1-4 East Road, Residential

Energy Statement





Glenveagh Living 18_D064 June 2019



1-4 East Road, Residential Energy Statement

Glenveagh Living

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Appendix 1: DEAP Part L Compliance Report

1. Introduction

This Energy Statement prepared by Ethos Engineering is to form part of the planning submission documentation to An Bord Pleanala for the proposed East Road residential development.

Located at the address East Road, East Wall, Co. Dublin, the development is subject to the planning requirements applicable to the Dublin City Council Development Plan 2016-2022.

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.

This report also addresses how the proposed development will comply with NZEB (Part L 2018 Dwellings). The principles underpinning Part L compliance are energy demand reduction through passive measures and increased supply from renewable and efficient sources. The proposed design will follow this principle.

Assessments carried out in this report are based on latest floor plans and elevations received from the architect.

1.1. Site and Building Summary

The subject site is located at East Road, East Wall, Co. Dublin.

The application consists of the demolition of all existing structures on site and the construction of a mixed use development with a gross floor area of c. 52,796 sq.m (excluding below podium parking areas) set out in 9 no. blocks, over two separate podium, ranging in height from 3 to 15 storeys to accommodate 554 no. apartments and commercial/enterprise space, 3 no. retail units, foodhub/café/exhibition space, residential tenant amenity, crèche and men's shed. The site will accommodate 241 no. car parking spaces, 810 no. bicycle parking spaces, storage, services and plant areas. Landscaping will include a new central public plaza and residential podium courtyards.

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 DEAP (Dwellings Energy Assessment Procedure) methodology.



Figure 1: East Road Residential Site location and floor plan layout (outlined in red)

2. Legislative/Planning Requirements

2.1. Part L

Draft 'Technical Guidance Document Part L 2018 – Conservation of Fuel and Energy – Dwellings (public consultation edition)' (referred to in this document as "Part L or NZEB") stipulates requirements on, minimum fabric and air permeability requirements, maximum primary energy use and carbon dioxide (CO₂) emissions as 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:

- 1. The limitation of primary energy use and CO₂ emissions
- 2. Building fabric
- 3. The use of renewable energy sources

2.1.1. Limitation of Primary Energy Use and CO₂ Emissions

In order to demonstrate that an acceptable primary energy consumption rate has been achieved, the calculated Energy Performance Coefficient (EPC) will be no greater than the Maximum Energy Performance Coefficient (MEPC). The MPEPC is 0.30.

To demonstrate that an acceptable CO_2 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). The MPCPC is 0.35.

2.1.2. Building fabric

In order to limit the heat loss through the building fabric the thermal insulation for each of the plane elements of a new dwelling must meet or better the area weighted average elemental U-Values (Um) as specified by Part L, listed in Table 1 (column; Part L 2018).

Element	U-value (W/m².K)	U-value (W/m ² .K)	
Element	Part L 2011	Draft Part L 2018 (NZEB)	
Pitched Roof (Insulated on slope or ceiling)	0.16	0.16	
Flat Roof	0.20	0.20 0.18	
Walls	0.21		
Ground Floors	0.21	0.18	
Exposed floors	0.21	0.18	
External doors, windows and roof lights	1.60	1.40	

Table 1: Fabric U Values Comparison Part L 2011 vs Part L 2018 (Draft)

2.1.3. Use of Renewable Energy Sources

In order to comply with NZEB, dwellings must conduct a comparative analysis for specified renewable technologies to demonstrate compliance with Regulation L3 (b).

Renewable Energy Ratio (RER) is the ratio of the primary energy from renewable energy sources to total primary energy as defined and calculated in DEAP. The following represents a very significant level of energy provision from renewable energy technologies in order to satisfy Regulation L3 (b).

Where the MPEPC of 0.3 and MPCPC of 0.35 are achieved, a RER of 0.20 represents a very significant level of energy provision from renewable energy technologies

2.2. Nearly Zero Energy Buildings (NZEB)

2.2.1. About NZEB Standard

The European Energy Performance of Buildings Directive Recast (EPBD) requires all new buildings to be Nearly Zero - Energy Buildings (NZEB) by 31st March 2020. This means that any building completed after these dates must achieve the standard irrespective of when they were started. This is quite different to the transitional arrangements for previous building regulations revisions.

'Nearly Zero - Energy Buildings' means a building that has a very high energy performance, Annex 1 of the Directive and in which "the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby"

2.2.2. Implementation of NZEB in Ireland

Each member Government has discretion in how the standard is applied nationally. To comply with the NZEB requirement, the Irish Government has amended the 2011 Part L to include the following paragraphs:

'In order to achieve the acceptable primary energy consumption rate for a nearly zero energy dwelling, the calculated energy performance coefficient (EPC) of the dwelling being assessed should be no greater than the Maximum Permitted Energy Performance Coefficient (MPEPC). The MPEPC for a nearly zero energy dwelling is 0.30.

To demonstrate that an acceptable CO2 emission rate has been achieved for a nearly zero energy dwelling, the calculated carbon performance coefficient (CPC) of the dwelling being assessed should be no greater than the Maximum Permitted Carbon Performance Coefficient (MPCPC). The MPCPC for a nearly zero energy dwelling is 0.35.'

2.3. Dublin City Development Plan 2016-2022

The energy strategy will consider the following council policies and objectives as outlined in the Dublin City Development Plan 2016-2022.

Apartment Living

It is the **policy** of Dublin City Council:

- QH18: To promote the provision of high quality apartments within sustainable neighbourhoods by achieving suitable levels of amenity within individual apartments, and within each apartment development, and ensuring that suitable social infrastructure and other support facilities are available in the neighbourhood, in accordance with the standards for residential accommodation.
- QH19: To promote the optimum quality and supply of apartments for a range of needs and aspirations, including households with children, in attractive, sustainable, mixed-income, mixed-use neighbourhoods supported by appropriate social and other infrastructure.
- QH20: To ensure apartment developments on City Council sites are models of international best practice and deliver the highest quality energy efficient apartments with all the necessary infrastructure where a need is identified, to include community hubs, sports and recreational green open spaces and public parks and suitable shops contributing to the creation of attractive, sustainable, mixed-use and mixed-income neighbourhoods

Climate Change

It is the **policy** of Dublin City Council:

• CC1: To prioritise measures to address climate change by way of both effective mitigation and adaptation responses in accordance with available guidance and best practice.

 CC2: To mitigate the impacts of climate change through the implementation of policies that reduce energy consumption, reduce energy loss/wastage, and support the supply of energy from renewable sources.

It is an **<u>objective</u>** of Dublin City Council:

- CCO1: To implement the 'National Climate Change Adaptation Framework' (2012) by adopting a Climate Change Action Plan for Dublin City which will assist towards meeting National and EU targets. This will be adopted by end of 2018.
- CCO2: To support the implementation of the forthcoming 'Climate Change Strategy for Dublin and Climate Change Action Plan for Dublin City.
- CCO3: To support the implementation of the national level 'Strategy for Renewable Energy 2012-2020' and the related National Renewable Energy Action Plan (NREAP) and National Energy Efficiency Action Plan (NEEAP)
- CCO4: To support the implementation of the 'Dublin City Sustainable Energy Action Plan 2010-2020' and any replacement plan made during the term of this Development Plan.

Sustainable Energy / Renewable Energy

It is the **policy** of Dublin City Council:

- CCO5: To support and collaborate on initiatives aimed at achieving more sustainable energy use, particularly in relation to the residential, commercial and transport sectors.
- CCO6: To promote the concept of sustainable communities throughout the city and to seek to initiate and support carbon neutral demonstration projects in conjunction with local communities.
- CCO7: To actively promote and facilitate the growth of the new emerging green industries to contribute both to the reduction of the city's energy consumption levels and to the role of the city as a leader in environmental sustainability.
- CCO8: In conjunction with Codema, to complete a comprehensive spatial energy demand analysis to help align the future energy demands of the city with sustainable energy solutions
- CCO9: To encourage the production of energy from renewable sources, such as from BioEnergy, Solar Energy, Hydro Energy, Wave/Tidal Energy, Geothermal, Wind Energy, Combined Heat and Power (CHP), Heat Energy Distribution such as District Heating/Cooling Systems, and any other renewable energy sources, subject to normal planning considerations, including in particular, the potential impact on areas of environmental sensitivity including Natura 2000 sites
- CCO10: To support renewable energy pilot projects which aim to incorporate renewable energy into schemes where feasible
- CCO11: To support and seek that the review of the National Building Regulations be expedited with
 a view to ensuring that they meet or exceed the passive house standard or equivalent, with
 particular regard to energy performance and other sustainability considerations, to alleviate
 poverty and reduce carbon reduction targets

Sustainable Building Design/Quality

It is the **policy** of Dublin City Council:

 QH12: To promote more sustainable development through energy end-use efficiency, increasing the use of renewable energy, and improved energy performance of all new development throughout the city by requiring planning applications to be supported by information indicating how the proposal has been designed in accordance with the development standards set out in the development plan.

Energy Efficiency and the Built Environment

It is the **policy** of Dublin City Council:

- CC3: To promote energy efficiency, energy conservation, and the increased use of renewable energy in existing and new developments.
- CC4: To encourage building layout and design which maximises daylight, natural ventilation, active transport and public transport use.



