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Purpose Planning

Version P.01.03

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ENERGY STATEMENT

655nr DWELLING DEVELOPMENT
BOHERBOY
SAGGART
Co. Dublin

Architect Davey Smith Architects
McCrossan O'Rourke Manning Architects

Services Engineers BBSC Consulting Engineers

Planning Consultant Armstrong Fenton Associates

On Behalf of Kelland Homes Ltd.
Durkin Estates Ltd

Revision	Date of Issue	Reason For Issue	By	Chk'd
P.01.00	мр а !w нлнн	ISSUED FOR PLANNING	BON	BON

PROPOSED DEVELOPMENT

Kelland Homes Ltd and Durkan Estates Ireland Ltd are applying to An Bord Pleanála for permission for a strategic housing development at a site at Boherboy, Saggart, County Dublin. To the immediate north of the site is the Carrigmore residential estate, to the west are agricultural lands and a single dwelling, to the east is the Corbally residential estate while to the south is the Boherboy Road. The proposed application represents the development of the entire Boherboy Neighbourhood as identified in the Fortunestown Local Area Plan (2012).

The development will consist of 655 no. dwellings, comprised of 257 no. 2, 3 & 4 bed, 2 & 3 storey detached, semi-detached & terraced houses, 152 no. 1, 2 & 3 bed duplex units in 17 no. 2-3, 3-4 & 4 storey blocks, and 246 no. 1, 2 & 3 bed apartments in 9 no. buildings ranging in height from 2, 2-5, 4-5 & 5 storeys, and a 2 storey crèche (693m²).

Access to the development will by via one no. vehicular access point from the Boherboy Road, along with proposed upgrade works to Boherboy Road to include the provision of a roadside footpath along the front of the site at the Boherboy Road, continuing eastwards to the junction with the N81 Blessington Road (for an overall distance of c.370m). The proposed development also provides for pedestrian and cyclist connectivity to the adjoining Carrigmore Park to the north-east, and vehicular, pedestrian and cyclist connections to adjoining developments at Corbally Heath to the east and Carrigmore Green to the north.

The proposed development provides for (i) all associated site development works above and below ground, including surface water attenuation & an underground foul sewerage pumping station at the northern end of the site, (ii) public open spaces (c. 3Ha), including alongside the Corbally Stream, which will accommodate the provision of pedestrian / cyclist links to Carrigmore Park to the north-east, (iii) communal open spaces (c. 6062m²), (iv) hard and soft landscaping and boundary treatments, (v) undercroft, basement & surface car parking (919 no. spaces including EV parking), (vi) bicycle parking (914 no. bicycle parking spaces), (vii) bin & bicycle storage, (viii) public lighting, and (ix), plant (M&E), utility services & 5 no. ESB sub-stations, all on an overall application site area of 18.3ha. In accordance with the Fortunestown Local Area Plan (2012) an area of approx. 1.42ha within the site is reserved as a future school site.

Contents

1 PURPOSE OF REPORT

Kelland Homes Ltd. And Durkin Estates Ireland Ltd. appointed BBSC, January 2020 to study the impact on energy to the development as set out under SI 600/2001.

The development will be over one phase.

It shall comprise Apartments, landlord areas, civic amenity as per current planning requirements.

2 PRINCIPLE STANDARDS

2.1 BUILDING REGULATIONS

- Technical Guidance Documents as A through M as published and set out in Law, Department of the Environment, relevant edition relates to date of publication and date of building.
- S.I. No. 600/2001 - Planning and Development Regulations, 2001
- Domestic Energy Auditing Procedure, Version 4.2 Published by SEAI

2.2 GENERAL

The purpose of this Sustainability Report is to define the requirements for achieving Part F & L of the Building Regulations with respect to the Energy usage of the development.

Planning requirements applicable shall be to the South Dublin County Council Development Plan 2016-2022, Section 10 E2 Objective 2, E2 Objective 3, E2 Objective 7.

This report aims to satisfy the legislative planning requirements by addressing how the overall energy strategy of the proposed development has been approached in a holistic manner, striving to meet the highest standards of sustainable building design such as passive solar design, high efficiency systems and use of renewable energy technologies.

Principle energy targets and objectives shall be nZEB (Near Zero Energy Building As defined by Part L of the building regulations, current edition at time of publication). This report sets out how the building will achieve these objectives, the underpinning Part L compliance are energy demand reduction through passive measures and increased supply from renewable and efficient sources.

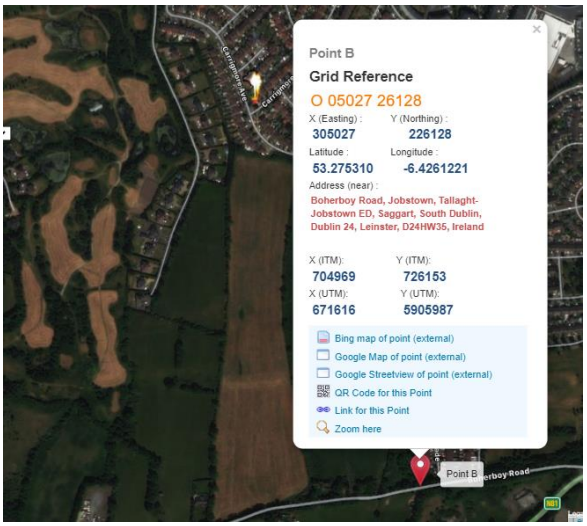
The proposed design will employ the necessary engineering solutions to follow this principle.

The proposed site development will meet or exceed where feasible the requirements of the Part L 2018 building regulations, which stipulates requirements on minimum renewable contribution, minimum fabric and air permeability requirements, maximum energy use and carbon dioxide emissions as calculated using the SEAI published DEAP (Dwellings Energy Assessment Procedure) methodology excel workbook.

Assessments carried out in this report are based on latest floor plans and elevations received from the Architect, at the time of assessment.

2.3 SITE LOCATION

The Site is located over a 1.44ha Green field site, off Boherboy Road, Johnstown, Dublin.



Grid ref: O 05027 26128
X (ITM) 704969
Y(ITM) 726153
Latitude : 53.275310
Longitude : -6.4261221
(https://irish.gridreferencefinder.com/)

2.4 SCHEDULE OF UNITS

The following tables details the units. Refer to the Schedule of space and accommodations for full details

Unit Description	Qty.
House A	10
House B	35
House B1	32
House B2	22
House C	11
House D	7
House D1	3
House E	18
House E1	1
House F	6
House F1	1
House G	15

Unit Description	Qty.
House G1	3
House J1	4
House J	13
House H1	2
House H	8
House H1	6
House H	24
House H	28
House K	2
House K	6
Total (houses)	**257**

Unit Description	Qty.
Duplex Block A	20
Duplex Block B	16
Duplex Block C	16
Duplex Block D	10
Duplex Block E	12
Duplex Block F	6
Duplex Block G	12
Duplex Block H	12
Duplex Block I	12
Duplex Block J	8
Duplex Block K1 to K4	16
Duplex Block L1 to L2	4
Duplex Block X1 to X2	8

Unit Description	Qty.
Total (Duplex)	**152**
Apartment Block A one bed	26
Apartment Block A two bed	84
Apartment Block B one bed	6
Apartment Block B two bed	14
Apartment Block B three bed	1
Apartment Block C one bed	18
Apartment Block C two bed	67
Apartment Block C three bed	6
Apartment Y1 to Y6 one bed	6
Apartment Y1 to Y7 two bed	6
Apartment Y1 to Y8 one bed	6
Apartment Y1 to Y9 two bed	6

Unit Description	Qty.
Total (Apartment)	**246**

3 LEGISLATIVE/PLANNING REQUIREMENTS

3.1 FORTUNESTOWN LOCAL AREA PLAN - MAY 2012 SOUTH DUBLIN DEVELOPMENT PLAN

The following policies of Local County Council shall be applied

5.5.7 Energy Efficiency It is an objective of the Local Area Plan to:

Promote energy efficiency and conservation above the Building Regulations standards in the design and development of all new buildings and in residential schemes in particular and require designers to demonstrate that they have taken maximising energy efficiency and the use of renewable energy into account in their planning applications. (Objective BF5)

7.2.11 Renewable Energy and Storm Water Management Managing the demand for energy in a sustainable manner through using energy more efficiently…All buildings, including residential, commercial and community, should be designed to take account of local climate considerations and incorporate renewable energy options and energy saving measures

3.2 SOUTH DUBLIN DEVELOPMENT PLAN 2019-2022

The following policies of Local County Council shall be applied

Section / Policy	Commentary pertaining to proposed development
ENERGY (E) Policy 4 Energy Performance in New Buildings	
E4 Objective 1: To ensure that medium to large scale residential and commercial developments are designed to take account of the impacts of climate change, including the installation of rainwater harvesting systems, and that energy efficiency and renewable energy measures are incorporated in accordance with national building regulations, policy and guidelines.	All dwellings shall be nZEB, A2 or better as per Part L as published after the development plan
E4 Objective 2: To support the passive house standard or equivalent for all new build in the County.	All dwellings shall be nZEB, A2 or better as per Part L as published after the development plan
E7 Objective 1: To encourage and support the development of solar energy infrastructure for on-site energy use, including solar PV, solar thermal and seasonal storage technologies.	Solar PV panels are to be incorporated in the scheme.
E7 Objective 2: To encourage and support the development of solar energy infrastructure for local distribution, including solar PV, solar thermal and seasonal storage technologies	Using DEAP the apartments and houses are required to use PV panels to generate electrical energy and the sample energy savings per year is addressed herein per sampled units.
ENERGY (E) Policy 11 Service Providers and Energy Facilities	This is addressed in the Utility Report forming part of this submission. All existing overhead cables are to be rerouted underground, working with EirGrid the design shall be developed to address this objective.
CAR PARKING FOR ELECTRIC VEHICLES	
TM7 Objective 4:	

Section / Policy	Commentary pertaining to proposed development
To make provisions for the use of electric vehicles through a significant increase in the provision of clearly and exclusively designated electric car charging points on public and private land in partnership with ESB and other relevant stakeholders and land owners	1 in 10 of car parking spaces shall be provided with car chargers, 2.4 to 3.7kw in size 1 in 30 spaces, subject to analysis by ESB Networks, Tesla will be provided with or provision for future fast charging. These chargers are commercial in nature and exceed ESB guidelines for domestic levels of connection Ducting will be provided for all site car parking in accordance with Part L 2021 section 1.4.6.
11.4.3 CAR PARKING FOR ELECTRIC VEHICLES The Electric Transport Programme (2008) contains a target for 10% of the national road transport fleet to be electrically powered by 2020. To facilitate the use of electrically operated cars and bicycles in line with National Policy, all developments shall provide facilities for the charging of battery operated cars at a rate of up to 10% of the total car parking spaces. The remainder of the parking spaces should be constructed to be capable of accommodating future charging points, as required. The Planning Authority will also consult with ESB Networks to continue the roll-out of Rapid Charge points throughout the County. Particular emphasis will be placed on the provision of such spaces within centres of commercial activity, as outlined by Movement Framework Plans, Area Access Plans and other strategic planning documents.	
11.7.2 ENERGY PERFORMANCE IN NEW BUILDINGS	
The construction of new residential and non-residential buildings should comply with the requirements of the current Building Regulations Part L – Conservation of Fuel and Energy (2008 and 2011), and any other supplementary or superseding guidance documents	Technical Guidance Document L- Conservation of Fuel and Energy – Dwellings (2021) to be applied SEAI DEAP current edition to be applied for BER
Development proposals for new residential and non-residential buildings should have regard to the DECLG 'Towards nearly Zero Energy Buildings in Ireland - Planning for 2020 and Beyond', which promotes the increase of near Zero Energy Buildings (nZEB).	Technical Guidance Document L- Conservation of Fuel and Energy – Dwellings (2021) to be applied which requires nZEB
Residential developments should also have regard to Criteria 5 and 9 of the DEHLG Urban Design – A Best Practice Guide (2009) which relate to efficiency and adaptability.	These standards have been addressed in the Technical Guidance Document L- Conservation of Fuel and Energy – Dwellings (2021)
The use of green building methods such as BREEAM (Building Research Establishment Environmental Assessment Methodology) and LEED (Leadership in Energy Efficiency and Design) ensure a whole-life cycle approach to building design including operational carbon and embodied carbon. This holistic approach results in low energy demand buildings with a significantly reduced carbon footprint and a higher commercial value	These standards have been addressed in the Technical Guidance Document L- Conservation of Fuel and Energy – Dwellings (2021)
E7 Objective 1: To encourage and support the development of solar energy infrastructure for on-site energy use, including solar PV, solar thermal and seasonal storage technologies.	
11.7.5 SOLAR ENERGY	

Section / Policy	Commentary pertaining to proposed development
Development proposals for solar energy development must: Prioritise south facing aspects and have an inclination of between approximately 35 and 50 degrees, depending on the use of solar PV or solar thermal technologies,	Using DEAP the apartments and houses are required to use PV panels to generate electrical energy and the sample energy savings per year is addressed herein per sampled units.
Be designed to take account of over-shadowing from other solar installations on site and from existing elements of the built environment such as chimneys, parapet, roof plant equipment, taller buildings and structures in the immediate vicinity,	

4 PART F

4.1 PRINCIPLE STANDARD

- Technical Guidance Document F - Ventilation (2009)
- Leakage classification of Class 2 or better as defined in IS EN 13141-7

4.2 COMMENT

Each Dwelling is to be sealed against un-wanted external air, infiltration.

This is to be achieved using certified building products CE and Irish Agrément certification.

As a result of sealing of the building it is intended to meet the requirements of Part F, section 1.2.3 by means of Mechanical Ventilation with Heat Recovery (MVHR). This unit shall fully comply with the requirements of Section 1.2.3., with 80% or better energy recovery.

Air shall be supplied to all habitable rooms and removed from ancillary rooms i.e. bathrooms etc.

All air shall be ducted in Class E fire rated Ductwork, with fire dampers at all fire compartment zones.

Air shall be feed from the external walls on the same level as the apartment, no ducting shall rise vertical or cross structural floors.

All ducting shall be contained in the apartment it services.

4.3 AIR PERMEABILITY OF THE DWELLING.

Air Tightness shall not exceed the limits as laid down in Part L, Section 1.5.4.2, 7 $m^3/hr/m^2$. The apartments shall be tested as per the requirements of section 1.5.4, Air permeability pressure tests.

4.4 VENTILATION CHARACTERISTICS OF THE DWELLING AND VENTILATION EQUIPMENT;

The building regulations permit a number of solutions to achieve compliance with Part F.

Currently Part F allows the following or similar systems employing these principles and Irish Agrément certificated systems.

DEAP allows for additional systems and is detailed in the SEAI DEAP manual

- Centralized Continuous Mechanical Extract Ventilation (CMEV)
- Centralized Mechanical Ventilation with Heat Recovery (MVHR)
- Natural Ventilation

DEAP

- Intermittent Fans and passive vents (Extract fans, Passive stack ventilators, Trickle vents or air bricks)
- Positive input ventilation
- Mechanical extract ventilation
- Exhaust Air Heat Pumps

Apartments will generally be heated and ventilated by means of waste air heat recovery system providing heat from the waste hot air in the apartment, this solution is recognised in the Part F

Houses will be ventilated by means of an Irish Agrément certificated Demand Controlled Mechanical Extract Systems. A demand-driven ventilation system will ventilate each dwelling comprising Humidity controlled ventilators to continuously transport the exhaust air from the bathrooms, kitchen, utility room and WC to external, creating a slightly reduced, or negative air pressure in the living spaces. Due to this low-pressure fresh air is made up to the living and sleeping areas through humidity controlled fresh air inlets. Air inlets will be acoustic and wind pressure protected and ensure draught free fresh air.

System Components:

- Air inlets to bring fresh air to habitable rooms
- Extract units to transfer moisture or odour intensive air to external via ducting and a central extract fan(s).

- Central electric constant pressure fan to extract moisture and odour intensive air from each dwelling to external.

Humidity sensors in the fresh air inlets and extract units automatically adjust air flow volume to ensure a comfortable room climate. The system automatically adjusts ventilation volume according to the humidity.

All ducts running to the unit from or too external shall be insulated to reduce cold bridging effects.

This distance between intake and discharge shall not be less than 3m in so far as is practicable.

5 COMPLIANCE (PART L AND PART F)

The principal standard to be employed, and reference model.

- Technical Guidance Document L- Conservation of Fuel and Energy – Dwellings (2021)
- Table E1.6 Example F Mid Floor Apartment Dwelling space heating-heat pump and continuous mechanical extract ventilation
- nZEB or Part L

These stipulates the requirements for

- the minimum fabric and air permeability requirements,
- maximum primary energy use and carbon dioxide (CO2) emissions
- to be calculated using the DEAP (Domestic Energy Assessment Procedure) methodology.

This is a national standard and compliance is compulsory for all new dwellings.

Three design aspects demonstrate compliance:

- The limitation of primary energy use and CO2 emissions
- Building fabric (namely thermal performance)
- The use of renewable energy sources

5.1 LIMITATION OF PRIMARY ENERGY USE AND CO2 EMISSIONS

To demonstrate that an acceptable primary energy consumption rate has been achieved, the calculated Energy Performance Coefficient (EPC) shall be no greater than the Maximum Energy Performance Coefficient (MEPC).

