



Building Energy Performance Ltd

Sustainable Energy Statement

for

**Afan Lido,
Aberavon,
Neath Port Talbot.**

Building Energy Performance Ltd

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Introduction

Preface

This Energy Statement has been prepared to support the planning application for the residential development of 137 homes at Princess Margaret Way, Afan Lido, Aberavon, Neath Port Talbot SA12 6JF.

Development Description

The Afan Lido development is located near to the coast at Aberavon and consists of 137 dwellings. A copy of the proposed site layout has been included in Appendix A at the rear of this report for further reference. The site location is indicated in the aerial view below.



The site is located just off the coast at Afan Lido, Aberavon within Strategic Development Area H1/18 of the Neath Port Talbot CBC Local Development Plan.

Planning Policy & Conditions

Local Planning Policy

Neath Port Talbot CBC Local Development Plan (LDP) 2011-2026

This statement principally addresses Policy RE2 of the NPTCBC LDP relating to climate change and environmental limits through securing energy efficiency through building design:

Policy RE2: Renewable and Low Carbon Energy Technology in New Development

Schemes that connect to existing sources of renewable energy, district heating networks and incorporate on-site zero/low carbon technology (including microgeneration technologies) will be encouraged.

The following proposals will be required to submit an Energy Assessment to determine the feasibility of incorporating such a scheme and where viable, would be required to implement the scheme:

- (a) Residential development for 100 or more dwellings;
- (b) Development with a total floorspace of 1,000 sqm or more.

5.3.102 Where appropriate, development applications will need to be accompanied by an 'Energy Assessment' which investigates the potential to incorporate on-site zero and low carbon equipment and establish connections to existing sources of renewable energy. Opportunities for linking with district heating networks and where appropriate sharing renewable energy with the wider public should also be explored. The Energy Assessment will be required to set out how the proposal can make a contribution towards increased levels of energy generation from renewable or low carbon sources.

National Policy

Government policy in relation to the energy performance of buildings and sustainable construction has been evolving over the past decade, following government commitments to reduce the emission of greenhouse gases. This obligation was enshrined in the Climate Change Act 2008, which commits the UK to achieving a mandatory 80% reduction in the UK's CO₂ emissions by 2050, compared with 1990 levels.

The built environment therefore has a key role to play in delivering on these international commitments, accounting for approximately a third of overall CO₂ emissions. The translation of these commitments into national policies within the built environment has been driven by, amongst other mechanisms, the EU Energy Performance of Buildings Directive and the 2012 Energy Efficiency Directive.

Energy performance calculations are governed in the UK by Part L of the Building Regulations, which mandate a minimum absolute level of regulated carbon emission, those arising from energy demand for space and water heating, lighting, fixed building services (but not including appliance use, cooking or other building equipment not used to condition the space).

National planning policy relating to energy and CO₂ performance of new build housing has been evolving over the past decade, with 2010 building regulations requiring regulated CO₂ emission levels from new building domestic buildings to be approximately 25% lower than 2006 levels. A further 8% reduction has been seen in the latest 2014 building regulations.

Current government policy following the conclusion of the Housing Standards Review is that this progression in energy standards is appropriate in delivering dwellings with significantly lower energy demand and consequent CO₂ emissions than the existing housing stock.

The Government proposes that the Building Regulations are the appropriate mechanism to drive future standards with respect to energy consumption, with local authorities able to apply the optional requirements of the national technical standards with respect to water consumption and space.

Proposed Policy Response

Taking into account local and national policies, it is proposed that the dwellings in this development will be constructed to exceed the CO₂ reduction standards contained within the current Building Regulations Part L1A 2014.

In the main, it is proposed to meet these higher standards through the adoption of a 'fabric first' approach to capture as much carbon as possible within the fabric of each dwelling for its entire lifetime. In addition to this, the scheme will also include renewable energy PV panels on the 3No apartment block south facing roofs, and EV charging points within all homes with integral garages to encourage the future take-up of electric/hybrid vehicles within the development.

The proposed site addresses the current Neath Port Talbot CBC planning policy for sustainable growth by contributing toward the housing need of the area.

The site has incorporated a mix of different sized properties. The variety and range of units provides the possibility of a diverse mix of residents to contribute to the community.

Baseline CO₂ Emissions

As set out within the policy review section of this statement, it is considered that Building Regulations energy standards form the minimum requirement for the new dwellings to be constructed on the Afan Lido, Aberavon development.

The proposed buildings will be constructed in accordance with the 2014 edition of Approved Document L1A, or future updates as applicable, with AD L1A governing the residential development. The performance requirements within these documents therefore forms the baseline compliance level in terms of energy demand and CO₂ emissions.

Part L1A sets out 5 criteria which must be met in order to demonstrate that the buildings are designed and constructed in accordance with the approved standards:

- Criterion 1 – Achieving the TER
- Criterion 2 – Limits on design flexibility
- Criterion 3 – Limiting the effects of solar gain in summer
- Criterion 4 – Building performance consistent with DER
- Criterion 5 – Provisions for energy-efficient operation of the dwelling

Criterion 1 – Achieving the TER

Criterion 1 relates to achieving a maximum calculated level of CO₂ emissions referred to as the 'Target Emission Rate' (TER). The TER is calculated in accordance with the Standard Assessment Procedure (SAP) for residential buildings. This assessment establishes a maximum rate, expressed in kilograms of carbon dioxide per metre squared of total useful floor area, per annum (kgCO₂/m²/yr), as the benchmark for compliance.

