15-MAR-2022

Author	Barry O'Neill
Project ref	2020_0205
Purpose	Planning
Version	P.01.03



ENERGY STATEMENT

655nr DWELLING DEVELOPMENT **BOHERBOY** SAGGART Co. Dublin

Services Engineers Planning Consultant

Architect Davey Smith Architects McCrossan O'Rourke Manning Architects **BBSC Consulting Engineers Armstrong Fenton Associates**

On Behalf of

Kelland Homes Ltd. **Durkin Estates Ltd**

Date of Issue Revision P.01.0 U°k

Reason For Issue ISSUED FOR PLANNING Chk'd

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	4
2	PRINCIPLE STANDARDS	
2.1	BUILDING REGULATIONS	4
2.2	GENERAL	
2.3	SITE LOCATION	
2.4	SCHEDULE OF UNITS	5
3	LEGISLATIVE/PLANNING REQUIREMENTS	7
3.1	FORTUNESTOWN LOCAL AREA PLAN - MAY 2012 SOUTH DUBLIN DEVELOPMENT PLAN	7
3.2	SOUTH DUBLIN DEVELOPMENT PLAN 2019-2022	7
4	PART F	
4.1	PRINCIPLE STANDARD	
4.2	COMMENT	
4.3	AIR PERMEABILITY OF THE DWELLING.	
4.4	VENTILATION CHARACTERISTICS OF THE DWELLING AND VENTILATION EQUIPMENT;	
5	COMPLIANCE (PART L AND PART F)	
5.1	LIMITATION OF PRIMARY ENERGY USE AND CO2 EMISSIONS	
5.2	SIZE, GEOMETRY AND EXPOSURE OF THE DWELLING	
5.3	MATERIALS USED FOR CONSTRUCTION OF THE DWELLING	
5.4	THERMAL INSULATION OF THE DIFFERENT ELEMENTS OF THE BUILDING FABRIC	
5.5	EFFICIENCY, RESPONSIVENESS AND CONTROL CHARACTERISTICS OF THE HEATING SYSTEM(S)	
5.6	SOLAR GAINS THROUGH GLAZED OPENINGS OF THE DWELLING	
5.7	THERMAL STORAGE (MASS) CAPACITY OF THE DWELLING	
5.8	THERMAL BRIDGING	
5.9	RENEWABLE AND ALTERNATIVE ENERGY GENERATION TECHNOLOGIES INCORPORATED IN THE DWELLING	
5.10	PRIMARY ENERGY USAGE.	
5.11	THE FUEL USED TO PROVIDE SPACE AND WATER HEATING, VENTILATION AND LIGHTING.	
5.12	WATER FIXTURES & SANITARY FITTING	
6	BUILDING SERVICES	
7	CONSTRUCTION QUALITY AND COMMISSIONING OF SERVICES	
7.1	INSULATION CONTINUITY AND AIR PERMEABILITY	
7.2	THERMAL BRIDGING	
7.3	AIR PERMEABILITY PRESSURE TESTS	
8	USER INFORMATION	
9	SOLAR PV CELLS	
10	CRECHE	
11	DISTRICT HEATING	
APPEND	VIX 1 – DEAP 4.2 OUTPUT	
APPEND	IX 2 – PV CALCULATIONS	

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

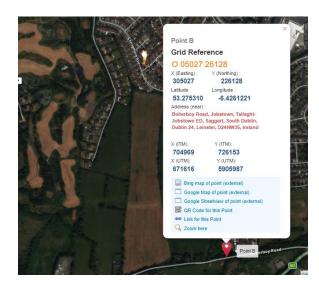
fabric and air permeability requirements, maximum energy use and carbon dioxide emissions as

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.g	ridreferencefinder.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.
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.
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.
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 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	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.
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 m³/hr/m². 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 ² K) ^{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	0.16 0.16	0.3
slope Flat roof	0.20	
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/m²K.

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 applie

Method of Heating :	To be a HARP	To be a HARP registered Heat Pump					
Heating appliance efficiency:		Greater than 600 % subject to BER Calculations etc. based on the final selection of products to be used					
Space heating and hot water supply system controls	Systems for D		nts as per 'Heating and Domestic Hot Wat ompliance with TGD Part L 2008' Section				
	Туре	Heat Pump					
	Medium	Refrigerant Gas/ Wa	ater				
	Efficiency	600 % (Calculations	indicate 720 %)				
	Radiators	High-efficiency radi	ators with high water volume to be utilize	ed			
		Supply water tempe 55ºC return at 50ºC	erature to the radiators should be in the r	ange			
	Installation	to be employed					
		Works to be undertaken by a F-Gas Plumber so qualified to undertake the works as described.					
	Domestic hot water						
	Controls	As required by the S	Supplement to Part L				
Insulation of hot water storage vessels, pipes and ducts	temperatures standards Standards BS vented coppe BS 7206:1990 Heating pipev All pipes when BS 5422:2001 vessels, ductv 40°C to +700° BRE Report N	rds BS 1566: 2002 Copper indirect cylinders for domestic purposes. O copper cylinders. Requirements and test methods 6:1990 Specification for unvented hot water storage units and packag g pipework es where not in the thermal envelope shall be insulated. 2:2001 Method for specifying thermal insulating materials for pipes, t , ductwork and equipment operating within the temperature range of					
	Water System		plying with the Heating and Domestic Ho ving Compliance with Part L it must not e				
		Pipe diameter (OD) mm	Maximum permissible heat loss (W/m)				
		8mm	7.06				
		10mm	7.23				
		12mm	7.35				
		15mm 7.89					
		22mm 9.12					
		28mm 10.07					
		35mm	11.08				
		42mm	12.19				
		54mm	14.12				

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

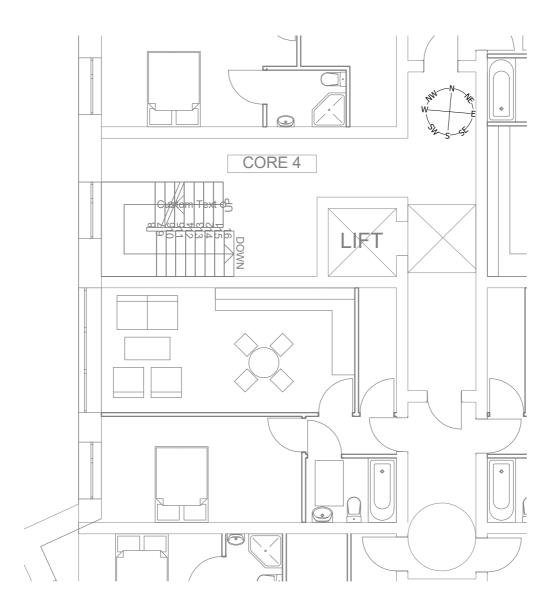
- Block A, one bed apartment, core 4, level 03 mid-floor apartment, E/W orientation
- Block B, two bed apartment, level 03 mid-floor apartment, E/W orientation
- Block C, two bed apartment, Level 02, mid-floor apartment, N orientation
- Duplex C, Plan A, two bed apartment, ground floor, End unit, E-W 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 followsFirst pageDrawing of unitSecond pageSR50-4:2021 outputSubsequent pagesDEAP output

SAMPLE 1

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



BLOCK A L03 TYPCIAL ONE BED 1

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

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



BUILDING SERVICES ENGINEERS [p] 086 386 7097 [e] barry.oneill@bbsc.ie BOHERBOY DEVELOPMENT 2020_0205 BER-BLOCK A- ONE BED APARTMENT

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

Project	2020_0205-BBSC-CALC-APARTMENT-BLOCK A-L03-1BED SAMPLE BOHERBOY	Ву	Barry O'Neill CEng 05Jul2021
U-Value Inputs Element	w/mK		

Lienienie	••,	
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	M 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 Stora	ge (accumulatio	on method.)	E4.3 Tank Sizing	SR50-4:2021 Appendix E
Vdp60 allowance		25 l/person	set temperature of the	55 °C
nr of Persons		2 persons	temperature of the co	10 °C
Total		100 litres	Volume	111 litres
			Energy Stored	5.8 kWh
E4.4 Heat Pump Capa	acity			
Hours Recovery	-	2 hrs	On at 3am off 5am	
thermal capacity of th	ne heat pump	2.9 kw		
Design Capacity	Table E.16		Note Max External Noise	45 dB(A)
Space Heating	2.0	kW	ISEN 15450:2007 Table F.1	
DHW	2.9	kW		
Design Capacity	2.9	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 I	version	2019					
Area [m ²] Height [n								
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 [m²] 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 ve								
Number of flueless gas fires	0							
Is there a draught lobby on main entrance? Number of storeys in the dwelling	Ye							
Has an air permeability test been carried or								
If no :								
Structure type		Masonry						
Is there a suspended wooden g		None						
Percentage of windows and doo	ors draughtstripped	[%] 100						
If yes Not applicable								
End if								
Number of sides sheltered	2							_
Ventilation method		ist Air Heat Pu	mp					7
Effective air change rate [ac/h] Ventilation heat loss [W/K]	0.7 3'							
Permeability test carried out and meets gui		Does Not	t Comply					
For mechanical ventilation, other than posit			:					
Is measured "PCDB" data avail	able?			NA	7			
Manufacturer and model				-				
Specific fan power [W/(I/s)]				-				
Heat exchanger efficiency [%]				-	1			
Windows								
Orientation	East/West East/		SE/SW	South	North	North	North	Horizontal
Orientation ID	3 3		4	5	1	1	1	6
Area [m²]	3.4 7.4		0	0	0	0	0	0
U-value [W/m ² K]	1.40 1.4	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 0.3	8 0.8	-	-	-	-	-	-
End if								
Correction for roof window and/or metal fra	me if applicable (Ta 0 0		and 2). 0	0	0	0	0	0
Overshading ID	1 1		0	0	0	0	0	0
Frame factor (Table 6c) [-]	0.80 0.8		0.00	0.00	0.00	0.00	0.00	0.00
Window type ID	2 2		0.00	0	0	0	0	0
Fabric	11				_			
Exposed element type Area [m ²]	U-value AL [W/m ² K] <i>[W/</i>		t (optional)		Element ty			
Windows/rooflights 10.8	[W/m ² K] <i>[W/</i> 1.3 14				(lor assess	ing TGD L	conformity)
Doors 2.1	1.6 3.4							
Floor 0.0	0.0 0.1				No underfle	oor heating		
Floor (type 2) 0.0	0.0 0.0	- C			No underfle	oor heating		
Floor (type 3) 0.0	0.0 0.					oor heating		
Walls 37.5	0.2 6.							ompliance check
Walls (type 2) 0.0 Walls (type 3) 0.0	0.0 0.0 0.0 0.1							ompliance check
Walls (type 4) 0.0	0.0 0.0							ompliance check
Walls (type 5) 0.0	0.0 0.0							ompliance check
Roof 0.0	0.0 0.0				Flat roof			
Roof (type 2) 0.0	0.0 0.0	- C			Pitched roo	of - Insulatio	on at ceilin	g
Roof (type 3) 0.0	0.0 0.0					of - Insulatio		•
Roof (type 4) 0.0	0.0 0.0					of - Insulation		•
Roof (type 5) 0.0	0.0 0.0	0 -			Pliched for	of - Insulatio	m at cellin	y
Total area of elements $[m^2]$ 50.40 Heat loss via plane elements $[W/K]$	24	1						
Factor for thermal bridging [W/m ² K]	0.0							
Fabric heat loss [W/K]	28							
Dwelling heat loss coefficient [W/K]	59							
Heat loss parameter, HLP [W/K m ²]	1.2	3						
Water heating								
Are there distribution losses?	Yes							
Distribution loss [kWh/y]	195							

f yes	storage los	ses?	Y	es 1					
i yes	Water sto	rage volume	[litres]			180			
	ls manufa If yes	icturer's decl	ared loss factor a	available?		Yes	1		
	ii yes		rer and model na rer's declared los		ay]	Nibe F730 1.2	D		
	lf no	Not applica	able				7		
	End if								
			adjusted (Table : ultiplier (from Tab		0.89 0.9				
nd if						<u>^</u>			
yes	solar water Not applic	heating sys [.] able	tem?		No	0			
						S	olar fraction	[%]	0
nd if									
	rcuit loss [ł	(Wh/y] (Table	e 3)				360		
			Wh/y] (Table 3a)			1. 40	0		
			keep-hot facility on heating is use		[kvvn/y] (Tar	bie 4f)	0 No		
		ter heater [k			1904				
		entary heate			0				
-		e <i>r heating sy</i> ndoors or in	s <i>tem [W]</i> group heating sc	heme?	72 No				
ighting			a cap notany su						
nnual en	ergy used	for lighting, E	EL [kWh/y]		127				
nternal g		-							
let intern	al gains [W	1			266				
leat use									
	a fraction [·			54					
leat use		ory of dwellin		um 80					
emperati leating sy leating sy Pumps/fa	nd respon ure adjustn ystem contr ystem resp uns	nent (Table 4 rol category (onsiveness c	ategory (Table 4	a or 4d)	0 2 1	Enter number present	If present, is boiler co by room th	ermostat?	lf present, inside dwelling?
			hot water to radia boiler and flue fa		or system)	1 0		Yes -	-
Gas boiler	- flue fan (if fan assiste	d flue)			0			
	warm air h efficiency	eating syster	n present?		No				
	at emissio	n system wit	nin an envelope e		nderfloor he	ating in gro	ound floor)	No	0
			lope element [W			-		0	
ype of m	ain heating	system	Indiv	idual system			1		
		ts - individu	al heating syste	ms	:				
	of main he		[%] (including E supplementary s				ndix F)	240.0 0	
	of seconda	,	entary heater(s)		,		/	0	
		iter heater [%	6] (from HARP or	from Table 4a	or 4b)			152.381	
uel data			Fuel						
	ating - mair		electricity						
	ating - seco ating - main		- electricity						
	ating - supp		-						
Photovolta Solar The	aic/ Wind T	urbine	758 kWh	•					
Joiar The	mai		0 kWh	у					
						Primary	CO2		Delivered
-	-	-							
Renewabl Fype 1	e and ener Descriptio	gy-saving te	chnologies Heat Pumps			energy factor [-]	factor [kg/kWh]		energy [kWh/y]

	Energy produced or saved Energy consumed	2.08 0.00	0.409 0.000	0 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	Primary	CO ₂				
	energy	energy	emissions				
	onorgy	onorgy	CITISSIONS				
	[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				
		55	AS				
Check conformity with MPEPC and MPCPC requirements in TGD L							
Max permitted							
•	Complies						

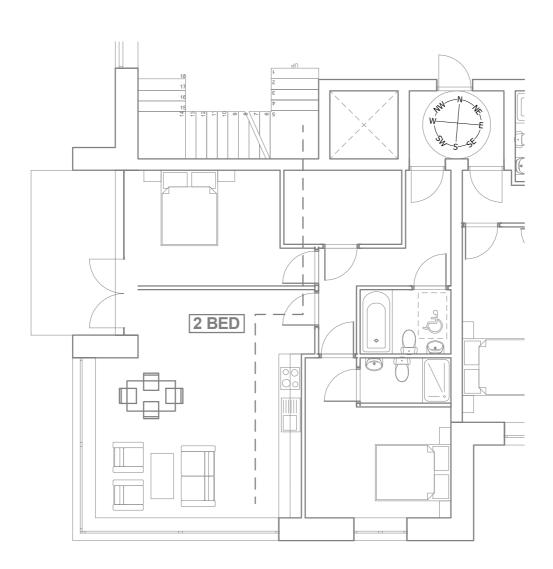
2019

	man point	inter o u
0.293	0.30	Complies
0.288	0.35	Complies
0.538	0.20	Complies
	0.293 0.288	0.288 0.35