- As per section 0.7.1, Part L, MPEPC is 0.30.

To demonstrate that an acceptable CO2 emission rate has been achieved, the calculated Carbon Performance Coefficient (CPC) of the dwellings being assessed will be no greater than the Maximum Carbon Performance Coefficient (MPCPC).

- As per Section 0.7.2, Part L, MPCPC is 0.35.

5.2 SIZE, GEOMETRY AND EXPOSURE OF THE DWELLING

Refer to the Architects general arrangements, site plan for details of the Buildings size, geometry and exposure.

5.3 MATERIALS USED FOR CONSTRUCTION OF THE DWELLING

The building shall be built of walls, floors and roofs as detailed on the Architects drawings the proposed U-Values shall meet or exceed the requirements as set out in Part L.

Table 1	Maximum elemental U-value (W/m^2K)[1, 2]	
Column 1 Fabric Elements	**Column 2 Area-weighted Average Elemental U-value (Um)**	**Column 3 Average Elemental U-value – individual element or section of element**
Roofs Pitched roof - Insulation at ceiling - Insulation on slope Flat roof	 0.16 0.16 0.20	 0.3
Walls	0.18	0.6
Ground floors[3]	0.18	0.6
Other exposed floors	0.18	0.6
External doors, windows and rooflights	1.4[4,5]	3.0

Notes:

1. *The U-value includes the effect of unheated voids or other spaces.*
2. *For alternative method of showing compliance see paragraph 1.3.2.3.*
3. *For insulation of ground floors and exposed floors incorporating underfloor heating, see paragraph 1.3.2.2.*
4. *Windows, doors and rooflights should have a maximum U-value of 1.4 W/m^2K.*
5. *The NSAI Window Energy Performance Scheme (WEPS) provides a rating for windows combining heat loss and solar transmittance. The solar transmittance value g_{perp} measures the solar energy through the window.*

5.4 THERMAL INSULATION OF THE DIFFERENT ELEMENTS OF THE BUILDING FABRIC

The Building fabric shall be constructed form various differing materials with different thermal properties. For full data on elements used in construction shall be listed as part of the BCAR process with the total U-Values as per above table, when calculated as per Part L Appendix A and B.

5.5 EFFICIENCY, RESPONSIVENESS AND CONTROL CHARACTERISTICS OF THE HEATING SYSTEM(S)

The heating system control characteristics is defined as per the requirements of DEAP as per samples attached in the Appendix 1

5.6 SOLAR GAINS THROUGH GLAZED OPENINGS OF THE DWELLING

Solar gains are based on aspect to the sun. The results have been calculated by means of the DEAP spreadsheet.

5.7 THERMAL STORAGE (MASS) CAPACITY OF THE DWELLING

The buildings are being constructed of Concrete Materials with storage capacities as indicated in the databases used for the SEAI published in the National Calculation Methodology.

That stated the buildings insulation envelope will be on the inner side of the occupied wall thus ensuring that the buildings thermal response is lightweight in nature.

5.8 THERMAL BRIDGING

The impact of Thermal Bridging can result in a heat loss of 15%, as a result the development shall conform to the meet or exceed the Approved Construction Details. Refer to Appendix 1 for details. The details are proposed and shall be finalised during the BCAR process.

5.9 RENEWABLE AND ALTERNATIVE ENERGY GENERATION TECHNOLOGIES INCORPORATED IN THE DWELLING

Each Dwelling shall be provided with Photovoltaic panels to produce electrical energy to meet or exceed the 4 kw/hr/annum/ m² requirement. Refer to Appendix 1 for calculations of same.

Part L, section 1.2.1, allows for Heat pumps to be define the Renewable Energy requirement and the effect of heat pumps is included in the calculation procedure.

The apartments shall be heated or cooled by Heat Pumps.

These shall be verified using BER software as published by SEAI and operated by a licensed BER consultant as part of the design and during the BCAR process.

Photovoltaic cells shall be applied, however the requirement to provide green roofs will limit this or Thermal Solar Cells for water heating.

5.10 PRIMARY ENERGY USAGE.

It is envisaged to provide on a dwelling-by-dwelling basis a Electrically operated Heat Pump, Waste Air heat recovery type, it shall feed heat via radiators with pipes to the space and shall provide heat via coils to the hot water storage vessel.

Storage vessel shall be selected to be A rated or better.

Controls shall be by means of valves linked to temperature and 2 zone control valves, these shall be supplemented with each radiator being thermostatically controlled.

Radiators to be selected in accordance with SR50 calculation methodology

5.11 THE FUEL USED TO PROVIDE SPACE AND WATER HEATING, VENTILATION AND LIGHTING.

The following systems shall be provided and operated

- Space Heating
- Air to Water Heat Pump.
- Water Heating
- Air to Water heat pump with summer immersion to a calorifier
- Lighting

Shall be by means of LED Fittings, electrically operated.

5.12 WATER FIXTURES & SANITARY FITTING

The calculation methodology requires the use of water consumption figures provided from manufacturers' product details.

Before the assessment can be carried out, figures will need to be collected from manufacturers product information to determine the consumption of each terminal fitting

DEAP-Water-Efficiency-Calculator_v.0 Calculation Tool (SEAI) Typical 3-bedroom calculation indicated the maximum flowrates etc to be employed.

Using the tool, the values are determined as, 184.19 litres per unit time per person as per the calculation for the above example.

6 BUILDING SERVICES

The following details the proposed building services solutions to be applied

<table>
<tr><th>Method of Heating :</th><th>To be a HARP registered Heat Pump</th></tr>
<tr><td>Heating appliance efficiency:</td><td>Greater than 600 % subject to BER Calculations etc. based on the final selection of products to be used</td></tr>
<tr><td>Space heating and hot water supply system controls</td><td>Controls shall meet the requirements as per ‘Heating and Domestic Hot Water Systems for Dwellings- Achieving Compliance with TGD Part L 2008’ Section 8 Heat pump systems. In summary
<table>
<tr><th>Type</th><th>Heat Pump</th></tr>
<tr><td>Medium</td><td>Refrigerant Gas/ Water</td></tr>
<tr><td>Efficiency</td><td>600 % (Calculations indicate 720 %)</td></tr>
<tr><td>Radiators</td><td>High-efficiency radiators with high water volume to be utilized
Supply water temperature to the radiators should be in the range 55ºC return at 50ºC</td></tr>
<tr><td>Installation</td><td>A pressurised water distribution system with expansion vessel is to be employed
Works to be undertaken by a F-Gas Plumber so qualified to undertake the works as described.</td></tr>
<tr><td>Domestic hot water</td><td>The domestic hot water system will include a tank thermostat and a time clock to optimise the time taken to heat the water</td></tr>
<tr><td>Controls</td><td>As required by the Supplement to Part L</td></tr>
</table></td></tr>
<tr><td>Insulation of hot water storage vessels, pipes and ducts</td><td>Insulation of primary stores. Because of the higher than normal storage temperatures in primary stores shall be insulated to meet or exceed the following standards
Standards BS 1566: 2002 Copper indirect cylinders for domestic purposes. Open vented copper cylinders. Requirements and test methods
BS 7206:1990 Specification for unvented hot water storage units and packages
Heating pipework
All pipes where not in the thermal envelope shall be insulated.
BS 5422:2001 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range of –40°C to +700°C
BRE Report No 262 Thermal insulation: avoiding risks, 2002 edition
Where insulation is labelled as complying with the Heating and Domestic Hot Water Systems for dwellings-Achieving Compliance with Part L it must not exceed the following heat loss levels:
<table>
<tr><th>Pipe diameter (OD) mm</th><th>Maximum permissible heat loss (W/m)</th></tr>
<tr><td>8mm</td><td>7.06</td></tr>
<tr><td>10mm</td><td>7.23</td></tr>
<tr><td>12mm</td><td>7.35</td></tr>
<tr><td>15mm</td><td>7.89</td></tr>
<tr><td>22mm</td><td>9.12</td></tr>
<tr><td>28mm</td><td>10.07</td></tr>
<tr><td>35mm</td><td>11.08</td></tr>
<tr><td>42mm</td><td>12.19</td></tr>
<tr><td>54mm</td><td>14.12</td></tr>
</table></td></tr>
</table>

Method of Heating :	To be a HARP registered Heat Pump
Mechanical ventilation systems	Fans are to be on the SEAI register or SAP Appendix Q database, all fans other than room based non ducted type, shall be SPF of 1.5 W/l/s or better in energy usage, to table 3 of the Building Regulations Part L Heat exchangers shall be greater than 67% efficient
Space Heating and Hot Water Supply System Control	Space and water heating systems to be effectively controlled so as to ensure the efficient use of energy by limiting the provision of heat to that required to satisfy the user requirements. The design intent is to provide the following minimum level of control; • Automatic control of space heating on the basis of room temperature • Automatic control of heat input to stored hot water on the basis of stored water temperature • Separate and independent automatic time control of space heating and hot water • Shut down of boiler or other heat source when there is no demand for either space or water heating from that source It is proposed to use a control system with full time and temperature control in each occupied room
Low Flow Sanitary Ware	Water efficient showers, taps, wash hand basins and baths to be employed. The installation of flow restrictors is required. Good practice would include: • Shower – 6L/min • Bath Volumes – Can vary but 175-130 L would be usual. 150L would be a recommended design target. These figures will be confirmed when the software officially becomes available
Lighting Design	A focus on lighting design will be another new aspect of the DEAP4 software where it is expected that credit will be given for an appropriate LED lighting design in relation to the dwelling. In the case of a deprived or over-elaborated lighting design spec, there will be a penalty for the building energy rating. A full lighting design analysis using appropriate software i.e. Dialux or Relux can help create a balanced lighting design.

7 CONSTRUCTION QUALITY AND COMMISSIONING OF SERVICES

The building and its services shall be continuously monitored and adjusted on an on going basis but formally at three stages during the build.

- Stage 1 is at the end of the trial dwelling type where all methods of installation shall be adjusted to meet the required standards and best installation practices before being applied to all areas of the build.
- Stage 2 is a formal first fix walk down, snagging and reporting to Building Control Authority.
- Stage 3 is a formal second fix walk down, snagging and reporting to Building Control Authority.
- Commissioning of Services shall occur and be witnessed by the Site Engineers as per contract specifications and in accordance with CIBSE , IS10101, IS3218, IS3217, BSRIA etc. requirements.

7.1 INSULATION CONTINUITY AND AIR PERMEABILITY

Shall be monitored by the Architect and reported accordingly in accordance with the methodology outlined above.

7.2 THERMAL BRIDGING

All thermal bridging shall be kept to a minimum and to the Approved Construction Details for the relevant elements of the build.

7.3 AIR PERMEABILITY PRESSURE TESTS

All Dwellings shall be air sealed and tested as per the requirements of Part L. It should be noted that the details being employed shall so ensure that the air permeability of the building is better than that noted in the Part L.

8 USER INFORMATION

At the end of the project all relevant information will be published online with a link to the information being provided to each dwelling owner.

It shall comprise of but not limited to,

- Drawings of the unit(s)
- Details of the products used in the unit(s)
- Details of operation of same
- Wiring test reports and certifications
- Fire Alarm test reports and certifications
- Emergency Lighting test reports and certifications
- Plumbing test reports and certifications
- Heat Pump test reports and certifications
- Public Health test reports and certifications for plumbing

These documents are typically entitled Operating and Maintenance (O&M) Manuals

9 SOLAR PV CELLS

Following amended calculation procedure in the DEAP software the estimated solar panels for apartments and houses has been determined based on the data as presented.

The final air tightness, plant efficiency of the final equipment as installed along with the calculation version at time of BER assessment will affect the total number of panels per dwelling.

The numbers presented herein are for the purposes of completeness only as the final BER will dedicate the final numbers to be applied, it is expected that the numbers per dwelling will not increase from the samples below.

Appendix 2 outlines a basic solar PV model as employed by SEAI, DEAP calculation method.

10 CRECHE

The Creche is to achieve a nZEB rating of A3, using commercial NEAP as published by SEAI, it is to be heated by heat pumps with Solar PV Cells on the roof, covering up to 60% of the area of the roof as is typical for buildings of this type and energy classification.

Ventilation will be subject to current guidance relating to airborne infection control at the time of BER assessment, as the national advice is in flux, the energy used will not be determined until final design is completed. At time of writing, 3 Air Changes Per hour, heat recovery ventilation unit(s) is proposed.

11 DISTRICT HEATING

District heating was not considered as the changes in the Part L and the need to provide nZEB houses has as a result of preliminary calculation resulted in appox. 2750 solar panels (PV) each producing 305W of power per hour for a total of 839KW, for 10hour day this is 8.3MW of electrical power. The final energy produced will be subject to further design development and final load calculations.

In addition it is noted that this development does not contain large energy users nor is it in one of the Councils areas of interest i.e. the Low Carbon District Heating at Tallaght, Grange Castle/Clonburris and Clondalkin.

APPENDIX 1 – DEAP 4.2 OUTPUT

Tool is available to down load from SEAI website
(https://www.seai.ie/home-energy/building-energy-rating-ber/support-for-ber-assessors/domestic-ber-resources/deap4-software/)

Please note,

The DEAP 4.2.1 Manual (2019) is applicable to new and existing dwellings for compliance checking with Part L of the Irish Building Regulations 2021.

For technical requirements, tables reference in the work book please refer to DEAP 4.2.2 Manual

For Part L compliance at planning please refer to the tool, DEAP 4.2.0 Workbook

For Part F compliance at planning, apartments are provided with Waste Air heat pumps, and houses with demand controlled ventilations systems.

List of Sample DEAP assessments

- Block A, one bed apartment, core 4, level 03 mid-floor apartment, E/W orientation
- Block B, two bed apartment, level 03 mid-floor apartment, E/W orientation
- Block C, two bed apartment, Level 02, mid-floor apartment, N orientation
- Duplex C, Plan A, two bed apartment, ground floor, End unit, E-W orientation
- Duplex C, Plan A, three bed maisonette (technical description for BER), first & second floor, End unit, E-W orientation
- House Plan B1, three bed house, N-S orientation
- House Plan H1, three bed house, N-S orientation

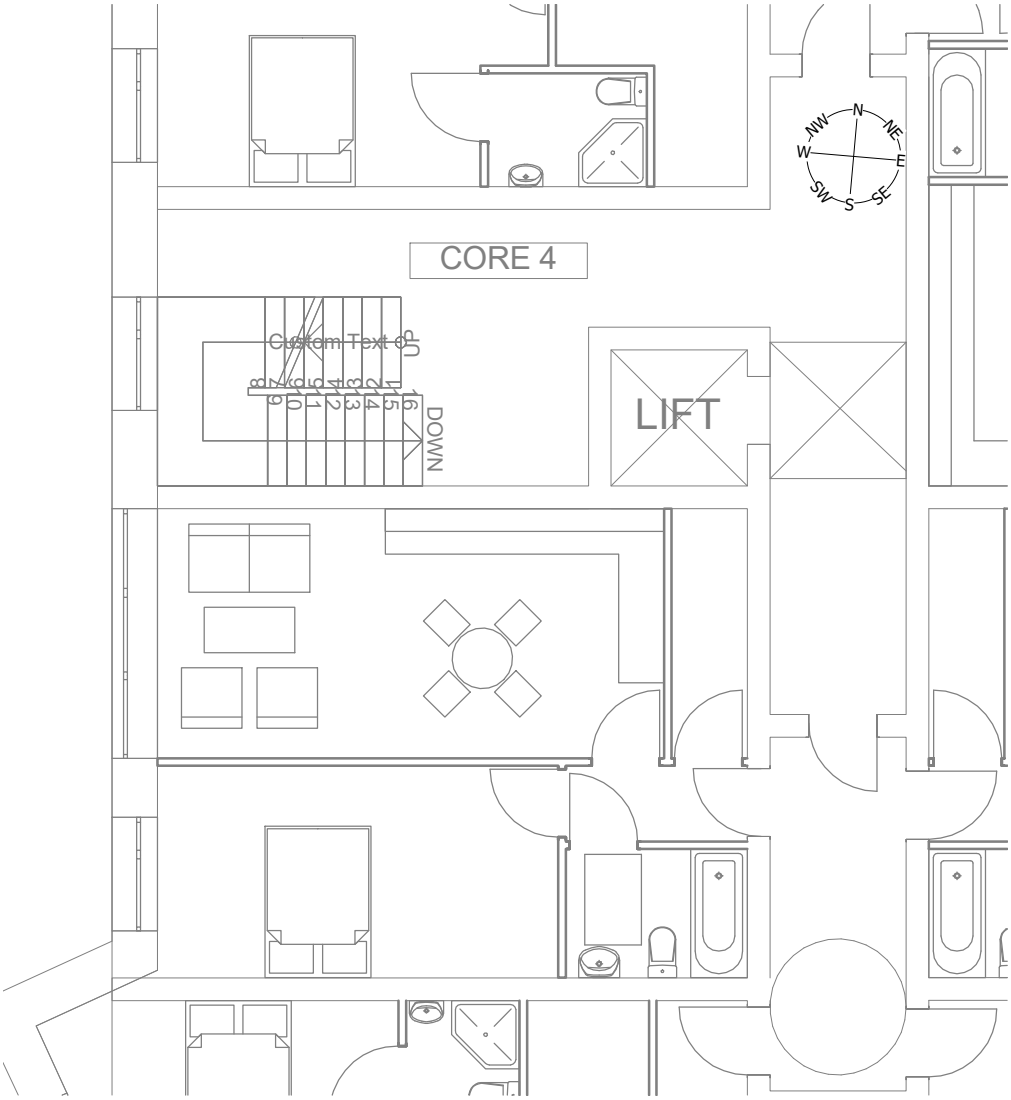
In addition to the above SR50-4: 2021 Heat pump sample calculations are provided.