It is an **<u>objective</u>** of Dublin City Council:

- CCO12: To ensure high standards of energy efficiency in existing and new developments in line with good architectural conservation practice and to promote energy efficiency and conservation in the design and development of all new buildings in the city, encouraging improved environmental performance of building stock.
- CCO13: To support and encourage pilot schemes which promote innovative ways to incorporate energy efficiency into new developments.

3. Part L Compliance

The proposed development will meet or exceed where feasible the requirements of Part L. Apartments have been assessed using the Sustainable Energy Authority of Ireland (SEAI) DEAP 4.1 (beta) software which demonstrates Part L compliance. Software inputs and outputs are summarised in section 5 of this report.

3.1. Building Fabric

In order to limit the heat loss through the building fabric of the proposed apartments the thermal insulation for each of the plane elements of the development will meet or better the area weighted average elemental U-Values (Um) as specified by Part L. Table 1 lists the Part L area weighted average elemental U-Values and the targeted U-Values of the proposed design.

Element	U value (U value (W/m².K)			
	Draft Part L 2018 (NZEB)	Targeted			
Pitched Roof	0.16	0.16			
Flat Roof	0.20	0.15			
Walls	0.18	0.18			
Ground Floors	0.18	0.15			
Exposed floors	0.18	0.15			
External doors, windows and roof lights	1.40	1.30			
Glazing gv (EN410)		*0.4-0.6			

Table 2: Fabric U Values (Apartments and Houses)

* pending overheating calculation

3.2. Thermal Bridging

To avoid excessive heat losses and local condensation problems, consideration will be given to ensure continuity of insulation and to limit local thermal bridging, e.g. around windows, doors and other wall openings, at junctions between elements and other locations.

Acceptable Construction Details will be adopted for all key junctions where appropriate (i.e. typical/standard junctions). For all bespoke key junctions certified details which have been certified by a third party certification body (such as Agrément or equivalent) will be used or calculated by an NSAI registered thermal modeller.

Heat loss associated with thermal bridges is taken into account in the DEAP methodology and can heavily impact the calculated energy use and CO_2 emissions. In general this is done by including an allowance for additional heat loss due to thermal bridging, expressed as a multiplier (Ψ , psi) applied to the total exposed surface area or by the calculation of the transmission heat loss coefficient H_{TB}. A default Ψ value of 0.15 is applied in DEAP; the proposed design is targeting a Ψ value of at least 0.08 or equivalent H_{TB} value.

3.3. Building Envelope Air Permeability

In addition to fabric heat loss/gain, considerable care will be taken during the design and construction to limit the air permeability (Infiltration). High levels of infiltration can contribute to uncontrolled ventilation.

Part L requires an air permeability level no greater than $5m^3/m^2/hr @ 50Pa$ for a new dwelling; which represents a reasonable upper limit of air tightness. The design intent for the proposed apartments and houses will be to target an air permeability of $2m^3/m^2/hr @ 50Pa$.

Air permeability testing will be carried out by a person certified by an independent third party (National Standards Authority of Ireland or equivalent certification body) in accordance with I.S. EN 13829: 2000 "Thermal performance of buildings: determination of air permeability of buildings: fan pressurisation method". All apartments will be tested in this way.

3.4. Building Services

3.4.1. Heating Appliance Efficiency

Regulation L3 (d) requires that space heating and water heating systems in dwellings are energy efficient, with efficient heat sources and effective controls. More specifically, Regulation L3 (e) provides that oil and gas fired boilers must achieve a minimum seasonal efficiency of 90%.

The proposed design for the apartments are to generate heat for space heating and domestic hot water (DHW) by using a centralised, group heating system with heat pump technology, delivering heat via heat interface units (HIUs). The design for houses intends to generate heat for space heating and domestic hot water (DHW) by using a central heating system.

In relation to apartments and houses, heating will be provided to the space by appropriately sized radiators or low temperature radiators which operate at lower flow and return temperature.

3.4.2. Space Heating and Hot Water Supply System Control

Space and water heating systems should 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

We propose to use a control system with full time and temperature control in each occupied room

3.4.3. Insulation of Hot Water Storage Vessels, Pipes and Ducts

All hot water storage vessels, pipes and ducts (where applicable) will be insulated to prevent heat loss. Adequate insulation of hot water storage vessels will be achieved by the use of a storage vessel with factory applied insulation tested to BS 1566, part 1:2002 Appendix B. Water pipes and storage vessels in unheated areas will be insulated for the purpose of protecting against freezing. Technical Guidance Document G and Risk report BR 262, Thermal insulation avoiding risks, published by the BRE will be followed.

3.4.4. Low Flow Sanitary Ware

At the time of writing the official DEAP4 software is yet to be made available. It is expected that this updated version for assessing the building energy rating will give credit for water efficient showers, taps, wash hand basins and baths. The installation of flow restrictors is recommended. 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.

3.4.5. 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.

3.4.6. User Information

After the completion of the proposed Development the end user(s) will be provided with sufficient information about the building, its installed services and their maintenance requirements so that the Apartments can be operated in line with their optimum operation for energy efficiency.

3.5. Use of Renewable Energy Sources

The following low & zero carbon technologies were reviewed in terms of their applicability for this development;

- Wind Power
- Photovoltaic Cells (PV)
- Solar Thermal Collectors
- Biomass Heating
- Ground Source Heat Pumps (GSHPs)
- Air Source Heat Pumps (ASHPs)
- Exhaust Air Heat Pumps (EAHPs)
- Combined Heat & Power (CHP)

Technology	Feasibility			Comments
rechnology	High	Medium	Low	Comments
Micro Wind			V	Technology Description: Micro wind turbines can be fitted to the roof of a building but would contribute a negligible amount of energy to the development. Applicability to this Development: Due to the suburban nature of the development site, this renewable has not been deemed viable. Vertical axis wind turbines may be more suited to this building, but there would still be the obvious aesthetic and potential noise issues.

Technology	Feasibility			Comments	
rechnology	High	Medium	Low	Comments	
Wind Power			V	Technology Description: Mast-mounted wind turbines can be located in an open area away from obstructions such as buildings and tall trees. Applicability to this Development: Due to the suburban location of the site and its location close to other residential buildings it is deemed that a large wind turbine installation is not feasible.	
Solar Photovoltaic (roof mounted)	V			Technology Description: Photovoltaic (PV) Cell technology involves the conversion of the sun's energy into electricity. PV panels can be discrete roof-mounted units or embedded in conventional windows, skylights, atrium glazing, façade cladding etc. Applicability to this Development: Residential developments can be suitable locations for the installation of PV depending on orientation roof pitch and over-shading while also being virtually maintenance free. PV should be included for this development and assessed further at detailed design.	
Solar hot water systems			V	 Technology Description: Active solar hot water technology uses the sun's thermal radiation energy to heat fluid through a collector in an active process. Applicability to this Development: Due to the maintenance factor surrounding solar panels a solar hot water system is not considered feasible at this site. 	

Tashaalaay	F	easibility		Commonto
Technology	High	Medium	Low	Comments
Biomass Heating			V	 Technology Description: Biomass boilers work on the principle that the combustion of wood chip or pellets can create heat for space heating and hot water loads. Applicability to this Development: This technology requires substantial space allowance in a boiler room, access for delivery trucks, a thermal accumulator tank and considerable space for fuel storage of wood chips or pellets. The system also requires regular maintenance to remove ash etc. The use of biomass calls for a continuous local supply of suitable fuel to be truly sustainable. Concerns exist over the level of NOx and particulate emissions from biomass boiler installations, particularly in urban areas.
Ground source heat pump (GSHP)			\checkmark	 Technology Description: GSHP technologies exploit seasonal temperature differences between ground and air temperatures to provide heating in the winter and cooling in the summer. GSHP systems use some electricity to run the heat pump, but as most of the energy is taken from the ground, they produce less greenhouse gas than conventional heating systems. Ground source heat systems deliver low temperature heat and high temperature cooling, suitable for underfloor heating or chilled beams. Applicability to this Development: Site restrictions would require the use of vertical boreholes as opposed to horizontal ground loops. GSHP technology would need further investigation during detailed design and will depend on a favourable ground Thermal Response Test. Additionally capital costs are high and ideally, there should be a good balance between heating and cooling loads to allow for high COPs and reasonable capital payback. While a well-designed GSHP system operating under favourable conditions can achieve good efficiencies, the capital cost difference may still outweigh potential energy savings. As there is no cooling load, this investment is not deemed viable

Tachaology	Feasibility			Commonto	
Technology	High	Medium	Low	Comments	
Air source heat pump (ASHP)	\checkmark			 Technology Description: ASHP technologies exploit seasonal temperature differences between external air and refrigerant temperatures to provide heating in the winter and cooling in the summer. ASHP systems use more electricity to run the heat pump when compared to GSHP, but as most of the energy is taken from the air, they produce less greenhouse gas than conventional heating systems over the heating season. Their COP can reduce to below 2.0 when outside air temperatures are ≤0°C and they can require additional energy for a defrost cycle. Applicability to this Development: Heat 	
				pumps are generally safer than the combustible based heating systems and have a relatively low carbon footprint. Heat pumps can deliver heat at low outside temperatures which can be considered suited to the Irish climate. For this reason ASHP has been deemed suitable for the proposed development for the provision of space heating and/or DHW demand.	
Exhaust Air source heat pump (EAHP)	\checkmark			Technology Description: The exhaust air heat pump uses otherwise wasted heat in the warm air areas of your home (bathrooms, kitchen, utility) and transfers that heat to hot water using the same principles as air source and ground source heat pumps. An Exhaust Air Heat Pump (EAHP) extracts heat from the exhaust air and transfers the heat to domestic hot water and/or hydronic heating system (underfloor heating, radiators).This type of heat pump requires a certain air exchange rate to maintain its output power. Since the inside air is approximately 20- 22 degrees Celsius all year round, the maximum output power of the heat pump is not varying with the seasons and outdoor temperature	
				Applicability to this Development: Exhaust Air Heat Pumps are best suited to apartments which will have low fabric heat losses. The latest units with inverter controlled compressor also have a ducted outside air supply which means the unit can draw on outside air when extract rates are low but without the need for an external condenser unit.	