SAMPLE 2

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

SHEET SIZE A4



BLOCK B L03 TYPICAL TWO BED 1

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

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



BUILDING SERVICES ENGINEERS [e] barry.oneill@bbsc.ie BOHERBOY DEVELOPMENT 2020_0205 BER-BLOCK B- TWO BED APARTMENT

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

Project	2020_0205 BOHERBOY	i-BBSC-CALC-APARTMENT-L03-BLOCK B 2BED SAMPLE	Ву	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 m ³	
B-01-L02-HALL	89	7.78	18.67	
B-01-L02-BEDROOM 2	649	12.41	32.89	
B-01-L02-KITCHEN-DINING R	OOM 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 Plus margin	3,535 10% 4.00	77.79 KW	202.67	

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Stora	ge (accumulat	ion method.)	E4.3 Tank Sizing	SR50-4:2021 Appendix E
Vdp60 allowance		25 I/perso	set temperature of the	55 °C
nr of Persons		4 person	s temperature of the co	10 °C
Total		200 litres	Volume	222 litres
			Energy Stored	11.6 kWh
E4.4 Heat Pump Capa	acity			
Hours Recovery		2 hrs	On at 3am off 5am	
thermal capacity of the	ne heat pump	5.8 kw		
Design Capacity	Table E.16		Note Max External Noise	45 dB(A)
Space Heating	4.0	kW	ISEN 15450:2007 Table F.1	
DHW	5.8	kW		
Design Capacity	5.8	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 ve	ersion	2019					
Area [m ²] Height [r	n]								
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							
•	nto	1							
Number of intermittent fans and passive ve	ents	0							
Number of flueless gas fires	, ,								
Is there a draught lobby on main entrance?		Yes							
Number of storeys in the dwelling	10	1							
Has an air permeability test been carried o	ut?	No	0						
If no :				7					
Structure type			Masonry						
Is there a suspended wooden g			None						
Percentage of windows and do	ors draughtstri	pped [%]	100						
If yes Not applicable				-					
				1					
End if		-							
Number of sides sheltered		2							_
Ventilation method	I		Air Heat Pun	np					7
Effective air change rate [ac/h]		0.69							
Ventilation heat loss [W/K]		47							
Permeability test carried out and meets gu			Does Not	Comply					
For mechanical ventilation, other than posi	tive input venti	lation from	m loft:	:		_			
Is measured "PCDB" data avail	able?				NA				
Manufacturer and model					-				
Specific fan power [W/(I/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	0.00	
Is U-value a manufacturer's certified value	? -	-	-	-	-	-	-	-	-
If yes:									
Manufacturer and model	- 0.8	- 0.8	-	-	-	-	-	-	-
Solar energy transmittance End if	0.0	0.0	-	-	-	-	-	-	-
Correction for roof window and/or metal fra	me if applicabl	le (Table	6a, notes 1	and 2).					
	0	0	0	0	0	0	0	0	0
Overshading ID	1	1	Õ	0 0	Ő	0	Ő	Ő	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	-	-	Ŭ	Ū	Ū	0	0	Ū	0
Fabric									
Exposed element type Area	U-value	AU	Comment	(optional)		Element ty	ре		
[m ²]	[W/m ² K]	[W/K]		()		(for assess		conformity	0
Windows/rooflights 32.2	1.3	42.7	-			(10) 235633		comorning)
Doors 2.1	1.6	3.4	-						
						Noundar	oor bootin-		
	0.0	0.0	-			No underfle			
Floor (type 2) 0.0	0.0	0.0	-			No underfle			
Floor (type 3) 0.0	0.0	0.0	-			No underfle		1.4.1.2	multiple of the t
Walls 16.1	0.2	2.6	-						ompliance check
Walls (type 2) 0.0	0.0	0.0	-						ompliance check
Walls (type 3) 0.0	0.0	0.0	-						ompliance check
Walls (type 4) 0.0	0.0	0.0	-						ompliance check
Walls (type 5) 0.0	0.0	0.0	-				int for TGD	L fabric co	ompliance check
Roof 0.0	0.0	0.0	-			Flat roof			
Roof (type 2) 0.0	0.0	0.0	-			Pitched roo			
Roof (type 3) 0.0	0.0	0.0	-			Pitched roo			
Roof (type 4) 0.0	0.0	0.0	-			Pitched roo			•
Roof (type 5) 0.0	0.0	0.0	-			Pitched roo	ot - Insulatio	on at ceilin	g
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							
		00							
Dwelling heat loss coefficient [W/K]		100							
Heat loss parameter, HLP [W/K m ²]		1.28							
Water heating									
Water heating	V-								
Are there distribution losses?	Yes								
Distribution loss [kWh/y]	246								

	storage losse	es?	Yes 1						
If yes	: Water stora	ige volume	[litres]		180				
	Is manufac	urer's dec	ared loss factor available?		Yes	1			
	If yes	: Manufactu	rer and model name		Nibe F73	D			
		Manufactu	rer's declared loss factor [kWl	n/day]	1.2	-			
	II NO	Not applica	able						
	End if								
			nadjusted (Table 2) ultiplier (from Table 2 notes)	0.89 0.9					
End if			· · · · ·						
Is there a If yes	solar water h Not applica		tem?	No	0				
					S	olar fraction	[%]	0	
End if			0						
	rcuit loss [kV loss for com		e 3) Wh/y] (Table 3a)			360 0			
			keep-hot facility of combi boi ion heating is used in summe		ble 4f)	0 No			
Output fro	m main wate	r heater [k	Wh/y]	2281		NO			
•	m suppleme s from water	•		0 121					
			group heating scheme?	Yes					
Annual en	ergy used fo	r lighting, l	EL [kWh/y]	194					
Internal g	ains al gains [W]			408					
	ai gains [vv]			400					
Heat use Living area	a fraction [-]		0.40						
Thermal m Heat use [nass categor [kWh/y]	y of dwellir	ng Medium 933						
Space hea	-								
	<i>nd responsi</i> ure adjustme		e), where appropriate [C]	0					
	stem contro	• •	(Table 4e) category (Table 4a or 4d)	2 1					
Pumps/fa		ISIVEIIESS (I	Enter number present	If present, is boiler co by room th		If present, inside	
	01 1		hot water to radiators or unde	rfloor system)	1	by room in	Yes	dwelling?	
	pump (supp - flue fan (if		boiler and flue fan) ed flue)		0 0		-	-	
Is there a	warm air hea			No					
			hin an envelope element? (e.	g. underfloor he	eating in gro	ound floor)	No	0	
Type of m	lf yes, U-va ain heating s		elope element [W/m ² K] Individual system			1	0		
Energy re	quirements	- individu	al heating systems	:					
Space He Efficiency	•	ing system	ı [%] (including Efficiency Adju	ustment Factor			240.0		
Fraction of Efficiency	f heat from s of secondary	econdary /	supplementary system (from nentary heater(s) [%] (from Ta	Table 7, Table	10 or Appe	endix F)	0		
Water hea Efficiency		er heater [%	6] (from HARP or from Table	4a or 4b)			152.381		
Fuel data			Fuel						
Space hea	ating - main ating - secon	dany	electricity						
Water hea	iting - main		electricity						
	iting - supple aic/ Wind Tur		- 758 kWh/y						
Solar Ther			0 kWh/y						
					Primary			Delivered	
Renewable Type 1	e and energy Description	•	chnologies Heat Pumps		energy factor [-]	factor [kg/kWh]		energy [kWh/y]	

	Energy produced or saved Energy consumed	2.08 0.00	0.409 0.000	0 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

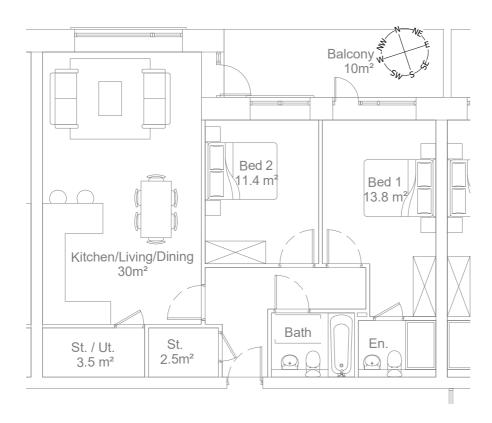
		Delivered energy	Primary energy	CO ₂ emissions		
		[kWh/y]	[kWh/y]	[kg/y]		
Space heating - main		438	912	179		
Space heating - secor	ndary	0	0	0		
Water heating - main	•	1,497	3,114	612		
Water heating - supple	ementary	0	0	0		
Pumps, fans		120	251	49		
Energy for lighting		194	404	79		
Renewable and energy	y-saving technologies					
CHP input (individual	heating systems only)	0	0	0		
CHP electrical output	(individual heating syst	0	0	0		
Photovoltaic/ Wind Tu	rbine	-758	-1,577	-310		
Type 1 Heat Pump	os	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 Ratin	g [kWh/m² y]		40	A2		
Check conformity with MPEPC and MPCPC requirements in TGD L Max permitted						
EPC	0.293 0.30	Complies				
	0.230 0.30	Complies				

2019

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



BLOCK C L03 TYPICAL TWO BED 1

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

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



BUILDING SERVICES ENGINEERS [p] 086 386 7097 [e] barry.oneill@bbsc.ie [w] www.bbsc.ie BOHERBOY BOHERBOY DEVELOPMENT 2020_0205 BER-BLOCK C- TWO BED APARTMENT

SR50-4:2021 Heat Pump Heat Loss Calculation Summary

Project	2020_0205 BOHERBO	5-BBSC-CALC-APARTMENT-L03-BLOCK C 2BED SAMPLE	Ву	Barry O'Neill CEng 05Jul2021
U-Value Inputs Element	w/mK			
Wall1	0.18	Part L: 2019		

Walli	0.10	1 alt L. 2015
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 Stora	age (accumulation i	nethod.)	E4.3 Tank Sizing	SR50-4:2021 Appendix E
Vdp60 allowance		25 l/person	set temperature of the	55 °C
nr of Persons		4 persons	temperature of the co	10 °C
Total		200 litres	Volume	222 litres
			Energy Stored	11.6 kWh
E4.4 Heat Pump Capa	acity			
Hours Recovery		2 hrs	On at 3am off 5am	
thermal capacity of the	he heat pump	5.8 kw		
Design Capacity	Table E.16		Note Max External Noise	45 dB(A)
Space Heating	4.0 kW	,	ISEN 15450:2007 Table F.1	
DHW	5.8 kW	,		
Design Capacity	5.8 kw	,		



DEAP Report

Distribution loss [kWh/y]

243

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.

2019 **Dwelling dimensions** TGD L version Area [m²] 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 [m²] 76 Dwelling volume [m³] 200 Living area [m²] 30.0 Ventilation Number of chimneys 0 0 Number of open flues 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 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 ves Not applicable End if Number of sides sheltered 2 Ventilation method 7 Exhaust Air Heat Pump 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/(I/s)] Heat exchanger efficiency [%] Windows East/West SE/SW Orientation North North South North North North Horizontal Orientation ID 3 1 4 5 1 6 1 1 1 Area [m²] 15.2 2.7 0 0 0 0 0 0 0 U-value [W/m² 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 0.8 0.8 Solar energy transmittance -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 0 0 0 0 0 0 1 1 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 U-value AU Comment (optional) Element type [m²] [W/m² K] [W/K] (for assessing TGD L conformity) Windows/rooflights 17 9 1.3 23.7 Doors 0.0 16 0.0 No underfloor heating Floor 0.0 0.0 0.0 Floor (type 2) 0.0 0.0 0.0 No underfloor heating Floor (type 3) 0.0 0.0 0.0 No underfloor heating Wall relevant for TGD L fabric compliance check Walls 23.8 0.2 3.8 Walls (type 2) 0.0 0.0 0.0 Wall relevant for TGD L fabric compliance check Walls (type 3) Wall relevant for TGD L fabric compliance check 0.0 0.0 0.0 Walls (type 4) 0.0 Wall relevant for TGD L fabric compliance check 0.0 0.0 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 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 Total area of elements [m²] 41.70 Heat loss via plane elements [W/K] 28 Factor for thermal bridging [W/m² K] 0.08 Fabric heat loss [W/K] 31 Dwelling heat loss coefficient [W/K] 77 Heat loss parameter, HLP [W/K m²] 1.02 Water heating Are there distribution losses? Yes

	storage loss	es?	Yes	1					
If yes	: Water stora	age volume	[litres]		180		1		
	ls manufac	turer's dec	ared loss factor available?		Yes	1			
	If yes	: Manufactu	rer and model name		Nibe F73	0			
		Manufactu	rer's declared loss factor [k	Wh/day]	1.2	•			
	lf no	Not applica	adie			7			
	End if								
	Temperatu		adjusted (Table 2) ultiplier (from Table 2 notes	0.89					
End if				,					
Is there a s If yes	solar water l Not applica		tem?	No	0				
					S	olar fraction	[%]	0	
End if			-						
	rcuit loss [k\ loss for com		e 3) Wh/y] (Table 3a)			360 0			
	•		keep-hot facility of combi b on heating is used in summ		ble 4f)	0 No			
Output from	m main wate	er heater [k	Wh/y]	2260		NO			
	m suppleme s from water			0 88					
-			group heating scheme?	No					
	ergy used fo	or lighting, l	EL [kWh/y]	190					
Internal g									
Net interna	al gains [W]			369					
Heat use	a fraction [-]		0.40						
	ass categor	y of dwellir							
Space hea	-								
	nd respons ure adjustme		e), where appropriate [C]	0					
• •	stem contro	• •	(Table 4e) category (Table 4a or 4d)	2 1					
Pumps/fai		ISIVEILESS		I	Enter number present	If present, is boiler co		If present, inside	
	01 1		hot water to radiators or un	derfloor system)	1	by room th	Yes	dwelling?	
	pump (supp - flue fan (if		boiler and flue fan) d flue)		0 0		-	-	
	warm air hea efficiency	ating syster	n present?	No					
	at emission		hin an envelope element? (e.g. underfloor he	eating in gro	ound floor)	No	0	
Type of ma	lf yes, U-va ain heating s		elope element [W/m ² K] Individual syste	m		1	0		
		- individu	al heating systems	:					
Space Head	•	ting system	[%] (including Efficiency A	djustment Factor)		240.0		
Efficiency	of secondar		supplementary system (fro entary heater(s) [%] (from	,		endix F)	0 0		
Water heat Efficiency		er heater [%	6] (from HARP or from Tabl	e 4a or 4b)			152.381		
Fuel data		-	Fuel						
Space hea	ating - main	don	electricity						
Water hea	ating - secon ting - main	-	- electricity						
	ting - supple iic/ Wind Tu		- 1,011 kWh/y						
Solar Ther		-	0 kWh/y						
					Primary			Delivered	
Renewable Type 1	e and energ Descriptior		chnologies Heat Pumps		energy factor [-]	factor [kg/kWh]		energy [kWh/y]	