Each sample is arranged as follows

First page	Drawing of unit
Second page	SR50-4:2021 output
Subsequent pages	DEAP output

SAMPLE 1

- Block A, one bed apartment, core 4, level 03 mid-floor apartment, E/W orientation
- 3nr PV South arrangement



1 BLOCK A L03 TYPCIAL ONE BED

1 : 100

BER PROVISIONAL A3 : PART L 2019

	PERFORMANCE COEFFICIENTS	MAXIMUM PERMITTED	COMPLIANCE
EPC (kWh/y)	0.293	0.300	COMPLIES
CO2 (kg/y)	0.288	0.350	COMPLIES
RENEWABLE ENERGY RATION (RER)	0.54	0.20	COMPLIES

PRINCPLE MEASURES

1. SPACE HEAT SOURCE
   - A. HEAT PUMP, WASTE AIR TYPE
2. DOM HOT WATER HEAT SOURCE
   - A. HEAT PUMP, WASTE AIR TYPE
3. VENTILATION
   - A. HEAT RECOVERY VIA WASTE AIR HEAT PUMP
   - B. DUCTED FRESH AIR AND WASTE AIR TO HEAT RECOVERY UNITS
4. RENEWABLES
   - A. 3nr PV PANELS (305W EACH)
   - B. HEAT PUMP, WASTE AIR
5. LIGHTS
   - A. ALL LED
6. WATER PUMPING
   - A. CENTRAL FROM CENTRAL TANK MAINS

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BOHERBOY
BOHERBOY DEVELOPMENT
2020_0205 BER-BLOCK A- ONE BED APARTMENT

Scale 1 : 100

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SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

Project	2020_0205-BBSC-CALC-APARTMENT-BLOCK A-L03-1BED SAMPLE BOHERBOY	By	Barry O'Neill CEng 05Jul2021

U-Value Inputs

Element	w/mK	
Wall1	0.18	Part L: 2019
Wall2	0.18	Part L: 2019
Wall3	0.18	Part L: 2019
Party Wall	0.9	
Floor	0.18	Part L: 2019
Roof	0.16	Part L: 2019 table 5
Door	1.4	Part L: 2019
Window1	1.4	Part L: 2019
Roof Light	1.4	Part L: 2019

Heat Losses Based on SEAI calculation Spreadsheet

Room	**Heat Loss Watts**	**Area m²**	**Volume m³**	
Hall				
A-1-L02-HALL	41	2.40	5.76	
A-1-L02-BEDROOM 1	261	14.98	39.70	
A-1-L02-KITCHEN-DINING ROOM	1162	25.74	68.21	63.19381
A-1-L02-BATHROOM	198	4.41	11.47	
Totals	**1,662**	47.53	125.13	
Plus margin **10%**	**2.00**	KW		

SR50:4 2021 HEAT PUMP SIZING METHOD

E4.2 Hot Water Storage (accumulation method.)

Vdp60 allowance	25	**l/person**
nr of Persons	2	**persons**
Total	100	**litres**

E4.3 Tank Sizing **SR50-4:2021 Appendix E**

set temperature of the	55	°C
temperature of the co	10	°C
Volume	111	litres
Energy Stored	**5.8**	**kWh**

E4.4 Heat Pump Capacity

Hours Recovery	2	hrs
thermal capacity of the heat pump	2.9	kw

On at 3am off 5am

Design Capacity	**Table E.16**	
Space Heating	2.0	kW
DHW	2.9	kW
Design Capacity	**2.9**	kW

Note Max External Noise 45 dB(A)
ISEN 15450:2007 Table F.1

DEAP Report

DEAP Workbook: Aligned to DEAP software version 3.2 plus inclusion of Part L 2019 requirements, incorporating NZEB
Inputs and results, with selected intermediate results shown in *italics*
Details not applicable for this dwelling are grayed out.
Print out 'Proj' worksheet separately if required.

Dwelling dimensions **TGD L version** 2019

	Area [m^2]	Height [m]
Ground floor	0	0.0
First floor	48	2.7
Second floor	0	0.0
Third and other floors	0	0.0
Total floor area [m^2]	48	
Dwelling volume [m^3]	126	
Living area [m^2]	25.7	

Ventilation

Number of chimneys	0	
Number of open flues	0	
Number of intermittent fans and passive vents	0	
Number of flueless gas fires	0	
Is there a draught lobby on main entrance?	Yes	
Number of storeys in the dwelling	1	
Has an air permeability test been carried out?	No	0

If no :

Structure type	Masonry
Is there a suspended wooden ground floor?	None
Percentage of windows and doors draughtstripped [%]	100

If yes Not applicable

End if

Number of sides sheltered	2	
Ventilation method	Exhaust Air Heat Pump	7
Effective air change rate [ac/h]	0.74	
Ventilation heat loss [W/K]	31	

Permeability test carried out and meets guidelines in TGD L? Does Not Comply

For mechanical ventilation, other than positive input ventilation from loft: :

Is measured "PCDB" data available?	NA
Manufacturer and model	-
Specific fan power [W/(l/s)]	-
Heat exchanger efficiency [%]	-

Windows

Orientation	East/West	East/West	North	SE/SW	South	North	North	North	Horizontal
Orientation ID	3	3	1	4	5	1	1	1	6
Area [m^2]	3.4	7.4	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?	-	-	-	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	0.8	-	-	-	-	-	-
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	1	1	0	0	0	0	0	0	0
Frame factor (Table 6c) [-]	0.80	0.80	0.70	0.00	0.00	0.00	0.00	0.00	0.00
Window type ID	2	2	7	0	0	0	0	0	0

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	10.8	1.3	14.3	-	
Doors	2.1	1.6	3.4	-	
Floor	0.0	0.0	0.0	-	No underfloor heating
Floor (type 2)	0.0	0.0	0.0	-	No underfloor heating
Floor (type 3)	0.0	0.0	0.0	-	No underfloor heating
Walls	37.5	0.2	6.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 2)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 3)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 4)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 5)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Roof	0.0	0.0	0.0	-	Flat roof
Roof (type 2)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 3)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 4)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 5)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Total area of elements [m^2]	50.40				
Heat loss via plane elements [W/K]			24		
Factor for thermal bridging [W/m^2 K]			0.08		
Fabric heat loss [W/K]			28		
Dwelling heat loss coefficient [W/K]			59		
Heat loss parameter, HLP [W/K m^2]			1.23		

Water heating

Are there distribution losses?	Yes
Distribution loss [kWh/y]	195

Are there storage losses? Yes 1

If yes :

Water storage volume [litres]	180
Is manufacturer's declared loss factor available?	Yes 1

If yes :

Manufacturer and model name	Nibe F730
Manufacturer's declared loss factor [kWh/day]	1.2

If no Not applicable

End if

Temperature factor unadjusted (Table 2)	0.89
Temperature factor multiplier (from Table 2 notes)	0.9

End if

Is there a solar water heating system? No 0

If yes Not applicable

Solar fraction [%] 0

End if

Primary circuit loss [kWh/y] (Table 3)	360
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]	1904
Output from supplementary heater [kWh/y]	0
Heat gains from water heating system [W]	72
Is hot water storage indoors or in group heating scheme?	No

Lighting

Annual energy used for lighting, EL [kWh/y] 127

Internal gains

Net internal gains [W] 266

Heat use

Living area fraction [-]	0.54
Thermal mass category of dwelling	Medium
Heat use [kWh/y]	1180

Space heating

Control and responsiveness

Temperature adjustment (Table 4e), where appropriate [C]	0
Heating system control category (Table 4e)	2
Heating system responsiveness category (Table 4a or 4d)	1

Pumps/fans

	Enter number present	If present, is boiler controlled by room thermostat?	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	-	-
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

Type of main heating system Individual system 1

Energy requirements - individual heating systems :

Space Heating

Efficiency of main heating system [%] (including Efficiency Adjustment Factor)	240.0
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) 152.381

Fuel data

	Fuel
Space heating - main	electricity
Space heating - secondary	-
Water heating - main	electricity
Water heating - supplementary	-
Photovoltaic/ Wind Turbine	758 kWh/y
Solar Thermal	0 kWh/y

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type 1	Description: Heat Pumps			

	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 2	Description PV			
	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 3	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

Energy requirements - group/community heating scheme Not applicable

Results

	Delivered energy	Primary energy	CO_2 emissions
	[kWh/y]	[kWh/y]	[kg/y]
Space heating - main	502	1,043	205
Space heating - secondary	0	0	0
Water heating - main	1,250	2,599	511
Water heating - supplementary	0	0	0
Pumps, fans	89	186	37
Energy for lighting	127	265	52
Renewable and energy-saving technologies			
CHP input (individual heating systems only)	0	0	0
CHP electrical output (individual heating syst	0	0	0
Photovoltaic/ Wind Turbine	-758	-1,577	-310
Type 1 Heat Pumps	0	0	0
Type 2 PV	0	0	0
Type 3 -	0	0	0
Total	1,210	2,517	495
per m^2 floor area	25.5	53.0	10.4

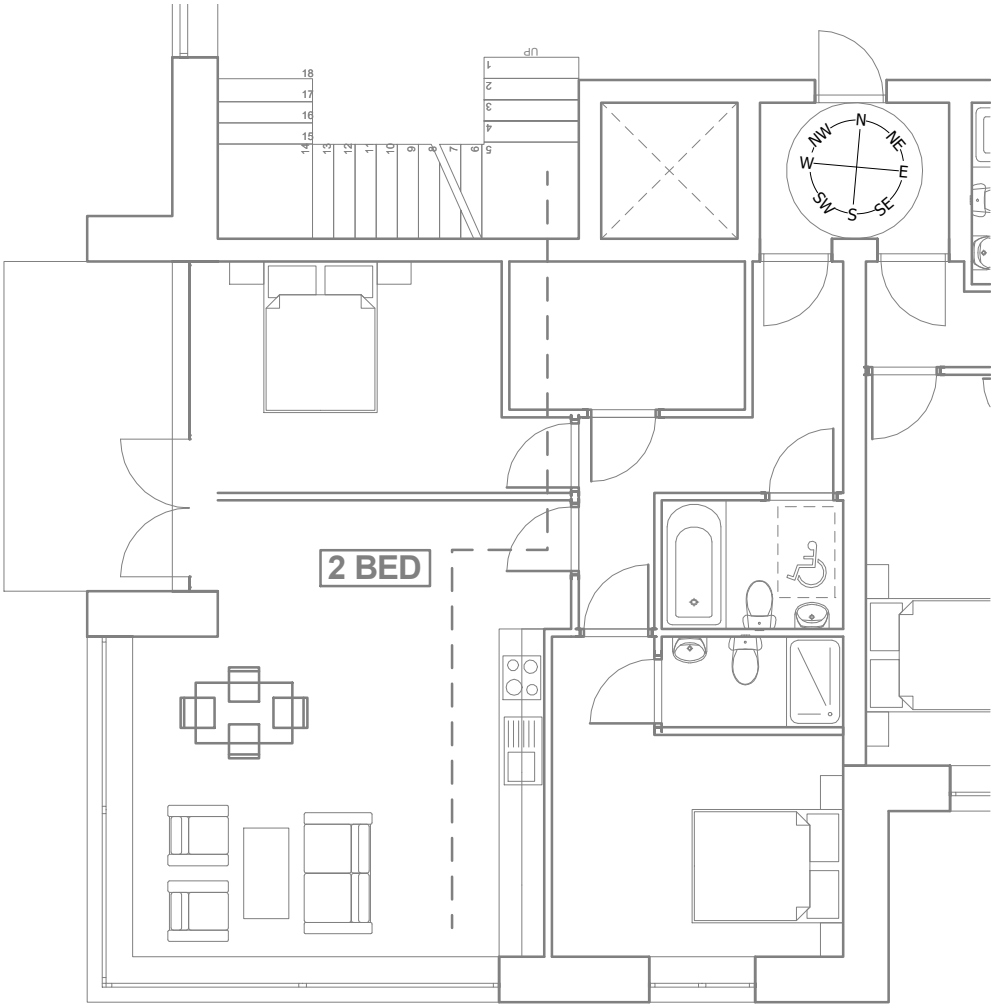
Building Energy Rating [kWh/m^2 y] 53 A3

Check conformity with MPEPC and MPCPC requirements in TGD L ***2019***

		Max permitted	
EPC	0.293	0.30	Complies
CPC	0.288	0.35	Complies
RER	0.538	0.20	Complies

SAMPLE 2

- Block B, two bed apartment, level 03 mid-floor apartment, E/W orientation
- 3nr PV South arrangement



1 BLOCK B L03 TYPICAL TWO BED

1 : 100

BER PROVISIONAL A3 : PART L 2019

	PERFORMANCE COEFFICIENTS	MAXIMUM PERMITTED	COMPLIANCE
EPC (kWh/y)	0.293	0.3	COMPLIES
CO2 (kg/y)	0.288	0.350	COMPLIES
RENEWABLE ENERGY RATION (RER)	0.49	0.20	COMPLIES

PRINCPLE MEASURES

1. SPACE HEAT SOURCE
   A. HEAT PUMP, WASTE AIR TYPE
2. DOM HOT WATER HEAT SOURCE
   A. HEAT PUMP, WASTE AIR TYPE
3. VENTILATION
   A. HEAT RECOVERY VIA WASTE AIR HEAT PUMP
   B. DUCTED FRESH AIR AND WASTE AIR TO HEAT RECOVERY UNITS
4. RENEWABLES
   A. 3nr PV PANELS (305W EACH)
   B. HEAT PUMP, WASTE AIR
5. LIGHTS
   A. ALL LED
6. WATER PUMPING
   A. CENTRAL FROM CENTRAL TANK

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BOHERBOY
BOHERBOY DEVELOPMENT
2020_0205 BER-BLOCK B- TWO BED APARTMENT

Scale 1 : 100

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SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

Project	2020_0205-BBSC-CALC-APARTMENT-L03-BLOCK B 2BED SAMPLE BOHERBOY	By	Barry O'Neill Ceng 09Jun2021

U-Value Inputs

Element	w/mK	
Wall1	0.18	Part L: 2019
Wall2	0.18	Part L: 2019
Wall3	0.18	Part L: 2019
Party Wall	0.9	
Floor	0.18	Part L: 2019
Roof	0.16	Part L: 2019 table 5
Door	1.4	Part L: 2019
Window1	1.4	Part L: 2019
Roof Light	1.4	Part L: 2019

Heat Losses Based on SEAI calculation Spreadsheet

Room	**Heat Loss Watts**	**Area m²**	**Volume m³**	
B-01-L02-HALL	89	7.78	18.67	
B-01-L02-BEDROOM 2	649	12.41	32.89	
B-01-L02-KITCHEN-DINING ROOM	2083	31.45	83.34	92.72788
B-01-L02-ENSUITE 1	132	2.88	7.63	
B-01-L02-BATH	188	4.08	10.81	
B-01-L02-BEDROOM 01	300	13.08	34.66	
B-01-L02-STORE	94	6.11	14.66	
Totals	**3,535**	77.79	202.67	
Plus margin **10%**	**4.00**	KW		

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Storage (accumulation method.)

Vdp60 allowance	25	**l/person**
nr of Persons	4	**persons**
Total	200	**litres**

E4.3 Tank Sizing **SR50-4:2021 Appendix E**

set temperature of the	55	°C
temperature of the co	10	°C
Volume	222	litres
Energy Stored	**11.6**	**kWh**

E4.4 Heat Pump Capacity

Hours Recovery	2	hrs	On at 3am off 5am
thermal capacity of the heat pump	5.8	kw	

Design Capacity	**Table E.16**		
Space Heating	4.0	kW	
DHW	5.8	kW	
Design Capacity	**5.8**	kW	

Note Max External Noise 45 dB(A)
ISEN 15450:2007 Table F.1

DEAP Report

DEAP Workbook: Aligned to DEAP software version 3.2 plus inclusion of Part L 2019 requirements, incorporating NZEB
Inputs and results, with selected intermediate results shown in *italics*
Details not applicable for this dwelling are grayed out.
Print out 'Proj' worksheet separately if required.

