWh/yr	Carbon factor	0.437 kg/kWh	On site use value (€/yr)	11,866.95
Panel Weight	6,000 kg	Orientation	South	Carbon off-set	22,946 kg/yr		
Panel WxH	1.6x1 m	Panel angle	15 °	Panel area	384 m2		

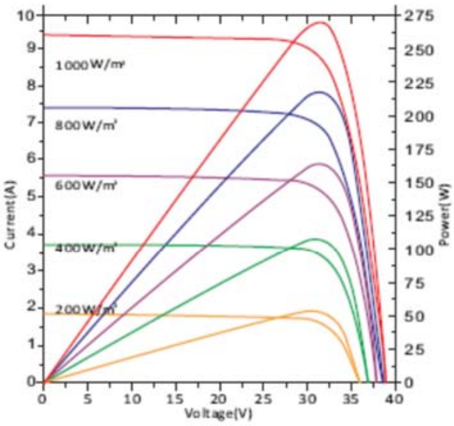


APPENDIX 2

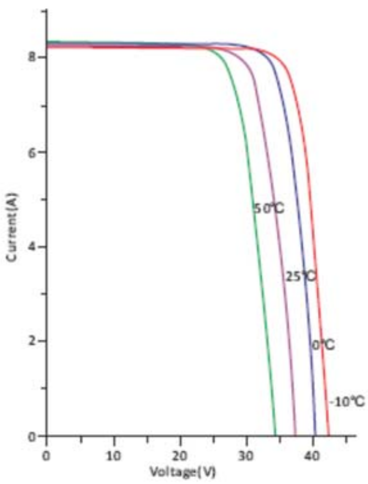
RISEN 260 POLY BLACK PV DATA



RSM60-6-270P
Electrical characteristics at different irradiations (25℃)



I-V characteristics at different cell temperatures (AM1.5, 1000W/m²)



Electrical Characteristics at STC

Type		RSM60-6-250P	RSM60-6-255P	RSM60-6-260P	RSM60-6-265P	RSM60-6-270P
Maximum Power	Pmax(W)	250W	255W	260W	265W	270W
Tolerance Value for Power	%	0~+3%	0~+3%	0~+3%	0~+3%	0~+3%
Maximum Power Voltage	Vmpp(V)	30.30	30.40	30.60	30.70	30.80
Maximum Power Current	Impp(A)	8.26	8.39	8.50	8.63	8.77
Open Circuit Voltage	Voc(V)	37.50	37.70	37.90	38.20	38.40
Short Circuit Current	Isc(A)	8.90	9.05	9.12	9.14	9.26
Module Efficiency	η	>15.27%	>15.58%	>15.88%	>16.19%	>16.50%

Performance at STC: Irradiance of 1000W/m², Module temperature 77±3.6°F (25±2℃) AM 1.5

Electrical Characteristics at NOCT

Type		RSM60-6-250P	RSM60-6-255P	RSM60-6-260P	RSM60-6-265P	RSM60-6-270P
Maximum Power	Pmax(W)	183.20	187.40	189.28	192.92	196.56
Maximum Power Voltage	Vmpp(V)	27.50	27.60	27.80	27.90	28.00
Maximum Power Current	Impp(A)	6.66	6.79	6.81	6.91	7.02
Open Circuit Voltage	Voc(V)	34.30	34.40	34.50	34.60	34.70
Short Circuit Current	Isc(A)	7.11	7.23	7.32	7.44	7.55

Performance at NOCT: Irradiance 800W/m², Ambient temperature 20℃, Wind speed 1m/S

Temperature Coefficients(Tc)

NOCT(Nominal Operating Cell temperature)	45±2℃
Temperature Coefficient of VOC(β)	-0.33%/℃
Temperature Coefficient of ISC(α)	+0.033%/℃
Temperature Coefficient of Pmax	-0.39%/℃

Permissible Operating Conditions

Maximum System Voltage	1000 V
Operating Temperature Range	-40℃~+85℃
Maximum Surface Load Capacity	Test up to 5400Pa according to IEC61215 (Advanced test)
Resistance Against Hail	Maximum diameter of 1in.(25mm) impact speed of 51.5mph(23m/s)