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

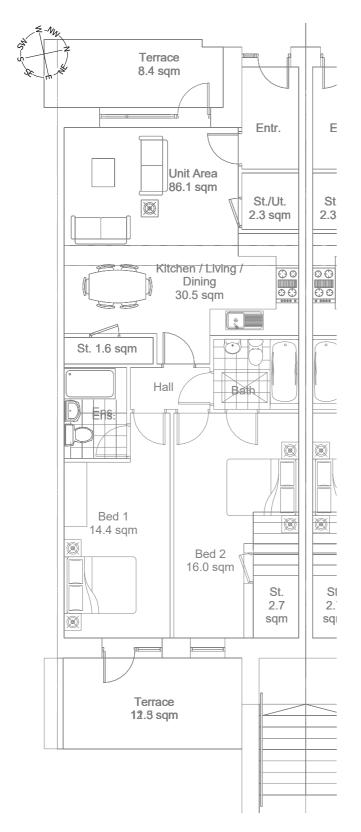
	Delivered energy	Primary energy	CO ₂ emissions			
	[kWh/y]	[kWh/y]	[kg/y]			
Space heating - main	663	1,380	271			
Space heating - secondary	0	0	0			
Water heating - main	1,483	3,085	607			
Water heating - supplementary	0	0	0			
Pumps, fans	119	247	49			
Energy for lighting	190	395	78			
Renewable and 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 Max permitted						

	мах репп	iiileu
0.295	0.30	Complies
0.291	0.35	Complies
0.559	0.20	Complies
	0.295 0.291	0.291 0.35

2019

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
- A. HEAT PUMP, WASTE AIR TYPE2. 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
- WATER PUMPING

 WATER BOOSTER TO WHOLE HOUSE
 CAR CHARGING
 - A. 1 IN 10 SPACES TO BE PROVIDED

D

1

DUPLEX-A L00 TYPICAL ONE BED





BUILDING SERVICES ENGINEERS [p] 086 386 7097

ej barry.oneill@bbsc.ie [w] www.bbsc.ie BOHERBOY BOHERBOY DEVELOPMENT 2020_0205 BER-DUPLEX C- TYPICAL TWO BED GROUND APARTMENT

Project	2020_0205-BBSC-CALC-DUPLEX-L00-BLOCK C 2BED SAMPLE BOHERBOY		Ву	Barry O'Neill CEng 09Jun2021	
U-Value Inputs					
Element	w/mK				
Wall1	0.18	Part L: 2019			
Wall2	0.18	Part L: 2019			
W/5112	0.10	Dart I + 2010			

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 RO	OM 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-LOO-STORE (3)	87	2.70	6.48
DUPC-LOO-HALL (2)	82	2.31	5.54
Totals Plus margin 10	3,309 % 4.00	82.88 KW	216.42

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Stora	ge (accumulati	ion method.)	E4.3 Tank Sizing	SR50-4:2021 Appendix E
Vdp60 allowance		25 l/person	set temperature of the	55 °C
nr of Persons		4 persons	temperature of the co	10 °C
Total		200 litres	Volume	222 litres
			Energy Stored	11.6 kWh
E4.4 Heat Pump Capa	city			
Hours Recovery		2 hrs	On at 3am off 5am	
thermal capacity of th	e heat pump	5.8 kw		
Design Capacity	Table E.16		Note Max External Noise	45 dB(A)
Space Heating	4.0	kW	ISEN 15450:2007 Table F.1	
DHW	5.8	kW		
Design Capacity	5.8	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 vei	rsion	2019					
Area [m ²] Heig	ht [m]								
	.0								
First floor 86 2	.7								
	.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 passiv Number of flueless gas fires	e vents	1 0							
Is there a draught lobby on main entrar	ice?	No							
Number of storeys in the dwelling		1							
Has an air permeability test been carrie	ed out?	No	0						
If no				-					
Structure type			Masonry						
Is there a suspended wood			None						
If yes Not applicable	doors draughtstr	ipped [%]	100						
				1					
End if				-					
Number of sides sheltered		2							
Ventilation method			ir Heat Pun	np					7
Effective air change rate [ac/h]		0.71							
Ventilation heat loss [W/K] Permeability test carried out and meets	duidelines in TO	55 012	Does Not	Comply					
For mechanical ventilation, other than									
Is measured "PCDB" data a			i ioit.	•	NA				
Manufacturer and model					-				
Specific fan power [W/(I/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 va		-	0.00	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	-	-	-	-	-	-	-
Correction for roof window and/or meta	I frame if applical	ole (Table 6	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									
	ea U-value	AU	Comment	(optional)		Element ty	/pe		
	n ²] [W/m ² K]	[W/K]				(for assess	sing TGD L	conformity	()
-	5.2 1.3	20.1	-						
	.0 1.6	0.0	-			Noundar	oor bootin-		
	.0 0.0 .0 0.0	0.0 0.0	-				oor heating oor heating		
())	.0 0.0	0.0	-				oor heating		
	3.6 0.2	11.8	-						ompliance check
Walls (type 2) 0	.0 0.0	0.0	-			Wall releva	ant for TGD	L fabric co	ompliance check
Walls (type 3) 0	.0 0.0	0.0	-						ompliance check
(),	.0 0.0	0.0	-						ompliance check
	.0 0.0	0.0	-				ant for TGD	L fabric co	ompliance check
	.0 0.0 .0 0.0	0.0 0.0	-			Flat roof	of - Insulatio	on at calli-	a
	.0 0.0	0.0	-				of - Insulatio		
	.0 0.0	0.0	-				of - Insulatio		
	.0 0.0	0.0	-				of - Insulatio		0
	.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							
Duralling head loop filetent BAUKS		64							
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								