Dwelling dimensions **TGD L version** 2019

	Area [m^2]	Height [m]
Ground floor	0	0.0
First floor	78	2.7
Second floor	0	0.0
Third and other floors	0	0.0
Total floor area [m^2]	78	
Dwelling volume [m^3]	206	
Living area [m^2]	31.5	

Ventilation

Number of chimneys	0	
Number of open flues	0	
Number of intermittent fans and passive vents	1	
Number of flueless gas fires	0	
Is there a draught lobby on main entrance?	Yes	
Number of storeys in the dwelling	1	
Has an air permeability test been carried out?	No	0

If no :

Structure type	Masonry
Is there a suspended wooden ground floor?	None
Percentage of windows and doors draughtstripped [%]	100

If yes Not applicable

End if

Number of sides sheltered	2	
Ventilation method	Exhaust Air Heat Pump	7
Effective air change rate [ac/h]	0.69	
Ventilation heat loss [W/K]	47	
Permeability test carried out and meets guidelines in TGD L?	Does Not Comply	

For mechanical ventilation, other than positive input ventilation from loft: :

Is measured "PCDB" data available?	NA
Manufacturer and model	-
Specific fan power [W/(l/s)]	-
Heat exchanger efficiency [%]	-

Windows

Orientation	East/West	South	North	SE/SW	South	North	North	North	Horizontal
Orientation ID	3	5	1	4	5	1	1	1	6
Area [m^2]	18.6	13.6	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?	-	-	-	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	-	-	-	-	-	-	-
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	1	1	0	0	0	0	0	0	0
Frame factor (Table 6c) [-]	0.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Window type ID	2	2	0	0	0	0	0	0	0

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	32.2	1.3	42.7	-	
Doors	2.1	1.6	3.4	-	
Floor	0.0	0.0	0.0	-	No underfloor heating
Floor (type 2)	0.0	0.0	0.0	-	No underfloor heating
Floor (type 3)	0.0	0.0	0.0	-	No underfloor heating
Walls	16.1	0.2	2.6	-	Wall relevant for TGD L fabric compliance check
Walls (type 2)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 3)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 4)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 5)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Roof	0.0	0.0	0.0	-	Flat roof
Roof (type 2)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 3)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 4)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 5)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Total area of elements [m^2]	50.40				
Heat loss via plane elements [W/K]			49		
Factor for thermal bridging [W/m^2 K]			0.08		
Fabric heat loss [W/K]			53		
Dwelling heat loss coefficient [W/K]			100		
Heat loss parameter, HLP [W/K m^2]			1.28		

Water heating

Are there distribution losses?	Yes
Distribution loss [kWh/y]	246

Are there storage losses? Yes 1

If yes :

Water storage volume [litres]	180	
Is manufacturer's declared loss factor available?	Yes	1
If yes :		
Manufacturer and model name	Nibe F730	
Manufacturer's declared loss factor [kWh/day]	1.2	
If no	Not applicable	
End if		
Temperature factor unadjusted (Table 2)	0.89	
Temperature factor multiplier (from Table 2 notes)	0.9	

End if

Is there a solar water heating system? No 0

If yes Not applicable

Solar fraction [%] 0

End if

Primary circuit loss [kWh/y] (Table 3)	360
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]	2281
Output from supplementary heater [kWh/y]	0
Heat gains from water heating system [W]	121
Is hot water storage indoors or in group heating scheme?	Yes

Lighting

Annual energy used for lighting, EL [kWh/y] 194

Internal gains

Net internal gains [W] 408

Heat use

Living area fraction [-]	0.40
Thermal mass category of dwelling	Medium
Heat use [kWh/y]	933

Space heating

Control and responsiveness

Temperature adjustment (Table 4e), where appropriate [C]	0
Heating system control category (Table 4e)	2
Heating system responsiveness category (Table 4a or 4d)	1

Pumps/fans

	Enter number present	If present, is boiler controlled by room thermostat?	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	-	-
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

Type of main heating system Individual system 1

Energy requirements - individual heating systems :

Space Heating

Efficiency of main heating system [%] (including Efficiency Adjustment Factor)	240.0
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) 152.381

Fuel data

	Fuel
Space heating - main	electricity
Space heating - secondary	-
Water heating - main	electricity
Water heating - supplementary	-
Photovoltaic/ Wind Turbine	758 kWh/y
Solar Thermal	0 kWh/y

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type 1	Description: Heat Pumps			

	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 2	Description PV			
	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 3	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

Energy requirements - group/community heating scheme Not applicable

Results

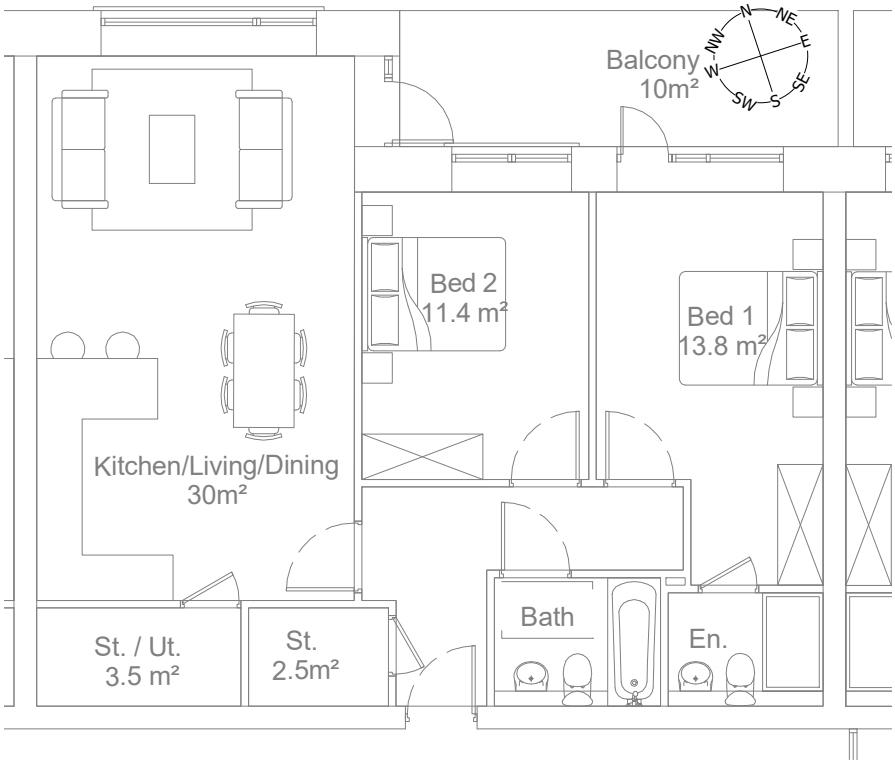
	Delivered energy	Primary energy	CO_2 emissions
	[kWh/y]	[kWh/y]	[kg/y]
Space heating - main	438	912	179
Space heating - secondary	0	0	0
Water heating - main	1,497	3,114	612
Water heating - supplementary	0	0	0
Pumps, fans	120	251	49
Energy for lighting	194	404	79
Renewable and energy-saving technologies			
CHP input (individual heating systems only)	0	0	0
CHP electrical output (individual heating syst	0	0	0
Photovoltaic/ Wind Turbine	-758	-1,577	-310
Type 1 Heat Pumps	0	0	0
Type 2 PV	0	0	0
Type 3 -	0	0	0
Total	1,492	3,104	610
per m^2 floor area	19.2	39.9	7.8
Building Energy Rating [kWh/m^2 y]		40	A2

Check conformity with MPEPC and MPCPC requirements in TGD L ***2019***

		Max permitted	
EPC	0.293	0.30	Complies
CPC	0.288	0.35	Complies
RER	0.489	0.20	Complies

SAMPLE 3

- Block C, two bed apartment, Level 02, mid-floor apartment, N orientation
- 4nr PV South arrangement



1 BLOCK C L03 TYPICAL TWO BED

1 : 100

BER PROVISIONAL A3 : PART L 2019

	PERFORMANCE COEFFICIENTS	MAXIMUM PERMITTED	COMPLIANCE
EPC (kWh/y)	0.295	0.3	COMPLIES
CO2 (kg/y)	0.291	0.350	COMPLIES
RENEWABLE ENERGY RATION (RER)	0.559	0.20	COMPLIES

PRINCPLE MEASURES

1. SPACE HEAT SOURCE
   A. HEAT PUMP, WASTE AIR TYPE
2. DOM HOT WATER HEAT SOURCE
   A. HEAT PUMP, WASTE AIR TYPE
3. VENTILATION
   A. HEAT RECOVERY VIA WASTE AIR HEAT PUMP
   B. DUCTED FRESH AIR AND WASTE AIR TO HEAT RECOVERY UNITS
4. RENEWABLES
   A. 3nr PV PANELS (305W EACH)
   B. HEAT PUMP, WASTE AIR
5. LIGHTS
   A. ALL LED
6. WATER PUMPING
   A. CENTRAL FROM CENTRAL TANK

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BOHERBOY
BOHERBOY DEVELOPMENT
2020_0205 BER-BLOCK C- TWO BED APARTMENT

Scale 1 : 100

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SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

Project	2020_0205-BBSC-CALC-APARTMENT-L03-BLOCK C 2BED SAMPLE BOHERBOY	By	Barry O'Neill CEng 05Jul2021

U-Value Inputs

Element	w/mK	
Wall1	0.18	Part L: 2019
Wall2	0.18	Part L: 2019
Wall3	0.18	Part L: 2019
Party Wall	0.9	
Floor	0.18	Part L: 2019
Roof	0.16	Part L: 2019 table 5
Door	1.4	Part L: 2019
Window1	1.4	Part L: 2019
Roof Light	1.4	Part L: 2019

Heat Losses Based on SEAI calculation Spreadsheet

Room	**Heat Loss Watts**	**Area m²**	**Volume m³**	
Hall				
C-01-L02-HALL	83	7.01	16.82	
C-01-L02-BEDROOM 2	453	11.40	30.21	
C-01-L02-KITCHEN-DINING ROOM	1511	30.00	79.50	70.50426
C-01-L02-ENSUITE 1	181	3.59	9.51	
C-01-L02-BATHROOM	198	3.96	10.49	
C-01-L02-BEDROOM 01	403	13.80	36.57	
C-01-L02-STORE	45	2.34	5.62	
C-01-L02-STORE (2)	88	3.51	8.42	
Totals	**2,962**	75.61	197.14	
Plus margin **10%**	**4.00**	KW		

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Storage (accumulation method.)

Vdp60 allowance	25	**l/person**
nr of Persons	4	**persons**
Total	200	**litres**

E4.3 Tank Sizing **SR50-4:2021 Appendix E**

set temperature of the	55	°C
temperature of the co	10	°C
Volume	222	litres
Energy Stored	**11.6**	**kWh**

E4.4 Heat Pump Capacity

Hours Recovery	2	hrs
thermal capacity of the heat pump	5.8	kw

On at 3am off 5am

Design Capacity	**Table E.16**	
Space Heating	4.0	kW
DHW	5.8	kW
Design Capacity	**5.8**	kW

Note Max External Noise 45 dB(A)
ISEN 15450:2007 Table F.1

DEAP Report

DEAP Workbook: Aligned to DEAP software version 3.2 plus inclusion of Part L 2019 requirements, incorporating NZEB
Inputs and results, with selected intermediate results shown in *italics*
Details not applicable for this dwelling are grayed out.
Print out 'Proj' worksheet separately if required.

Dwelling dimensions **TGD L version** 2019

	Area [m^2]	Height [m]
Ground floor	0	0.0
First floor	76	2.7
Second floor	0	0.0
Third and other floors	0	0.0
Total floor area [m^2]	76	
Dwelling volume [m^3]	200	
Living area [m^2]	30.0	

Ventilation

Number of chimneys	0	
Number of open flues	0	
Number of intermittent fans and passive vents	1	
Number of flueless gas fires	0	
Is there a draught lobby on main entrance?	Yes	
Number of storeys in the dwelling	1	
Has an air permeability test been carried out?	No	0

If no :

Structure type	Masonry
Is there a suspended wooden ground floor?	None
Percentage of windows and doors draughtstripped [%]	100

If yes Not applicable

End if

Number of sides sheltered	2	
Ventilation method	Exhaust Air Heat Pump	7
Effective air change rate [ac/h]	0.70	
Ventilation heat loss [W/K]	46	
Permeability test carried out and meets guidelines in TGD L?	Does Not Comply	

For mechanical ventilation, other than positive input ventilation from loft: :

Is measured "PCDB" data available?	NA
Manufacturer and model	-
Specific fan power [W/(l/s)]	-
Heat exchanger efficiency [%]	-

Windows

Orientation	North	East/West	North	SE/SW	South	North	North	North	Horizontal
Orientation ID	1	3	1	4	5	1	1	1	6
Area [m^2]	15.2	2.7	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?	-	-	0.00	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	-	-	-	-	-	-	-
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	1	1	0	0	0	0	0	0	0
Frame factor (Table 6c) [-]	0.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Window type ID	2	2	0	0	0	0	0	0	0

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	17.9	1.3	23.7	-	
Doors	0.0	1.6	0.0	-	
Floor	0.0	0.0	0.0	-	No underfloor heating
Floor (type 2)	0.0	0.0	0.0	-	No underfloor heating
Floor (type 3)	0.0	0.0	0.0	-	No underfloor heating
Walls	23.8	0.2	3.8	-	Wall relevant for TGD L fabric compliance check
Walls (type 2)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 3)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 4)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 5)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Roof	0.0	0.0	0.0	-	Flat roof
Roof (type 2)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 3)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 4)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 5)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Total area of elements [m^2]	41.70				
Heat loss via plane elements [W/K]			28		
Factor for thermal bridging [W/m^2 K]			0.08		
Fabric heat loss [W/K]			31		
Dwelling heat loss coefficient [W/K]			77		
Heat loss parameter, HLP [W/K m^2]			1.02		

Water heating

Are there distribution losses?	Yes
Distribution loss [kWh/y]	243

Are there storage losses?	Yes	1	
If yes :			
Water storage volume [litres]		180	
Is manufacturer's declared loss factor available?		Yes	1
If yes :			
Manufacturer and model name		Nibe F730	
Manufacturer's declared loss factor [kWh/day]		1.2	
If no	Not applicable		
End if			
Temperature factor unadjusted (Table 2)	0.89		
Temperature factor multiplier (from Table 2 notes)	0.9		
End if			
Is there a solar water heating system?	No	0	
If yes	Not applicable		
Solar fraction [%]		0	
End if			
Primary circuit loss [kWh/y] (Table 3)		360	
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]	2260		
Output from supplementary heater [kWh/y]	0		
Heat gains from water heating system [W]	88		
Is hot water storage indoors or in group heating scheme?	No		

Lighting

Annual energy used for lighting, EL [kWh/y]	190

Internal gains

Net internal gains [W]	369

Heat use

Living area fraction [-]	0.40	
Thermal mass category of dwelling	Medium	
Heat use [kWh/y]	1517	

Space heating

Control and responsiveness

Temperature adjustment (Table 4e), where appropriate [C]	0
Heating system control category (Table 4e)	2
Heating system responsiveness category (Table 4a or 4d)	1

Pumps/fans

	Enter number present	If present, is boiler controlled by room thermostat?	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	-	-
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	
Type of main heating system	Individual system	1

Energy requirements - individual heating systems :

Space Heating

Efficiency of main heating system [%] (including Efficiency Adjustment Factor)	240.0
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)	152.381

Fuel data	Fuel	
Space heating - main	electricity	
Space heating - secondary	-	
Water heating - main	electricity	
Water heating - supplementary	-	
Photovoltaic/ Wind Turbine	1,011	kWh/y
Solar Thermal	0	kWh/y

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type 1	Description: Heat Pumps			

	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 2	Description PV			
	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 3	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

Energy requirements - group/community heating scheme Not applicable

Results

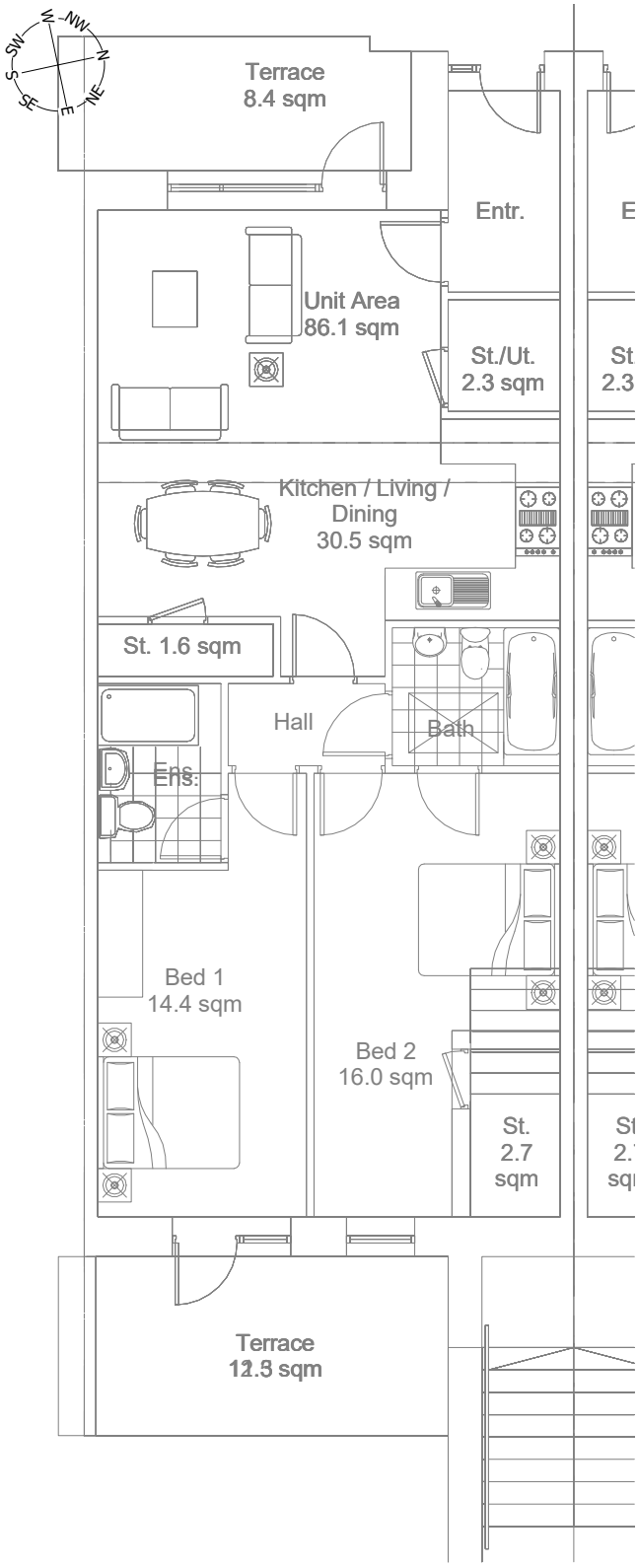
	Delivered energy	Primary energy	CO_2 emissions
	[kWh/y]	[kWh/y]	[kg/y]
Space heating - main	663	1,380	271
Space heating - secondary	0	0	0
Water heating - main	1,483	3,085	607
Water heating - supplementary	0	0	0
Pumps, fans	119	247	49
Energy for lighting	190	395	78
Renewable and energy-saving technologies			
CHP input (individual heating systems only)	0	0	0
CHP electrical output (individual heating syst	0	0	0
Photovoltaic/ Wind Turbine	-1,011	-2,103	-414
Type 1 Heat Pumps	0	0	0
Type 2 PV	0	0	0
Type 3 -	0	0	0
Total	1,444	3,004	591
per m^2 floor area	19.1	39.7	7.8
Building Energy Rating [kWh/m^2 y]		40	A2