Mechanical specifications

Cells	Polycrystalline cell, 6"(6x10), 3BB/4BB
Junction Box	IP67,combined with 3 by-pass diodes
Front Glass Thickness	3.2mm
Connecting Cable/Connector	MC4 compatible connector/4mm² diameter, 900mm length
Frame Dimension	1650x992x35mm
Weight	20KG

Packing Features

Frame Height	35mm
Qty/Pallet (PCS)	29
Qty/40HC container (PCS)	812

HIGH EFFICIENT MAINS GAS BOILER DATA

ENGINEERING EFFICIENCY SINCE 1935

remeha

QUINTA ACE 160

TECHNICAL SPECIFICATION SHEET

August 2017

This is a quick reference specification sheet, full details can can be found in the Quinta Ace installation/service guide via **remeha.co.uk/documents.**

OVERVIEW	
MODEL: Quinta Ace 160	GC No. N/A
Rated Output kW (80/60°C)	31.5-152.1
Rated Output kW (50/30°C)	34.6-161.6
Weight (dry) kgs	147
Overall Dim WxHxD mm	600x1045x602
No of sections:	One piece casting
SBEM Seasonal Efficien. %: GCV(1)	95.9
Efficiency -Full Load 100%: NCV(4)	97.5
Efficiency -Part Load 30%: NCV(5)	108.5
Stand-by Heat Loss kW:	0.191

BURNER TYPE PRE MIX	
Std Fuel Available	Naural Gas
Fuel Consumption M³/h	16.5 NG max
Fuel Consumption M³/h	6.3 LPG max
Flame Protection	Ionisation
Ignition	Electrinic
Noise level dB(A) at 1 metre	59.5
Optional Fuel	LPG
LGP adjustment (*)	N.A
Gas Connection size BSP	1" (M)
Min/Max Gas pressure mbar	17 - 25 NG
Min/Max Gas pressure mbar	37 - 50 LPG
NOx (dry, 0% O_2) EN483 EN 15420	36 (*)

FLUE/AIR INLET	
Flue diameter mm I/D	100
Air inlet diameter mm I/D	150
Mass flue gas flow rate kg/hr	277 (max)
Flue gas temperature °C	30 - 66
Maximum counter pressure PA	200

STANDARD - On/Off, 0-10v dc, Open Therm High limit protection Low water protection Volt free common alarm and boiler run indication Manual o/ride Modulating (18 - 100%, avg.) Hot water priority facility (3 way valve or pump) Two Safety interlocks Hours run indication	OPTIONAL - Optimising / Compensator Cascade kits Low loss headers Outside sensor Hot water priority kits Relay kits for single and multiple controls Multiple boiler pipework kits For simple weather compensation Pump or valve kits

ERP DATA - ECO DESIGN	
Useful Efficiency -Full Load (GCV)% (2)	87.8
Useful Efficiency -Part Load (GCV)% (2)	97.8
Sound Power Levels L_{wa} Indoors dB	68

HYDRAULICS	
Water contents ltrs	17.0
Resistance @ 11°C mbar	N/A
Resistance @ 20°C mbar	170
Nom Flow Rate @ 11°C l/s	N/A
Nom Flow Rate @ 20°C l/s	1.82
Min Flow Rate m3/hr	0.4
Condensate Connection	32mm
Connection Size " BSP	1 1/4" (M)
Std Operating Temp °C	20 - 90 (**)
Max Operating Temp °C	90 (*)
High Limit Set Point °C	110 (*)
Max operating pressure bar	4
Min operating pressure bar	0.8

ELECTRICAL	
Power Supply	230v - 1 ph - 50 hz
PCU Amps	1.6
Power Consumption W	47 - 275
Modulating input V dc	0 - 10
Fuse Rating amps	6.3
Controls Voltage	24 (max 4va)
Insulation Class IP	IPX1B

(1) In accordance with the Non Domestic Building Services Compliance Guide 2013 Edition-For use in England
(2) In accordance with EU 813 & 814 / 2013 EcoDesign Regulations
(3) @ 80/60 °C Nett (EN 92/42)
(4) @ 30 °C nett (92/42)
(*) See installation and service manual
(**) Open vented option maximum operating temperature 75° C high limit 95° C
(***) For conventional or room sealed operation