Technology	Feasibility			Comments	
rechnology	High	Medium	Low	Comments	
Combined Heat and Power (CHP)	V			Technology Description: Combined heat and power (CHP), also known as co-generation, is the simultaneous generation of both useable heat and electrical power from the same source. A CHP unit comprises of an engine (referred to as the prime mover) in which fuel is combusted. The mechanical power produced by the engine is used to generate electricity using an integral electrical generator. The heat emitted from the engine (waste heat) is used to provide space heating and domestic hot water Applicability to this Development: CHP systems can be used in applications where there is a significant year-round demand for heating in addition to the electricity generated. CHP has been deemed suitable for the proposed development for the provision of space heating and/or DHW demand due to annual hours of operation considering the nature of the development.	

4. Passive Design

A focus for this project is to operate the building with low energy consumption. The building will be designed to minimise/avoid the requirements for mechanical ventilation and/or air conditioning. This will be done with the use of passive systems to control the internal environment, where possible.

This will be further developed with the client, architect, structural engineer and cost consultant as the scheme develops. The passive systems will aim to reduce external noise and pollution, reduce heat loss (in winter), reduce solar gains (in summer), and maximum daylight while maintaining comfort conditions.

4.1. Natural Ventilation

Natural ventilation will be incorporated wherever possible via either single sided or cross ventilation. Where natural ventilation cannot provide the comfort and air quality needs of the occupants or the space and mechanical ventilation cannot be avoided, these systems will incorporate energy efficient solutions to maximise the efficiency of the systems through the use of heat recovery and the efficient controls. This will be fully assessed during detailed design in accordance with procedures in CIBSE TM59 – 'Design methodology for the assessment of overheating risk in homes'.

For dwellings that incorporate mechanical solutions as in paragraph 4.2 below, it should be noted that these systems will not be sufficient to prevent summertime overheating alone. CIBSE TM59 states that 'homes that are predominantly naturally ventilated, including homes that have mechanical ventilation with heat recovery (MVHR), with good opportunities for natural ventilation in the summer should assess overheating using the adaptive method'. This will involve detailed consideration of openable windows and doors and testing the design for a number of typical worst case apartments using dynamic simulation software.

4.2. Balanced Whole House Mechanical Ventilation with Heat Recovery



Figure 3: Balanced Whole house Mechanical Ventilation with heat recovery

The proposed system for apartments will use mechanical ventilation with heat recovery (MVHR), which is a whole-house ventilation system that generally supplies fresh air to dry rooms and extracts stale air from wet rooms.

Both air flows are to be ducted and driven by two fans, one on the supply side and one on the extract side. This will provide whole building ventilation as the mechanical extract fan will remove odours and excessive humidity to maintain a good air quality. A key component of the system is that a heat recovery unit is utilised to transfer heat from the warm exhaust air to the fresh air, achieving heat recovery.

The ventilation system should be listed on SAP appendix Q which ensures a suitable method of testing procedure for Irish use.

4.3. Passive Solar

Daylight in buildings creates a positive environment by providing connectivity with the outside world and assisting in the wellbeing of the building inhabitants. Daylight also represents an energy source; it reduces the need for artificial lighting, particularly in dwellings where natural light alone is often sufficient throughout the day. The design intent is to maximise the use of natural daylight to enhance visual comfort and not compromise thermal performance. The proposed development will have glazing specified that will minimise thermal conduction (u-value) while allowing for sufficient daylight levels and the maximisation of solar gain. Maximising solar gain within the limitations of thermal comfort will allow for a portion of the space heating load to be met passively during the day.

4.4. Water Conservation

During the detailed design stage for the proposed development the consumption of potable water in sanitary applications will be strongly considered and where possible low water use fittings and dual flush WCs will be specified.

A rainwater harvesting system will also be considered for this project and during the detailed design stage; calculations will be carried out to evaluate the suitability of this type of system. Reclaimed rainwater can be used for a range of applications such as toilet flushing, washing machines and irrigation. There are three main types of rainwater recovery systems: indirectly pumped, directly pumped, and gravity fed. The benefits of rain water harvesting is twofold as not only does it help to reduce the use of treated mains water for non-potable use, it can also help reduce water run –off and risk of flooding.

5. DEAP Calculation Summary

DEAP calculations have been carried out using SEAI DEAP 4.1 (beta) software in order to demonstrate compliance with Part L 2018 on a sample of 2-bed apartments. The DEAP calculations are based on the following provisional inputs:

5.1. SEAI DEAP 4.1 (beta) Inputs – Apartment (Centralised System)

•	Fabric U Values	
	 Wall U value 	$= 0.18 \text{ W/m}^2\text{K}$
	 Semi exposed walls 	= 0.23 W/m ² K (walls to unheated voids)
	• Floor	$= 0.15 \text{ W/m}^2\text{K}$
	 Flat Roof 	$= 0.15 \text{ W/m}^{2}\text{K}$
	• Doors	$= 1.40 \text{ W/m}^2\text{K}$
	 Glazing/Balcony door 	= 1.30 W/m ² K (whole window unit inclusive of frame)
	 Glazing gv (EN410) 	= 0.4-0.6 (subject to overheating study)
	 Frame Factor 	= 0.7 (i.e. 30% frame)
•	Air permeability	= 2 m ³ /m ² /hr at 50 Pa
•	Thermal bridging	$= 0.08 \text{ W/m}^2.\text{K}$
•	Ventilation	= MVHR
	Specific Fan Power	= 0.38 W/I/s
•	Heat Exchanger Efficiency	= 93%
•	Lighting	= 100% Low energy
•	Heating system	= Community Heating
•	Distribution system loss and gains	;
	 Heating system category: 	Group heating schemes
	 Heating system: Group heating 	-
		Full time and temperature zone control
•	Charging on heat consumed $= 1$	
•		1.05
	Heating system: Air-Water heat pu	
	 Heat Pump efficiency 	= 273%
		I/low temperature radiators only
	Sub-category: Boiler	
	 Heating fuel 	= Mains gas
	• Boiler efficiency	= 91%
•	Space heating system also supplies	
	Heat Interface Unit Loss Factor	= 0.364 kWh/day
	Heat Interface Unit Water Storage	
•	Renewable Sources	= 1no. PV Panel/Apt

5.2. SEAI DEAP 4.2(beta) Outputs – Apartments

Table 4 summaries the results of the preliminary DEAP calculations carried out for a representative 2bed apartment using the energy strategy detailed in this report. Appendix 1 contains the DEAP output which demonstrates draft Part L 2018 (NZEB) compliance.

		Sammary Aparen	ient eentra			==010)
	Apartmer	nt	Energy Rating	EPC	CPC	RER
	Top Floor - Block A22-Bed apartmentMid Floor - Block A22-Bed apartmentGround Floor - Block A22-Bed apartment		A2	0.298	0.276	0.250
			A2	0.244	0.230	0.260
			A2	0.265	0.246	0.260

Table 3: DEAP Output Summary - Apartment - Centralised Sys (Draft Part L 2018)

5.3. Conclusions

5.3.1. Draft Part L 2018 - Apartment compliance (Centralised):

This report confirms that the proposed East Road apartments will comply with Part L regulations (NZEB). The report highlights that Part L will be achieved if applied as the report suggests. The strategies adopted for the East Road apartments are outlined here:

- U-values for floor and roof will exceed the building regulation backstops
- Using Glazing U-Value target outlined in this report
- Better performance air permeability than the backstop, adding to building air tightness and ventilation effectiveness
- Balanced whole house mechanical ventilation with heat recovery
- High performance thermal bridging
- Air source heat pump (ASHP) to provide space Heating (via radiators) and domestic hot water
- Renewable Sources 1 no. PV Panel per apartment