Check conformity with MPEPC and MPCPC requirements in TGD L ***2019***

		Max permitted	
EPC	0.295	0.30	Complies
CPC	0.291	0.35	Complies
RER	0.559	0.20	Complies

SAMPLE 4

- Duplex C, Plan A, two bed apartment, ground floor, End unit, E-W orientation
- 4nr PV South arrangement



BER PROVISIONAL A3 : PART L 2019

	PERFORMANCE COEFFICIENTS	MAXIMUM PERMITTED	COMPLIANCE
EPC (kWh/y)	0.270	0.3	COMPLIES
CO2 (kg/y)	0.264	0.350	COMPLIES
RENEWABLE ENERGY RATION (RER)	0.567	0.20	COMPLIES

PRINCPLE MEASURES

1. SPACE HEAT SOURCE
   A. HEAT PUMP, WASTE AIR TYPE
2. DOM HOT WATER HEAT SOURCE
   A. HEAT PUMP, WASTE AIR TYPE
3. VENTILATION
   A. HEAT RECOVERY VIA WASTE AIR HEAT PUMP
   B. DUCTED FRESH AIR AND WASTE AIR TO HEAT RECOVERY UNITS
4. RENEWABLES
   A. 5nr PV PANELS (305W EACH)
   B. HEAT PUMP, WASTE AIR
5. LIGHTS
   A. ALL LED
6. WATER PUMPING
   A. WATER BOOSTER TO WHOLE HOUSE
7. CAR CHARGING
   A. 1 IN 10 SPACES TO BE PROVIDED

1 DUPLEX-A L00 TYPICAL ONE BED

1 : 100

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BOHERBOY
BOHERBOY DEVELOPMENT
2020_0205 BER-DUPLEX C- TYPICAL TWO BED GROUND APARTMENT

Scale 1 : 100

20/07/2021 12:54:43

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

Project	2020_0205-BBSC-CALC-DUPLEX-L00-BLOCK C 2BED SAMPLE BOHERBOY	By	Barry O'Neill CEng 09Jun2021

U-Value Inputs

Element	w/mK	
Wall1	0.18	Part L: 2019
Wall2	0.18	Part L: 2019
Wall3	0.18	Part L: 2019
Party Wall	0.9	
Floor	0.18	Part L: 2019
Roof	0.16	Part L: 2019 table 5
Door	1.4	Part L: 2019
Window1	1.4	Part L: 2019
Roof Light	1.4	Part L: 2019

Heat Losses Based on SEAI calculation Spreadsheet

Room	**Heat Loss Watts**	**Area m²**	**Volume m³**
DUPC-L00-HALL	138	3.90	9.36
DUPC-L00-BEDROOM 2	657	16.00	42.40
DUPC-L00-KITCHEN-DINING ROOM	1435	30.50	80.83
DUPC-L00-ENSUITE 1	176	3.84	10.18
DUPC-L00-WC	270	5.29	14.02
DUPC-L00-BEDROOM 01	378	14.40	38.16
DUPC-L00-STORE	31	1.84	4.42
DUPC-00-L01-STORE (2)	55	2.10	5.04
DUPC-L00-STORE (3)	87	2.70	6.48
DUPC-L00-HALL (2)	82	2.31	5.54
Totals	**3,309**	82.88	216.42
Plus margin **10%**	**4.00**	KW	

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Storage (accumulation method.)

Vdp60 allowance	25	**l/person**
nr of Persons	4	**persons**
Total	200	**litres**

E4.3 Tank Sizing **SR50-4:2021 Appendix E**

set temperature of the	55	°C
temperature of the co	10	°C
Volume	222	litres
Energy Stored	**11.6**	**kWh**

E4.4 Heat Pump Capacity

Hours Recovery	2	hrs	On at 3am off 5am
thermal capacity of the heat pump	5.8	kw	

Design Capacity	**Table E.16**	
Space Heating	4.0	kW
DHW	5.8	kW
Design Capacity	**5.8**	kW

Note Max External Noise 45 dB(A)
ISEN 15450:2007 Table F.1

DEAP Report

DEAP Workbook: Aligned to DEAP software version 3.2 plus inclusion of Part L 2019 requirements, incorporating NZEB
Inputs and results, with selected intermediate results shown in *italics*
Details not applicable for this dwelling are grayed out.
Print out 'Proj' worksheet separately if required.

Dwelling dimensions **TGD L version** 2019

	Area [m^2]	Height [m]
Ground floor	0	0.0
First floor	86	2.7
Second floor	0	0.0
Third and other floors	0	0.0
Total floor area [m^2]	86	
Dwelling volume [m^3]	232	
Living area [m^2]	30.0	

Ventilation

Number of chimneys	0	
Number of open flues	0	
Number of intermittent fans and passive vents	1	
Number of flueless gas fires	0	
Is there a draught lobby on main entrance?	No	
Number of storeys in the dwelling	1	
Has an air permeability test been carried out?	No	0

If no :

Structure type	Masonry
Is there a suspended wooden ground floor?	None
Percentage of windows and doors draughtstripped [%]	100

If yes Not applicable

End if

Number of sides sheltered	2	
Ventilation method	Exhaust Air Heat Pump	7
Effective air change rate [ac/h]	0.71	
Ventilation heat loss [W/K]	55	

Permeability test carried out and meets guidelines in TGD L? Does Not Comply

For mechanical ventilation, other than positive input ventilation from loft: :

Is measured "PCDB" data available?	NA
Manufacturer and model	-
Specific fan power [W/(l/s)]	-
Heat exchanger efficiency [%]	-

Windows

Orientation	East/West	East/West	North	SE/SW	South	North	North	North	Horizontal
Orientation ID	3	3	1	4	5	1	1	1	6
Area [m^2]	5.443	9.72	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?	-	-	0.00	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	-	-	-	-	-	-	-
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	1	1	0	0	0	0	0	0	0
Frame factor (Table 6c) [-]	0.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Window type ID	2	2	0	0	0	0	0	0	0

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	15.2	1.3	20.1	-	
Doors	0.0	1.6	0.0	-	
Floor	0.0	0.0	0.0	-	No underfloor heating
Floor (type 2)	0.0	0.0	0.0	-	No underfloor heating
Floor (type 3)	0.0	0.0	0.0	-	No underfloor heating
Walls	73.6	0.2	11.8	-	Wall relevant for TGD L fabric compliance check
Walls (type 2)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 3)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 4)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 5)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Roof	0.0	0.0	0.0	-	Flat roof
Roof (type 2)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 3)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 4)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 5)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Total area of elements [m^2]	88.76				
Heat loss via plane elements [W/K]			32		
Factor for thermal bridging [W/m^2 K]			0.08		
Fabric heat loss [W/K]			39		
Dwelling heat loss coefficient [W/K]			94		
Heat loss parameter, HLP [W/K m^2]			1.09		

Water heating

Are there distribution losses?	Yes
Distribution loss [kWh/y]	256

Are there storage losses? Yes 1

If yes :

Water storage volume [litres]	180
Is manufacturer's declared loss factor available?	Yes 1

If yes :

Manufacturer and model name	Nibe F730
Manufacturer's declared loss factor [kWh/day]	1.2

If no Not applicable

End if

Temperature factor unadjusted (Table 2)	0.89
Temperature factor multiplier (from Table 2 notes)	0.9

End if

Is there a solar water heating system? No 0

If yes Not applicable

Solar fraction [%] 0

End if

Primary circuit loss [kWh/y] (Table 3)	360
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]	2351
Output from supplementary heater [kWh/y]	0
Heat gains from water heating system [W]	92
Is hot water storage indoors or in group heating scheme?	No

Lighting

Annual energy used for lighting, EL [kWh/y] 210

Internal gains

Net internal gains [W] 400

Heat use

Living area fraction [-]	0.35
Thermal mass category of dwelling	Medium
Heat use [kWh/y]	1896

Space heating

Control and responsiveness

Temperature adjustment (Table 4e), where appropriate [C]	0
Heating system control category (Table 4e)	2
Heating system responsiveness category (Table 4a or 4d)	1

Pumps/fans

	Enter number present	If present, is boiler controlled by room thermostat?	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	-	-
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

Type of main heating system Individual system 1

Energy requirements - individual heating systems :

Space Heating

Efficiency of main heating system [%] (including Efficiency Adjustment Factor)	240.0
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) 152.381

Fuel data

	Fuel
Space heating - main	electricity
Space heating - secondary	-
Water heating - main	electricity
Water heating - supplementary	-
Photovoltaic/ Wind Turbine	1,133 kWh/y
Solar Thermal	0 kWh/y

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type 1	Description: Heat Pumps			

	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 2	Description PV			
	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 3	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

Energy requirements - group/community heating scheme Not applicable

Results

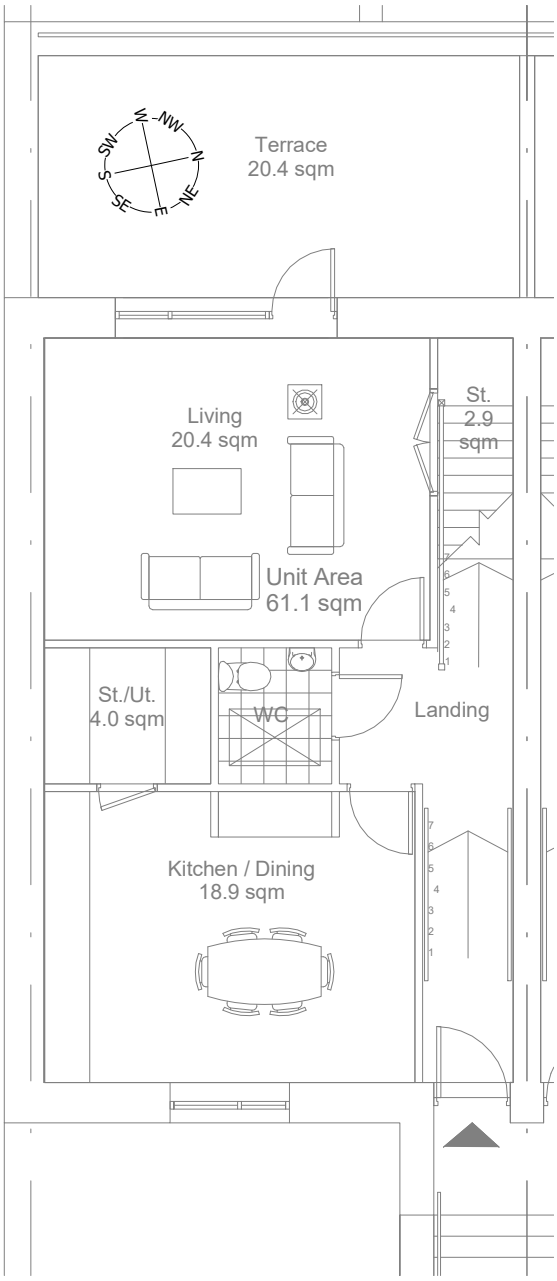
	Delivered energy	Primary energy	CO_2 emissions
	[kWh/y]	[kWh/y]	[kg/y]
Space heating - main	838	1,742	343
Space heating - secondary	0	0	0
Water heating - main	1,543	3,209	631
Water heating - supplementary	0	0	0
Pumps, fans	135	281	55
Energy for lighting	210	436	86
Renewable and energy-saving technologies			
CHP input (individual heating systems only)	0	0	0
CHP electrical output (individual heating syst	0	0	0
Photovoltaic/ Wind Turbine	-1,133	-2,357	-464
Type 1 Heat Pumps	0	0	0
Type 2 PV	0	0	0
Type 3 -	0	0	0
Total	1,592	3,311	651
per m^2 floor area	18.5	38.5	7.6
Building Energy Rating [kWh/m^2 y]		38	A2

Check conformity with MPEPC and MPCPC requirements in TGD L ***2019***

		Max permitted	
EPC	0.270	0.30	Complies
CPC	0.264	0.35	Complies
RER	0.567	0.20	Complies

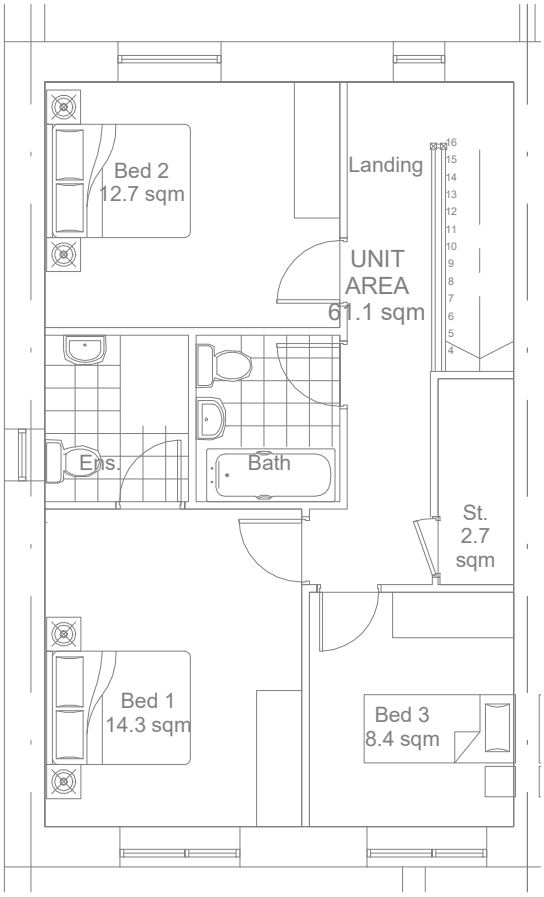
SAMPLE 5

- Duplex C, Plan A, three bed maisonette (technical description for BER), first & second floor, End unit, E-W orientation
- 8nr PV South arrangement



1 DUPLEX-A L01 TYP 3 BED

1 : 100



2 DUPLEX-A L02 TYP 3 BED

1 : 100

BER PROVISIONAL A3 : PART L 2019

	PERFORMANCE COEFFICIENTS	MAXIMUM PERMITTED	COMPLIANCE
EPC (kWh/y)	0.275	0.3	COMPLIES
CO2 (kg/y)	0.262	0.350	COMPLIES
RENEWABLE ENERGY RATION (RER)	0.569	0.20	COMPLIES

PRINCPLE MEASURES

1. SPACE HEAT SOURCE
   A. HEAT PUMP, AIR TO WATER TYPE
2. DOM HOT WATER HEAT SOURCE
   A. FROM HEAT PUMP
3. VENTILATION
   A. WALL VENTS WITH DEMAND CONTROL VENTILATION
4. RENEWABLES
   A. 5nr PV PANELS (305W EACH)
   B. HEAT PUMP, AIR TO WATER
5. LIGHTS
   A. ALL LED
6. WATER PUMPING
   A. WATER BOOSTER TO WHOLE HOUSE
7. CAR CHARGING
   A. 1 IN 10 SPACES TO BE PROVIDED

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BOHERBOY

BOHERBOY DEVELOPMENT
2020_0205 BER-DUPLEX D- TYPICAL THREE BED MASIONETTE

Scale 1 : 100

20/07/2021 12:54:45

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

Project	2020_0205-BBSC-CALC-DUPLEX-L00-BLOCK C 2BED SAMPLE BOHERBOY	By	Barry O'Neill CEng 09Jun2021

U-Value Inputs

Element	w/mK	
Wall1	0.18	Part L: 2019
Wall2	0.18	Part L: 2019
Wall3	0.18	Part L: 2019
Party Wall	0.9	
Floor	0.18	Part L: 2019
Roof	0.16	Part L: 2019 table 5
Door	1.4	Part L: 2019
Window1	1.4	Part L: 2019
Roof Light	1.4	Part L: 2019

Heat Losses Based on SEAI calculation Spreadsheet

Room	**Heat Loss Watts**	**Area m²**	**Volume m³**
DUPC-L00-HALL	138	3.90	9.36
DUPC-L00-BEDROOM 2	657	16.00	42.40
DUPC-L00-KITCHEN-DINING ROOM	1435	30.50	80.83
DUPC-L00-ENSUITE 1	176	3.84	10.18
DUPC-L00-WC	270	5.29	14.02
DUPC-L00-BEDROOM 01	378	14.40	38.16
DUPC-L00-STORE	31	1.84	4.42
DUPC-00-L01-STORE (2)	55	2.10	5.04
DUPC-L00-STORE (3)	87	2.70	6.48
DUPC-L00-HALL (2)	82	2.31	5.54
Totals	**3,309**	82.88	216.42
Plus margin **10%**	**4.00**	KW	

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Storage (accumulation method.)