The TER figure was introduced into Part L in 2006 to set an absolute level of CO₂ performance which was reduced by approximately 25% under Part L 2010, and a further 8% under Part L 2014, requiring substantial improvements to thermal insulation and building services or significant increase in on-site renewable energy provision.

Energy performance of new dwellings is therefore equivalent to approximately a 33% reduction on CO₂ emissions, and therefore will deliver dwellings with significantly lower energy demand and emissions than dwellings built to comply with these baseline standards.

Table 1: CO₂ emissions reduction over Part L1A standards

Building Regulations	CO ₂ emissions reduction over L1A 2006
Part L1A 2006	-
Part L1A 2010	25%
Part L1A 2014	33%

A site-wide energy model has been developed in order to assess the energy demand of the site and calculate the energy reduction through the use of the 2014 Building Regulations. Typical results for each house type are shown in table two.

Table 2: House type Part L compliant CO₂ emissions

House Type	Part L compliant emissions (kgCO ₂ /annum)
Alnwick	1,189.78
Barton	1,355.81
Carleton	1,545.81
Coniston	1,935.42
Corby	928.17
Derwent	1,725.04
Grasmere	1,750.48
Hornsea	1,876.58
Lockwood	1,739.10
Moseley	1,279.18
Piel	1,125.88
Ullswater	1,688.68
Windermere	1,569.29

The site-wide Part L compliant CO₂ emissions are shown in Table 3.

Table 3: Site-wide Part L compliant CO₂ emissions

House Type	Part L compliant emissions (kgCO ₂ /annum)
Site-wide	208,023.13

Energy and CO₂ Reduction Strategy

It is proposed that the CO₂ reduction strategy to meet the TER figure of each dwelling incorporates improvements beyond the minimum requirements contained within Part L1A and concentrates finance and efforts on reduced energy demand as the first stage of the Energy Hierarchy (Figure 1).

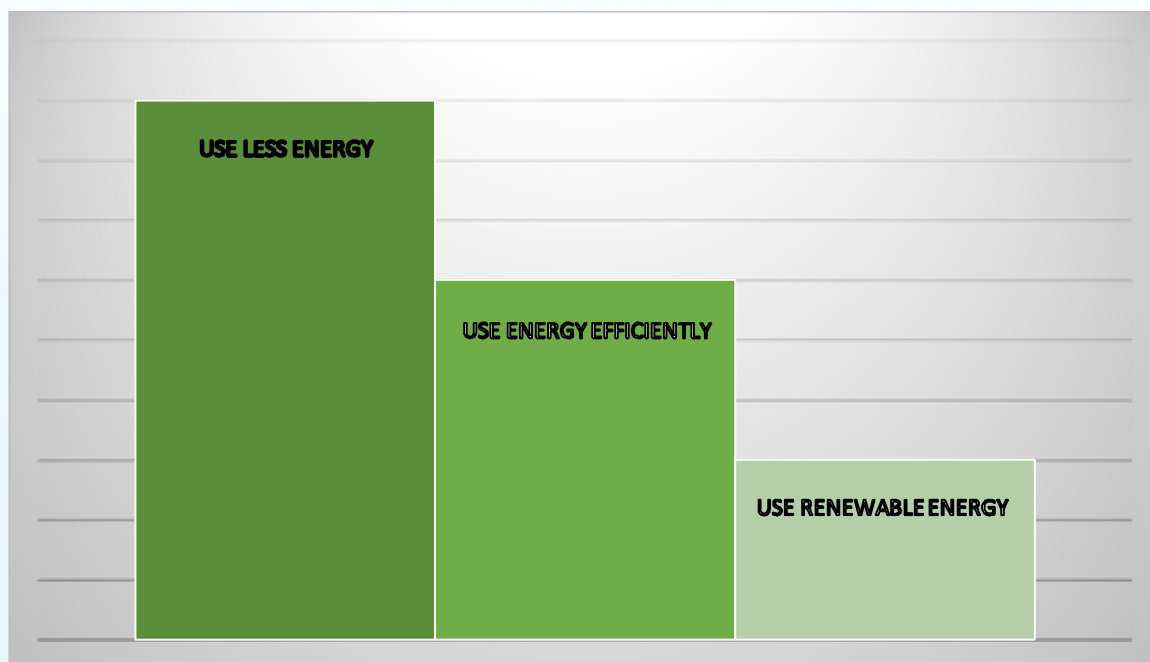


Figure 1: The energy hierarchy

Use Less Energy

The design of a development from the masterplan to individual building design will assist in reducing energy demand in a variety of ways, with a focus on minimising heating, cooling and lighting loads, key consideration include:

- Building orientation – maximise passive solar gain and daylight
- Building placement – control over shading and wind sheltering
- Landscaping – control daylight, glare and mitigate heat island effects
- Building design – minimise energy demand through fabric specification

Use Energy Efficiently

The design and specification of building services to utilize energy efficiency is the next stage of the hierarchy taking into account:

- High efficiency heating and cooling systems
- Ventilation systems (with heat recovery where applicable)
- Low energy lighting
- High efficiency appliances and ancillary equipment

Use Low Carbon / Renewable Energy

Low carbon and renewable energy systems form the final stage of the energy hierarchy and can be used to directly supply energy to buildings, or offset energy carbon emissions arising from unavoidable demand. This may be in the form of:

- Low carbon fuel sources – e.g biomass
- Heat pump technologies
- Building scale renewable energy systems
- Small scale heat networks
- Development-scale heat networks

As the hierarchy demonstrates, designing out energy use is weighted more highly than the generation of low-carbon or renewable energy to offset energy carbon emissions arising from unavoidable demand. Applied to the development of new housing, this approach is referred to as ‘fabric first’ and concentrates finance and efforts on improving U-values, reducing thermal bridging, improving airtightness and installing energy efficient ventilation and heating services.

This approach has been widely supported by industry and government for some time, with the Zero Carbon Hub and Energy Savings Trust having both stressed the importance of prioritizing energy demand as a key factor in delivering resilient, low energy homes. NHBC Foundation research also supports the view with a 2013 report stating “The most robust way to minimise energy use is through the building fabric. Getting the fabric right will save energy for the whole life of the dwelling.”

There is further explicit acknowledgement of the benefits of this approach through the introduction of Fabric Energy Efficiency Standards into Part L the Building Regulations 2014, which is intended to ‘discourage excessive and inappropriate trade-offs, for example poor insulation standards being offset by renewable energy systems with uncertain service lives’.

The benefits to prospective homeowners of following the Fabric First approach are summarized in Table 4.

Table 4: Benefits of the ‘Fabric First’ approach

	Fabric energy efficiency measures	Bolt-on renewable energy technologies
Energy savings applied to all dwellings	✓	✗
Savings built-in for lifetime of dwelling	✓	✗
Highly cost-effective	✓	✗
Improves thermal comfort	✓	✗
Promotes energy conservation	✓	✓
Minimal ongoing maintenance replacement cost	✓	✗
Disruptive to fit post occupation	✓	✗

The following section will therefore set out how the TER will be achieved without requiring renewable energy systems.

Criterion 2 – Limits on design flexibility

Criterion 2 introduces minimum standards which must be met for all main building elements to ensure that an excessively low performance on one area is not simply offset through over performance in another area.

In accordance with the fabric first approach and in order to ensure that the energy demand of the development is reduced, the dwelling should be designed to minimise heat loss through the fabric wherever possible. Table 5 details the design specification for major building elements which reflects the fabric first approach to meeting the overall Part L requirements. The first column in this table sets out the part L1A limiting fabric parameters in order to provide a comparison.

Table 5: Indicative construction specification – main elements

	Part L1A limiting fabric parameters	Indicative fabric specification
External wall U-value	0.21W/m ² K	0.21W/m ² K
Party wall U-value	0.20W/m ² K	0.00W/m ² K
Plane roof U-value	0.15W/m ² K	0.14W/m ² K
Ground floor U-value	0.18W/m ² K	0.14-0.16W/m ² K
Window U-value	1.60W/m ² K	1.40W/m ² K
Door U-value	1.60W/m ² K	1.40W/m ² K
Air Permeability	10m ³ /hr.m ² at 50 Pa	5m ³ /hr.m ² at 50 Pa

Energy efficient heating and lighting

Heat generation and distribution systems should be designed to give the occupants a high level of control over their use, encouraging and allowing energy-efficient behaviour. High efficiency combi boilers will be installed in properties to eliminate the need for hot water cylinders where appropriate. Intelligent programmable room thermostats and thermostatic radiator valves will be installed in all dwellings to ensure that only the required amount of heat is provided to each house. All primary pipework will be fully insulated to reduce heat loss.

Internal lighting should be low energy wherever possible, and areas of infrequent use should be fitted with occupancy sensors. External security and space lighting should be low energy and fitted with PIR and daylight sensors where appropriate.

Criterion 3 – Limiting the effects of solar gain in summer

Passive design measures and overheating risk mitigation

Site constraints can dictate layout, however orientation has been considered to maximise the potential for solar gain where feasible and promote useful solar gains during the day.

Where possible all dwellings will be able to benefit from cross-ventilation to reduce unwanted heat build-up in hot weather. When considering glazing specification, a balance should be met which allows useful solar gain in the winter whilst reducing unwanted solar gain in the summer.

Measures taken to reduce internal heat gain and provide natural ventilation through window openings will allow sufficient air exchange rates to purge any heat build-up. Active cooling systems are therefore not proposed.

These measures will serve to ensure that the development builds in resilience to a potentially changing climate over the lifetime of the buildings and minimises the overheating risk that can be exacerbated by the drive to build better insulated, more airtight homes, if not considered within the design and construction process.

Criterion 4 – Building performance consistent with DER

Thermal bridging

The significance of thermal bridging as a potentially major source of fabric heat losses is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the thermal bridging would not achieve the desired energy and CO₂ reduction targets.

The dwellings should be constructed to minimise unnecessary bridging of the insulation layers, with avoidable heat loss therefore being reduced wherever possible. Accurate calculation of these heat losses forms an integral part of the SAP calculations which will be undertaken to establish the energy demand of the dwellings.