Appendix 1: DEAP Part L Compliance Report

DEAP Worl	Report													
		Aligned to	DEAP soft	ware version	n 3.2 (plus	draft chang	es for NZEE	3 part L)						
nputs and i	results, wi		intermediat											
Details not	applicable	for this dw	elling are gr	ayed out.										
Print out 'Pr	roj' worksh	eet separat	ely if requir	ed.										
Dwelling d	limension				TGD L ve	rsion	2018							
		Area [m ²]	Height [m]											
Ground floo	r	107	2.6											
First floor		0	0.0											
Second floo		0	0.0											
Third and of	ther floors	0	0.0											
Total floor a	area [m²]	107												
Dwelling vo	lume [m ³]	278												
iving area		49.2												
and a	[]													
/entilatior	۱													
Number of a					0									
Number of o					0									
		t fans and r	bassive vent	s	1									
Number of f				.0	0									
	•	by on main	entrance?		Yes									
		the dwelling			1									
			a n carried out	?	Yes	1								
	Not applica	-		••	100									
	oppilo				-									
			1											
If yes :														
	Air nermes	hility [m2/h	n.m2 at 50 F	Pal		0.1						+ + +		
End if		aonity [1113/1	at JU I	պ		0.1	1							
Vumber of s	sides chall	ered			3									
/entilation						whole-bour	e mechanic	al ventilatio	n with best	recovery		6		
		nto [oo/h]			0.15	whole-hous	e mechanic		n with heat	recovery		0		
Effective ai					13									
			meets guid	lalinaa in Ti										
						a loft:								
			than positiv		ination from		·	Vee						
			ix Q" data a	avaliable?		,		Yes		-				
		rer and mo				· · · ·	Vent Axia S		enc Advanc	5				
		n power [W						0.42						
	Heat exch	anger efficie	ency [%]					92						
A/:														
Nindows				N 1	E 67 1		05/000	0	N1	N				
Drientation				North	East/West		SE/SW	South	North	North	North	Horizontal		
Drientation	ID			1	3	1	4	5	1	1	1	6		
Area [m ²]				11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
J-value [W/	/m² K]			1.30	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
s U-value a	a manufact	urer's certifi	ied value?	Yes	Yes	-	-		-	-	-	-		
f yes:								-						
								-						
	Manufactu	rer and mo	del	-	-	-	-	-	-	-	-	-		
		rer and moo gy transmit		- 0.4	- 0.4	-			-	-	-	-		
:				-	- 0.4		-	-				- -		
End if	Solar ener	gy transmit		- 0.4		-	-	-				- -		
End if	Solar ener	gy transmit	tance	- 0.4		-	-	-				- - 0		
End if Correction f	Solar ener	gy transmit	tance	- 0.4 e if applical	ble (Table 6	- ia, notes 1	- - and 2).	-	-	-	-			
End if Correction f Overshading	Solar ener for roof win g ID	gy transmit	tance	- 0.4 e if applical 0 2	ble (Table 6 0 3	- a, notes 1 0 0	- - and 2). 0 0	- - 0 0	- 0 0	- 0 0	- 0 0	0		
End if Correction f Overshading Frame facto	Solar ener for roof win g ID or (Table 6	gy transmit	tance	- 0.4 e if applical 0 2 0.70	ble (Table 6 0 3 0.70	- a, notes 1 0 0 0.00	- - and 2). 0 0 0.00	- - 0 0 0.00	- 0 0 0.00	- 0 0 0.00	- 0 0.00	0 0 0.00		
End if Correction f Overshading Frame facto	Solar ener for roof win g ID or (Table 6	gy transmit dow and/or	tance	- 0.4 e if applical 0 2	ble (Table 6 0 3	- a, notes 1 0 0	- - and 2). 0 0	- - 0 0	- 0 0	- 0 0	- 0 0	0		
End if Correction f Dvershading Frame facto Nindow typ	Solar ener for roof win g ID or (Table 6	gy transmit dow and/or	tance	- 0.4 e if applical 0 2 0.70	ble (Table 6 0 3 0.70	- a, notes 1 0 0 0.00	- - and 2). 0 0 0.00	- - 0 0 0.00	- 0 0 0.00	- 0 0 0.00	- 0 0.00	0 0 0.00		
End if Correction f Dvershading Frame facto Window typ Fabric	Solar ener for roof win g ID or (Table 6 oe ID	gy transmit dow and/or c) [-]	tance	- 0.4 e if applical 0 2 0.70	ble (Table 6 0 3 0.70	- a, notes 1 0 0 0.00	- - 0 0 0.00 0	- - 0 0 0.00	- 0 0 0.00	- 0 0.00 0	- 0 0.00	0 0 0.00		
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End if Correction f Dvershading Frame facto Window typ Fabric Exposed el	Solar ener for roof win g ID or (Table 6 be ID ement type	gy transmit dow and/or c) [-]	tance metal fram Area [m ²]	- 0.4 e if applical 0 2 0.70 4 U-value [W/m ² K]	ble (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>]	- a, notes 1 0 0 0.00 0	- - 0 0 0.00 0	- - 0 0 0.00	- 0 0.00 0 Element ty	- 0 0.00 0	- 0 0.00 0	0 0 0.00 0		
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Watarha												1
Water he	distribution	1000002		Yes								
								-				
Distributio	on loss [kWl	n/yj		301				-				
A				N/				-				
	storage los	ses?		Yes	1							
lf yes			flitere e 1			-	3.4					
	vvater sto	rage volume	litres				3.4	-				
		cturer's decl	ared loss ta	actor availat	DIE?		Yes	1				
	lf yes	: Manufactu		1.1			F. LF MA					
								Instant 5/8	0			
	16			ed loss fact	or [kvvn/da	ayj	0.364	_				
	lf no	Not applica	adie			-		-				
	End if		1	1				_				
								-				
		ure factor un			otoo)	1	-	-				
End if	remperatu	ure factor mu	uniplier (fror	n Table 2 h	ules)	1		_				
	color water	hooting cure	tom?			No	0					
Is there a If yes	Not applic	heating sys				INO	U					
ii yes	NUL applic	aule					0	olor freetic-	F0/ 1	0		
	-						S	olar fraction	[%]	0		
End if							1	-				
	irouit looo []	(M/b/) / Tob	up 2)					360				
		kWh/y] (Tab		ala 2a)				0				
		mbi boiler [k on of electri			mhi hailar		Toble 46	0				
		ctric immers				[KVVIVy] (1	able 41)	No				
		ter heater [k		is used in	summer?	2457		INO				
		entary heate				2457						
						109						
		<i>r heating sy</i> ndoors or in		ing ophomy	. <u>.</u>	Yes						
Lighting	ei storage i		group near	ing scheme	<i>;</i>	165						
	of fixed lig	hting outlets	that are lo	w-oporav [-	1	#REF!						
		or lighting, E]	262						
Annuaren	lergy used i	or ngriting, L				202						
Internal of	naine											
	al gains [W	7				489						
Net Intern	iai yairis [vv]				409						
Heatuse												
	a fraction [-	1		0.461086								
		ory of dwellir	na	Medium								
Heat use			.9	1442								
	[
Space he	eating											
	and respons	siveness										
		ent (Table 4	e), where a	ppropriate I	Cl	0	1	1				
		rol category			- 1	3						
		onsiveness (able 4a or 4	ld)	1						
Pumps/fa			J., (1		,		Enter	If present,		If present,		
							number	is boiler co	ontrolled	inside		
							present		nermostat?	dwelling?		
Central he	eating pump	(supplying	hot water to	o radiators	or underfloo	or system)	0	.,	Yes			
		plying oil to				.,	0	1	-	-		
		f fan assiste		,			0					
		eating system		•		No	Ť	1				
Emission												-
Emission Is main he			thin an env	elope eleme	ent? (e.a. u	Inderfloor he	eating in gr	round floor)	No	0		
	eat emission	n system wi			, ,	Inderfloor he	eating in gr	round floor)	No 0.15	0		
ls main he	eat emission	n system wi alue of enve		nt [W/m ² K]	inderfloor he eating sche		round floor)	No 0.15	0		

	y space he		community			1						
					em (use value from					0		
										-		
Generation	n efficiency	of seconda	ary / supplem	entary heatin	g system [%] (use	e value from	Table 4a or	Appendix E)		0		
Main (ara	up heating) systom										
	based on		umod2			Yes						
	n loss facto					1.05						
				oot room ord	from power station							
Boilers	i neat nom			eat lecoveru	nom power station	0						
Doners	/16 4h - 6n 4		(frame la sila na l		tions in time law and	4						
	(If the fract	ion of near	t from bollers	is zero, this s	section is irrelevan	t).						
	Heat source	e type	Fuel			Efficiency	Percent of					
		21.5				[%]	heat [%]					
	Boiler type	1	mains gas			91	49					
	Boiler type		-			0	0					
	Heat pump		electricity			273	51					
	Solar heat						0					
CHP or w	aste heat fr											
				aste heat is z	ero, this section is	s irrelevant).						
	System ty				-	ĺ			2			
	If CHP								_			
		Electrical	efficiency of (CHP unit (e.c	. 0.3) from operation	onal records	or the CHP	design specif	ication [0.28		
) from operational					0.57		
		Fuel type		(e.g. e.e.	mains gas			.g				
					gan	-						
Fuel data			Fuel									
Space hea	ating - seco	ndarv	-									
- ,	3 2200					Primary	CO2	De	elivered			
Renewable	and energ	v-saving te	echnologies			energy	factor		nergy			
Type 1	Description	, 0	-			factor [-]			Wh/y]			
.,	Energy pro		saved			2.08	0.409		91			
	Energy co					0.00	0.000		0			
Type 2	Description		-						-			
21.5	Energy pro		saved			2.08	0.409		231			
	Energy co					0.00	0.000		0			
Turne 2	Description		-						-			
Type 3			aanad			0.00	0.000		0		1	
Туре 3	Energy pro	aucea or s	saveu			0.00	0.000		0			



If yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation heat la Permeability test For mechanical ve Is mea Manufa Specifi	Aligned to , with selected able for this dwe rksheet separat sions Area [m ²] 107 0 0 ors 0 n ²] 107 m ³] 278 49.2 eys ues ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] sss [W/K] carried out and	Intermediat Illing are grading	e results sł ayed out. ed. s s ? Paj lelines in TC	TGD L ve TGD L ve 0 0 1 0 Yes 1 Yes 1 Yes 3		2018						Image: Constraint of the sector of
nputs and results Details not applic Print out 'Proj' wo Dwelling dimen: Ground floor First floor Second floor First floor Cotal floor area (n Dwelling volume [Living area [m ²] Ventilation Number of chimme Number of chimme Number of chimme Number of flueles: s there a draught Number of storeys Has an air permea f no Not ap (f yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation metho Effective air chan Ventilation metho Effective air chan Ventilation metho Effective air chan Ventilation heat lo Permeability test For mechanical w Specifi Heat e Nindows	with selected able for this dwa rksheet separat sions Area [m ²] 107 0 0 ors 0 n ²] 107 m ³] 278 49.2 49.2 eys ues ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] sss [W/K] carried out and antilation, other sured "Appendia acturer and moo ic fan power [W	Intermediat Illing are grading	e results sł ayed out. ed. s s ? Paj lelines in TC	TGD L ver TGD L ver 0 0 0 1 0 1 0 Yes 1 Yes 3 Balanced 0.15	lics rsion 1 0.1	2018					Image: Constraint of the sector of	Image: Constraint of the sector of
Details not applic: Print out 'Proj' wo Dwelling dimension Ground floor First floor Second floor Total floor area [m' Dwelling volume [iving area [m2] /entilation Number of chimne Number of chimne Number of flueles: s there a draught Number of storey: As an air permeat f yes End if Number of sides s /entilation metho Effective air chan Ventilation metho Erd if Number of sides s /entilation metho Effective air chan Ventilation heat lo Permeability test For mechanical we Is meat Manufi Specifi Heat e Windows	able for this dwerksheet separat sions Area [m ²] 107 0 0 0 107 107 107 49.2 Area [m ²] 107 m ³] 278 49.2 eys ues ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] sss [W/K] carried out and entilation, other sured "Appendia acturer and moo ic fan power [W	Illing are gri ely if require Height [m] 2.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	ayed out. ed. s s ? 2a]	TGD L ve 0 0 1 Ves 1 Yes 3 Balanced 0.15	rsion						Image: Constraint of the sector of	Image: Section of the sectio
Print out 'Proj' wo Dwelling dimens Fround floor First floor Second floor First floor Firs	rksheet separat sions Area [m ²] 107 0 0 0 0 0 0 0 0 0 0 0 0 0	Height [m] 2.6 0.0 0.0 0.0 0.0 0.0 carsive vent entrance? carried out	s ? Pa] lelines in TC	0 0 1 0 Yes 1 Yes 3 Balanced 0.15	1							Image: Constraint of the sector of
Ground floor First floor First floor First floor Cotal floor area [m ²] Cotal floor area [Area [m ²] 107 0 0 0 0 0 0 0 0 0 107 m ³] 278 49.2 49.2 278 49.2 278 49.2 278 49.2 278 49.2 278 49.2 278 49.2 278 49.2 278 278 49.2 278 278 278 49.2 278 278 278 49.2 278 278 278 49.2 278 278 278 49.2 278 278 278 49.2 278 278 278 278 278 278 278 27	2.6 0.0 0.0 0.0 assive vent entrance? carried out .m2 at 50 F .m2 at 50 F meets guid than positiv x Q" data a	s ? Paj	0 0 1 0 Yes 1 Yes 3 Balanced 0.15	1			Image: Control of the sector of the			Image: Constraint of the sector of	Image: Section of the sectio
Ground floor First floor First floor First floor Cotal floor area [m ²] Cotal floor area [Area [m ²] 107 0 0 0 0 0 0 0 0 0 107 m ³] 278 49.2 49.2 278 49.2 278 49.2 295 ues ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] sss [W/K] carried out and antilation, other sured "Appendia acturer and moo ic fan power [W	2.6 0.0 0.0 0.0 assive vent entrance? carried out .m2 at 50 F .m2 at 50 F meets guid than positiv x Q" data a	s ? Paj	0 0 1 0 Yes 1 Yes 3 Balanced 0.15	1						Image: Constraint of the sector of	Image: Constraint of the sector of
First floor Second floor Second floor Total floor area [m Dwelling volume [Living area [m ²] Ventilation Number of chimne Number of chimne Number of flueles: s there a draught Number of storey: Has an air permea f no Not ap Number of sides s Ventilation metho Effective air chan Ventilation heat lc Permeability test for mechanical ve Is mea Manufa Specifi Heat e Nindows	107 0 278 49.2 eys ues ttent fans and p s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] sss [W/K] carried out and acturer and modia curver and m	2.6 0.0 0.0 0.0 assive vent entrance? carried out .m2 at 50 F .m2 at 50 F meets guid than positiv x Q" data a	? Pa]	0 1 0 Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic					Image: Constraint of the sector of	Image: Section of the sectio
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Third and other flo Total floor area [n Dwelling volume [iving area [m ²] Ventilation Number of chimme Number of open fl Number of internes Sthere a draught Number of storeys Has an air permea If no Not ap If yes : Air per End if Number of stores Ventilation metho Effective air chan Ventilation heat to Permeability test For mechanical we Specifi Heat e Windows	ors 0 n ²] 107 m ³] 278 49.2 49.2 ves ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] pss [W/K] carried out and antilation, other isured "Appendia acturer and moo is fan power [W	0.0 assive vent entrance? carried out .m2 at 50 F meets guid than positiv x Q" data a	? Pa]	0 1 0 Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic						
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Iving area [m ²] Ventilation Vumber of chimme Number of intermi Number of flueles: s there a draught Number of storey: Has an air permea ff no Not ap ff yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation metho Effective air chan Ventilation heat le Permeability test For mechanical ve Is mea Manufi Specifi Heat e Windows	49.2 eys ues ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] sss [W/K] carried out and antilation, other is ured "Appendia acturer and moo is fan power [W	entrance? carried out .m2 at 50 F meets guid than positiv x Q" data a	? Pa]	0 1 0 Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic						
Ventilation Number of chimme Number of open fi Number of flueles: s there a draught Number of storeys rlas an air permea ff no Not ap ff yes :	eys ues ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other isured "Appendi acturer and moo ic fan power [W	entrance? carried out .m2 at 50 F meets guid than positiv x Q" data a	? Pa]	0 1 0 Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic						
Number of chimne Number of open fl Number of intermi Number of flueless is there a draught Number of storeys Has an air permea f no Not ap If yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation heat lu Permeability test For mechanical we Is mea Manufi Specifi Heat e Nindows	ues ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] pss [W/K] carried out and antilation, other isured "Appendia acturer and moo is fan power [W	entrance? carried out .m2 at 50 F meets guid than positiv x Q" data a	? Pa]	0 1 0 Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic						Image: Constraint of the sector of
Number of open fl Number of intermi Number of flueles: s there a draught Number of storeys Has an air permea f no Not ap f no Not ap f yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation heat to Permeability test For mechanical we Is mea Manufa Specifi Heat e Nindows	ues ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] pss [W/K] carried out and antilation, other isured "Appendia acturer and moo is fan power [W	entrance? carried out .m2 at 50 F meets guid than positiv x Q" data a	? Pa]	0 1 0 Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic						Image: Constraint of the sector of
Number of intermi Number of flueles: s there a draught Number of storeys Has an air permea fl no Not ap fl yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation heat la Permeability test For mechanical we Is mea Manufa Specifi Heat e Windows	ttent fans and p s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d g rate [ac/h] sss [W/K] carried out and antilation, other usured "Appendia acturer and moo ic fan power [W	entrance? carried out .m2 at 50 F meets guid than positiv x Q" data a	? Pa]	1 0 Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic						Image: Constraint of the sector of
Number of flueles: s there a draught Number of storeys Has an air permea ff no Not ap If yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation metho Effective air chan Ventilation heat lc Permeability test For mechanical ve Is mea Manufi Specifi Heat e Windows	s gas fires lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other isured "Appendi acturer and moo ic fan power [W	entrance? carried out .m2 at 50 F meets guid than positiv x Q" data a	? Pa]	0 Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic						
s there a draught Number of storeys Has an air permer fron Not ap If yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation heat lû Permeability test For mechanical ve Is mea Manufi Specifi Heat e Nindows	lobby on main s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other isured "Appendi acturer and moo ic fan power [W	carried out .m2 at 50 F meets guid than positiv x Q" data a	Pa]	Yes 1 Yes 3 Balanced 0.15	0.1	e mechanic						Image: Constraint of the sector of
Number of storeys Has an air permea If no Not ap If yes : Air per End if Vumber of sides s Ventilation metho Effective air chan Ventilation heat le Permeability test For mechanical we Is mea Manufa Specifi Heat e Nindows	s in the dwelling ability test been plicable meability [m3/h sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other issured "Appendi acturer and mod ic fan power [W	carried out .m2 at 50 F meets guid than positiv x Q" data a	Pa]	1 Yes 3 Balanced 0.15	0.1	e mechanic						- - - -
las an air permea f no Not ap f yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation heat lo Permeability test For mechanical ve Is mea Manufa Specifi Heat e Nindows	ability test been plicable meability [m3/h sheltered d ge rate [ac/h] oss [W/K] carried out and antilation, other isured "Appendia acturer and moo ic fan power [W	.m2 at 50 F meets guid than positiv x Q" data a	Pa]	Yes 3 Balanced 0.15	0.1	e mechanic						
If no Not ap	plicable meability [m3/h sheltered d ge rate [ac/h] sss [W/K] carried out and antilation, other is ured "Appendi acturer and mod ic fan power [W	.m2 at 50 F meets guid than positiv x Q" data a	Pa]	3 Balanced 0.15	0.1	e mechanic						
If yes : Air per End if Number of sides s Ventilation metho Effective air chan Ventilation heat lo Permeability test For mechanical we Is mea Manufi Specifi Heat e Nindows	meability [m3/h sheltered d ge rate [ac/h] sss [W/K] carried out and antilation, other issured "Appendi acturer and moo ic fan power [W	meets guid than positiv x Q" data a	lelines in TC	Balanced 0.15		e mechanic						
Air per End if Vumber of sides s Ventilation metho Effective air cham Ventilation heat la Ventilation heat la Permeability test For mechanical ve Is mea Manuf Specif Heat e Windows	sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other issured "Appendi acturer and moo ic fan power [W	meets guid than positiv x Q" data a	lelines in TC	Balanced 0.15		e mechanic						
Air per End if Vumber of sides s Ventilation metho Effective air cham Ventilation heat la Ventilation heat la Permeability test For mechanical ve Is mea Manuf Specif Heat e Windows	sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other issured "Appendi acturer and moo ic fan power [W	meets guid than positiv x Q" data a	lelines in TC	Balanced 0.15		e mechanic						
Air per End if Vumber of sides s /entilation metho Effective air cham /entilation heat la Permeability test For mechanical ve Is mea Manuf, Specif Heat e Windows	sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other issured "Appendi acturer and moo ic fan power [W	meets guid than positiv x Q" data a	lelines in TC	Balanced 0.15		e mechanic						
Air per End if Vumber of sides s Ventilation metho Effective air cham Ventilation heat la Ventilation heat la Permeability test For mechanical ve Is mea Manuf Specif Heat e Windows	sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other issured "Appendi acturer and moo ic fan power [W	meets guid than positiv x Q" data a	lelines in TC	Balanced 0.15		e mechanic						
End if Number of sides s Ventilation metho Effective air chan Ventilation heat lo Permeability test For mechanical w Is mea Manufi Specifi Heat e Nindows	sheltered d ge rate [ac/h] pss [W/K] carried out and entilation, other issured "Appendi acturer and moo ic fan power [W	meets guid than positiv x Q" data a	lelines in TC	Balanced 0.15		e mechanic						
Vumber of sides s /entilation metho Effective air chan /entilation heat lo Permeability test For mechanical ve Is mea Manufa Specifi Heat e Vindows	d ge rate [ac/h] pss [W/K] carried out and entilation, other isured "Appendi acturer and mod ic fan power [W	than positiv x Q" data a	lelines in T(Balanced 0.15	whole-house	e mechanic	al					
/entilation metho Effective air chan /entilation heat le Permeability test for mechanical we Is mea Manufi Specifi Heat e Vindows	d ge rate [ac/h] pss [W/K] carried out and entilation, other isured "Appendi acturer and mod ic fan power [W	than positiv x Q" data a	lelines in T(Balanced 0.15	whole-house	e mechanic	al constituent					
Effective air chan Ventilation heat lo Permeability test For mechanical we Is mea Manufi Specif Heat e Windows	ge rate [ac/h] oss [W/K] carried out and entilation, other isured "Appendi acturer and mod ic fan power [W	than positiv x Q" data a	lelines in T(0.15			al ventilation	on with heat	recoverv		6	
Ventilation heat lo Permeability test For mechanical we Is mea Manufi Specifi Heat e Windows	oss [W/K] carried out and entilation, other isured "Appendi acturer and mod ic fan power [W	than positiv x Q" data a							. 555 vol y			
Permeability test For mechanical ve Is mea Manufa Specif Heat e Nindows	carried out and entilation, other isured "Appendi acturer and mod ic fan power [W	than positiv x Q" data a		10								
For mechanical ve Is mea Manufa Specif Heat e Nindows	entilation, other sured "Appendi acturer and mod ic fan power [W	than positiv x Q" data a		GD L?								
Is mea Manufa Specif Heat e Nindows	sured "Appendi acturer and moo ic fan power [W	x Q" data a	/e input ven		n loft:	:						
Manufa Specif Heat e Windows	acturer and mod ic fan power [W					-	Yes					
Specif Heat e	ic fan power [W	lei			V	/ent Axia S		etic Advanc	е			
Heat e							0.42					
Windows							92					
Orientation												
			North	East/West	t North	SE/SW	South	North	North	North	Horizontal	
Drientation ID			1	3	1	4	5	1	1	1	6	
Area [m ²]			11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
J-value [W/m ² K]			1.30	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
s U-value a manu	facturer's certifi	ed value?	Yes	Yes	-	-	-	-	-	-	-	
f yes:												
Manuf	acturer and mod	lel	-	-	-	-	-	-	-	-	-	
Solar e	energy transmit	ance	0.4	0.4	-	-	-	-	-	-	-	
End if												
Correction for roof	window and/or	metal frame	e if applicat	ole (Table 6	Sa, notes 1 a	and 2).						
			0	0	0	0	0	0	0	0	0	
Overshading ID			3	3	0	0	0	0	0	0	0	
Frame factor (Tab	le 6c) [-]		0.70	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Nindow type ID			4	4	0	0	0	0	0	0	0	
abric					-							
Exposed element	type	Area	U-value	AU	Comment	(optional)		Element ty				
		[m ²]	[W/m ² K]	[W/K]				(for assess	ing TGD L	conformity	/)	
Nindows/rooflight	'S	20.0	1.24	24.7	-							
Doors		0.0	0.00	0.0	-							
Floor		0.0	0.00	0.0	-			No underflo	oor heating			
Floor (type 2)		0.0	0.00	0.0	-			-				
loor (type 3)		0.0	0.00	0.0	-			-				<u> </u>
Valls		33.8	0.18	6.1	Wall Type						ompliance ch	
Valls (type 2)		6.8	0.23	1.6	Wall Type	2					c complianc	
Valls (type 3)		0.0	0.00	0.0	-						ompliance ch	
Valls (type 4)		0.0	0.00	0.0	-						ompliance ch	
Valls (type 5)		0.0	0.00	0.0	-				nt for TGD	L tabric co	ompliance ch	IECK
Roof		0.0	0.00	0.0	-			-				
Roof (type 2)		0.0	0.00	0.0	-			-			-	
Roof (type 3)		0.0	0.00	0.0	-			-				
Roof (type 4)		0.0	0.00	0.0	-			-				
Roof (type 5)		0.0	0.00	0.0	-			-			-	
Total area of elen		60.58		00								
leat loss via plar		-		32								
actor for thermal		K]		0.08								
Fabric heat loss [W/KI			37							-	
											-	
				51							-	
Dwelling heat loss Heat loss parame	s coefficient [W			0.47								