Vdp60 allowance	25	**l/person**
nr of Persons	4	**persons**
Total	200	**litres**

E4.3 Tank Sizing **SR50-4:2021 Appendix E**

set temperature of the	55	°C
temperature of the co	10	°C
Volume	222	litres
Energy Stored	**11.6**	**kWh**

E4.4 Heat Pump Capacity

Hours Recovery	2	hrs	On at 3am off 5am
thermal capacity of the heat pump	5.8	kw	

Design Capacity	**Table E.16**	
Space Heating	4.0	kW
DHW	5.8	kW
Design Capacity	**5.8**	kW

Note Max External Noise 45 dB(A)
ISEN 15450:2007 Table F.1

DEAP Report

DEAP Workbook: Aligned to DEAP software version 3.2 plus inclusion of Part L 2019 requirements, incorporating NZEB
Inputs and results, with selected intermediate results shown in *italics*
Details not applicable for this dwelling are grayed out.
Print out 'Proj' worksheet separately if required.

Dwelling dimensions **TGD L version** 2019

	Area [m^2]	Height [m]
Ground floor	0	0.0
First floor	86	2.7
Second floor	0	0.0
Third and other floors	0	0.0
Total floor area [m^2]	86	
Dwelling volume [m^3]	232	
Living area [m^2]	30.0	

Ventilation

Number of chimneys	0	
Number of open flues	0	
Number of intermittent fans and passive vents	1	
Number of flueless gas fires	0	
Is there a draught lobby on main entrance?	No	
Number of storeys in the dwelling	1	
Has an air permeability test been carried out?	No	0

If no :

Structure type	Masonry
Is there a suspended wooden ground floor?	None
Percentage of windows and doors draughtstripped [%]	100

If yes Not applicable

End if

Number of sides sheltered	2	
Ventilation method	Exhaust Air Heat Pump	7
Effective air change rate [ac/h]	0.71	
Ventilation heat loss [W/K]	55	

Permeability test carried out and meets guidelines in TGD L? Does Not Comply

For mechanical ventilation, other than positive input ventilation from loft: :

Is measured "PCDB" data available?	NA
Manufacturer and model	-
Specific fan power [W/(l/s)]	-
Heat exchanger efficiency [%]	-

Windows

Orientation	East/West	East/West	North	SE/SW	South	North	North	North	Horizontal
Orientation ID	3	3	1	4	5	1	1	1	6
Area [m^2]	5.443	9.72	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?	-	-	0.00	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	-	-	-	-	-	-	-
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	1	1	0	0	0	0	0	0	0
Frame factor (Table 6c) [-]	0.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Window type ID	2	2	0	0	0	0	0	0	0

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	15.2	1.3	20.1	-	
Doors	0.0	1.6	0.0	-	
Floor	0.0	0.0	0.0	-	No underfloor heating
Floor (type 2)	0.0	0.0	0.0	-	No underfloor heating
Floor (type 3)	0.0	0.0	0.0	-	No underfloor heating
Walls	73.6	0.2	11.8	-	Wall relevant for TGD L fabric compliance check
Walls (type 2)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 3)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 4)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 5)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Roof	0.0	0.0	0.0	-	Flat roof
Roof (type 2)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 3)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 4)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 5)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Total area of elements [m^2]	88.76				
Heat loss via plane elements [W/K]			32		
Factor for thermal bridging [W/m^2 K]			0.08		
Fabric heat loss [W/K]			39		
Dwelling heat loss coefficient [W/K]			94		
Heat loss parameter, HLP [W/K m^2]			1.09		

Water heating

Are there distribution losses?	Yes
Distribution loss [kWh/y]	256

Are there storage losses? Yes 1

If yes :

Water storage volume [litres]	180
Is manufacturer's declared loss factor available?	Yes 1

If yes :

Manufacturer and model name	Nibe F730
Manufacturer's declared loss factor [kWh/day]	1.2

If no Not applicable

End if

Temperature factor unadjusted (Table 2)	0.89
Temperature factor multiplier (from Table 2 notes)	0.9

End if

Is there a solar water heating system? No 0

If yes Not applicable

Solar fraction [%] 0

End if

Primary circuit loss [kWh/y] (Table 3)	360
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]	2351
Output from supplementary heater [kWh/y]	0
Heat gains from water heating system [W]	92
Is hot water storage indoors or in group heating scheme?	No

Lighting

Annual energy used for lighting, EL [kWh/y] 210

Internal gains

Net internal gains [W] 400

Heat use

Living area fraction [-]	0.35
Thermal mass category of dwelling	Medium
Heat use [kWh/y]	1896

Space heating

Control and responsiveness

Temperature adjustment (Table 4e), where appropriate [C]	0
Heating system control category (Table 4e)	2
Heating system responsiveness category (Table 4a or 4d)	1

Pumps/fans

	Enter number present	If present, is boiler controlled by room thermostat?	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	-	-
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

Type of main heating system Individual system 1

Energy requirements - individual heating systems :

Space Heating

Efficiency of main heating system [%] (including Efficiency Adjustment Factor)	240.0
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) 152.381

Fuel data

	Fuel
Space heating - main	electricity
Space heating - secondary	-
Water heating - main	electricity
Water heating - supplementary	-
Photovoltaic/ Wind Turbine	1,133 kWh/y
Solar Thermal	0 kWh/y

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type 1	Description: Heat Pumps			

	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 2	Description PV			
	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 3	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

Energy requirements - group/community heating scheme Not applicable

Results

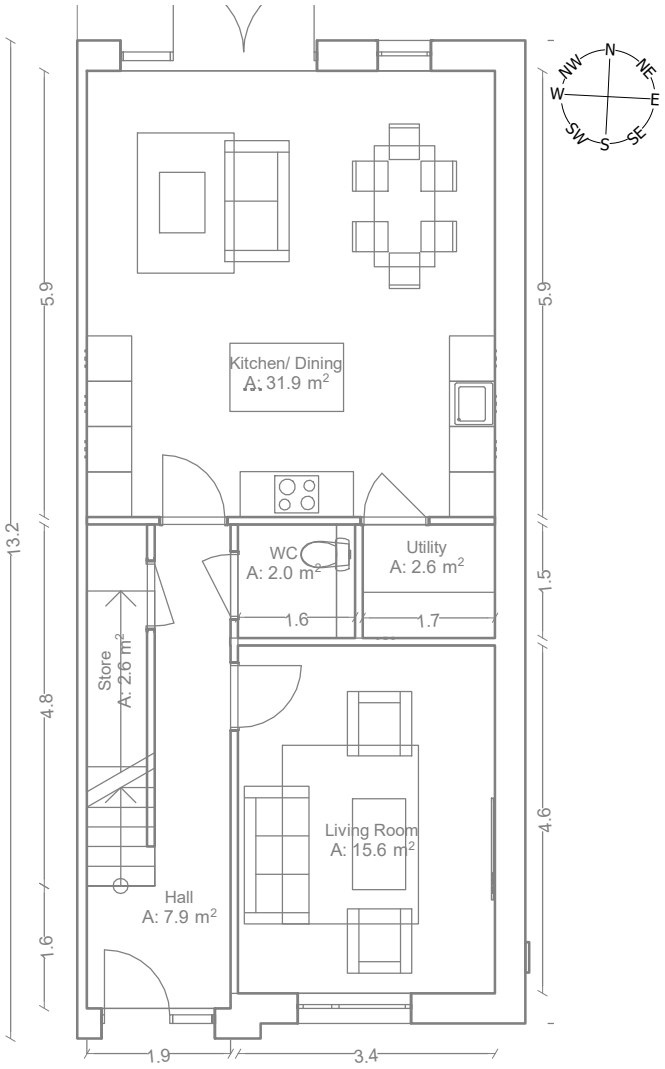
	Delivered energy	Primary energy	CO_2 emissions
	[kWh/y]	[kWh/y]	[kg/y]
Space heating - main	838	1,742	343
Space heating - secondary	0	0	0
Water heating - main	1,543	3,209	631
Water heating - supplementary	0	0	0
Pumps, fans	135	281	55
Energy for lighting	210	436	86
Renewable and energy-saving technologies			
CHP input (individual heating systems only)	0	0	0
CHP electrical output (individual heating syst	0	0	0
Photovoltaic/ Wind Turbine	-1,133	-2,357	-464
Type 1 Heat Pumps	0	0	0
Type 2 PV	0	0	0
Type 3 -	0	0	0
Total	1,592	3,311	651
per m^2 floor area	18.5	38.5	7.6
Building Energy Rating [kWh/m^2 y]		38	A2

Check conformity with MPEPC and MPCPC requirements in TGD L ***2019***

		Max permitted	
EPC	0.270	0.30	Complies
CPC	0.264	0.35	Complies
RER	0.567	0.20	Complies

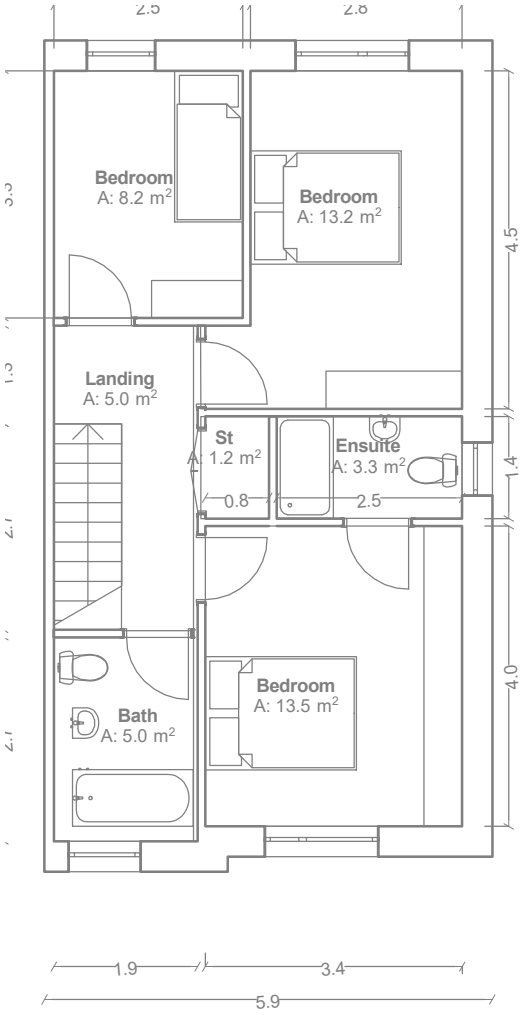
SAMPLE 6

- House Plan B1, three bed house, N-S orientation
- 8nr PV South arrangement



1 HOUSE-B1 L00 TYPE 3 BED

1 : 100



2 HOUSE-B1 L01 TYPE 3 BED

1 : 100

BER PROVISIONAL A3 : PART L 2019

	PERFORMANCE COEFFICIENTS	MAXIMUM PERMITTED	COMPLIANCE
EPC (kWh/y)	0.283	0.3	COMPLIES
CO2 (kg/y)	0.276	0.350	COMPLIES
RENEWABLE ENERGY RATION (RER)	0.47	0.20	COMPLIES

PRINCPLE MEASURES

1. SPACE HEAT SOURCE
   A. HEAT PUMP, AIR TO WATER TYPE
2. DOM HOT WATER HEAT SOURCE
   A. FROM HEAT PUMP
3. VENTILATION
   A. WALL VENTS WITH DEMAND CONTROL VENTILATION
4. RENEWABLES
   A. 8nr PV PANELS (305W EACH)
   B. HEAT PUMP, AIR TO WATER
5. LIGHTS
   A. ALL LED
6. WATER PUMPING
   A. WATER BOOSTER TO WHOLE HOUSE
7. CAR CHARGING
   A. DEDICATED CHARGING TO BE PROVIDE

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BOHERBOY
BOHERBOY DEVELOPMENT
2020_0205 BER-HOUSE-B1- TYPCIAL 3 BED HOUSE

Scale 1 : 100

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SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

Project	2020_0205-BBSC-CALC-HOUSE-B1-3BED SAMPLE BOHERBOY	By	Barry O'Neill CEng 05Jul2021

U-Value Inputs

Element	w/mK	
Wall1	0.18	Part L: 2019
Wall2	0.18	Part L: 2019
Wall3	0.18	Part L: 2019
Party Wall	0.9	
Floor	0.18	Part L: 2019
Roof	0.16	Part L: 2019 table 5
Door	1.4	Part L: 2019
Window1	1.4	Part L: 2019
Roof Light	1.4	Part L: 2019

Heat Losses Based on SEAI calculation Spreadsheet

Room	**Heat Loss Watts**	**Area m²**	**Volume m³**
Hall			
HB1-L00-HALL	395	11.78	31.22
HB1-L00-LIVING	772	15.64	41.45
HB1-L00-KITCHEN-DINING	1702	31.86	84.43
HB1-L00-WC	76	2.40	6.36
HB1-L00-STORE	45	2.55	6.76
HB1-L01-STORE (2)	30	1.12	2.80
HB1-L01-BEDROOM 01	510	13.60	34.00
HB1-L01-ENSUITE 1	191	3.50	8.75
HB1-L01-BEDROOM 02	358	13.20	33.00
HB1-L01-BEDROOM 03	266	8.25	20.63
HB1-L01-BATHROOM	341	5.13	12.83
HB1-L01-STORE (2)	30	1.12	2.80
HB1-L01-LANDING	199	8.34	20.85
Totals	**4,916**	118.49	305.86
Plus margin **10%**	**6.00**	KW	

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Storage (accumulation method.)

Vdp60 allowance	25	**l/person**
nr of Persons	5	**persons**
Total	250	**litres**

E4.3 Tank Sizing **SR50-4:2021 Appendix E**

set temperature, hot v	55	°C
temperature, cold wat	10	°C
Volume	278	litres
Energy Stored	**14.5**	**kWh**

E4.4 Heat Pump Capacity

Hours Recovery	2	hrs	On at 3am off 5am
thermal capacity of the heat pump	7.3	kw	

Design Capacity	**Table E.16**		Note Max External Noise	45	dB(A)
Space Heating	6.0	kW	ISEN 15450:2007 Table F.1		
DHW	7.3	kW			
Design Capacity	**7.3**	kW			

DEAP Report

DEAP Workbook: Aligned to DEAP software version 3.2 plus inclusion of Part L 2019 requirements, incorporating NZEB
Inputs and results, with selected intermediate results shown in *italics*
Details not applicable for this dwelling are grayed out.
Print out 'Proj' worksheet separately if required.