Air leakage

After conductive heat losses through building elements have been reduced, convective losses through draughts are the next major source of energy wastage. It is assumed at this stage that the dwellings will be designed to achieve an airtightness standard of no greater than 5m³/hr.m²@50Pa, an enhancement on Part L1A minimum requirements.

Criterion 5 – Provisions for energy efficient operation of the dwelling

The occupants of the dwelling should be provided with all necessary literature and guidance relating to the energy efficient operation of the fixed building services.

Currently it is assumed that all dwellings will be provided with modern gas fired heating systems, with controls enabling different temperature profiles in a minimum of two defined zones, a measure which serves to avoid unnecessary heating of spaces when not required, for example, bedrooms and living rooms with differing hours of occupancy.

As-designed CO₂ Emissions

By following the strategy described, the following will deliver CO₂ emission reductions in excess of Part L requirements. Table 6 shows the designed CO₂ emissions for each house type present in this scheme, together with the %CO₂ reductions achieved by adopting a 'fabric first' approach.

Table 6: House type CO₂ emissions reduction

House Type	Part L compliant emissions (kgCO ₂ /annum)	Proposed scheme emissions (kgCO ₂ /annum)	%CO ₂ reduction achieved
Alnwick	1,189.78	1,138.21	4.35%
Barton	1,355.81	1,294.70	4.51%
Carleton	1,545.81	1,485.97	3.86%
Coniston	1,935.42	1,884.79	2.63%
Corby	928.17	889.35	4.20%
Derwent	1,725.04	1,661.09	3.72%
Grasmere	1,750.48	1,626.76	7.09%
Hornsea	1,876.58	1,800.91	4.03%
Lockwood	1,739.10	1,712.01	1.55%
Moseley	1,279.18	1,233.72	3.54%
Piel	1,125.88	1,111.64	1.25%
Ullswater	1,688.68	1,637.90	3.03%
Windermere	1,569.29	1,533.13	2.30%

Table 7 below summarises the site-wide annual CO₂ emissions for the development.

Table 7: Site-wide CO₂ emissions reduction

House type	Quantity on development	Part L compliant emissions (kgCO₂/annum)	Proposed scheme emissions (kgCO₂/annum)
Alnwick	12	14,277.36	13,658.52
Barton	9	12,202.29	11,652.30
Carleton	6	9,274.86	8,915.82
Coniston	8	15,483.36	15,078.32
Corby	8	7,425.36	7,114.80
Derwent	4	6,900.16	6,644.36
Grasmere	11	19,255.28	17,894.36
Hornsea	11	20,642.38	19,810.01
Lockwood	7	12,173.70	11,984.07
Moseley	3	3,837.54	3,701.16
Piel	16	18,014.08	17,786.24
Ullswater	22	37,150.96	36,033.80
Windermere	20	31,385.80	30,662.60
Site	137	208,023.13	200,936.36

Table 8 below summarises the site-wide annual energy demand for the development.

Table 8: Site-wide kWhr energy demand

House type	Quantity on development	Part L compliant energy demand (kWhr/annum)	Proposed scheme energy demand (kWhr/annum)
Alnwick	12	60,180	57,304
Barton	9	51,524	51,524
Carleton	6	39,015	37,353
Coniston	8	65,693	63,818
Corby	8	30,734	29,296
Derwent	4	29,325	28,141
Grasmere	11	82,117	75,816
Hornsea	11	87,800	83,947
Lockwood	7	51,786	50,907
Moseley	3	16,043	15,411
Piel	16	74,933	73,879
Ullswater	22	156,086	151,634
Windermere	20	132,223	128,875
Site	137	877,459	847,905

The scheme proposed will achieve a 3.41% reduction in site-wide CO₂ emission and a 3.37% reduction in site-wide energy use through the sole use of a 'fabric first' approach, as highlighted in Tables 9 and 10 below.

Table 9: Site-wide percentage Part L CO₂ emissions reduction

House Type	Part L compliant emissions (kgCO ₂ /annum)	Proposed scheme emissions (kgCO ₂ /annum)	%CO ₂ reduction
Site-wide	208,023.13	200,936.36	3.41%

Table 10 below shows the percentage reduction in annual energy demand achieved with the proposed scheme.

Table 10: Site-wide percentage Part L kWhr energy reduction

House Type	Part L compliant energy demand (kWhr/annum)	Proposed scheme energy demand (kWhr/annum)	%kWhr reduction
Site-wide	877,459	847,905	3.37%

Table 11 illustrates the overall performance of the scheme as designed when compared with the Part L1A 2006 benchmark.

Table 11: Estimated site-wide performance compared with Part L1A 2006

Building Regulations	CO ₂ emissions reduction over L1A 2006
Part L1A 2006	-
Part L1A 2010	25%
Part L1A 2014	33%
As-designed	36.41%

Comparisons

The following section draws comparisons between a 'fabric first' approach verses a 'renewable technology' alternative, in order to meet the energy demands of the development. Photovoltaic (PV) panels have been used, as this form of renewable technology is deemed to be the most affordable and widely-used renewable technology in the current UK house-building market.

The amount of PV required for an alternative non-fabric first approach has been determined by relaxing the fabric performance back to the Part L1A limits of acceptability and then adding the required amount of PV to each house in order to comply with the CO₂ targets set by Building Regulations in the government approved SAP 2012 software.