Water h -	ating		1								
Water hea					-	-					
	distribution		Yes								
Distributio	n loss [kW	n/y]	301								
		-									
	storage los	ses?	Yes	s 1							
lf yes	:										
	Water sto	rage volume [li	tres]			3.4					
	ls manufa	cturer's declare	ed loss factor av	ailable?		Yes	1				
	lf yes	:					_				
		Manufacturer	and model nam	e	Heatrae Sa	adia Hi Ma	x Instant 5/8	0			
		Manufacturer	's declared loss	factor [kWh/	day]	0.364					
	lf no	Not applicabl	e				_				
	End if										
		ire factor unad	justed (Table 2)		1						
			plier (from Table		1						
End if	remperate			2 10(03)			-				
	e olar woter	heating syste	m2		No	0					
	Not applic				INU	U					
lf yes	NOL APPIIC	aule				-	olor froatic-	F0/ 1	0		
							olar fraction	[70]	0		
	L	r	ĩ			4					
End if			a)								
		(Wh/y] (Table					360				
			h/y] (Table 3a)				0				
			ceep-hot facility			Table 4f)	0				
Is supplem	nentary ele	ctric immersio	n heating is use	d in summer	?		No				
Output from	m main wa	er heater [kW	'h/y]		2457						
Output from	m supplem	entary heater [[kWh/y]		0						
Heat gains	s from wate	r heating syste	em [W]		109						
Is hot wate	er storage i	ndoors or in gr	oup heating sch	eme?	Yes						
Lighting											
	of fixed lia	nting outlets th	nat are low-energ	l-] vc	#REF!						
		or lighting, EL		57 []	268						
/ IIIIIddi Off		, ingriding, 22	[200						
Internal g	aine						_				
-	al gains [W	7			489						
Net Interne	ai yairis [vv				409						
114											
Heatuse	n fan este i f		0.101	200							
•	a fraction [-		0.4610								
		ry of dwelling	Mediu				_				
Heat use [[ĸWh/y]		435)	_	-					
_											
Space he											
	nd respons										
			where appropri	ate [C]	0						
Heating sy	/stem conti	ol category (T	able 4e)		3						
Heating sy	stem resp	onsiveness cat	tegory (Table 4a	or 4d)	1						
Pumps/fai						Enter	If present,		If present,		
						number	is boiler co	ontrolled	inside		
						present		nermostat?	dwelling?		
Central he	ating nump	(supplying bo	t water to radiat	ors or underfl	OOr system)			Yes	an onling.		
			oiler and flue fan		set by storn)	0		-	-		
		f fan assisted		/		0		-	-		
		ating system			No	U					
		aung system	present?		INO						
	efficiency			1					0		
is main he			n an envelope e		underfloor h	eating in g	round floor)	No	0		
			e element [W/n					0.15			
Turne of me	ain heating	svstem	Group	/ community	heating sch	eme	2				