Dwelling dimensions **TGD L version** 2019

	Area [m^2]	Height [m]
Ground floor	66	3.0
First floor	54	2.7
Second floor	0	0.0
Third and other floors	0	0.0
Total floor area [m^2]	121	
Dwelling volume [m^3]	345	
Living area [m^2]	31.9	

Ventilation

Number of chimneys	0	
Number of open flues	0	
Number of intermittent fans and passive vents	0	
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?	No	0

If no :

Structure type	Masonry
Is there a suspended wooden ground floor?	None
Percentage of windows and doors draughtstripped [%]	100

If yes Not applicable

End if

Number of sides sheltered	2	
Ventilation method	Whole-house extract ventilation	4
Effective air change rate [ac/h]	0.72	
Ventilation heat loss [W/K]	82	
Permeability test carried out and meets guidelines in TGD L?	Does Not Comply	

For mechanical ventilation, other than positive input ventilation from loft: :

Is measured "PCDB" data available?	NA
Manufacturer and model	-
Specific fan power [W/(l/s)]	-
Heat exchanger efficiency [%]	-

Windows

Orientation	East/West	East/West	South	SE/SW	South	North	North	North	Horizontal
Orientation ID	3	3	5	4	5	1	1	1	6
Area [m^2]	8.7327	10.7438	0.8904	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	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	0.8	-	-	-	-	-	-
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	1	1	0	0	0	0	0	0	0
Frame factor (Table 6c) [-]	0.80	0.80	0.70	0.00	0.00	0.00	0.00	0.00	0.00
Window type ID	2	2	7	0	0	0	0	0	0

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	20.4	1.3	25.8	-	
Doors	2.1	1.6	3.4	-	
Floor	66.2	0.2	10.6	-	No underfloor heating
Floor (type 2)	0.0	0.0	0.0	-	No underfloor heating
Floor (type 3)	0.0	0.0	0.0	-	No underfloor heating
Walls	107.0	0.2	17.1	-	Wall relevant for TGD L fabric compliance check
Walls (type 2)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 3)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 4)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 5)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Roof	61.1	0.2	9.8	-	Flat roof
Roof (type 2)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 3)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 4)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 5)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Total area of elements [m^2]	256.77				
Heat loss via plane elements [W/K]			67		
Factor for thermal bridging [W/m^2 K]			0.08		
Fabric heat loss [W/K]			87		
Dwelling heat loss coefficient [W/K]			169		
Heat loss parameter, HLP [W/K m^2]			1.40		

Water heating

Are there distribution losses?	Yes
Distribution loss [kWh/y]	275

Are there storage losses?	Yes	1	
If yes :			
Water storage volume [litres]		200	
Is manufacturer's declared loss factor available?		Yes	1
If yes :			
Manufacturer and model name		PUHZ-SW75VHA	
Manufacturer's declared loss factor [kWh/day]		1.91	
If no	Not applicable		
End if			
Temperature factor unadjusted (Table 2)	0.89		
Temperature factor multiplier (from Table 2 notes)	0.9		
End if			
Is there a solar water heating system?	No	0	
If yes	Not applicable		
Solar fraction [%]		0	
End if			
Primary circuit loss [kWh/y] (Table 3)		360	
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]	2698		
Output from supplementary heater [kWh/y]	0		
Heat gains from water heating system [W]	98		
Is hot water storage indoors or in group heating scheme?	No		

Lighting

Annual energy used for lighting, EL [kWh/y]	259

Internal gains

Net internal gains [W]	471

Heat use

Living area fraction [-]	0.26	
Thermal mass category of dwelling	Medium	
Heat use [kWh/y]	4691	

Space heating

Control and responsiveness

Temperature adjustment (Table 4e), where appropriate [C]	0
Heating system control category (Table 4e)	2
Heating system responsiveness category (Table 4a or 4d)	1

Pumps/fans

	Enter number present	If present, is boiler controlled by room thermostat?	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	-	-
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	
Type of main heating system	Individual system	1

Energy requirements - individual heating systems :

Space Heating

Efficiency of main heating system [%] (including Efficiency Adjustment Factor)	240.0
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)	152.381

Fuel data	Fuel	
Space heating - main	electricity	
Space heating - secondary	-	
Water heating - main	electricity	
Water heating - supplementary	-	
Photovoltaic/ Wind Turbine	1,813	kWh/y
Solar Thermal	0	kWh/y

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type 1	Description: Heat Pumps			

	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 2	Description -			
	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 3	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

Energy requirements - group/community heating scheme Not applicable

Results

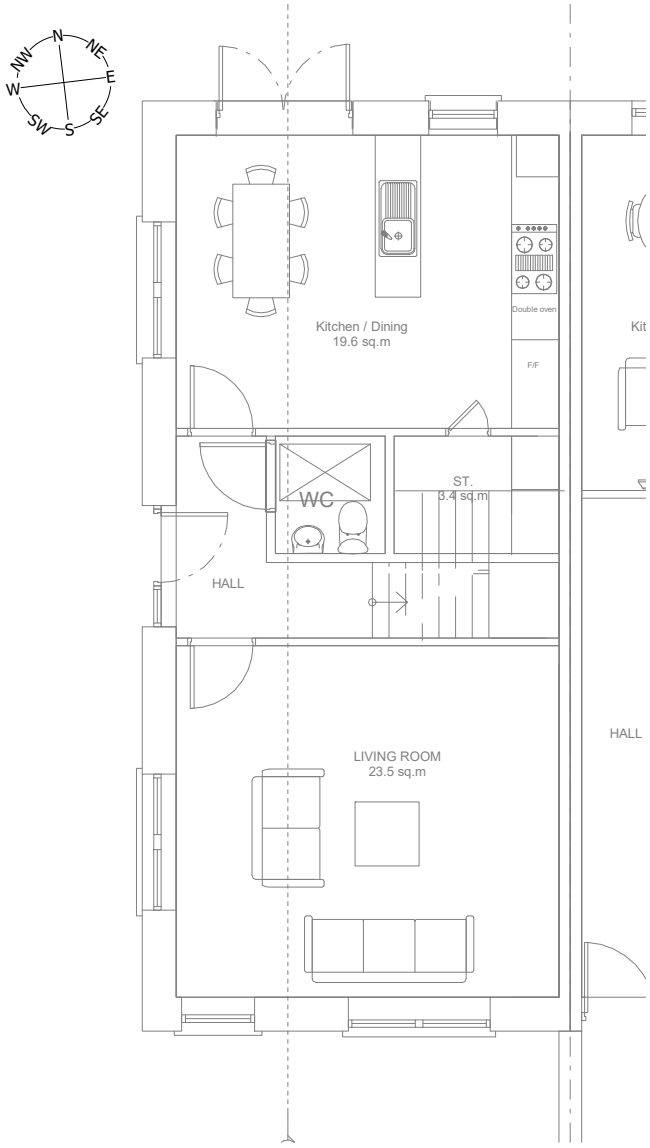
	Delivered energy	Primary energy	CO_2 emissions
	[kWh/y]	[kWh/y]	[kg/y]
Space heating - main	2,068	4,300	846
Space heating - secondary	0	0	0
Water heating - main	1,771	3,683	724
Water heating - supplementary	0	0	0
Pumps, fans	241	500	98
Energy for lighting	259	538	106
Renewable and energy-saving technologies			
CHP input (individual heating systems only)	0	0	0
CHP electrical output (individual heating syst	0	0	0
Photovoltaic/ Wind Turbine	-1,813	-3,772	-742
Type 1 Heat Pumps	0	0	0
Type 2 -	0	0	0
Type 3 -	0	0	0
Total	2,524	5,250	1,032
per m^2 floor area	20.9	43.6	8.6
Building Energy Rating [kWh/m^2 y]		44	A2

Check conformity with MPEPC and MPCPC requirements in TGD L ***2019***

		Max permitted	
EPC	0.277	0.30	Complies
CPC	0.264	0.35	Complies
RER	0.591	0.20	Complies

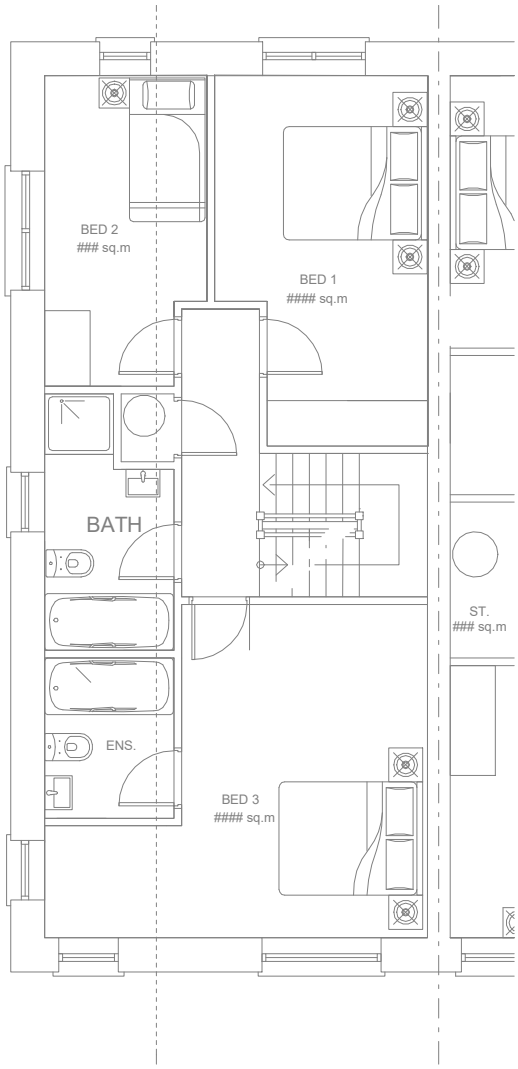
SAMPLE 7

- House Plan H1, three bed house, N-S orientation
- 8nr PV South arrangement



1 HOUSE-H L00 TYPE 3 BED

1 : 100



2 HOUSE-H L01 TYPE 3 BED

1 : 100

BER PROVISIONAL A3 : PART L 2019

	PERFORMANCE COEFFICIENTS	MAXIMUM PERMITTED	COMPLIANCE
EPC (kWh/y)	0.274	0.3	COMPLIES
CO2 (kg/y)	0.261	0.350	COMPLIES
RENEWABLE ENERGY RATION (RER)	0.562	0.20	COMPLIES

PRINCPLE MEASURES

1. SPACE HEAT SOURCE
   A. HEAT PUMP, AIR TO WATER TYPE
2. DOM HOT WATER HEAT SOURCE
   A. FROM HEAT PUMP
3. VENTILATION
   A. WALL VENTS WITH DEMAND CONTROL VENTILATION
4. RENEWABLES
   A. 6nr PV PANELS (305W EACH)
   B. HEAT PUMP, AIR TO WATER
5. LIGHTS
   A. ALL LED
6. WATER PUMPING
   A. WATER BOOSTER TO WHOLE HOUSE
7. CAR CHARGING
   A. DEDICATED CHARGING TO BE PROVIDE

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BOHERBOY

BOHERBOY DEVELOPMENT
2020_0205 BER-HOUSE-H- TYPICAL 3 BED HOUSE

Scale 1 : 100

20/07/2021 12:54:49

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

Project	2020_0205-BBSC-CALC-HOUSE-B1-3BED SAMPLE BOHERBOY	By	Barry O'Neill CEng 05Jul2021

U-Value Inputs

Element	w/mK	
Wall1	0.18	Part L: 2019
Wall2	0.18	Part L: 2019
Wall3	0.18	Part L: 2019
Party Wall	0.9	
Floor	0.18	Part L: 2019
Roof	0.16	Part L: 2019 table 5
Door	1.4	Part L: 2019
Window1	1.4	Part L: 2019
Roof Light	1.4	Part L: 2019

Heat Losses Based on SEAI calculation Spreadsheet

Room	**Heat Loss Watts**	**Area m²**	**Volume m³**
HB1-L00-HALL	233	7.37	19.53
HB1-L00-LIVING	1282	23.52	62.32
HB1-L00-KITCHEN-DINING	1242	19.64	52.04
HB1-L00-WC	71	2.25	5.96
HB1-L00-STORE	63	3.26	8.64
HB1-L01-STORE (2)	10	0.64	1.59
HB1-L01-BEDROOM 01	711	17.01	42.53
HB1-L01-ENSUITE 1	184	3.78	9.45
HB1-L01-BEDROOM 02	392	12.50	31.25
HB1-L01-BEDROOM 03	316	8.81	22.02
HB1-L01-BATHROOM	287	5.00	12.50
HB1-L01-STORE (2)	10	0.64	1.59
HB1-L01-LANDING	179	8.13	20.33
Totals	**4,979**	112.54	289.75
Plus margin **10%**	**6.00**	KW	

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Storage (accumulation method.)

Vdp60 allowance	25	**l/person**
nr of Persons	5	**persons**
Total	250	**litres**

E4.3 Tank Sizing **SR50-4:2021 Appendix E**

set temperature, hot v	55	°C
temperature, cold wat	10	°C
Volume	278	litres
Energy Stored	**14.5**	**kWh**

E4.4 Heat Pump Capacity

Hours Recovery	2	hrs	On at 3am off 5am
thermal capacity of the heat pump	7.3	kw	

Design Capacity	**Table E.16**		Note Max External Noise	45	dB(A)
Space Heating	6.0	kW	ISEN 15450:2007 Table F.1		
DHW	7.3	kW			
Design Capacity	**7.3**	kW			

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM HB1-L00-HALL

Design Room Temp	18	Notes:
External Design Temp	-3	
Design Temp Difference	21	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	0.5	1	7.37	2.65	9.76525	0.33	21	67.6731825
Additional air changes due to Chimneys or Flues	0	For additional air changes see table in section 2.2. Ventilation Heat Loss			0	0.33	21	0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor	1	7.37		7.37	0.18	21	27.8586
External Wall (Gross area)	2.65		2.65	7.0225			
Window				0	1.4	21	0
Window				0	1.4	21	0
External Door		1.6	2.4	3.84	1.4	21	112.896
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			3.1825	0.18	21	12.02985
External Roof (Gross area)				0			
Rooflights		0	0	0	1.4	21	0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			0	0.39	21	0.000
Party Wall Adjoining unheated space			2.65	0	0.9	8	0.000
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		220.458
Thermal Bridging		12.223
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.000
High Ceiling - Is the room served by underfloor heating	No	0.000
Total room Heat Loss		**232.7**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM	HB1-L00-LIVING

Design	21	Notes:
External Design Temp	-3	
Design Temp Difference	24	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	1.5	5.061	4.647	2.65	93.5	0.33	24	740.4
Additional air changes due to Chimneys or Flues	0	For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	24	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff	
External Floor	5.061	4.647		23.5	0.18	24	101.6
External Wall (Gross area)	9.708		2.65	25.7			
Window		1	2	2.0	1.4	24	67.2
Window		1.85	2	3.7	1.4	24	124.3
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	24	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			20.0	0.18	24	86.5
External Roof (Gross area)				0.0			
Rooflights				0.0	1.4	24	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			0.0	0.39	24	0.0
Party Wall Adjoining unheated space	4.647		2.65	12.3	0.9	11	121.9
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		1242.0
Thermal Bridging		40.1
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**1282.1**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM HB1-L00-KITCHEN-DINING

Design	21	Notes:
External Design Temp	-3	
Design Temp Difference	24	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	1.5	3.88	5.061	2.65	78.1	0.33	24	618.2
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	24	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor	3.88	5.061		19.6	0.18	24	84.8
External Wall (Gross area)	8.941		2.65	23.7			
Window		0.9	2.05	1.8	1.4	24	62.0
Window		1.8	2.05	3.7	1.4	24	124.0
Window				0.0	1.4	0	0.0
External Door		1.8	2.4	4.3	1.4	24	145.2
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			13.8	0.18	24	59.8
External Roof (Gross area)				0.0			
Rooflights				0.0	1.4	24	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			0.0	0.39	24	0.0
Party Wall Adjoining unheated space	3.88		2.65	10.3	0.9	11	101.8
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		1195.7
Thermal Bridging		46.2
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**1241.9**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM	HB1-L00-WC

Design	18	Notes:
External Design Temp	-3	
Design Temp Difference	21	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	1.5	1.45	1.552	2.65	8.9	0.33	21	62.0
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	21	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor	1.45	1.552		2.3	0.18	21	8.5
External Wall (Gross area)				0.0			
Window				0.0	1.4	21	0.0
Window				0.0	1.4	21	0.0
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	21	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			0.0	0.18	21	0.0
External Roof (Gross area)				0.0			
Rooflights				0.0	1.4	21	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			0.0	0.39	21	0.0
Party Wall Adjoining unheated space			2.65	0.0	0.9	8	0.0
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		70.5
Thermal Bridging		0.7
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**71.2**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM	HB1-L00-STORE

Design	16	Notes:
External Design Temp	-3	
Design Temp Difference	19	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	0.5	2.1	1.552	2.65	4.3	0.33	19	27.1
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	19	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor	2.1	1.552		3.3	0.18	19	11.1
External Wall (Gross area)			2.65	0.0			
Window				0.0	1.4	19	0.0
Window				0.0	1.4	19	0.0
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	19	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			0.0	0.18	19	0.0
External Roof (Gross area)				0.0			
Rooflights				0.0	1.4	19	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			0.0	0.39	19	0.0
Party Wall Adjoining unheated space	1.552		2.65	4.1	0.9	6	22.2
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		60.4
Thermal Bridging		2.7
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**63.1**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM	HB1-L00-STORE (2)

Design	16	Notes:
External Design Temp	-3	
Design Temp Difference	19	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	0.5	0	0	0	0.0	0.33	19	0.0
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	19	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor	0	0		0.0	0.18	19	0.0
External Wall (Gross area)	0		2.65	0.0			
Window				0.0	1.4	19	0.0
Window				0.0	1.4	19	0.0
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	19	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			0.0	0.18	19	0.0
External Roof (Gross area)				0.0			
Rooflights				0.0	1.4	19	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			0.0	0.39	19	0.0
Party Wall Adjoining unheated space	0		2.65	0.0	0.9	6	0.0
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		0.0
Thermal Bridging		0.0
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**0.0**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM HB1-L01-BEDROOM 01

Design Room Temp	18	Notes:
External Design Temp	-3	
Design Temp Difference	21	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	1	1	17.01	2.5	42.5	0.33	21	294.7
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	21	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor				0.0	0.18	21	0.0
External Wall (Gross area)	7.349		2.5	18.4			
Window		0.7	1.65	1.2	1.4	21	34.0
Window		1.6	1.65	2.6	1.4	21	77.6
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	21	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			14.6	0.18	21	55.1
External Roof (Gross area)	1	17.01		17.0			
Rooflights				0.0	1.4	21	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			17.0	0.39	21	139.3
Party Wall Adjoining unheated space	4.408		2.5	11.0	0.9	8	79.3
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		680.0
Thermal Bridging		30.8
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**710.9**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM HB1-L01-ENSUITE 1

Design	22	Notes:
External Design Temp	-3	
Design Temp Difference	25	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	1.5	2.21	1.71	2.5	14.2	0.33	25	116.9
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	25	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor				0.0	0.18	25	0.0
External Wall (Gross area)	2.21		2.5	5.5			
Window				0.0	1.4	25	0.0
Window				0.0	1.4	25	0.0
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	25	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			5.5	0.18	25	24.9
External Roof (Gross area)	2.21	1.71		3.8			
Rooflights				0.0	1.4	25	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			3.8	0.39	25	36.8
Party Wall Adjoining unheated space			2.5	0.0	0.9	12	0.0
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		178.6
Thermal Bridging		4.9
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**183.6**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM HB1-L01-BEDROOM 02