The CO₂ reductions achieved over the lifespan of the PV systems (typically 20 years) has then been compared with the corresponding 'fabric first' approach, which should be present for the lifespan of the dwellings (taken to be 70 years for this comparison).

The lifetime CO₂ reductions for these two options have been summarized in the following 2 tables, which show that:

- The lifetime CO₂ reductions from the 'fabric first' approach amounts to 496,074 kgCO₂.
- The lifetime CO₂ reductions from the 'PV renewable technology' alternative amounts to 431,295 kgCO₂.

Further consideration should also be given to the fact that the above calculations have all been undertaken using SAP 2012 software, as required for Building Regulation compliance checking. However, it is common knowledge that the carbon emission fuel factors for mains gas and grid electricity have recently changed, and new updated factors will be used in the next version of SAP/Part L due to come into force later this year. The factors used in all the above calculations are 0.216kgCO₂/kWhr (gas) and 0.519kgCO₂/kWhr (electricity). These will shortly be changing to 0.210kgCO₂/kWhr (gas) and 0.136kgCO₂/kWhr (electricity).

It can be seen that the factor for grid electricity has improved significantly due to the rapid 'greening' of the national grid with large increases in wind and solar PV generation in recent years. The CO₂ reductions for the 'fabric first' approach will only affect mains gas use, as the fabric thermal improvements affect the space heating demand, which is satisfied by efficient mains gas condensing boilers. The CO₂ reductions for the PV renewable technology alternative will only affect the grid electricity use, as PV panels generate electrical energy.

Therefore, when making future predictions of CO₂ emissions it would be more accurate to base them on the latest carbon fuel factors, making the 'true' CO₂ reductions for each option:

- The lifetime CO₂ reductions from the 'fabric first' approach amounts to 482,294 kgCO₂.
- The lifetime CO₂ reductions from the 'PV renewable technology' alternative amounts to 113,018 kgCO₂.

- Fabric first approach saves more than 4 times the renewable PV approach over their respective lifetimes which applying the latest 'government approved' carbon fuel factors.

Table 12: Lifetime CO₂ emissions reduction achieved by 'Fabric First' scheme

House type	Quantity on development	Part L compliant emissions (kgCO ₂ /annum)	Proposed scheme emissions (kgCO ₂ /annum)	Proposed scheme emissions saving (kgCO ₂ /annum)	Total CO ₂ reduction from dwelling 70 year lifespan
Alnwick	12	14,277.36	13,658.52	618.84	43,319
Barton	9	12,202.29	11,652.30	549.99	38,499
Carleton	6	9,274.86	8,915.82	359.04	25,133
Coniston	8	15,483.36	15,078.32	405.04	28,353
Corby	8	7,425.36	7,114.80	310.56	21,739
Derwent	4	6,900.16	6,644.36	255.80	17,906
Grasmere	11	19,255.28	17,894.36	1,360.92	95,264
Hornsea	11	20,642.38	19,810.01	832.37	58,266
Lockwood	7	12,173.70	11,984.07	189.63	13,274
Moseley	3	3,837.54	3,701.16	136.38	9,547
Piel	16	18,014.08	17,786.24	227.84	15,949
Ullswater	22	37,150.96	36,033.80	1,117.16	78,201
Windermere	10	31,385.80	30,662.60	723.20	50,624
Site	137	208,023.13	200,936.36	7,086.77	496,074

Table 13: Lifetime CO₂ emissions reduction achieved by 'PV Renewable Technology' scheme

House type	Quantity on development	Part L compliant emissions (kgCO ₂ /annum)	Shortfall using Limiting Fabric (kgCO ₂ /annum)	PV required to make up shortfall (kWp per dwelling)	Total CO ₂ reduction from PV over 20 year lifespan
Alnwick	12	14,277.36	1,583.16	0.35	31,663
Barton	9	12,202.29	1,424.84	0.42	28,497
Carleton	6	9,274.86	1,356.99	0.60	27,140
Coniston	8	15,483.36	1,115.74	0.37	22,315
Corby	8	7,425.36	422.17	0.14	8,443
Derwent	4	6,900.16	376.94	0.16	7,539
Grasmere	11	19,255.28	207.32	0.05	4,146
Hornsea	11	20,642.38	912.20	0.22	18,244
Lockwood	7	12,173.70	923.51	0.35	18,470
Moseley	3	3,837.54	576.72	0.51	11,534
Piel	16	18,014.08	2,713.98	0.45	54,280
Ullswater	22	37,150.96	4,975.62	0.60	99,512
Windermere	10	31,385.80	4,975.62	0.66	99,512
Site	137	208,023.13	21,564.81	56.85	431,295

Conclusions

This statement has been prepared to support the planning application relating to the site at Afan Lido, Aberavon, Neath Port Talbot.

This strategy sets out how the proposed development addresses Policy RE2 contained within the Neath Port Talbot CBC Local Development Plan by following a 'fabric first' approach to constructing energy efficient buildings, with insulation standards, thermal bridging and air leakage all improved beyond the minimum compliance levels within the Building Regulations.