If yes water storage volume [itres] 100 100 100 100 100 100 100 100 100 10		torage losse	s?	Yes	1					
If yes imanufacturer and model name Nibe F730 If no Manufacturer addition loss factor [kWh/day] 1.2 If no Imanufacturer addition loss factor [kWh/day] 1.2 End if Imanufacturer fador multipler (nom Table 2 notes) 0.9 End if Solar factors [%] 0 Fromary circuit loss [kWh/g] (Table 3) 360 Additional loss for water heating system? No 0 End if Solar factors [%] 0 Fromary circuit loss [kWh/g] (Table 3) 360 0 Output form any water heater (kWh/g) 0 1 Best gate from supplementary electric immersion fiscility is used in summer? No 0 Output form any water heater (kWh/g) 210 1 Internal gains Met use [kWh/g] 210 1 Not applicable 0 355 1 1 Uning area factor [-] 0.35 1 1 1 1 Thermal agas statem of loss (kWh/g) 1.06 1 1 1 1 Parternal agains 1 0 - - - - - - </td <td></td> <td>: Water stora</td> <td>ge volume</td> <td>[litres]</td> <td></td> <td>180</td> <td></td> <td>1</td> <td></td> <td></td>		: Water stora	ge volume	[litres]		180		1		
Image: Section of the sectin of the section of the section of the section of the		ls manufact	urer's decl	ared loss factor available?	?	Yes	1			
Image: Manufacturer's declared loss factor [kWh/day] 1.2 If mo 1.2 End if Temperature factor multipler (fm Table 2 notes) 0.89 Error of temperature factor multipler (fm Table 2 notes) 0.9 Is ther a social water heating system? No 0 If yes Sociar faction [%] 0 End if Sociar faction [%] 0 France Section combinition (KWh/g) (Table 3) 300 Additional loss for CWh/g (Table 3) 21 Addition loss for Comb Deller (KWh/g) 210 Internal gains 10 Not applicable 10 Pater apport of weat reading system responsiveness 10 Space facility of Camb applicable difference			Manufactu	rer and model name		Nibe F73	0			
End if Importative factor unadjusted (Table 2) 0.89 End if Is there a solar water heating system? No 0 If is there a solar water heating system? No 0 If if Solar fraction (%) 0 End if Solar fraction (%) 0 If if Solar fraction (%) 0 If if Solar fraction (%) 0 End if Solar fraction (%) 0 End if		1	Manufactu	rer's declared loss factor [kWh/day]		•			
Temperature factor undigitate (Trable 2) 0.88 End If 0.9 End Is there a solar water heating system? No 0 If yes Solar fraction [%] 0 End I Solar fraction [%] 0 Electricity consumption of electric keep-hot facility of combi bolier [kWhy] (Table 4) 0 Supplementary heater (kWhy) 231 0 Ordput from supplementary heater (kWhy) 0 1 Heat gas from water heating system (M) 92 1 Supplementary water heating system (M) 92 1 Is hot water storage indoors or in group heating scheme? No 1 Lighting Annual energy used for lighting, EL [kWhy] 210 1 Internal gains Medium 1 1 1 Ving area faction [] 0.35 1 1 1 1 Heat use (kWhy] 1808 1 1 1 1			vot applica	adie						
Temperature factor undigitate (Trable 2) 0.88 End If 0.9 End Is there a solar water heating system? No 0 If yes Solar fraction [%] 0 End I Solar fraction [%] 0 Electricity consumption of electric keep-hot facility of combi bolier [kWhy] (Table 4) 0 Supplementary heater (kWhy) 231 0 Ordput from supplementary heater (kWhy) 0 1 Heat gas from water heating system (M) 92 1 Supplementary water heating system (M) 92 1 Is hot water storage indoors or in group heating scheme? No 1 Lighting Annual energy used for lighting, EL [kWhy] 210 1 Internal gains Medium 1 1 1 Ving area faction [] 0.35 1 1 1 1 Heat use (kWhy] 1808 1 1 1 1		End if								
End if Enter a solar water heating system? No 0 If yes Not applicable Solar fraction [%] 0 End if Primary circuit loss [kWhy] (Table 3) 360 Additional loss for comb bole [KWhy] (Table 3) 360 Additional loss for comb bole [KWhy] (Table 3) 0 Electricity consumption of electric keep-hot facility of comb bole [KWhy] (Table 41) 0 Electricity consumption of electric keep-hot facility of comb bole [KWhy] (Table 41) 0 Cuptor tom support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion for the support of the suppo		Temperatur								
If yes Not applicable	End if	·		· ·	1					
Solar fraction [%] 0 End if Solar fraction [%] 0 Finang viccuit loss [kWhy] (Table 3) 360 Additional toss for comb ibolier [kWhy] 0 Electricity consumption of electric keep-hot facility of combi bolier [kWhy] 0 Is supplementary electric immersion heating is used in summer? No Output from main water heater [kWhy] 0 Heat gains from water heating system [W] 92 Is hot water storage indoors or in group heating scheme? No Uptiming Annal energy used for lighting. EL [kWhy] 210 Internal gains No Uning area fraction [-] 0.35 Thermal mass category of dwelling Medium Heat use [kWhy] 1896 Space heating Control and responsiveness Control and responsiveness Enter if f present, if present, inside number is bolier controlled inside present by room thermostar? Control and responsiveness 0 - Cast older . Fue (if fan assisted fue) 0 - Control and responsiveness 1 Present by room thermostar? dwelling? Cast older . Fue (if fan assisted fue)				tem?	No	0				
Primary pricult loss [kVMNy] (Table 3) 360 Additional loss for combib loier [kVMNy] (Table 3a) 0 Electricity consumption of electric keep-hot facility of combi boiler [kVMNy] (Table 4f) 0 Is supplementary heater [kVMNy] (Table 3a) 0 Output from supplementary heater [kVMNy] 2351 No Output from supplementary heater [kVMNy] 0 Heat gains from water heater [kVMNy] 210 Internal gains Annual energy used for lighting, EL [kVMNy] 210 Internal gains Not internal gains [kVM] 400 Heat uses Lighting Annual energy used for lighting, EL [kVMNy] 100 Heat uses Lighting atom the factor [Ling area fraction [Li	,					S	olar fraction	[%]	0	
Additional loss for combi boiler (WMv) (Table 3a) 0 Electricity consumption of electric keep-hot facility of comb boiler (Whv) (Table 4) 0 Is supplementary heater, KWhv) 2351 Output from main water heating system (W) 9 Electricity consumption of electric KWhv) 1 Annual energy used for lighting, EL [kWhv] 210 Internal gains Met internal gains [W] 400 Heat gains from water heating system (W) 400 Heat gains from supplementary heater (KWhv) 1 Internal gains [W] 400 Heat gains from supplementary heater (KWhv) 1 Internal gains [W] 400 Heat use Living area fraction [-] 0.35 Thermal mass category of dwelling Medium Heating system control category (Table 4e) 400 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 0 Internal mass category of dwelling Medium Heat use Living area fraction [-] 0.35 Theme in mass category of dwelling Medium Heat use for the properties [C] 0 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 2 Heating system control category (Table 4a or 4d) 1 Pumps ¹ (Table 4e), where appropriate [C] 0 Heating system responsiveness category (Table 4a or 4d) 1 Pumps ² (Table 4b) 0 Central heating pump (supplying hot water to radiators or underfloor system) 1 to the aver the fart (If an assisted flue) 0 The far advert for assisted flue) 0 Finiscion officiency Brainsion efficiency Brainsion efficiency Brainsion efficiency Hype of main heating system present? No Encergy requiremants - individual system 1 Encergy requiremants - individual system 1 Encergy requiremants - individual system 1 Encergy requiremants - individual system (for Table 4 or Appendix F) 0 Efficiency of main heating system (for Table 4 or Appendix F) 0 Efficiency of anain water heater [%] (from HARP or from Table 4 a or Appendix F) 0 Efficiency of main water heater [%] (from HARP or from Table 4 a or Appendix F) 0 Efficiency of main wa										
Is supplementary electric immersion heating is used in summer? No Output from marker heat (WhVy) 2351 Output from marker heating system (W) 92 Is hot water storage indoors or in group heating scheme? No Lighting Annual energy used for lighting, EL (kWhV) 210 Internal gains Not internal gains (W) 400 Heat use Living area fraction [-] 0.35 Themat mass category of dwelling Medium Heat use (kWhV) 1896 Space heating Control and responsiveness Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system control category (Table 4e) 2 Heating system control category (Table 4a or 4d) 1 Pumpsfans Living area fraction [-] 0.35 Space heating Control and responsiveness category of table 4e or 4d) 1 Heating system control category (Table 4a or 4d) 0 Sabeller - hue fung (supplying hot water to radiators or underfloor system) 1 Ol boiler - pump (supplying hot water to radiators or underfloor system) 0 Is there a warm air heating system present? No Emission officiency 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 [Yein 'K'] 0 If yee of main heating system ['bi (including Efficiency Adjustment Factor) 240.0 Fraction of the from secondary / supplementary system (from Table 4a or Appendix E) 0 Water heating - main electricity Space heating - main electricity Space heating - main electricity Space heating - main electricity Space heating - main electricity Water heating - main electricity Space heating - main electricity Space heating - main electricity Water										
Output from main water heater (WhVy) 2351 Output from main water heating system (W) 92 Is hat water storage indoors or in group heating scheme? No Lighting 210 Internal gains 400 Heat agains (M) 92 Internal gains 400 Heat use 100 Ling area fraction [-] 0.35 Thermal mass category of dwelling Medium Heat use (WhVy) 1896 Space heating 2 Control and responsiveness 1 Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system control category (Table 4a or 4d) 1 Pumps/fans Enter If present, inside present by room thermostat? Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Oil boiler - pump (supplying not us boiler and flue fan) 0 - - Gas boiler - flue fan (If an assisted flue) 0 - - - She avain at heating system present? No 0 - - - Type of main heating system fifting, EL [kWmV/] 0 0 <td></td> <td>•</td> <td></td> <td></td> <td>• •• •</td> <td>ble 4f)</td> <td></td> <td></td> <td></td> <td></td>		•			• •• •	ble 4f)				
Heat gains from water beating system (W) 92 Is hot water storage indoors or in group heating scheme? No Lighting 210 Internal gains 210 Internal gains (M) 400 Heat use 100 Living area fraction [-] 0.35 Thermal mass category of dwelling Medium Heat use 2 Living area fraction [-] 0.35 Space heating Control and responsiveness Control and responsiveness 2 Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter If present, inside present Ot bolier - prive (supplying) hot water to radiators or underfloor system) 1 Yes Ol bolier - prive (supplying) hot water to radiators or underfloor system) 1 Yes Ol bolier - prive (supplying) hot water to radiators or underfloor heating in ground floor) 0 1 Brains on difficiency No 0 1 Yes	Output fron	n main wate	r heater [k	Wh/y]	2351		NO			
is hot water storage indoors or in group heating scheme? No Lighting Annual energy used for lighting, EL [kWhy] 210 Internal gains Not internal gains [W] 400 Heat use Living area fraction [-] 0.35 Themail mass category of dwelling Medium Heat use [kWhy] 1896 Space heating Control and responsiveness Control and responsiveness Control and responsiveness category (Table 4e) 2 Heating system control category (Table 4e) 1 Pumpsfans I (Frase action of [-] 100 Control and responsiveness Control and responsiveness Category (Table 4e) 2 Heating system control category (Table 4e) 1 Pumpsfans I (Frase action of [-] 100 Control and responsiveness Category (Table 4e) 2 Heating system control category (Table 4e) 0 Control and responsiveness Category (Table 4e) - 0 If yes, U-value of envelope element? (e.g. underfloor heating in ground floor) No 0 If yes of main heating system resent? No Emission officiency Is main heating system within an envelope element? (e.g. underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (from Table 7, Table 10 or Appendix F) 0 Efficiency of secondary / supplementary system (from Table 4a or 4b) 152.381 Fuel data Fuel Space heating - main electricity Water heating - supplementary i electricity Water h										
Annue dergry used for lighting, EL [kWh/y] 210 Internal gains Net internal gains [W] 400 Heat use Living area fraction [] 0.35 Themal 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 tresponsiveness category (Table 4a or 4d) 1 Pumps/fans Central heating pump (supplying hot water to radiators or underfloor system) 1 freesent, inside present by oroon thermostat? dwelling? Central heating system within an envelope element? (e.g. underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (e.g. underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was the table of Appendix F) 0 Control and rom secondary / supplementary system (mall in table 7, table 10 or Appendix F) 0 If inclusion group in the ating system (%) (from Table 7, table 10 or Appendix F) 0 If is a supplementary heater(%) (from HaRP or from Table 4a or Appendix E) 0 If is a supplementary heater(%) (from HARP or from Table 4a or Appendix E) 0 If is a supplementary is electricity Water heating - main electricity Water hea	Is hot water									
Internal gains Net internal gains [W] 400 Heat use Living area fraction [-] 0.35 Thermail 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 If present, inside Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Ot boiler - pump (supplying oil to boiler and flue fan) 0 - Ot boiler - num air heating system present? No 0 Emission efficiency Ot boiler - num is heating system present? No 0 - Entergy requirements - individual heating system 1 Enter 0 0 0 Type of main heating system (%) (including Efficiency Adjustment Factor) 240.0 Fraction of heating system (%) (including Efficiency Adjustment Factor) 240.0 Efficiency of main water heater (%) (from HARP or from Table 7, able 10 or Appendix E) 0 0 Efficiency of main water heater (%) (from HARP or from Table 4a or Appendix E) 0 0 Efficiency of main water heater (%) (from HARP or from Table 4a or										
Net interial gains [W] 400 Heat use Living area fraction [-] 0.35 Thermail 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 is bolier controlled present If present, inside Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Oli bolier - pump (supplying oil to bolier and flue fan) 0 - Gas bolier - flue fan (ff an assisted flue) 0 - Is there a warm air heating system mesent? No 0 If yes, U-value of envelope element? (e.g. underfloor heating in ground floor) No 0 Type of main heating system [Wim Xe] 0 0 0 Type of main heating system [Wim [Chulding Efficiency Adjustment Factor) 240.00 240.00 Fractor of heat from secondary / supplementary system (from Table 4a or Appendix E) 0 0 Space heating Fuel Space heating - secondary / supplementary heater(s) [%] (from Table 4a or Appendix E)	Annual ene	ergy used for	lighting, E	EL [kWh/y]	210					
Heat use Living area fraction [-] 0.35 Thermal mass category of dwelling Heat use (kWh/y) 1896 Space heating Control and responsiveness 0 Heating system control category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter number is boiler controlled present by room themostate? If present, inside dwelling? Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Ol boiler - pump (supplying oil to boiler and flue fan) 0 - Gas boiler - fue fan (ff an assisted flue) 0 - - - Gas boiler - fue fan (ff an assisted flue) 0 - - - Sab coller - fue fan (ff an assisted flue) 0 - - - Sab coller - fue fan (ff an assisted flue) 0 - - - Sab coller - fue fan (ff an assisted flue) 0 - - - - - Sup controlled for fan assisted flue) 0 - - - - - - - - - - - - - - - - - -	-				400					
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 control category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Central heating pump (supplying hot water to radiators or underfloor system) 0 Gas boiler - pump (supplying hot water to radiators or underfloor system) 1 Yes Oli boiler - pump (supplying hot water to radiators or underfloor system) 1 Yes 1 Store a warm air heating system present? No Emission efficiency Type of main heating 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 [%] (including Efficiency Adjustment Factor) 240.0 Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 Efficiency of main heating system [%] (from HARP or from Table 4a or 4b) 152.381 Fuel data Fuel Space heating - secondary / supplementary system (from Table 4a or Appendix E) 0 Water heating - secondary - i Water heating - supplementary - Photovoltaic / Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y		i gairis [vv]			400					
Themain 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 responsiveness category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter If present, If present, Inside present by room themosta? dwelling? Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Of booler - pumps (Jable 4a) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0		fraction [-]		0.35						
Space heating Control and responsiveness Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter If present, inside number is boiler controlled inside Oll boiler - pump (supplying hol twater to radiators or underfloor system) 1 Yes Oll boiler - pump (supplying oil to boiler and flue fan) 0 - Gas boiler - flue fan (if fan assisted flue) 0 - - Gas boiler - flue fan (if fan assisted flue) 0 - - Is there a warm air heating system present? No 0 - - Emission efficiency Is main heat emission system within an envelope element? (e.g. underfloor heating in ground floor) No 0 0 Type of main heating system [%] (including Efficiency Adjustment Factor) 240.0 Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix E) 0 Water heating System from Table 4a or 4b) 152.381 Fuel dat Fraction of heat from secondary / supplementary system (from Table 4a or 4b) 152.381 Fuel dat Fuel Space heating - main	Thermal ma	ass category	of dwellir	ng Medium						
Control and responsiveness Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system control category (Table 4a or 4d) 1 <i>Pumps/fans</i> Enter If present, inside central heating system responsiveness category (Table 4a or 4d) 1 <i>Pumps/fans</i> Enter If present, inside central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Oil boller - pump (supplying oil to boiler and flue fan) 0 - - Gas boiler - flue fan (if fan assisted flue) 0 - - St here a warm air heating system present? No No Emission efficiency Is main heat emission system within an envelope element? (e.g. underfloor heating in ground floor) No 0 Type of main heating system Individual system 1 Individual system Efficiency of secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 O Fraction of heat from secondary / supplementary system (from Table 4a or Appendix E) 0 Water heating Efficiency of secondary / supplementary system (from Table 4a or Appendix E) 0 Vater heating Efficiency of secondary / supplementary supplementary supplementary sup	-			1090						
Heating system control category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 <i>Pumps/fans</i> Central heating pump (supplying hot water to radiators or underfloor system) 1 Oil boiler - pump (supplying oil to boiler and flue fan) 0 Central heating 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 <i>Emission efficiency</i> 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 [%] (including Efficiency Adjustment Factor) 240.0 Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 Efficiency of main heating system [%] (from HARP or from Table 4a or Appendix E) 0 <i>Water heating</i> Efficiency of main water heater [%] (from HARP or from Table 4a or Appendix E) 0 <i>Water heating</i> Efficiency of main water heater [%] (from HARP or from Table 4a or Appendix E) 0 <i>Water heating</i> Efficiency of main water heater [%] (from HARP or from Table 4a or Appendix E) 0 <i>Water heating</i> - main electricity Space heating - main electricity Space		-	veness							
Heating system responsiveness category (Table 4a or 4d) Pumps/fans Interim If present, If p										
number is boiler controlled inside present by room thermostat? dwelling? Oil boiler - pump (supplying oil to boiler and flue fan) 0 - Gas boiler - flue fan (if fan assisted flue) 0 - State 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/m² K] 0 0 - Type of main heating system Individual system 1 - Energy requirements - individual heating systems 240.0 - - Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 - Water heating Fuel - - - Braction of heat from secondary / supplementary system (from Table 4a or 4b) 152.381 - Fuel data Fuel - - - Space heating - main electricity - - - Space heating - main electricity - - - - Vater heating - main	Heating sys	stem respon	• •	· /		_				
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/m² K] 0 0 0 Type of main heating system Individual system 1 240.0 Energy requirements - individual heating systems : 240.0 5 Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 0 Efficiency of secondary / supplementary heater(s) [%] (from Table 4a or Appendix E) 0 0 Water heating Fuel 5 5 5 Space heating - main electricity 5 5 5 Space heating - secondary - - - - - Space heating - main electricity - - - - - - - - - - </td <td>Pumps/fan</td> <td>IS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ntrolled</td> <td></td> <td></td>	Pumps/fan	IS						ntrolled		
Oil boiler - pump (supplying oil to boiler and flue fan) 0 - - Gas boiler - flue fan (if fan assisted flue) 0 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/m² K] 0 0 0 Type of main heating system Individual system 1 0 Energy requirements - individual heating systems : 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 - supplementary - Vater heating - supplementary - Vater heating - supplementary - Space heating - main electricity Space heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Sola	Central bes	ating pump (eupplying	hot water to radiators or u	nderfloor system)		by room th		dwelling?	
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 If yes, U-value of envelope element [W/m ² K] Type of main heating system Individual system Individual system Individual system Individual system I Energy requirements - individual heating systems Efficiency of main heating system [%] (including Efficiency Adjustment Factor) Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) Efficiency of secondary / supplementary heater(s) [%] (from Table 4a or Appendix E) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or	Oil boiler -	pump (supp	ying oil to	boiler and flue fan)	ndemoor system)	0		-	-	
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 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 for the state of the sta				,	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 - main electricity Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies			vetem wit	hin an envelope element?	(e.g. underfloor b	aating in gr	ound floor)	No	0	
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 beater(s) [%] (from Table 4a or Appendix E) 0 Water heating 0 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 Primary CO2 Delivered Renewable and energy-saving technologies Primary CO2 Delivered		lf yes, U-val	ue of enve	elope element [W/m ² K]		sating in gro		-	0	
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 0 Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) 152.381 Fuel data Fuel Space heating - main electricity Space heating - main electricity Water heating - main electricity Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies energy factor	Type of ma	in heating s	ystem	Individual syst	tem		1			
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 0 Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) 152.381 Fuel data Fuel Space heating - main electricity Water heating - main electricity Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies Primary CO2			- individu	al heating systems	:					
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 - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies energy factor energy	Efficiency of	of main heati								
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 CO2 Delivered							endix F)			
Fuel 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 CO2 Delivered	Water heat	ting				,		152 381		
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 CO2 Delivered		n main wate	i neatei [/					152.501		
Space heating - secondary - Water heating - main electricity Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Renewable and energy-saving technologies energy		ting - main								
Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies energy factor energy	Space heat	ting - second	lary	-						
Solar Thermal 0 kWh/y Primary CO2 Renewable and energy-saving technologies energy factor energy	Water heat	ing - supplei		-						
Primary CO2 Delivered Renewable and energy-saving technologies energy factor energy			oine							
Renewable and energy-saving technologies energy factor energy						Priman	C02		Delivered	
I ype 1 Description Heat Pumps factor [-] [kg/kWh] [kWh/y]			-saving te	•		energy	factor		energy	
	1уре 1	Description		Heat Pumps		tactor [-]	[kg/kWh]		[KWh/y]	

	Energy produced or saved Energy consumed	2.08 0.00	0.409 0.000	0 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 I	neating - main	838	1,742	343
Space I	neating - secondary	0	0	0
	eating - main	1,543	3,209	631
Water h	eating - supplementary	0	0	0
Pumps,	fans	135	281	55
Energy	for lighting	210	436	86
	able and energy-saving technologies			
	out (individual heating systems only)	0	0	0
CHP ele	ectrical output (individual heating syst	0	0	0
	oltaic/ 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	loor area	18.5	38.5	7.6
Building	Energy Rating [kWh/m ² y]		38	A2
Check	conformity with MPEPC and MPCP Max permi		ents in T	GD L
EPC	0.270 0.30	Complies		
	0.210 0.30	Complies		

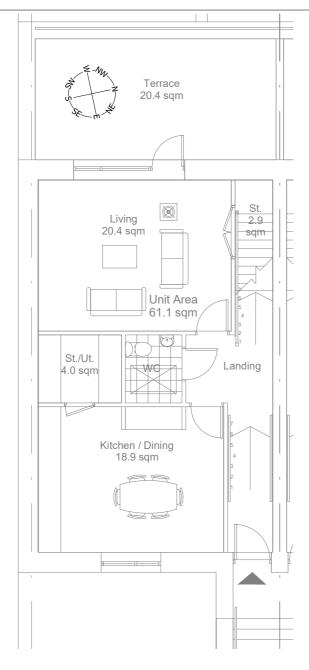
2019

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



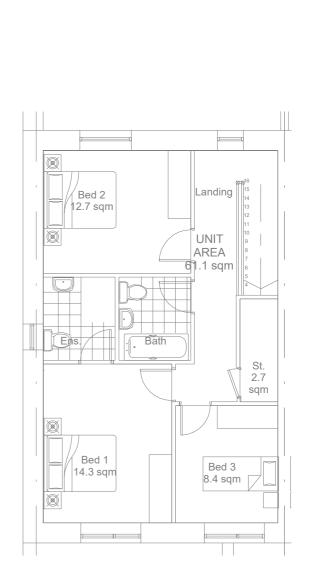


DUPLEX-A L01 TYP 3 BED 1

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



DUPLEX-A L02 TYP 3 BED 2

1:100

PRINCPLE MEASURES

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



BUILDING SERVICES ENGINEERS [p] 086 386 7097 [e] barry.oneill@bbsc.ie [w] www.bbsc.ie BOHERBOY BOHERBOY DEVELOPMENT 2020_0205 BER-DUPLEX D- TYPICAL THREE BED MASIONETTE

Project	2020_0205-BBSC-CALC-DUPLEX-L00-BLOCK C 2BED SAMPLE BOHERBOY		Ву	Barry O'Neill CEng 09Jun2021	
U-Value Inputs					
Element	w/mK				
Wall1	0.18	Part L: 2019			
Wall2	0.18	Part L: 2019			
W/5112	0.10	Dart I + 2010			

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 RO	OM 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-LOO-STORE (3)	87	2.70	6.48
DUPC-LOO-HALL (2)	82	2.31	5.54
Totals Plus margin 10	3,309 % 4.00	82.88 KW	216.42