Design Room Temp	18	Notes:
External Design Temp	-3	
Design Temp Difference	21	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	0.5	1	12.5	2.5	15.6	0.33	21	108.3
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	21	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor				0.0	0.18	21	0.0
External Wall (Gross area)	2.815		2.5	7.0			
Window		1.4	1.275	1.8	1.4	21	52.5
Window				0.0	1.4	21	0.0
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	21	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			5.3	0.18	21	19.9
External Roof (Gross area)	1	12.5		12.5			
Rooflights				0.0	1.4	21	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			12.5	0.39	21	102.4
Party Wall Adjoining unheated space	4.895		2.5	12.2	0.9	8	88.1
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		371.1
Thermal Bridging		21.0
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**392.1**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM HB1-L01-BEDROOM 03

Design Room Temp	18	Notes:
External Design Temp	-3	
Design Temp Difference	21	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	0.5	2.146	4.105	2.5	11.0	0.33	21	76.3
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	21	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor				0.0	0.18	21	0.0
External Wall (Gross area)	6.251		2.5	15.6			
Window		0.7	1.275	0.9	1.4	21	26.2
Window		1.6	1.65	2.6	1.4	21	77.6
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	21	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			12.1	0.18	21	45.7
External Roof (Gross area)	2.146	4.105		8.8			
Rooflights				0.0	1.4	21	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			8.8	0.39	21	72.1
Party Wall Adjoining unheated space			2.5	0.0	0.9	8	0.0
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		298.0
Thermal Bridging		17.7
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**315.8**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM	HB1-L01-BATHROOM

Design	22	Notes:
External Design Temp	-3	
Design Temp Difference	25	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	1.5	1	5	2.5	18.8	0.33	25	154.7
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	25	0.0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor				0.0	0.18	25	0.0
External Wall (Gross area)	3.393		2.5	8.5			
Window		0.7	1.65	1.2	1.4	25	40.4
Window				0.0	1.4	25	0.0
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	25	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			7.3	0.18	25	33.0
External Roof (Gross area)	1	5		5.0			
Rooflights				0.0	1.4	25	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			5.0	0.39	25	48.8
Party Wall Adjoining unheated space			2.5	0.0	0.9	12	0.0
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		276.8
Thermal Bridging		9.8
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**286.6**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM HB1-L01-STORE (2)

Design	16	Notes:
External Design Temp	-3	
Design Temp Difference	19	

	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
Ventilation Heat Loss	0.5	0.701	0.91	2.5	0.8	0.33	19	5.0
Additional air changes due to Chimneys or Flues		For additional air changes see table in section 2.2. Ventilation Heat Loss			0.0	0.33	19	0.0

	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
Fabric Heat Loss							
External Floor				0.0	0.18	19	0.0
External Wall (Gross area)			2.5	0.0			
Window				0.0	1.4	19	0.0
Window				0.0	1.4	19	0.0
Window				0.0	1.4	0	0.0
External Door				0.0	1.4	19	0.0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			0.0	0.18	19	0.0
External Roof (Gross area)	0.701	0.91		0.6			
Rooflights				0.0	1.4	19	0.0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			0.6	0.39	19	4.7
Party Wall Adjoining unheated space			2.5	0.0	0.9	6	0.0
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		9.7
Thermal Bridging		0.4
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.0
High Ceiling - Is the room served by underfloor heating	No	0.0
Total room Heat Loss		**10.1**

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

BBSC

ROOM HB1-L01-LANDING

Design Room Temp	18	Notes:
External Design Temp	-3	
Design Temp Difference	21	

Ventilation Heat Loss	No. of air changes per hour ac/h	Room Volume (meters) Length (m)	Width (m)	Height (m)	Amount of air to be heated per hour m^3/h	Air change factor $W/m^3.K$	Design Temp Diff °C	Heat Loss Watts
	0.5	1	8.13	2.5	10.1625	0.33	21	70.426125
Additional air changes due to Chimneys or Flues	0	For additional air changes see table in section 2.2. Ventilation Heat Loss			0	0.33	21	0

Fabric Heat Loss	Length (m)	Width (m)	Height (m)	Area m^2	U-Value $W/m^2.K$	Design Temp Diff °C	
External Floor				0	0.18	21	0
External Wall (Gross area)			2.5	0			
Window				0	1.4	21	0
Window				0	1.4	21	0
External Door				0	1.4	21	0
External Wall (Nett area)	**(Subtract glazing and door areas from gross external wall area)**			0	0.18	21	0
External Roof (Gross area)	1	8.13		8.13			
Rooflights		0	0	0	1.4	21	0
External Roof (Nett area)	**(Subtract roof glazing area from gross roof area)**			8.13	0.39	21	66.585
Party Wall Adjoining unheated space	1.9		2.5	4.75	0.9	8	34.200
Other	-	-	-	-	-	-	-

Design Heat Loss from Room (Sum of Watts for all elements)		171.211
Thermal Bridging		8.063
Exposed Location? (If yes, 10% is added to the heat loss)	No	0.000
High Ceiling - Is the room served by underfloor heating	No	0.000
Total room Heat Loss		**179.3**

DEAP Report

DEAP Workbook: Aligned to DEAP software version 3.2 plus inclusion of Part L 2019 requirements, incorporating NZEB
Inputs and results, with selected intermediate results shown in *italics*
Details not applicable for this dwelling are grayed out.
Print out 'Proj' worksheet separately if required.

Dwelling dimensions **TGD L version** 2019

	Area [m^2]	Height [m]
Ground floor	58	3.0
First floor	58	2.7
Second floor	0	0.0
Third and other floors	0	0.0
Total floor area [m^2]	115	
Dwelling volume [m^3]	329	
Living area [m^2]	19.6	

Ventilation

Number of chimneys	0	
Number of open flues	0	
Number of intermittent fans and passive vents	0	
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?	No	0

If no :

Structure type	Masonry
Is there a suspended wooden ground floor?	None
Percentage of windows and doors draughtstripped [%]	100

If yes Not applicable

End if

Number of sides sheltered	2	
Ventilation method	Whole-house extract ventilation	4
Effective air change rate [ac/h]	0.72	
Ventilation heat loss [W/K]	78	
Permeability test carried out and meets guidelines in TGD L?	Does Not Comply	

For mechanical ventilation, other than positive input ventilation from loft: :

Is measured "PCDB" data available?	NA
Manufacturer and model	-
Specific fan power [W/(l/s)]	-
Heat exchanger efficiency [%]	-

Windows

Orientation	South	North	East/West	SE/SW	South	North	North	North	Horizontal
Orientation ID	5	1	3	4	5	1	1	1	6
Area [m^2]	9.415	8.5275	17.287	0	0	0	0	0	0
U-value [W/m^2 K]	1.40	1.40	1.40	0.00	0.00	0.00	0.00	0.00	0.00
Is U-value a manufacturer's certified value?	-	-	-	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	0.8	-	-	-	-	-	-
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	1	1	1	0	0	0	0	0	0
Frame factor (Table 6c) [-]	0.80	0.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00
Window type ID	2	2	2	0	0	0	0	0	0

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	35.2	1.3	46.7	-	
Doors	2.1	1.6	3.4	-	
Floor	66.2	0.2	10.6	-	No underfloor heating
Floor (type 2)	0.0	0.0	0.0	-	No underfloor heating
Floor (type 3)	0.0	0.0	0.0	-	No underfloor heating
Walls	94.7	0.2	15.2	-	Wall relevant for TGD L fabric compliance check
Walls (type 2)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 3)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 4)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Walls (type 5)	0.0	0.0	0.0	-	Wall relevant for TGD L fabric compliance check
Roof	61.1	0.2	9.8	-	Flat roof
Roof (type 2)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 3)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 4)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Roof (type 5)	0.0	0.0	0.0	-	Pitched roof - Insulation at ceiling
Total area of elements [m^2]	259.38				
Heat loss via plane elements [W/K]			86		
Factor for thermal bridging [W/m^2 K]			0.08		
Fabric heat loss [W/K]			106		
Dwelling heat loss coefficient [W/K]			184		
Heat loss parameter, HLP [W/K m^2]			1.60		

Water heating

Are there distribution losses?	Yes
Distribution loss [kWh/y]	273

Are there storage losses?	Yes	1	
If yes :			
Water storage volume [litres]		200	
Is manufacturer's declared loss factor available?		Yes	1
If yes :			
Manufacturer and model name		PUHZ-SW75VHA	
Manufacturer's declared loss factor [kWh/day]		1.91	
If no	Not applicable		
End if			
Temperature factor unadjusted (Table 2)	0.89		
Temperature factor multiplier (from Table 2 notes)	0.9		
End if			
Is there a solar water heating system?	No	0	
If yes	Not applicable		
Solar fraction [%]		0	
End if			
Primary circuit loss [kWh/y] (Table 3)		360	
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]	2688		
Output from supplementary heater [kWh/y]	0		
Heat gains from water heating system [W]	97		
Is hot water storage indoors or in group heating scheme?	No		

Lighting

Annual energy used for lighting, EL [kWh/y]	252

Internal gains

Net internal gains [W]	462

Heat use

Living area fraction [-]	0.17	
Thermal mass category of dwelling	Medium	
Heat use [kWh/y]	3690	

Space heating

Control and responsiveness

Temperature adjustment (Table 4e), where appropriate [C]	0
Heating system control category (Table 4e)	2
Heating system responsiveness category (Table 4a or 4d)	1

Pumps/fans

	Enter number present	If present, is boiler controlled by room thermostat?	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	-	-
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	
Type of main heating system	Individual system	1

Energy requirements - individual heating systems :

Space Heating

Efficiency of main heating system [%] (including Efficiency Adjustment Factor)	240.0
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)	152.381

Fuel data	Fuel	
Space heating - main	electricity	
Space heating - secondary	-	
Water heating - main	electricity	
Water heating - supplementary	-	
Photovoltaic/ Wind Turbine	1,517	kWh/y
Solar Thermal	0	kWh/y

Renewable and energy-saving technologies		Primary energy factor [-]	CO2 factor [kg/kWh]	Delivered energy [kWh/y]
Type 1	Description: Heat Pumps			

	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 2	Description -			
	Energy produced or saved	2.08	0.409	0
	Energy consumed	0.00	0.000	0
Type 3	Description -			
	Energy produced or saved	0.00	0.000	0
	Energy consumed	0.00	0.000	0

Energy requirements - group/community heating scheme Not applicable

Results

	Delivered energy	Primary energy	CO_2 emissions
	[kWh/y]	[kWh/y]	[kg/y]
Space heating - main	1,682	3,498	688
Space heating - secondary	0	0	0
Water heating - main	1,764	3,669	721
Water heating - supplementary	0	0	0
Pumps, fans	231	480	94
Energy for lighting	252	525	103
Renewable and energy-saving technologies			
CHP input (individual heating systems only)	0	0	0
CHP electrical output (individual heating syst	0	0	0
Photovoltaic/ Wind Turbine	-1,517	-3,155	-620
Type 1 Heat Pumps	0	0	0
Type 2 -	0	0	0
Type 3 -	0	0	0
Total	2,412	5,017	986
per m^2 floor area	20.9	43.5	8.5
Building Energy Rating [kWh/m^2 y]		43	A2

Check conformity with MPEPC and MPCPC requirements in TGD L ***2019***

		Max permitted	
EPC	0.274	0.30	Complies
CPC	0.261	0.35	Complies
RER	0.562	0.20	Complies

APPENDIX 2 – PV CALCULATIONS

- SEAI DEAP CALCULATION MODEL
- AVERAGE CALCULATION FOR BLOCKS AND TYPICAL PLANS TYPES, SUBJECT TO FULL SOLAR PV ANAYLSIS AS PER SEAI REQUIREMENTS

Solar PV Calculation, DEAP 4.2.0 Method (as used for BER)

watts	nr of panels	kwp	S	zpv	result
305	6	1.83	1036	1	1516.7
305	5	1.525	1036	1	1263.9
305	4	1.22	1036	1	1011.1
305	3	0.915	1036	1	758.4
305	2	0.61	1036	1	505.6

Table H1: **Default collector parameters**

Collector type	η_0	a_1 (W/m²K)	Ratio of aperture area to gross area
Evacuated tube	0.6	3	0.72
Flat plate, glazed	0.75	6	0.90
Unglazed	0.9	20	1.00

Table H2: **Annual solar radiation, kWh/m²**

Tilt of collector	Orientation of collector				
	South	SE/SW	E/W	NE/NW	North
Horizontal	963				
15°	1036	1005	929	848	813
30°	1074	1021	886	736	676
45°	1072	1005	837	644	556
60°	1027	956	778	574	463
75°	942	879	708	515	416
Vertical	822	773	628	461	380

Where solar collectors have multiple tilts and orientations, the annual solar radiation should be calculated from Table H2 based on an area weighted average of solar collector area. If the collectors are all of the same orientation and tilt, then an annual solar radiation figure from Table H2 must be selected without interpolation. The values in Table H2 are not specific to the installed solar collector type. Table H2 is based on solar radiation figures from national climate data.

Unit Description	Qty.	Beds	PV load	Nr of panels (most likely)	Average Orientation	Total Panels	Total for units (kw/yr)
House A	10	4 bed	305	8	SE/SW	80	19,617.60
House B	35	3 bed	305	6	SE/SW	210	51,496.20
House B1	32	3 bed	305	6	SE/SW	192	47,082.24
House B2	22	3 bed	305	6	SE/SW	132	32,369.04
House C	11	3 bed	305	6	SE/SW	66	16,184.52
House D	7	4 bed	305	8	SE/SW	56	13,732.32
House D1	3	4 bed	305	8	SE/SW	24	5,885.28
House E	18	4 bed	305	6	SE/SW	108	26,483.76
House E1	1	4 bed	305	6	SE/SW	6	1,471.32
House F	6	4 bed	305	8	SE/SW	48	11,770.56
House F1	1	4 bed	305	6	SE/SW	6	1,471.32
House G	15	4 bed	305	8	SE/SW	120	29,426.40
House G1	3	4 bed	305	6	SE/SW	18	4,413.96
House J1	4	4 bed	305	8	SE/SW	32	7,847.04
House J	13	4 bed	305	8	SE/SW	104	25,502.88
House H1	2	3 bed	305	4	SE/SW	8	1,961.76
House H	8	3 bed	305	6	SE/SW	48	11,770.56
House H1	6	3 bed	305	4	SE/SW	24	5,885.28
House H	24	3 bed	305	6	SE/SW	144	35,311.68
House H	28	3 bed	305	6	SE/SW	168	41,196.96
House K	2	2 bed	305	3	SE/SW	6	1,471.32
House K	6	2 bed	305	3	SE/SW	18	4,413.96
Duplex Block A	20	1, 2 & 3bed	305	4	E/W	80	19,617.60
Duplex Block B	16	1, 2 & 3bed	305	4	E/W	64	15,694.08
Duplex Block C	16	1, 2 & 3bed	305	4	E/W	64	15,694.08
Duplex Block D	10	1, 2 & 3bed	305	4	E/W	40	9,808.80
Duplex Block E	12	1, 2 & 3bed	305	4	E/W	48	11,770.56
Duplex Block F	6	1, 2 & 3bed	305	4	E/W	24	5,885.28
Duplex Block G	12	1, 2 & 3bed	305	4	E/W	48	11,770.56
Duplex Block H	12	1, 2 & 3bed	305	4	E/W	48	11,770.56
Duplex Block I	12	1, 2 & 3bed	305	4	E/W	48	11,770.56
Duplex Block J	8	1, 2 & 3bed	305	4	E/W	32	7,847.04
Duplex Block K1 to K4	16	1, 2 & 3bed	305	4	E/W	64	15,694.08
Duplex Block L1 to L2	4	1, 2 & 3bed	305	4	E/W	16	3,923.52
Duplex Block X1 to X2	8	1, 2 & 3bed	305	4	E/W	32	7,847.04
Apartment Block A one bed	26	1 bed	305	2	South	52	12,751.44
Apartment Block A two bed	84	2 bed	305	3	South	252	61,795.44
Apartment Block B one bed	6	1 bed	305	2	South	12	2,942.64
Apartment Block B two bed	14	2 bed	305	3	South	42	10,299.24
Apartment Block B three bed	1	3 bed	305	4	South	4	980.88
Apartment Block C one bed	18	1 bed	305	2	South	36	8,827.92
Apartment Block C two bed	67	2 bed	305	3	South	201	49,289.22
Apartment Block C three bed	6	3 bed	305	4	South	24	5,885.28
Apartment Y1 to Y6 one bed	6	1 bed	305	3	SE/SW	18	4,413.96
Apartment Y1 to Y7 two bed	6	2 bed	305	3	SE/SW	18	4,413.96
Apartment Y1 to Y8 one bed	6	1 bed	305	2	SE/SW	12	2,942.64
Apartment Y1 to Y9 two bed	6	2 bed	305	3	SE/SW	18	4,413.96
Total (Apartment)	655					**2915**	**714,816.30**

Notes

All PV Calculations are based on most likley PV panels at Final BER stage

Most Average Orientation has been applied

Total results are plus or minus 15% of presented figure