It has been shown that delivering this standard through the proposed 'fabric first' approach will lead to significant benefits to the occupiers of the dwellings, including a reduction in energy bills and improved thermal comfort, as well as ensuring that these CO₂ reductions are embedded into the lifetime of each home.

Calculations undertaken under the approved Standard Assessment Procedure (SAP) demonstrate that Part L compliant emissions would equate to 208,023kgCO₂/year. Through following the energy efficiency approach described, the calculated as-designed emissions are reduced by a further 3.41% over Part L requirements.

It is estimated that a reduction in CO₂ emissions of around 36.41% will be achieved compared with the Part L 2006 baseline year, improving energy efficiency and mitigating the impacts on climate change for the lifetime of the dwellings.

A comparison between the preferred 'fabric first' approach and a PV renewable technology alternative has demonstrated that a net CO₂ saving of 369,276kgCO₂ is possible in favour of the 'fabric first' approach over the lifetime of the respective options.

Renewable technologies such as PV, solar thermal and heat pumps have typical lifespans of circa 20 years, whereas the use of embedded energy reductions within the fabric of the building will safeguard the longevity of the energy savings for the lifetime of the house.

From an initial capital expenditure point of view the scheme could not support both enhanced fabric performance and renewable technologies at the outset throughout the entire site. Therefore, the passive, fabric measures have been chosen for the scheme as they will bring the most benefit in the long-term, and also keep the opportunity for the home owners to further improve the energy performance by adding bolt-on renewable technologies in the future. The exception to this case is the 3No apartment blocks, where outright freehold ownership of individual roofs do not exist, making the future take-up of roof mounted PV less likely. Therefore, in addition to the enhanced fabric thermal performance, it is proposed to incorporate PV systems on the SE/S/SW facing roof areas of these 3No blocks from the outset of the scheme. The PV systems will meet the specific requirements of the planning conditions should the scheme be approved. It is requested that the full details and requirements of the PV systems be provided under an appropriately worded planning condition on any future decision notice for this development.

Furthermore, to encourage the take-up of electric vehicle ownership, an EV charging point will be provided in all properties containing integral garages.

Appendix A – Development Site Plans



Appendix B – Sample SAP Calculations



Building Energy Performance Ltd

SAP Report Submission for Building Regulations Compliance

Client: Persimmon Homes (Wales) Ltd

Project: 969 Derwent Det, Princess Margaret Way
Afan Lido, Aberavon, NPT

Contact: Kevin O'Donnell
Building Energy Performance Limited
kevin@bep ltd.co.uk

Report Issue Date: 15/06/2021

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Property Reference	Afan Lido Derwent				Issued on Date	15/06/2021
Assessment Reference	B&B	Prop Type Ref	969 Derwent Det S4			
Property	969 Derwent Det, Princess Margaret Way, Afan Lido, Aberavon, NPT					
SAP Rating	83 B	DER	18.43	TER	19.14	
Environmental	85 B	% DER<TER	3.72			
CO ₂ Emissions (t/year)	1.54	FEE	50.64	TFEE	N/A	
General Requirements Compliance	Pass	% DFEE<TFEE	N/A			
Assessor Details	Mr. Michael O'Donnell, Michael O'Donnell, Tel: 02920 851111, michael@bepltd.co.uk				Assessor ID	4878-0001
Client	Persimmon Homes (Wales) Ltd, 005					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criteria 1 – The DER must be no greater than the TER

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	19.14	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	18.43	kgCO ₂ /m ²	Pass
	-0.71 (-3.7%)	kgCO ₂ /m ²	

Criteria 2 – Limits on design flexibility

Building Fabric

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.21)	0.21 (max. 0.70)	Pass
Floor	0.15 (max. 0.18)	0.15 (max. 0.70)	Pass
Roof	0.14 (max. 0.15)	0.14 (max. 0.35)	Pass
Openings	1.42 (max. 1.60)	1.60 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Fixed Building Services

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC COMBI ESP1 35 Combi boiler Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%	Pass
Secondary heating system	None	

5 Cylinder insulation

Hot water storage	No cylinder	
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



6 Controls

Space heating controls	Programmer, room thermostat and TRVs	Pass
Hot water controls	No cylinder	
Boiler interlock	Yes	Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100	%	
Minimum	75	%	Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting overheating due to solar and other gains

9 Summertime temperature

Overheating risk (Wales)	Not significant	Pass
Based on:		
Overshading	Average	
Windows facing North	0.88 m ² , No overhang	
Windows facing East	5.18 m ² , No overhang	
Windows facing South	0.66 m ² , No overhang	
Windows facing West	7.92 m ² , No overhang	
Air change rate	4.00 ach	
Blinds/curtains	None	

Criterion 4 – Building performance consistent with DER

Air-pressure testing

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

10 Key features

None	N/A
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SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Property Reference	Afan Lido Derwent				Issued on Date	15/06/2021
Assessment Reference	B&B		Prop Type Ref	969 Derwent Det S4		
Property	969 Derwent Det, Princess Margaret Way, Afan Lido, Aberavon, NPT					
SAP Rating		83 B	DER	18.43	TER	19.14
Environmental		85 B	% DER<TER	3.72		
CO ₂ Emissions (t/year)		1.54	FEE	50.64	TFEE	N/A
General Requirements Compliance		Pass	% DFEE<TFEE	N/A		
Assessor Details	Mr. Michael O'Donnell, Michael O'Donnell, Tel: 02920 851111, michael@bepltd.co.uk				Assessor ID	4878-0001
Client	Persimmon Homes (Wales) Ltd, 005					