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

E4.2 Hot Water Stora	ge (accumulati	ion method.)	E4.3 Tank Sizing	SR50-4:2021 Appendix E
Vdp60 allowance		25 l/person	set temperature of the	55 °C
nr of Persons		4 persons	temperature of the co	10 °C
Total		200 litres	Volume	222 litres
			Energy Stored	11.6 kWh
E4.4 Heat Pump Capa	city			
Hours Recovery		2 hrs	On at 3am off 5am	
thermal capacity of th	e heat pump	5.8 kw		
Design Capacity	Table E.16		Note Max External Noise	45 dB(A)
Space Heating	4.0	kW	ISEN 15450:2007 Table F.1	
DHW	5.8	kW		
Design Capacity	5.8	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 vei	rsion	2019					
Area [m ²] Heig	ht [m]								
	.0								
First floor 86 2	.7								
	.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 passiv Number of flueless gas fires	e vents	1 0							
Is there a draught lobby on main entrar	ice?	No							
Number of storeys in the dwelling		1							
Has an air permeability test been carrie	ed out?	No	0						
If no				-					
Structure type			Masonry						
Is there a suspended wood			None						
If yes Not applicable	doors draughtstr	ipped [%]	100						
				1					
End if				-					
Number of sides sheltered		2							
Ventilation method			ir Heat Pun	np					7
Effective air change rate [ac/h]		0.71							
Ventilation heat loss [W/K] Permeability test carried out and meets	duidelines in TO	55 012	Does Not	Comply					
For mechanical ventilation, other than									
Is measured "PCDB" data a			i ioit.	•	NA				
Manufacturer and model					-				
Specific fan power [W/(I/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 va		-	0.00	-	-	-	-	-	-
If yes:									
Manufacturer and model	-	-	-	-	-	-	-	-	-
Solar energy transmittance	0.8	0.8	-	-	-	-	-	-	-
Correction for roof window and/or meta	I frame if applical	ole (Table 6	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									
	ea U-value	AU	Comment	(optional)		Element ty	/pe		
	n ²] [W/m ² K]	[W/K]				(for assess	sing TGD L	conformity	()
-	5.2 1.3	20.1	-						
	.0 1.6	0.0	-			Noundar	oor bootin-		
	.0 0.0 .0 0.0	0.0 0.0	-				oor heating oor heating		
())	.0 0.0	0.0	-				oor heating		
	3.6 0.2	11.8	-						ompliance check
Walls (type 2) 0	.0 0.0	0.0	-			Wall releva	ant for TGD	L fabric co	ompliance check
Walls (type 3) 0	.0 0.0	0.0	-						ompliance check
(),	.0 0.0	0.0	-						ompliance check
	.0 0.0	0.0	-				ant for TGD	L fabric co	ompliance check
	.0 0.0 .0 0.0	0.0 0.0	-			Flat roof	of - Insulatio	on at calli-	a
	.0 0.0	0.0	-				of - Insulatio		
	.0 0.0	0.0	-				of - Insulatio		
	.0 0.0	0.0	-				of - Insulatio		0
	.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							
Duralling head loss filetent BAUKS		64							
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								

If yes water storage volume [itres] 100 100 100 100 100 100 100 100 100 10		torage losse	s?	Yes	1					
If yes imanufacturer and model name Nibe F730 If no Manufacturer addition loss factor [kWh/day] 1.2 If no Imanufacturer addition loss factor [kWh/day] 1.2 End if Imanufacturer fador multipler (nom Table 2 notes) 0.9 End if Solar factors [%] 0 Fromary circuit loss [kWh/g] (Table 3) 360 Additional loss for water heating system? No 0 End if Solar factors [%] 0 Fromary circuit loss [kWh/g] (Table 3) 360 0 Output form any water heater (kWh/g) 0 1 Best gate from supplementary electric immersion fiscility is used in summer? No 0 Output form any water heater (kWh/g) 210 1 Internal gains Met use [kWh/g] 210 1 Not applicable 0 355 1 1 Uning area factor [-] 0.35 1 1 1 1 Thermal agas statem of loss (kWh/g) 1.06 1 1 1 1 Parternal agains 1 0 - - - - - - </td <td></td> <td>: Water stora</td> <td>ge volume</td> <td>[litres]</td> <td></td> <td>180</td> <td></td> <td>1</td> <td></td> <td></td>		: Water stora	ge volume	[litres]		180		1		
Image: Section of the sectin of the section of the section of the section of the		ls manufact	urer's decl	ared loss factor available?	?	Yes	1			
Image: Manufacturer's declared loss factor [kWh/day] 1.2 If mo 1.2 End if Temperature factor multipler (fm Table 2 notes) 0.89 Error of temperature factor multipler (fm Table 2 notes) 0.9 Is ther a social water heating system? No 0 If yes Sociar faction [%] 0 End if Sociar faction [%] 0 France Section combinition (KWh/g) (Table 3) 300 Additional loss for CWh/g (Table 3) 21 Addition loss for Comb Deller (KWh/g) 210 Internal gains 10 Not applicable 10 Pater apport of weat reading system responsiveness 10 Space facility of Camb applicable difference			Manufactu	rer and model name		Nibe F73	0			
End if Importative factor unadjusted (Table 2) 0.89 End if Is there a solar water heating system? No 0 If is there a solar water heating system? No 0 If if Solar fraction (%) 0 End if Solar fraction (%) 0 If if Solar fraction (%) 0 If if Solar fraction (%) 0 End if Solar fraction (%) 0 End if		1	Manufactu	rer's declared loss factor [kWh/day]		•			
Temperature factor undigitate (Trable 2) 0.88 End If 0.9 End Is there a solar water heating system? No 0 If yes Solar fraction [%] 0 End I Solar fraction [%] 0 Electricity consumption of electric keep-hot facility of combi bolier [kWhy] (Table 4) 0 Supplementary heater (kWhy) 231 0 Ordput from supplementary heater (kWhy) 0 1 Heat gas from water heating system (M) 92 1 Supplementary water heating system (M) 92 1 Is hot water storage indoors or in group heating scheme? No 1 Lighting Annual energy used for lighting, EL [kWhy] 210 1 Internal gains Medium 1 1 1 Ving area faction [] 0.35 1 1 1 1 Heat use (kWhy] 1808 1 1 1 1			vot applica	adie						
Temperature factor undigitate (Trable 2) 0.88 End If 0.9 End Is there a solar water heating system? No 0 If yes Solar fraction [%] 0 End I Solar fraction [%] 0 Electricity consumption of electric keep-hot facility of combi bolier [kWhy] (Table 4) 0 Supplementary heater (kWhy) 231 0 Ordput from supplementary heater (kWhy) 0 1 Heat gas from water heating system (M) 92 1 Supplementary water heating system (M) 92 1 Is hot water storage indoors or in group heating scheme? No 1 Lighting Annual energy used for lighting, EL [kWhy] 210 1 Internal gains Medium 1 1 1 Ving area faction [] 0.35 1 1 1 1 Heat use (kWhy] 1808 1 1 1 1		End if								
End if Enter a solar water heating system? No 0 If yes Not applicable Solar fraction [%] 0 End if Primary circuit loss [kWhy] (Table 3) 360 Additional loss for comb bole [KWhy] (Table 3) 360 Additional loss for comb bole [KWhy] (Table 3) 0 Electricity consumption of electric keep-hot facility of comb bole [KWhy] (Table 41) 0 Electricity consumption of electric keep-hot facility of comb bole [KWhy] (Table 41) 0 Cuptor tom support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion heating is used in summer? No Cuptor form support electric immersion for the support of the suppo		Temperatur								
If yes Not applicable	End if	·		· ·	1					
Solar fraction [%] 0 End if Solar fraction [%] 0 Finang viccuit loss [kWhy] (Table 3) 360 Additional toss for comb ibolier [kWhy] 0 Electricity consumption of electric keep-hot facility of combi bolier [kWhy] 0 Is supplementary electric immersion heating is used in summer? No Output from main water heater [kWhy] 0 Heat gains from water heating system [W] 92 Is hot water storage indoors or in group heating scheme? No Uphting Annal energy used for lighting. EL [kWhy] 210 Internal gains No Uning area fraction [-] 0.35 Thermal mass category of dwelling Medium Heat use [kWhy] 1896 Space heating Control and responsiveness Control and responsiveness Enter if present, if present, inside number is bolier controlled inside present by room thermostar? dwelling? Control and responsiveness 0 - - Gas boler - flow (supplying hot water to radiators or underfloor system) 0 Yeesent, inside Control and responsivements? No 0 - - </td <td></td> <td></td> <td></td> <td>tem?</td> <td>No</td> <td>0</td> <td></td> <td></td> <td></td> <td></td>				tem?	No	0				
Primary pricult loss [kVMNy] (Table 3) 360 Additional loss for combib loier [kVMNy] (Table 3a) 0 Electricity consumption of electric keep-hot facility of combi boiler [kVMNy] (Table 4f) 0 Is supplementary heater [kVMNy] (Table 3a) 0 Output from supplementary heater [kVMNy] 2351 No Output from supplementary heater [kVMNy] 0 Heat gains from water heater [kVMNy] 210 Internal gains Annual energy used for lighting, EL [kVMNy] 210 Internal gains Not internal gains [kVM] 400 Heat uses Lighting Annual energy used for lighting, EL [kVMNy] 100 Heat uses Lighting atom the factor [Ling area fraction [Li	,					s	olar fraction	[%]	0	
Additional loss for combi boiler (WMv) (Table 3a) 0 Electricity consumption of electric keep-hot facility of comb boiler (Whv) (Table 4) 0 Is supplementary heater, KWhv) 2351 Output from main water heating system (W) 9 Electricity consumption of electric KWhv) 1 Annual energy used for lighting, EL [kWhv] 210 Internal gains Met internal gains [W] 400 Heat gains from water heating system (W) 400 Heat gains from supplementary heater (KWhv) 1 Internal gains [W] 400 Heat gains from supplementary heater (KWhv) 1 Internal gains [W] 400 Heat use Living area fraction [-] 0.35 Thermal mass category of dwelling Medium Heating system control category (Table 4e) 400 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 0 Internal mass category of dwelling Medium Heat use Living area fraction [-] 0.35 Theme in mass category of dwelling Medium Heat use for the properties [C] 0 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 2 Heating system control category (Table 4a or 4d) 1 Pumps ¹ (Table 4e), where appropriate [C] 0 Heating system responsiveness category (Table 4a or 4d) 1 Pumps ² (Table 4b) 0 Central heating pump (supplying hot water to radiators or underfloor system) 1 to the aver the fart (If an assisted flue) 0 The far advert for assisted flue) 0 Finiscion officiency Brainsion efficiency Brainsion efficiency Brainsion efficiency Hype of main heating system present? No Encergy requiremants - individual system 1 Encergy requiremants - individual system 1 Encergy requiremants - individual system 1 Encergy requiremants - individual system (for Table 4 or Appendix F) 0 Efficiency of main heating system (for Table 4 or Appendix F) 0 Efficiency of anain water heater [%] (from HARP or from Table 4 a or Appendix F) 0 Efficiency of main water heater [%] (from HARP or from Table 4 a or Appendix F) 0 Efficiency of main wa										
Is supplementary electric immersion heating is used in summer? No Output from marker heat (WhVy) 2351 Output from marker heating system (W) 92 Is hot water storage indoors or in group heating scheme? No Lighting Annual energy used for lighting, EL (kWhV) 210 Internal gains Not internal gains (W) 400 Heat use Living area fraction [-] 0.35 Themat mass category of dwelling Medium Heat use (kWhV) 1896 Space heating Control and responsiveness Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system control category (Table 4e) 2 Heating system control category (Table 4a or 4d) 1 Pumpsfans Living area fraction [-] 0.35 Space heating Control and responsiveness category of table 4e or 4d) 1 Heating system control category (Table 4a or 4d) 0 Sabeller - hue fung (supplying hot water to radiators or underfloor system) 1 Ol boiler - pump (supplying hot water to radiators or underfloor system) 0 Is there a warm air heating system present? No Emission officiency 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 [Yein 'K'] 0 If yee of main heating system ['bi (including Efficiency Adjustment Factor) 240.0 Fraction of the from secondary / supplementary system (from Table 4a or Appendix E) 0 Water heating - main electricity Space heating - main electricity Space heating - main electricity Space heating - main electricity Space heating - main electricity Water heating - main electricity Space heating - main electricity Space heating - main electricity Water										
Output from main water heater (WhVy) 2351 Output from main water heating system (W) 92 Is hat water storage indoors or in group heating scheme? No Lighting 210 Internal gains 400 Heat agains (M) 92 Internal gains 400 Heat use 100 Ling area fraction [-] 0.35 Thermal mass category of dwelling Medium Heat use (WhVy) 1896 Space heating 2 Control and responsiveness 1896 Space heating 2 Control and responsiveness 1 Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter If present, inside pumps/ing oil to boller and flue fan) 0 - Control and responsiveness category (Table 4a) 0 1 Yes 0 Oli boller - pump (supplying oil to boller and flue fan) 0 - - - Gas boller - flue fan (If an assisted flue) 0 - - - Space heating		•			• •• •	ble 4f)				
Heat gains from water beating system (W) 92 Is hot water storage indoors or in group heating scheme? No Lighting 210 Internal gains 210 Internal gains (M) 400 Heat use 100 Living area fraction [-] 0.35 Thermal mass category of dwelling Medium Heat use 2 Living area fraction [-] 0.35 Space heating Control and responsiveness Control and responsiveness 2 Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system control category (Table 4e) 2 Heating system control category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter If present, inside present Ot bolier - prive (supplying) hot water to radiators or underfloor system) 1 Yes Ol bolier - prive (supplying) hot water to radiators or underfloor system) 1 Yes Ol bolier - prive (supplying) hot water to radiators or underfloor heating in ground floor) 0 1 Brains on difficiency No 0 1 Yes	Output fron	n main wate	r heater [k	Wh/y]	2351		NO			
is hot water storage indoors or in group heating scheme? No Lighting Annual energy used for lighting, EL [kWhy] 210 Internal gains Not internal gains [W] 400 Heat use Living area fraction [-] 0.35 Themail mass category of dwelling Medium Heat use [kWhy] 1896 Space heating Control and responsiveness Control and responsiveness Control and responsiveness category (Table 4e) 2 Heating system control category (Table 4e) 1 Pumpsfans I (Frase action of [-] 100 Control and responsiveness Control and responsiveness Category (Table 4e) 2 Heating system control category (Table 4e) 1 Pumpsfans I (Frase action of [-] 100 Control and responsiveness Category (Table 4e) 2 Heating system control category (Table 4e) 0 Control and responsiveness Category (Table 4e) - 0 If yes, U-value of envelope element? (e.g. underfloor heating in ground floor) No 0 If yes of main heating system resent? No Emission officiency Is main heating system within an envelope element? (e.g. underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (from Table 7, Table 10 or Appendix F) 0 Efficiency of secondary / supplementary system (from Table 4a or 4b) 152.381 Fuel data Fuel Space heating - main electricity Water heating - supplementary i electricity Water h										
Annue dergry used for lighting, EL [kWh/y] 210 Internal gains Net internal gains [W] 400 Heat use Living area fraction [] 0.35 Themal 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 tresponsiveness category (Table 4a or 4d) 1 Pumps/fans Central heating pump (supplying hot water to radiators or underfloor system) 1 freesent, inside present by oroon thermostat? dwelling? Central heating system within an envelope element? (e.g. underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (e.g. underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was underfloor heating in ground floor) No 0 If yes, U-value of envelope element? (was the table of Appendix F) 0 Control and rom secondary / supplementary system (mather Table 7, Table 10 or Appendix F) 0 Ifficiency of main heating system (%) (from HaRP or from Table 4 a or Appendix E) 0 Control and in generating electricity Space heating - main electricit	Is hot water									
Internal gains Net internal gains [W] 400 Heat use Living area fraction [-] 0.35 Thermail 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 If present, inside Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Ot boiler - pump (supplying oil to boiler and flue fan) 0 - Ot boiler - num air heating system present? No 0 Emission efficiency Ot boiler - num is heating system present? No 0 - Entergy requirements - individual heating system 1 Enter 0 0 0 Type of main heating system (%) (including Efficiency Adjustment Factor) 240.0 Fraction of heating system (%) (including Efficiency Adjustment Factor) 240.0 Efficiency of main water heater (%) (from HARP or from Table 7, able 10 or Appendix E) 0 0 Efficiency of main water heater (%) (from HARP or from Table 4a or Appendix E) 0 0 Efficiency of main water heater (%) (from HARP or from Table 4a or										
Net interial gains [W] 400 Heat use Living area fraction [-] 0.35 Thermail 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 is bolier controlled If present, number If present, inside Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Of bolier - pump (supplying oil to bolier and flue fan) 0 - Gas bolier - flue fan (ff an assisted flue) 0 - Is there a warm air heating system mesent? No 0 If yes, U-value of envelope element? (e.g. underfloor heating in ground floor) No 0 Type of main heating system [Wim Xe] 0 0 0 Type of main heating system [Wim (Including Efficiency Adjustment Factor) 240.00 240.00 Fractor of heat from secondary / supplementary system (from Table 4a or Abpendix E) 0 0 Type of main heating system [%] (Including Efficiency Adjustment Factor) 240.00 5.3	Annual ene	ergy used for	lighting, E	EL [kWh/y]	210					
Heat use Living area fraction [-] 0.35 Thermal mass category of dwelling Heat use (kWh/y) 1896 Space heating Control and responsiveness 0 Heating system control category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter number is boiler controlled present by room themostate? If present, inside dwelling? Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Ol boiler - pump (supplying oil to boiler and flue fan) 0 - Gas boiler - fue fan (ff an assisted flue) 0 - - - Gas boiler - fue fan (ff an assisted flue) 0 - - - Sab coller - fue fan (ff an assisted flue) 0 - - - Sab coller - fue fan (ff an assisted flue) 0 - - - Sab coller - fue fan (ff an assisted flue) 0 - - - - - Sup controlled fue fan (ff an assisted flue) 0 - - - - - - - - - - - - - - - - - -	-				400					
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 control category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Central heating pump (supplying hot water to radiators or underfloor system) 0 Gas boiler - pump (supplying hot water to radiators or underfloor system) 1 Yes Oli boiler - pump (supplying hot water to radiators or underfloor system) 1 Yes 1 Store a warm air heating system present? No Emission efficiency Type of main heating 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 [%] (including Efficiency Adjustment Factor) 240.0 Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 Efficiency of main heating system [%] (from HARP or from Table 4a or 4b) 152.381 Fuel data Fuel Space heating - secondary / supplementary system (from Table 4a or Appendix E) 0 Water heating - secondary - i Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y		i gairis [vv]			400					
Themain 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 responsiveness category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter If present, If present, Inside present by room themosta? dwelling? Central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Of booler - pumps (Jable 4a) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0 Gas boiler - flue fan (if fan assisted flue) 0		fraction [-]		0.35						
Space heating Control and responsiveness Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system responsiveness category (Table 4a or 4d) 1 Pumps/fans Enter If present, inside number is boiler controlled inside Oll boiler - pump (supplying hol twater to radiators or underfloor system) 1 Yes Oll boiler - pump (supplying oil to boiler and flue fan) 0 - Gas boiler - flue fan (if fan assisted flue) 0 - - Gas boiler - flue fan (if fan assisted flue) 0 - - Is there a warm air heating system present? No 0 - - Emission efficiency Is main heat emission system within an envelope element? (e.g. underfloor heating in ground floor) No 0 0 Type of main heating system [%] (including Efficiency Adjustment Factor) 240.0 Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix E) 0 Water heating System from Table 4a or 4b) 152.381 Fuel dat Fraction of heat from secondary / supplementary system (from Table 4a or 4b) 152.381 Fuel dat Fuel Space heating - main	Thermal ma	ass category	of dwellir	ng Medium						
Control and responsiveness Temperature adjustment (Table 4e), where appropriate [C] 0 Heating system control category (Table 4a or 4d) 1 <i>Pumps/fans</i> Enter If present, inside central heating system responsiveness category (Table 4a or 4d) 1 <i>Pumps/fans</i> Enter If present, inside central heating pump (supplying hot water to radiators or underfloor system) 1 Yes Oil boller - pump (supplying oil to boiler and flue fan) 0 - - Gas boiler - flue fan (if fan assisted flue) 0 - - St here a warm air heating system present? No 0 - - <i>Emission efficiency</i> Individual system 0 - - Type of main heating system [%] (including Efficiency Adjustment Factor) 0 240.0 - Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 - Water heating Fuel Space Heating - 0 Space heating main heater lift (from HARP or from Table 4a or Appendix F) 0 - - Efficiency of secondary / supplementary system (from Table 4a or Appendix E) 0	-			1090						
Heating system control category (Table 4e) 2 Heating system responsiveness category (Table 4a or 4d) 1 <i>Pumps/fans</i> Central heating pump (supplying hot water to radiators or underfloor system) 1 Oil boiler - pump (supplying oil to boiler and flue fan) 0 Central heating 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 <i>Emission efficiency</i> 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 [%] (including Efficiency Adjustment Factor) 240.0 Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 Efficiency of main heating system [%] (from HARP or from Table 4a or Appendix E) 0 <i>Water heating</i> Efficiency of main water heater [%] (from HARP or from Table 4a or Appendix E) 0 <i>Water heating</i> Efficiency of main water heater [%] (from HARP or from Table 4a or Appendix E) 0 <i>Water heating</i> Efficiency of main water heater [%] (from HARP or from Table 4a or Appendix E) 0 <i>Water heating</i> - main electricity Space heating - main electricity Space		-	veness							
Heating system responsiveness category (Table 4a or 4d) Pumps/fans Interim If present, If p										
number is boiler controlled inside present by room thermostat? dwelling? Oil boiler - pump (supplying oil to boiler and flue fan) 0 - Gas boiler - flue fan (if fan assisted flue) 0 - State 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/m² K] 0 0 - Type of main heating system Individual system 1 - Energy requirements - individual heating systems 240.0 - - Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 - Water heating Fuel - - - Braction of heat from secondary / supplementary system (from Table 4a or 4b) 152.381 - Fuel data Fuel - - - Space heating - main electricity - - - Space heating - main electricity - - - - Vater heating - main	Heating sys	stem respon	• •	· /		_				
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/m² K] 0 0 0 Type of main heating system Individual system 1 240.0 Energy requirements - individual heating systems : 240.0 5 Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) 0 0 Efficiency of secondary / supplementary heater(s) [%] (from Table 4a or Appendix E) 0 0 Water heating Fuel 5 5 5 Space heating - main electricity 5 5 5 Space heating - secondary - - - - - Space heating - main electricity - - - - - - - - - - </td <td>Pumps/fan</td> <td>IS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ntrolled</td> <td></td> <td></td>	Pumps/fan	IS						ntrolled		
Oil boiler - pump (supplying oil to boiler and flue fan) 0 - - Gas boiler - flue fan (if fan assisted flue) 0 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/m² K] 0 0 0 Type of main heating system Individual system 1 0 Energy requirements - individual heating systems : 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 - supplementary - Vater heating - supplementary - Vater heating - supplementary - Space heating - main electricity Space heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Sola	Central bes	ating pump (eupplying	hot water to radiators or u	nderfloor system)		by room th		dwelling?	
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 If yes, U-value of envelope element [W/m ² K] Type of main heating system Individual system Individual system Individual system Individual system I Energy requirements - individual heating systems Efficiency of main heating system [%] (including Efficiency Adjustment Factor) Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) Fraction of heat from secondary / supplementary system (from Table 7, Table 10 or Appendix F) Efficiency of secondary / supplementary heater(s) [%] (from Table 4a or Appendix E) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) Efficiency of main water heater [%] (from HARP or	Oil boiler -	pump (supp	ying oil to	boiler and flue fan)	ndemoor system)	0		-	-	
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 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 for the state of the sta				,	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 - main electricity Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies			vetem wit	hin an envelope element?	(e.g. underfloor b	aating in gr	ound floor)	No	0	
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 beater(s) [%] (from Table 4a or Appendix E) 0 Water heating 0 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 Primary CO2 Delivered Renewable and energy-saving technologies Primary CO2 Delivered		lf yes, U-val	ue of enve	elope element [W/m ² K]		sating in gro		-	0	
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 0 Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) 152.381 Fuel data Fuel Space heating - main electricity Space heating - main electricity Water heating - main electricity Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies energy factor	Type of ma	in heating s	ystem	Individual syst	tem		1			
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 0 Efficiency of main water heater [%] (from HARP or from Table 4a or 4b) 152.381 Fuel data Fuel Space heating - main electricity Water heating - main electricity Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies Primary CO2			- individu	al heating systems	:					
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 - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies Primary factor energy	Efficiency of	of main heati								
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 CO2 Delivered							endix F)			
Fuel 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 CO2 Delivered	Water heat	ting				,		152 381		
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 CO2 Delivered		n main wate	i neatei [/					152.501		
Space heating - secondary - Water heating - main electricity Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Renewable and energy-saving technologies energy		ting - main								
Water heating - supplementary - Photovoltaic/ Wind Turbine 1,133 kWh/y Solar Thermal 0 kWh/y Primary CO2 Delivered Renewable and energy-saving technologies energy factor energy	Space heat	ting - second	lary	-						
Solar Thermal 0 kWh/y Primary CO2 Renewable and energy-saving technologies energy factor energy	Water heat	ing - supplei		-						
Primary CO2 Delivered Renewable and energy-saving technologies energy factor energy			oine							
Renewable and energy-saving technologies energy factor energy						Primany	C02		Delivered	
I ype 1 Description Heat Pumps factor [-] [kg/kWh] [kWh/y]			-saving te	•		energy	factor		energy	
	1уре 1	Description		Heat Pumps		tactor [-]	[kg/kWh]		[KWh/y]	