		roup/community h	cading scheme	·	-						
	ry space heating										
		econdary / supplen							0		
Generatio	n efficiency of se	condary / suppleme	ntary heating system	em [%] (use	value from	Table 4a or	Appendix E)		0		
Main (and	oup heating) sys	40.00									
	g based on heat				Yes						
	n loss factor [-] (1.05						
		unit or fraction of he	at recoverd from p	ower station	0						
Boilers			at recoveru nom p	ower station	0						
Doners	(If the freation o	f heat from boilers is	a zero this costion	in irrelevent	\ \						
	(ii the fraction o	Theat from bollers is	s zero, this section	i is melevani).						
	Heat source typ	e Fuel			Efficiency	Percent of					
					[%]	heat [%]					
	Boiler type 1	mains gas			91	49					
	Boiler type 2	-			0	.0					
	Heat pump	electricity			273	51					
	Solar heating sy					0					
CHP or w	aste heat from p					-					
		f heat from CHP/wa	ste heat is zero. th	nis section is	irrelevant).						
	System type			-				2			
	If CHP										
	Elec	trical efficiency of C	HP unit (e.a. 0.3)	from operatio	nal records	or the CHP	design spec	ification [0.28		
		efficiency of CHP							0.57		
		type		mains gas			5 1 1				
		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		geo							
Fuel data		Fuel									
	ating - secondary										
	,				Primary	CO2	C	Delivered			
Renewable	e and energy-sav	ing technologies			energy	factor		energy			
Type 1	Description	-				[kg/kWh]		kWh/y]			
71 -	Energy produce	ed or saved			2.08	0.409		91			
	Energy consum				0.00	0.000		0			
Type 2	Description	-									
	Energy produce	ed or saved			2.08	0.409		231			
	Energy consum				0.00	0.000		0		i i i i i i i i i i i i i i i i i i i	
	Description	-									
Type 3											
Туре 3	Energy produce	ed or saved			0.00	0.000		0			

Resul	ts																				
			Deliver energ [kWh/	y energy	CO ₂ emissions [kg/y]					Pr	ima	iry	ene	ergy	' [k'	Wh	/y]				
Snace he	ating - main		435	448	85		3,500														
	ating - seco			0	0		3,500										_				
	ating - main		2.45		479		3,000										_	-			
	ating - suppl		0	0	0		2 500		_												
Pumps, fa		, , ,	171	356	70		2,500											_			
Energy fo			268	558	110		2,000											-			
		heating syste		0	0																
		(individual he		0	0		1,500											-			
Photovolta	aic/ Wind Tu	urbine	0	0	0		1,000										_	_			
Type 1	` -		-91	-189	-37																
Type 2	-		-231	-480	-94		500			-								-			
Type 3	-		0	0	0		0			_	_						_	L '	Primary er	nergy [kWh/y	
Total			3,00	3,223	612		2	E	ain.	etc.	်မ္မ	heating	Ξ.	e .	÷.	~ 0		i i			
per m2 flo	or area		28.2	30.17	5.73		-500 8	conda	Ē		lighting	atir	output.	Turbine	Type 1	Type Type	Total	-			
				[kWh/m ²	vl		-1,000 =							1	۴-	F F	-	_			
Buildina E	hergy Ratir	na		30	A2		-1,000	- S6	Water heatin	ple s,f	Energy for	na	CHP electrical	ind							
		Ĭ					, pe	Bu	he	- supple Pumps, f	ŝ	Ņ	ect	≷							
							ace	eati	ter	5 2	Ë	ind	e	aic							
Check co	onformity w	ith MPEPC,	MPCPC and RE	R requireme	nts in TGD L		Spi	Space heating	Ň	E E		CHP input (individual	₹	Photovoltaic/Wind							
Relevant f	for new-build	d.						oac		, ue:		ing.		do							
			Primary	energy	CO2 emissions	Renewable		S		fer		₽		ΡΫ́							
			[kWh/y]	[kg/y]	Energy Ratio				Water heating - supple Pumps, f		0									
Totals for	reference d	welling	13,2	18	2,659																
			EPC		CPC	RER															
Performan	nce coefficie	ents	0.2	44	0.230	0.26															
Maximum	permitted		0.3	000	0.350	0.20															
			Compli	es	Complies	Complies															

	Poport													
DEAP Work	Report	Aligned to	DEAP soft	vare version	1.3.2 (plue	draft chang	es for NZEE	3 part I)						
			intermediat					s part L)						
	,		elling are gr											
			ely if requir											
Owelling d	dimension				TGD L ve	rsion	2018							
			Height [m]											
Ground floo	or	110	2.6											
First floor		0	0.0											
Second floo		0	0.0											
Third and ot	-	0	0.0											
Total floor a		110												
Dwelling vol														
iving area [[m²]	52.0												
Ventilation					0									
Number of c					0									
Number of c		t fana and r	bassive vent	•	1									
Number of f				5	0									
		by on main	ontronoo?		Yes									
		the dwelling			res 1									
) carried out	?	Yes	1								
	Not applica		. samea ou	•	103									
	ot appilot													
							1							
							1							
f yes :	:													
	Air permea	ability [m3/h	n.m2 at 50 F	Pa]		0.1								
nd if				-			ĺ							
lumber of s	sides shelt	ered			1									
/entilation r	method				Balanced	whole-hous	e mechanic	al ventilatio	on with heat	recovery		6		
Effective ail	ir change r	ate [ac/h]			0.16					·				
Ventilation					16									
Permeability	y test carr	ied out and	meets guid	lelines in T(GD L?									
For mechar	nical ventila	ation, other	than positiv	e input ven	tilation from	n loft:	:							
1	ls measure	ed "Append	ix Q" data a	vailable?				Yes						
		rer and mo				١	/ent Axia S		etic Advanc	e				
		n power [W						0.42						
ł	Heat exch	anger efficie	ency [%]					92						
A/:														
Windows				NUM	E : ^ / /	NL 2	05/000	C	N1	N	N1	11-2		
Drientation					East/West		SE/SW	South	North	North	North	Horizontal		
Drientation	ID			1	3	1	4	5	1	1	1	6		
Area [m ²]				11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
U-value [W/	-			1.30	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
s U-value a	a manufact	urer's certifi	ed value?											
f yes:				Yes	Yes	-	-	-	-	-	-	-		
		rer and mo		-	-	-	-	-	-	-	-	-		
S		rer and moo gy transmit												
End if	Solar ener	gy transmit	tance	- 0.4	- 0.4	-	-	-	-	-	-	-		
End if	Solar ener	gy transmit		- 0.4 e if applicat	- 0.4 ble (Table 6	- - ia, notes 1	- - and 2).	-	- - -	-	-	-		
End if Correction f	Solar ener	gy transmit	tance	- 0.4 e if applicat 0	- 0.4 ble (Table 6 0	- - a, notes 1 0	- - and 2). 0	- - 0	- - -		- - 0			
End if Correction fo Overshading	Solar ener for roof win g ID	gy transmit dow and/or	tance	- 0.4 e if applicat 0 2	- 0.4 ble (Table 6 0 3	- - a, notes 1 0 0	- - and 2). 0 0	- - 0 0	- - - 0 0	- - 0 0	- - 0 0	- - 0 0		
End if Correction for Overshading Frame factor	Solar ener for roof win g ID or (Table 6	gy transmit dow and/or	tance	- 0.4 e if applicat 0 2 0.70	- 0.4 ble (Table 6 0 3 0.70	- - a, notes 1 0 0 0.00	- - and 2). 0 0 0.00	- - 0 0 0.00	- - 0 0 0.00	- - 0 0 0.00	- - 0 0 0.00	- - 0 0.00		
End if Correction for Dvershading Frame factor	Solar ener for roof win g ID or (Table 6	gy transmit dow and/or	tance	- 0.4 e if applicat 0 2	- 0.4 ble (Table 6 0 3	- - a, notes 1 0 0	- - and 2). 0 0	- - 0 0	- - - 0 0	- - 0 0	- - 0 0	- - 0 0		
End if Correction fr Dvershading Frame facto Window typ	Solar ener for roof win g ID or (Table 6	gy transmit dow and/or	tance	- 0.4 e if applicat 0 2 0.70	- 0.4 ble (Table 6 0 3 0.70	- - a, notes 1 0 0 0.00	- - and 2). 0 0 0.00	- - 0 0 0.00	- - 0 0 0.00	- - 0 0 0.00	- - 0 0 0.00	- - 0 0.00		
End if Correction fr Dvershading Frame facto Vindow typ Fabric	Solar energi for roof win g ID or (Table 6 pe ID	gy transmit dow and/or c) [-]	tance metal fram	- 0.4 e if applicat 0 2 0.70 4	- 0.4 ble (Table 6 0 3 0.70 4	- - 0 0 0.00 0	- - 0 0 0.00 0	- - 0 0 0.00	- - 0 0 0.00 0	- - 0 0 0.00 0	- - 0 0 0.00	- - 0 0.00		
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Contraction for the second secon	Solar ener for roof win g ID or (Table 6 be ID lement typ boflights 2) 3) 2 2) 3) 4 2) 2 3 3) 2 2) 3) 4 4) 5 5 of element tria plane el hermal bric t loss [W/P eat loss con	gy transmit dow and/or c) [-] e e s (m ²] erments [W/m lging [W/m	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- 0.4 e if applicat 0 2 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	- 0.4 ble (Table 6 0 3 0.70 4 <i>AU</i> [<i>W</i> / <i>K</i>] 24.7 0.0 0.0 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 16.5 0.0 0.0 0.0 0.0 16.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- - - - - - - - - - - - - - - - - - -	- - 0 0 0.00 0 (optional)	- - 0 0 0.00	O O	- - - - - - - - - - - - - - - - - - -	- - 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	- - 0 0 0.00 0 0	e check eck eck	