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	East
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Urban
1.0 Property Type	House, Detached
2.0 Number of Storeys	2
3.0 Date Built	2019
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	28.14 m	45.06 m ²	2.44 m
	1st Storey:	28.14 m	45.06 m ²	2.64 m

7.0 Living Area	14.42	m ²
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8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	83.76	kJ/m ² K

9.0 External Walls							
Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)	
External Wall 1	Timber Frame	Timber framed wall (one layer of plasterboard)	0.21	9.00	142.95	124.41	

9.2 Internal Walls						
Description	Construction			Kappa (kJ/m ² K)	Area (m ²)	
Internal Wall 1	Plasterboard on timber frame			9.00	27.28	
Internal Wall 2	Plasterboard on timber frame			9.00	131.27	

10.0 External Roofs							
Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)	
Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.14	9.00	45.06	45.06	

10.2 Internal Ceilings						
Description	Construction			Kappa (kJ/m ² K)	Area (m ²)	
Internal Ceiling 1	Plasterboard ceiling, carpeted chipboard floor			9.00	45.06	

11.0 Heat Loss Floors

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Heat Loss Floor 1	Ground Floor - Solid	Suspended concrete floor, carpeted	0.15	75.00	45.06

11.2 Internal Floors

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1	Other	9.00	45.06

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.1			0.63		0.70	1.40
Front doors	Manufacturer	Solid Door							1.40
Rear Door	Manufacturer	Half Glazed Door	Double Low-E Soft 0.1			0.63		0.70	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front	Window	[1] External Wall 1	East	None	0.00					5.18	
Rear	Window	[1] External Wall 1	West	None	0.00					7.92	
Front Door	Solid Door	[1] External Wall 1	East							1.95	
Utility Door	Half Glazed Door	[1] External Wall 1	South							1.95	
90 Window	Window	[1] External Wall 1	North	None	0.00					0.88	
270 Window	Window	[1] External Wall 1	South	None	0.00					0.66	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported	Reference:
Independently assessed	E2 Other lintels (including other steel lintels)	13.04	0.155	No	NEW TB AUG 2018
Table K1 - Approved	E3 Sill	9.38	0.040	No	ACD
Table K1 - Approved	E4 Jamb	32.40	0.050	No	ACD
Independently assessed	E5 Ground floor (normal)	28.14	0.074	No	NEW TB AUG 2018 (B&B)
Independently assessed	E6 Intermediate floor within a dwelling	28.14	0.032	No	NEW TB AUG 2018
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	10.06	0.060	No	ACD
Independently assessed	E12 Gable (insulation at ceiling level)	18.08	0.043	No	NEW TB AUG 2018
Independently assessed	E16 Corner (normal)	25.40	0.051	No	NEW TB AUG 2018
Table K1 - Approved	E17 Corner (inverted – internal area greater than external area)	5.08	-0.090	No	ACD

Y-value	0.040	W/m²K
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18.0 Pressure Testing

Designed AP ₅₀	5.00	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP ₅₀		m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows half open
Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	4.00

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Mechanical Ventilation

Mechanical Ventilation System Present

No

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				4
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings	11	
Total number of L.E.L. fittings	11	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	Yes
Light and motion sensor	Yes

23.0 Electricity Tariff

Standard

24.0 Main Heating 1

	Database	
Percentage of Heat	100	%
Database Ref. No.	17929	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.5	
In Summer	87.3	
Controls	CBE Programmer, room thermostat and TRVs	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2106	
Boiler Compensator	Ideal Boilers, Ideal, PRT3	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	

25.0 Main Heating 2

None

Community Heating

None

28.0 Water Heating

	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

29.0 Hot Water Cylinder

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£29	B 84	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£346	A 94	

PREDICTED ENERGY ASSESSMENT



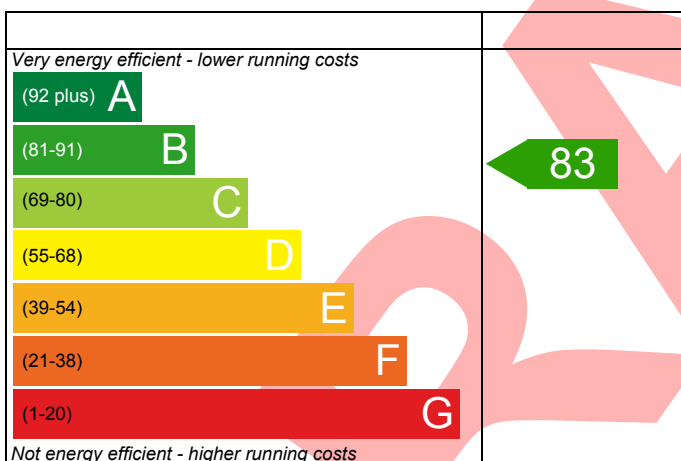
969 Derwent Det, Princess Margaret Way,
Afan Lido,
Aberavon,
NPT

Dwelling type: House, Detached
Date of assessment: 15/06/2021
Produced by: Building Energy Performance Limited
Total floor area: 90.12 m²

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.