	Energy produced or saved Energy consumed	2.08 0.00	0.409 0.000	0 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

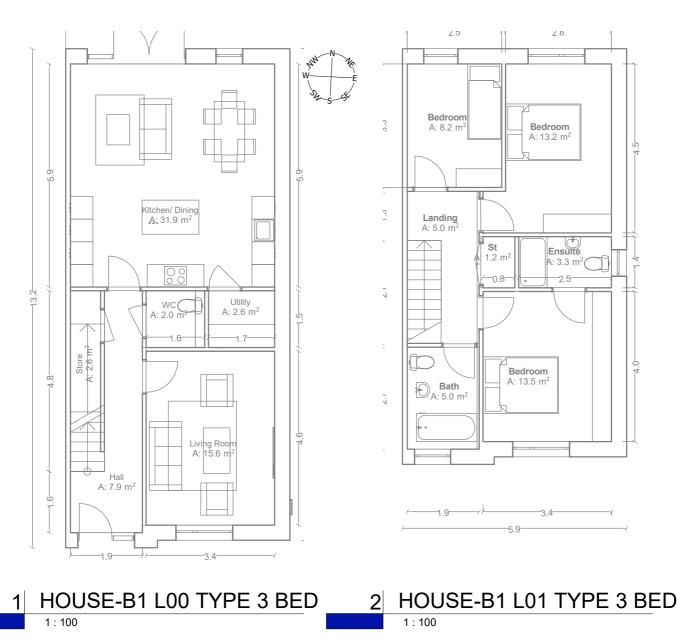
		Delivered energy	Primary energy	CO ₂ emissions		
		[kWh/y]	[kWh/y]	[kg/y]		
Space I	neating - main	838	1,742	343		
Space I	neating - secondary	0	0	0		
	eating - main	1,543	3,209	631		
Water h	eating - supplementary	0	0	0		
Pumps,	fans	135	281	55		
Energy	for lighting	210	436	86		
	able and energy-saving technologies					
	out (individual heating systems only)	0	0	0		
CHP ele	ectrical output (individual heating syst	0	0	0		
	oltaic/ 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	loor 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 Max permitted						
EPC	0.270 0.30	Complies				
	0.210 0.30	Complies				

2019

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



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



BUILDING SERVICES ENGINEERS [p] 086 386 7097 [e] barry.oneill@bbsc.ie [w] www.bbsc.ie BOHERBOY BOHERBOY DEVELOPMENT 2020_0205 BER-HOUSE-B1- TYPCIAL 3 BED HOUSE

20/07/2021 12:54:47

Project	roject 2020_0205-BBSC-CALC-HOUSE-B1-3BED SAMPLE BOHERBOY		Ву	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 m ³
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

FOR FLAT FORM			
(accumulation n	nethod.)	E4.3 Tank Sizing	SR50-4:2021 Appendix E
	25 l/person	set temperature, hot v	55 °C
	5 persons	temperature, cold wat	10 °C
	250 litres	Volume	278 litres
		Energy Stored	14.5 kWh
y			
	2 hrs	On at 3am off 5am	
neat pump	7.3 kw		
Table E.16		Note Max External Noise	45 dB(A)
6.0 kW		ISEN 15450:2007 Table F.1	
7.3 kW			
7.3 kW			
	(accumulation n y neat pump Table E.16 6.0 kW 7.3 kW	(accumulation method.) 25 I/person 5 persons 250 litres Y 2 hrs heat pump 7.3 kw Table E.16 6.0 kW 7.3 kW	(accumulation method.) 25 I/person set temperature, hot v 5 persons temperature, cold wai 250 litres Volume Energy Stored Y 2 hrs On at 3am off 5am heat pump 7.3 kw Table E.16 Note Max External Noise 6.0 kW ISEN 15450:2007 Table F.1 7.3 kW



DEAP Report

Distribution loss [kWh/y]

275

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.