Water he		12		Vee									
	distribution			Yes									
Distributio	on loss [kW	h/y]		306									
		_											
	storage los	ses?		Yes	1								
lf yes	:												
	Water sto	rage volume [litres]				3.4						
		cturer's declar	red loss fa	actor availat	ole?		Yes	1					
	lf yes	:											
		Manufacture	r and mod	del name		Heatrae Sa	idia Hi Max	Instant 5/8	0				
		Manufacture	r's declare	ed loss fact	or [kWh/da	ay]	0.364						
	lf no	Not applicab	le										
	End if												
	Temperate	ure factor una	djusted (T	able 2)		1							
		ure factor mult			otes)	1							
End if		i i			,	1	1						
	solar water	heating syste	em?			No	0						
lf yes	Not applic											1	
								olar fraction	[%]	0			
									[,0]	0			
End if	-	1 1					1					-	
	ircuit loss [kWh/y] (Table	3)					360					
		mbi boiler [kV		10 32)				0					
		ion of electric			ombi boilor	[k\//b/v] /T	Toble 4f)	0					
		ctric immersio				[KVVIVy] (1		No					
		ter heater [kV		is used in	Summer	2497		INU					
		entary heater				0							
						111							
		er heating syst			-0								
		ndoors or in g	roup neat	ing scheme	<i>}</i> ?	Yes							
Lighting			1 1.		1	"DEEL							
		hting outlets t		w-energy [-]	#REF!							
Annual er	nergy used i	for lighting, EL	[kWh/y]			270							
Internal													
Net intern	nal gains [W	7				500							
Heatuse													
	ea fraction [·			0.472298									
		ory of dwelling	1	Medium									
Heat use	[kWh/y]			2081									
Space he													
	and respon												
		ent (Table 4e)		ppropriate [C]	0							
		rol category (3							
		onsiveness ca	ategory (T	able 4a or 4	ld)	1							
Pumps/fa	ans						Enter	If present,		If present,			
							number	is boiler co	ontrolled	inside			
							present	by room th	nermostat?	dwelling?			
Central he	eating pump	o (supplying ho	ot water to	o radiators	or underfloo	or system)	0		Yes				
Oil boiler	- pump (sup	plying oil to b	oiler and	flue fan)			0		-	-			
		if fan assisted					0						
		eating system				No							
	n efficiency												
		n system with	nin an env	elope eleme	ent? (e.a. u	inderfloor h	eating in gr	ound floor)	No	0			
		alue of envelo							0.15				
	yes, U=v		he elerine	ic [vv/iii K					0.15				
Type of m	nain heating	system		Group / co	mmunity h	eating sche	me	2					

			community	isating sol	ionio .		-					
	y space he										-	
			dary / supplei								0	
Generatior	n efficiency	of seconda	ary / supplem	entary heating	ng system	[%] (use	value from	Table 4a or	Appendix I	=)	0	
	up heating											
	g based on						Yes					
	n loss facto						1.05					
	f heat from	CHP unit o	r fraction of h	eat recoverd	from powe	r station	0					
Boilers												
	(If the fract	ion of heat	from boilers	is zero, this	section is i	irrelevant)).					
	Heat source	e type	Fuel				Efficiency	Percent of				
							[%]	heat [%]				
	Boiler type	1	mains gas				91	49				
	Boiler type		-				0	0				
	Heat pump		electricity				273	51				
	Solar heat							0				
CHP or wa	aste heat fr											
			from CHP/wa	aste heat is	zero this s	ection is	irrelevant)					
	System ty				-		in olo lant).			2		
	If CHP									_		
		Electrical	efficiency of	CHP unit (e	a 0.3) from	operatio	nal records	or the CHP	design sn	ecification [0.28	
			ency of CHP								0.57	
		Fuel type		unit (c.g. 0.		nains gas			ign speeme		0.07	
		Fuertype				iailis yas						
Fuel data			Fuel									
		don	ruei									
Share ues	ating - seco	iudiy	-				Daiman	000		Delivered		
Demonstra			a bur a la aria :				Primary	CO2		Delivered		
		, 0	chnologies				energy	factor		energy		
Type 1	Description		-				factor [-]			[kWh/y]		
	Energy pro		saved				2.08	0.409		91		
	Energy co						0.00	0.000		0		
Type 2	Description		-									
	Energy pro		saved				2.08	0.409		231		
	Energy co						0.00	0.000		0		
Type 3	Description		-									
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			a word				0.00	0.000		0		
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Energy pro	aucea or s	saveu				0.00	0.000		U		

Results																				
	Delivered energy	Primary energy	CO ₂ emissions						-	Prir	<u> </u>	rv	000	arm		~\\\/	h/	. 1		٦
	[kWh/y]	[kWh/y]	[kg/y]								na		ent	- B	ין א		"	λī		
Space heating - main	2,081	2,143	406		6,00															
Space heating - secondary	0	0	0																	
Water heating - main	2,497	2,572	487		5,00	ס ו −−														
Water heating - supplementa	ry O	0	0																	
Pumps, fans, etc.	192	400	79		4,00															
Energy for lighting	270	562	111																	
CHP input (individual heating	systems only) 0	0	0		3,00	, <u> </u>														
CHP electrical output (individ	ual heating sys 0	0	0		2.00															
Photovoltaic/ Wind Turbine	0	0	0		2,00	, <u> </u>														
Type 1 -	-91	-189	-37		1,00	, ⊥ _														
Type 2 -	-231	-480	-94		1,00						-									
Type 3 -	0	0	0			, 💷									_			_	Primary energy [kWh/y]	
Total	4,719	5,008	950				a⊔	nain	_ ≥	etc.	p.	ц.	Ŧ	e	-	~	ŝ	otal		
per m ² floor area	42.9	45.49	8.63		-1,00	, united in the second	- 70	Ē	supplementary	e ŵ	Energy for lighting	ati	output.	Wind Turbine	Type 1	Type 2	Type 3	-P		
		[kWh/m ²	vl			6	secon	<u>6</u>	шe	an	÷	μ	10	₽	H	+	F			
Building Energy Rating		45	A2			atir	- S6	atir	Be	os, f	ē	qua	rice	ind						
3 3						Space heating	ng	Water heating	dng	Pumps, fans,	6	ž	electrical							
						ae	eat	ter	à	۲,	Ene	ind	e	aic						
Check conformity with MP	EPC, MPCPC and RER re	quireme	nts in TGD L			Spi	Space heating	М	Water heating -			CHP input (individual heating.	CHP	Photovoltaic/						
Relevant for new-build.							oac		heê			ġ		oto						
	Primary er	hergy	CO2 emissions	Renewable			S		fer			₽		Phc						
	[kWh/y]		[kg/y]	Energy Ratio					Vai			U								
Totals for reference dwelling	16,803		3,438						-											
3	EPC		CPC	RER																
Performance coefficients	0.298		0.276	0.25																
Maximum permitted	0.300		0.350	0.20																
	Complies		Complies	Complies																