Energy Efficiency Rating

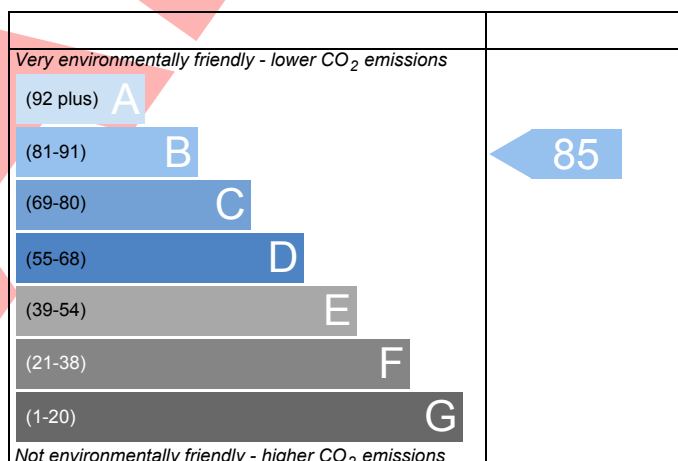


Wales

EU Directive
2002/91/EC

The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO₂) Rating



Wales

EU Directive
2002/91/EC

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

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THERMAL BRIDGING

Calculation Type: New Build (As Designed)



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Assessment Reference	B&B	Prop Type Ref	969 Derwent Det S4		
Property	969 Derwent Det, Princess Margaret Way, Afan Lido, Aberavon, NPT				
SAP Rating	83 B	DER	18.43	TER	19.14
Environmental	85 B	% DER<TER	3.72		
CO ₂ Emissions (t/year)	1.54	FEE	50.64	TFEE	N/A
General Requirements Compliance	Pass	% DFEE<TFEE	N/A		
Assessor Details	Mr. Michael O'Donnell, Michael O'Donnell, Tel: 02920 851111, michael@bepltd.co.uk			Assessor ID	4878-0001
Client	Persimmon Homes (Wales) Ltd, 005				

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.155	13.04	2.02	NEW TB AUG 2018
External wall	E3 Sill	Table K1 - Approved	0.040	9.38	0.38	ACD
External wall	E4 Jamb	Table K1 - Approved	0.050	32.40	1.62	ACD
External wall	E5 Ground floor (normal)	Independently assessed	0.074	28.14	2.08	NEW TB AUG 2018 (B&B)
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.032	28.14	0.90	NEW TB AUG 2018
External wall	E10 Eaves (insulation at ceiling level)	Table K1 - Approved	0.060	10.06	0.60	ACD
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.043	18.08	0.78	NEW TB AUG 2018
External wall	E16 Corner (normal)	Independently assessed	0.051	25.40	1.30	NEW TB AUG 2018
External wall	E17 Corner (inverted – internal area greater than external area)	Table K1 - Approved	-0.090	5.08	-0.46	ACD

Total: **9.22** W/mK:
Y-Value: **0.040** W/m²K:

U-VALUE CALCULATOR REPORT



Property Reference	Afan Lido Derwent		Issued on Date	15/06/2021
Assessment Reference	B&B	Prop Type Ref	969 Derwent Det S4	
Project	969 Derwent Det, Princess Margaret Way, Afan Lido, Aberavon, NPT			
Calculation Type	New Build (As Designed)			

SAP Rating	83 B	DER	18.43	TER	19.14
Environmental	85 B	% DER<TER	3.72		
CO ₂ Emissions (t/year)	1.54	FEE	50.64	TFEE	N/A
General Requirements Compliance	Pass	% DFEE<TFEE	N/A		

Assessor Details	Mr. Michael O'Donnell, Michael O'Donnell, Tel: 02920 851111, michael@bep ltd.co.uk	Assessor ID	4878-0001
Client	Persimmon Homes (Wales) Ltd, 005		

Building Elements

Floor 000001

Floor Type: Suspended Floor

Area = 45.06 m², Perimeter = 28.14 m, Wall thickness = 300.00 mm, Soil: Unknown

Depth of underfloor space below ground: 0.200 m Floor wind shielding: Average (suburban)

Floor height above ground: h = 0.200 m

U-value of walls above ground: U_w = 0.210 m

Ventilation openings per perimeter length: e = 0.0015 %

Mean wind speed: v = 5.000 m/s

Resistance on solum: R_g = 0.000 m²K/W

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.1700	
Layer 1	Blockwork, medium				
	Main construction	100	0.5700	0.1754	93.43
	Main construction	100	0.8803	0.1136	6.57
Layer 2	Polythene, 1000 gauge				
	Main construction	1	0.0000	0.0000	100.00
Layer 3	Springvale EPS Floorshield				
	Main construction	150	0.0300	5.0000	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 4	Screed				
	Main construction	75	1.1500	0.0652	100.00
Int surface				0.1700	

Total resistance:	Upper limit = 5.577 m ² K/W	Lower limit = 5.575 m ² K/W	Average = 5.576 m ² K/W
	Total correction = 0.0080 m ² K/W	U-value (unrounded) = 0.15 W/m ² K	

Unheated space: None

Total thickness:	326 mm	U-value: 0.15 W/m ² K	Kappa: n/a
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