2019 **Dwelling dimensions** TGD L version Area [m²] 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 [m²] 121 Dwelling volume [m³] 345 Living area [m²] 31.9 Ventilation Number of chimneys 0 0 Number of open flues 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 ves 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/(I/s)] Heat exchanger efficiency [%] Windows East/West East/West SE/SW Orientation South South North North North Horizontal Orientation ID 3 3 5 4 5 1 6 1 1 Area [m²] 0 0 8.7327 0.8904 0 0 0 0 10.7438 U-value [W/m² 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 0.8 0.8 0.8 Solar energy transmittance -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 0 0 0 0 0 0 1 1 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 U-value AU Comment (optional) Element type [m²] [W/m² K] [W/K] (for assessing TGD L conformity) Windows/rooflights 20.4 1.3 25.8 Doors 21 16 34 No underfloor heating Floor 66 2 0.2 10.6 _ Floor (type 2) 0.0 0.0 0.0 No underfloor heating Floor (type 3) 0.0 0.0 0.0 No underfloor heating 107.0 Wall relevant for TGD L fabric compliance check Walls 0.2 17.1 Walls (type 2) 0.0 0.0 0.0 Wall relevant for TGD L fabric compliance check Walls (type 3) Wall relevant for TGD L fabric compliance check 0.0 0.0 0.0 Walls (type 4) 0.0 Wall relevant for TGD L fabric compliance check 0.0 0.0 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 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 Total area of elements [m²] 256.77 Heat loss via plane elements [W/K] 67 Factor for thermal bridging [W/m² K] 0.08 Fabric heat loss [W/K] 87 Dwelling heat loss coefficient [W/K] 169 Heat loss parameter, HLP [W/K m²] 1.40 Water heating Are there distribution losses? Yes

Are there st	orage loss	es?	Yes	1					
If yes :	Nater stor	age volume	e [litres]		200		1		
1	s manufac	turer's dec	lared loss factor available?		Yes	1			
I	f yes	: Manufactu	rer and model name	PI	JHZ-SW75	VHA			
	6	Manufactu	rer's declared loss factor [kV		1.91				
1	f no	Not applic	adie			7			
E	End if								
1	Temperatu		nadjusted (Table 2) ultiplier (from Table 2 notes)	0.89					
End if									
Is there a so If yes	olar water l Not applica		tem?	No	0				
					S	olar fraction	[%]	0	
End if									
Primary circ Additional lo			e 3) Wh/y] (Table 3a)			360 0			
	•		keep-hot facility of combi be ion heating is used in summ		ble 4f)	0 No			
Output from	main wat	er heater [k	Wh/y]	2698		NO			
Output from Heat gains f				0 98					
			group heating scheme?	No					
Annual ener	rgy used fo	or lighting, l	EL [kWh/y]	259					
Internal gai Net internal				471					
	ganis [vv]			11					
Heat use Living area	fraction [-]		0.26						
Thermal ma Heat use [k]		ry of dwellir	ng Medium 4691						
-			1001						
Space heat Control and	-	iveness							
Temperature Heating sys			le), where appropriate [C]	0 2					
Heating sys	tem respo	• •	category (Table 4a or 4d)	1	= .				
Pumps/fans	S				Enter number	If present, is boiler co	ontrolled	lf present, inside	
Central heat	tina numn	(supplying	hot water to radiators or und	erfloor system)	present 1	by room th	ermostat? Yes	dwelling?	
Oil boiler - p	ump (sup	plying oil to	boiler and flue fan)	onioon oyotonii)	0		-	-	
Gas boiler - Is there a wa				No	0				
Emission e		system wit	hin an envelope element? (e	a underfloor he	ating in arc	ound floor)	No	0	
I	f yes, U-va	alue of enve	elope element [W/m ² K]	0		,	0	Ū	
Type of mai	n heating	system	Individual system	n		1			
Energy req		s - individu	al heating systems	:					
Efficiency of	f main hea		n [%] (including Efficiency Ad				240.0		
			supplementary system (fror nentary heater(s) [%] (from T			endix F)	0 0		
Water heating	5	er heater [9	6] (from HARP or from Table	4a or 4b)			152.381		
-		·		,					
<i>Fuel data</i> Space heati			Fuel electricity						
Space heati Water heatir		ndary	- electricity						
Water heatin	ng - supple		-						
Photovoltaio Solar Therm		UII IE	1,813 kWh/y 0 kWh/y						
					Primary	CO2		Delivered	
Renewable			•		energy	factor		energy	
Type 1	Descriptior	1	Heat Pumps		factor [-]	[kg/kWh]		[kWh/y]	

	Energy produced or saved Energy consumed	2.08 0.00	0.409 0.000	0
Type 2	Description -	0.00	0.000	0
	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	Primary	CO_2
	energy	energy	emissions
		57	
	[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
	20.0	10.0	0.0
Building Energy Rating [kWh/m ² y]		44	A2
			~2
Check conformity with MPEPC and MPCP	C requirem	onts in Ti	וחב
Max permit	•		
EPC 0.277 0.30	Complies		
LIC 0.277 0.30	Complies		

2019

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



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



BUILDING SERVICES ENGINEERS [p] 086 386 7097 [e] barry.oneill@bbsc.ie [w] www.bbsc.ie BOHERBOY BOHERBOY DEVELOPMENT

20/07/2021 12:54:49

Project	2020_0205 BOHERBOY	5-BBSC-CALC-HOUSE-B1-3BED SAMPLE /	Ву	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

SRR50:4 2021 METHOD FOR HEAT PUMP SIZING

Room		Heat Loss Watts	Area m²	Volume m ³
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 Plus margin	10%	4,979 6.00	112.54 KW	289.75

E4.2 Hot Water Stor	age (accumulatio	on method.)	E4.3 Tank Sizing	SR50-4:2021 Appendix E
Vdp60 allowance		25 l/person	set temperature, hot v	55 °C
nr of Persons		5 persons	temperature, cold wat	10 °C
Total		250 litres	Volume	278 litres
			Energy Stored	14.5 kWh
E4.4 Heat Pump Cap	pacity			
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		



BBSC

ROOM HB1-L00-HALL

Design Room Temp	18	Notes:							
External Design Temp	-3								
Design Temp Difference	21								
		No. of air	Room Volu	ime (meters	5)	Amount	Air	Design	Heat Loss
		changes				of air to	change	Temp Diff	Watts
		per hour	Length	Width (m)	Height	be heated	factor	°C	
Ventilation Heat Loss		ac/h	(m)		(m)	per hour	W/m ³ .K		
					. ,	m³/h			
		0.5	1	7.37	2.65	9.76525	0.33	21	67.6731825
Additional air changes due t	o Chimneys	0		air changes see		0	0.33	21	0
or Flues			2.2.	Ventilation Heat	: Loss				
			Length	Width (m)	Height	Area m ²	U-Value	Design	
Fabric Heat Loss			(m)		(m)		W/m².K	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 a	lazing and	door areas	from gross	3.1825	0.18	21	12.02985
				wall area)	5				
External Roof (Gross area)		I				0			
Rooflights				0	0	0	1.4	21	0
External Roof (Nett area)		(Subtract	roof glazing	g area from	gross roof	0	0.39	21	0.000
			ar	ea)					
Party Wall Adjoining unheat	ed space	l			2.65	0	0.9	8	0.000
Other			-	-	-	-	-	-	-
Design Heat Loss from Roor	n (Sum of W	atts for all	elements)						220.458
Thermal Bridging									12.223
Exposed Location? (If yes, 10	0% is added t	o the heat	loss)					No	0.000
High Ceiling - Is the room se	rved by unde	rfloor heat	ing					No	0.000
Total room Heat Lo	SS								232.7

BBSC

ROOM HB1-L00-LIVING

Design		21	Notes:							
	esign Temp	-3								
Design Ten	np Difference	24							1	
			No. of air changes	Room Volu	ime (meters	5)	Amount of air to	Air change	Design Temp Diff	Heat Loss Watts
Ventilatior	n Heat Loss		per hour ac/h	Length (m)	Width (m)	Height (m)	be heated per hour m ³ /h	factor W/m ³ .K	°C	
			1.5	5.061	4.647	2.65	93.5	0.33	24	740.4
Additional	air changes due or Flues	e to Chimneys	0		air changes see Ventilation Heat		0.0	0.33	24	0.0
Fabric Hea	t Loss			Length (m)	Width (m)	Height (m)		U-Value W/m ² .K	Design Temp Diff	
External Floor				5.061	4.647		23.5	0.18	24	101.6
External W	/all (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 Do	oor						0.0	1.4	24	0.0
External W	/all (Nett area)		(Subtract ຢູ		door areas wall area)	from gross	20.0	0.18	24	86.5
External Ro	oof (Gross area)		I				0.0			
Rooflights							0.0	1.4	24	0.0
External Ro	oof (Nett area)		(Subtract		g area from ea)	gross roof	0.0	0.39	24	0.0
Party Wall	Adjoining unhea	ated space		4.647	-	2.65	12.3	0.9	11	121.9
Other		•		-	-	-	-	-	-	-
Design Hea	at Loss from Roo	om (Sum of W	atts for all	elements)		I		I		1242.0
Thermal Br		-								40.1
Exposed Lo	ocation? (If yes, :	10% is added t	o the heat	loss)					No	0.0
High Ceilin	g - Is the room s	erved by unde	rfloor heat	ing					No	0.0
Total ro	om Heat L	OSS								1282.1

ROOM HB1-L00-KITCHEN-DINING

Design		21	Notes:							
External Design Tem	5	-3	NOLES.							
0										
Design Temp Difference 24		No. of air Room Volume (meters) changes			Amount of air to	Air change	Design Temp Diff	Heat Loss Watts		
Ventilation Heat Los	SS		per hour ac/h	Length (m)	Width (m)	Height (m)	be heated per hour m ³ /h	factor W/m ³ .K	°C	
			1.5	3.88	5.061	2.65	78.1	0.33	24	618.2
Additional air changes due to Chimneys or Flues					air changes see Ventilation Heat		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	s 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 ຢູ		door areas wall area)	from gross	13.8	0.18	24	59.8
External Roof (Gross	area)						0.0			
Rooflights							0.0	1.4	24	0.0
External Roof (Nett a	area)		(Subtract		g area from ea)	gross roof	0.0	0.39	24	0.0
Party Wall Adjoining	g unhea	ted space		3.88		2.65	10.3	0.9	11	101.8
Other				-	-	-	-	-	-	-
Design Heat Loss fro	om Roo	m (Sum of W	atts for all	elements)						1195.7
Thermal Bridging										46.2
Exposed Location? (If yes, 1	0% is added t	o the heat	loss)					No	0.0
High Ceiling - Is the i	room se	erved by unde	rfloor heat	ing					No	0.0
Total room He	eat Lo	oss								1241.9

BBSC

BBSC

ROOM HB1-L00-WC

Design		18	Notes:							
External De	•	-3								
Design Terr	p Difference	21								
			No. of air	Room Volu	ime (meters	5)	Amount	Air	0	Heat Loss
			changes				of air to	change	Temp Diff	Watts
			per hour	Length	Width (m)	Height	be heated	factor	°C	
Ventilation	Heat Loss		ac/h	(m)		(m)	per hour	W/m ³ .K		
							m³/h			
			1.5	1.45	1.552	2.65	8.9	0.33	21	62.0
Additional	air changes due or Flues	to Chimneys			air changes see Ventilation Heat		0.0	0.33	21	0.0
				Length	Width (m)	Height	Area m ²	U-Value	Design	
Fabric Heat	Loss			(m)		(m)		W/m².K	Temp Diff	
									°C	
External Flo	oor			1.45	1.552		2.3	0.18	21	8.5
External W	'all (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 Do	-						0.0	1.4	21	0.0
External W	'all (Nett area)		(Subtract g		door areas	from gross	0.0	0.18	21	0.0
				external	wall area)					
External Ro	of (Gross area)						0.0			
Rooflights							0.0	1.4	21	0.0
External Ro	of (Nett area)		(Subtract	roof glazing	g area from	gross roof	0.0	0.39	21	0.0
				ar	ea)					
Party Wall	Adjoining unhea	ted space				2.65	0.0	0.9	8	0.0
Other				-	-	-	-	-	-	-
Design Hea	t Loss from Roo	m (Sum of W	atts for all	elements)						70.5
Thermal Br										0.7
Exposed Lo	cation? (If yes, 1	10% is added t	o the heat	loss)					No	0.0
High Ceiling	g - Is the room so	erved by unde	rfloor heat	ing					No	0.0
Total ro	om Heat L	oss								71.2

BBSC

ROOM HB1-L00-STORE

Design		16	Notes:							
External De	sign Temp	-3								
Design Ten	np Difference	19								
			No. of air changes	Room Volu	ume (meters	5)	Amount of air to	Air change	Design Temp Diff	Heat Loss Watts
Ventilation	Heat Loss		per hour ac/h	Length (m)	Width (m)	Height (m)	be heated per hour m ³ /h	factor W/m ³ .K	°C	
			0.5	2.1	1.552	2.65	4.3	0.33	19	27.1
Additional	air changes due or Flues	to Chimneys			air changes see Ventilation Hea		0.0	0.33	19	0.0
Fabric Hea	t Loss			Length (m)	Width (m)	Height (m)	Area m ²	U-Value W/m ² .K	Design Temp Diff °C	
External Flo	oor			2.1	1.552		3.3	0.18	19	11.1
External W	/all (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 Do	or						0.0	1.4	19	0.0
External W	'all (Nett area)		(Subtract ຢູ		door areas wall area)	from gross	0.0	0.18	19	0.0
External Ro	of (Gross area)		1				0.0			
Rooflights							0.0	1.4	19	0.0
External Ro	of (Nett area)		(Subtract		g area from ea)	gross roof	0.0	0.39	19	0.0
Party Wall	Adjoining unhea	ated space	<u> </u>	1.552		2.65	4.1	0.9	6	22.2
Other				-	-	-	-	-	-	-
Design Hea	t Loss from Roo	om (Sum of W	atts for all	elements)						60.4
Thermal Br	idging									2.7
Exposed Lo	cation? (If yes, :	10% is added t	o the heat	loss)					No	0.0
High Ceiling	g - Is the room s	erved by unde	rfloor heat	ing					No	0.0
Total ro	om Heat L	oss								63.1

BBSC

ROOM HB1-L00-STORE (2)

Design		16	Notes:							
External De	sign Temp	-3								
Design Tem	p Difference	19								
			No. of air changes	Room Volu	ume (meters	5)	Amount of air to	Air change	Design Temp Diff	Heat Loss Watts
Ventilation	Heat Loss		per hour ac/h	Length (m)	Width (m)	Height (m)	be heated per hour m ³ /h	factor W/m ³ .K	°C	
			0.5	0	0	0	0.0	0.33	19	0.0
Additional	air changes due or Flues	e to Chimneys			air changes see Ventilation Heat		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 Flo	or			0	0		0.0	0.18	19	0.0
External W	all (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 Do	or						0.0	1.4	19	0.0
External W	all (Nett area)		(Subtract ខ្ល		door areas wall area)	from gross	0.0	0.18	19	0.0
External Ro	of (Gross area)		I				0.0			
Rooflights							0.0	1.4	19	0.0
	of (Nett area)		(Subtract		g area from ea)	gross roof	0.0	0.39	19	0.0
Party Wall	Adjoining unhea	ated space	I	0		2.65	0.0	0.9	6	0.0
Other				-	-	-	-	-	-	-
Design Hea	t Loss from Ro	om (Sum of W	atts for all	elements)						0.0
Thermal Bri										0.0
-	cation? (If yes,								No	0.0
	g - Is the room s		erfloor heat	ing					No	0.0
Total ro	om Heat L	OSS								0.0

BBSC

ROOM HB1-L01-BEDROOM 01

Design Room T		18	Notes:							
External Desigr	-	-3								
Design Temp D	ifference	21								
				Room Volu	ume (meters	5)	Amount	Air	Design	Heat Loss
			changes				of air to	change	Temp Diff	Watts
			per hour	Length	Width (m)	Height	be heated	factor	°C	
Ventilation He	at Loss		ac/h	(m)		(m)	per hour	W/m ³ .K		
							m³/h			
			1	1	17.01	2.5	42.5	0.33	21	294.7
Additional air o	changes due	to Chimneys			air changes see		0.0	0.33	21	0.0
	or Flues			2.2.	Ventilation Heat	LOSS				
				Length	Width (m)	Height	Area m ²	U-Value	Design	
Fabric Heat Los	ss			(m)		(m)		W/m ² .K	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 g		door areas	from gross	14.6	0.18	21	55.1
				external	wall area)					
External Roof (Gross area)			1	17.01		17.0			
Rooflights							0.0	1.4	21	0.0
External Roof (Nett area)		(Subtract	roof glazin	g area from	gross roof	17.0	0.39	21	139.3
				ar	ea)					
Party Wall Adjo	oining unhea	ted space		4.408		2.5	11.0	0.9	8	79.3
Other				-	-	-	-	-	-	-
Design Heat Lo	ss from Roo	om (Sum of W	atts for all	elements)						680.0
Thermal Bridgi	ng									30.8
Exposed Locati	on? (If yes, 1	LO% is added t	o the heat	loss)					No	0.0
High Ceiling - Is	the room so	erved by unde	rfloor heat	ing					No	0.0
Total roon	n Heat L	oss								710.9

BBSC

ROOM HB1-L01-ENSUITE 1

Design		22	Notes:							
External De	sign Temp	-3								
Design Terr	p Difference	25							•	
				Room Volu	ime (meters	5)	Amount	Air	Design	Heat Loss
			changes				of air to	change	Temp Diff	Watts
			per hour	Length	Width (m)	Height	be heated	factor	°C	
Ventilation	Heat Loss		ac/h	(m)		(m)	per hour	W/m³.K		
							m³/h			
			4.5	2.24	4.74	2.5	44.2	0.00	25	115.0
A 1 1 1	• • •		1.5	2.21	1.71 air changes see	2.5	14.2	0.33	25	116.9
Additional	air changes due or Flues	e to Chimneys			Ventilation Heat		0.0	0.33	25	0.0
			I	Length	Width (m)	Height	Area m ²	U-Value	Design	
Fabric Heat	Loss			(m)		(m)		W/m².K	Temp Diff	
									°C	
External Flo	or						0.0	0.18	25	0.0
External W	all (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 Do	or						0.0	1.4	25	0.0
External W	all (Nett area)		(Subtract g	glazing and	door areas	from gross	5.5	0.18	25	24.9
				external	wall area)					
External Ro	of (Gross area)			2.21	1.71		3.8			
Rooflights							0.0	1.4	25	0.0
External Ro	of (Nett area)		(Subtract	roof glazing	g area from	gross roof	3.8	0.39	25	36.8
				ar	ea)					
Party Wall	Adjoining unhea	ated space	I			2.5	0.0	0.9	12	0.0
Other				-	-	-	-	-	-	-
Design Hea	t Loss from Roo	om (Sum of W	atts for all	elements)						178.6
Thermal Br	dging									4.9
Exposed Lo	cation? (If yes,	10% is added t	o the heat	loss)					No	0.0
High Ceiling	g - Is the room s	erved by unde	rfloor heat	ing					No	0.0
Total ro	om Heat L	OSS								183.6

BBSC

ROOM HB1-L01-BEDROOM 02

Design Room Temp	18	Notes:							
External Design Temp	-3								
Design Temp Difference	21								
<u> </u>		changes	Room Volu	ıme (meters	;)	Amount of air to	Air change	Design Temp Diff	Heat Loss Watts
Ventilation Heat Loss		per hour ac/h	Length (m)	Width (m)	Height (m)	be heated per hour m ³ /h	factor W/m ³ .K	°C	
		0.5	1	12.5	2.5	15.6	0.33	21	108.3
Additional air changes due to or Flues	Chimneys			air changes see Ventilation Heat		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 ຢູ		door areas wall area)	from gross	5.3	0.18	21	19.9
External Roof (Gross area)		I	1	12.5		12.5			
Rooflights						0.0	1.4	21	0.0
External Roof (Nett area)		(Subtract		g area from ea)	gross roof	12.5	0.39	21	102.4
Party Wall Adjoining unheated	l space	I	4.895		2.5	12.2	0.9	8	88.1
Other			-	-	-	-	-	-	-
Design Heat Loss from Room	(Sum of W	atts for all	elements)						371.1
Thermal Bridging									21.0
Exposed Location? (If yes, 10%	is added t	o the heat	loss)					No	0.0
High Ceiling - Is the room serve	-	erfloor heat	ing					No	0.0
Total room Heat Los	S								392.1

ROOM HB1-L01-BEDROOM 03

Design Room Temp	18	Notes:							
External Design Temp	-3								
Design Temp Difference	21								
		No. of air changes	Room Volu	ime (meters	5)	Amount of air to	Air change	Temp Diff	Heat Loss Watts
Ventilation Heat Loss		per hour ac/h	Length (m)	Width (m)	Height (m)	be heated per hour m ³ /h	factor W/m ³ .K	°C	
		0.5	2.146	4.105	2.5	11.0	0.33	21	76.3
Additional air changes due to or Flues	Chimneys			air changes see Ventilation Heat		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 g		door areas wall area)	from gross	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		g area from ea)	gross roof	8.8	0.39	21	72.1
Party Wall Adjoining unheate	d space				2.5	0.0	0.9	8	0.0
Other			-	-	-	-	-	-	-
Design Heat Loss from Room	(Sum of Wa	atts for all	elements)		·			·	298.0
Thermal Bridging									17.7
Exposed Location? (If yes, 109	% is added t	o the heat	loss)					No	0.0
High Ceiling - Is the room serv	ed by unde	rfloor heat	ing					No	0.0
Total room Heat Los	SS								315.8

BBSC

BBSC

ROOM HB1-L01-BATHROOM

Design		22	Notes:							
External De	• ·	-3								
Design Tem	p Difference	25								T
				Room Volu	ime (meters	5)	Amount	Air	Design	Heat Loss
			changes				of air to	change	Temp Diff	Watts
			per hour	Length	Width (m)	Height	be heated	factor	°C	
Ventilation	Heat Loss		ac/h	(m)		(m)	per hour	W/m ³ .K		
							m³/h			
			1.5	1	5	2.5	18.8	0.33	25	154.7
Additional	air changes due	to Chimneys			air changes see		0.0	0.33	25	0.0
	or Flues			2.2.	Ventilation Heat	LOSS				
				Length	Width (m)	Height	Area m ²	U-Value	Design	
Fabric Heat	Loss			(m)		(m)		W/m ² .K	Temp Diff	
									°C	
External Flo	or						0.0	0.18	25	0.0
External W	all (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 Do	-						0.0	1.4	25	0.0
External W	all (Nett area)		(Subtract g		door areas	from gross	7.3	0.18	25	33.0
				external	wall area)					
External Ro	of (Gross area)			1	5		5.0			
Rooflights							0.0	1.4	25	0.0
External Ro	of (Nett area)		(Subtract	roof glazing	g area from	gross roof	5.0	0.39	25	48.8
				ar	ea)					
Party Wall A	Adjoining unhea	ated space				2.5	0.0	0.9	12	0.0
Other				-	-	-	-	-	-	-
Design Hea	t Loss from Roc	om (Sum of W	atts for all	elements)						276.8
Thermal Bri										9.8
•	cation? (If yes, :								No	0.0
High Ceiling	g - Is the room s	erved by unde	rfloor heat	ing					No	0.0
Total ro	om Heat L	OSS								286.6

BBSC

ROOM HB1-L01-STORE (2)

Design		16	Notes:							
External De	sign Temp	-3								
Design Terr	p Difference	19								
			No. of air changes	Room Volu	ume (meters	5)	Amount of air to	Air change	Temp Diff	Heat Loss Watts
Ventilation	Heat Loss		per hour ac/h	Length (m)	Width (m)	Height (m)	be heated per hour m ³ /h	factor W/m ³ .K	°C	
			0.5	0.701	0.91	2.5	0.8	0.33	19	5.0
Additional	air changes due or Flues	to Chimneys			air changes see Ventilation Heat		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 Flo	or						0.0	0.18	19	0.0
External W	'all (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 Do	or						0.0	1.4	19	0.0
External W	'all (Nett area)		(Subtract ខ្		door areas wall area)	from gross	0.0	0.18	19	0.0
External Ro	of (Gross area)			0.701	0.91		0.6			
Rooflights							0.0	1.4	19	0.0
External Ro	of (Nett area)		(Subtract		g area from ea)	gross roof	0.6	0.39	19	4.7
	Adjoining unhea	ated space	L.			2.5	0.0	0.9	6	0.0
Other				-	-	-	-	-	-	-
Design Hea	t Loss from Roo	om (Sum of W	atts for all	elements)						9.7
Thermal Br										0.4
-	cation? (If yes, :			-					No	0.0
High Ceiling	g - Is the room s	erved by unde	erfloor heat	ing					No	0.0
Total ro	om Heat L	OSS								10.1

BBSC

ROOM HB1-L01-LANDING

Design Roon		18	Notes:							
External Des	ign Temp	-3								
Design Temp	Difference	21								
			No. of air	Room Volu	ume (meters	5)	Amount	Air	Design	Heat Loss
			changes				of air to	change	Temp Diff	Watts
			per hour	Length	Width (m)	Height	be heated	factor	°C	
Ventilation I	Heat Loss		ac/h	(m)		(m)	per hour	W/m ³ .K		
				. ,		. ,	m³/h			
							-			
			0.5	1	8.13	2.5	10.1625	0.33	21	70.426125
Additional a	ir changes due	to Chimneys	0		air changes see		0	0.33	21	0
	or Flues			2.2.	Ventilation Heat	: Loss				
				Length	Width (m)	Height	Area m ²	U-Value	Design	
Fabric Heat	Loss			(m)		(m)		W/m ² .K	Temp Diff	
								,	°C	
External Floo	or						0	0.18	21	0
External Wa	ll (Gross area)					2.5	0			
Window							0	1.4	21	0
Window							0	1.4	21	0
External Doc	or						0	1.4	21	0
External Wa	ll (Nett area)		(Subtract a	lazing and	door areas	from gross	0	0.18	21	0
	((wall area)			0.10		
External Roc	f (Gross area)		1	1	8.13		8.13			
Rooflights					0	0	0	1.4	21	0
External Roc	of (Nett area)		(Subtract	roof glazing	g area from	gross roof	8.13	0.39	21	66.585
				ar	ea)					
Party Wall A	djoining unhea	ted space	l	1.9		2.5	4.75	0.9	8	34.200
Other				-	-	-	-	-	-	-
Design Heat	Loss from Roo	om (Sum of W	atts for all	elements)						171.211
Thermal Bric	lging									8.063
Exposed Loc	ation? (If yes, 1	LO% is added t	o the heat	loss)					No	0.000
High Ceiling	- Is the room s	erved by unde	erfloor heat	ing					No	0.000
Total roo	om Heat L	oss								179.3

DEAP Report

Distribution loss [kWh/y]

273

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.

2019 **Dwelling dimensions** TGD L version Area [m²] 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 [m²] 115 Dwelling volume [m³] 329 Living area [m²] 19.6 Ventilation Number of chimneys 0 0 Number of open flues 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 ves 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/(I/s)] Heat exchanger efficiency [%] Windows East/West Orientation South North SE/SW South North North North Horizontal Orientation ID 5 1 3 4 5 1 6 1 1 Area [m²] 0 0 9.415 8.5275 17.287 0 0 0 0 U-value [W/m² 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 0.8 0.8 0.8 Solar energy transmittance -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 0 0 0 0 0 1 1 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 U-value AU Comment (optional) Element type [m²] [W/m² K] [W/K] (for assessing TGD L conformity) Windows/rooflights 35.2 1.3 46.7 Doors 21 16 34 No underfloor heating Floor 66 2 0.2 10.6 _ Floor (type 2) 0.0 0.0 0.0 No underfloor heating Floor (type 3) 0.0 0.0 0.0 No underfloor heating Wall relevant for TGD L fabric compliance check Walls 94.7 0.2 15.2 Walls (type 2) 0.0 0.0 0.0 Wall relevant for TGD L fabric compliance check Walls (type 3) Wall relevant for TGD L fabric compliance check 0.0 0.0 0.0 Walls (type 4) 0.0 Wall relevant for TGD L fabric compliance check 0.0 0.0 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 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 Total area of elements [m²] 259.38 Heat loss via plane elements [W/K] 86 Factor for thermal bridging [W/m² K] 0.08 Fabric heat loss [W/K] 106 Dwelling heat loss coefficient [W/K] 184 Heat loss parameter, HLP [W/K m²] 1.60 Water heating Are there distribution losses? Yes

Are there sto	rage loss	es?	Yes	1					
If yes : W	/ater stora	age volume	e [litres]		200		1		
ls	manufac	turer's dec	lared loss factor available	?	Yes	1			
lf	yes	: Manufactu	rer and model name		PUHZ-SW75	VHA			
16		Manufactu	rer's declared loss factor		1.91				
"	no	Not applic	adie			7			
E	nd if								
т	emperatu		nadjusted (Table 2) ultiplier (from Table 2 note	0.89					
End if				,			1		
Is there a sol If yes N	ar water h ot applica		tem?	No	0				
					s	olar fraction	[%]	0	
End if									
Primary circu Additional los			e 3) Wh/y] (Table 3a)			360 0			
Electricity cor	nsumptior	n of electric	keep-hot facility of combi		able 4f)	0			
Output from I			ion heating is used in sum Wh/y]	2688 2688		No			
Output from s Heat gains fr				0 97					
Is hot water s			group heating scheme?	No					
Lighting									
Annual energ	gy used fo	r lighting, l	EL [kWh/y]	252					
Internal gain									
Net internal g	gains [W]			462					
Heat use			0.47						
Living area fr Thermal mas		y of dwellir	0.17 ng Medium						
Heat use [kN	Vh/y]		3690						
Space heatin	-								
Control and Temperature			le), where appropriate [C]	0					
Heating syste Heating syste		• •	(Table 4e) category (Table 4a or 4d)	2 1					
Pumps/fans					Enter	If present,		If present,	
					number present	is boiler co by room th	ermostat?	inside dwelling?	
			hot water to radiators or u boiler and flue fan)	nderfloor system) 1 0		Yes -	-	
Gas boiler - f	lue fan (if	fan assiste	ed flue)	Na	0				
Is there a wa Emission ef		ating syste	m present?	No					
			hin an envelope element? elope element [W/m² K]	(e.g. underfloor	heating in gro	ound floor)	No	0	
Type of main			Individual sys	tem		1	0		
Energy requ	irements	- individu	al heating systems	:					
Space Heati	ng		[%] (including Efficiency	Adjustment Eact	ar)		240.0		
Fraction of he	eat from s	econdary /	supplementary system (f	rom Table 7, Tab	le 10 or Appe	endix F)	0		
Efficiency of a Water heating		y / supplen	nentary heater(s) [%] (fron	n Table 4a or App	endix E)		0		
Efficiency of	main wate	er heater [9	6] (from HARP or from Ta	ble 4a or 4b)			152.381		
Fuel data			Fuel						
Space heatin Space heatin		dary	electricity -						
Water heating Water heating	g - main	-	electricity						
Photovoltaic/	Wind Tu	,	- 1,517 kWh/y						
Solar Therma	al		0 kWh/y						
Renowable -	and oner	Leguine +-	chnologies		Primary			Delivered	
Renewable a Type 1 D	escription		chnologies Heat Pumps		energy factor [-]	factor [kg/kWh]		energy [kWh/y]	

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

2019

	Max permitted			
0.274	0.30	Complies		
0.261	0.35	Complies		
0.562	0.20	Complies		
	0.274 0.261	0.274 0.30 0.261 0.35		

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	kwp	S	zpv	result	
	panels					
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	ηo	a1 (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 ⁰	1036	1005	929	848	813		
30 ⁰	1074	1021	886	736	676		
45°	1072	1005	837	644	556		
60 ⁰	1027	956	778	574	463		
75 ⁰	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	10	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	48 32	7,847.04
Duplex Block K1 to K4	8 16	1, 2 & 3bed	305	4	E/W	52 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, 2 & Sbed 1 bed	305	2		52 52	12,751.44
•		2 bed			South		
Apartment Block A two bed	84		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	305 205	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