

# OwenEco

## Energy Solutions

*keeping air fresh*

SAP – Predicted Energy Assessment

For **Leziate Drove, Pott Row, Kings Lynn PE32 1DE**

Report by Dr Richard Owen OCDEA NDEA

6<sup>th</sup> March 2019

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### Legal Requirements

Section 7 of the European Directive on the Energy Performance of Buildings (EPBD) states that **any dwelling which is newly constructed, sold, or rented requires an Energy Performance Certificate.**

The EPC shows two things and, once created, is valid for 10 years.

- the dwellings Energy Efficiency Rating (KWh/m<sup>2</sup> per year) - relates to the running cost of the building.
- the dwellings Environmental Impact Rating (Tonnes/m<sup>2</sup> per year) - relates to the carbon dioxide emissions of the building.

Each rating is shown on an A–G rating scale similar to those used for fridges and other electrical appliances. The energy calculation undertaken to produce an EPC is referred to as the Standard Assessment Procedure (SAP). In other words **to produce an EPC we need to do the SAP calculation.**

### Outline of the SAP process

- **Design Stage**
  - **A Predicted Energy Assessment (PEA) should be undertaken before building commences.** The data for this calculation is extracted from the working drawings and the design specifications.
  - If the building shows non-compliance with Part L1A of the building regulations then the Energy Assessor will consult with the Architect and discuss what changes are needed to achieve compliance. This ensures that any potential problems are addresses at the design stage.
  - **The PEA will produce a 'Regulation Compliance Report', which should be passed to your Building Control body who will then allow building work to commence.**
- **On Completion Stage**
  - Once the building is completed the Energy Assessor will require a Developer's Statement to be completed, signed and returned along with associated documents such as Air Pressure Test Reports, Accredited Details and Boiler Details.
  - Once this data has been gathered the Energy Assessor can generate an EPC and lodge the EPC on the governments 'Landmark' database.
  - You will then receive an updated 'Regulation Compliance Report', which should be passed to your Building Control body who will then allow the building to be signed off.
  - You will further receive an EPC and Final Report containing all relevant documents.

DEVELOPERS STATEMENT for SAP



OE19-009 – [REDACTED]

Assessor Name: Richard Owen Accreditation Number: STRO022801

Please note that any deviations from original specifications are shown below in red

Dwelling Details

Dwelling Address	Please enter the exact dwelling name and address which is to appear on the EPC		
Dwelling Type	Detached House	Orientation	North West
SAP Methodology	SAP 2012	Developers Specifications	Notes on Drawing
Thermal Mass	Low – Timber Frame House	Thermal Bridging	psi-value used based on ACDs.

The Building Envelope

Accredited Details	<ul style="list-style-type: none"> <li>It is understood that you are building to the 'Accredited Details' standard for all linear thermal bridging.</li> <li>In other words special attention is being paid to all joins, such as lintels, jambs, sills, corners and edges.</li> <li>Please study the attached document 'Accredited Details' and ensure that these details are correct.</li> </ul>			
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Element	Description	Width mm	Lambda W/mK	Evidence & Comments	
FLOOR - slab	Internal	-	-	Developers Specifications with P/A ratio adjustment. * Phenolic Insulation – rigid sheets <ul style="list-style-type: none"> <li>Celotex (lambda 0.021 W/mK)</li> <li>Kingspan (lambda 0.018 W/mK)</li> </ul> * Mineral Wool – e.g. Dritherm 32	
	Top Surface - Screed	50	0.41		
	Insulation - Phenolic *	150	0.021		
	Concrete – medium density	100	1.35		
	Damp proof membrane	1	1		
	Hardcore	150	2.3		
	Underground	<b>u-value</b>	<b>0.11 W/m<sup>2</sup>K</b>		
WALL – timber frame - brick face	Internal	-	-	Developers Specifications	
	Plasterboard & skim	15	0.21		
	Battens & service void	25	-		
	Insulation & Stud - Kingspan	120	0.018		
	OSB	9	0.13		
	Cavity	60	-		
	Outer leaf - brickwork	102.5	0.77		
	External	<b>u-value</b>	<b>0.18 W/m<sup>2</sup>K</b>		
WALL – timber frame – stone face	Internal	-	-	Developers Specifications	
	Plasterboard & skim	15	0.21		
	Battens & service void	25	-		
	Insulation & Stud - Kingspan	120	0.018		
	OSB	9	0.13		
	Cavity	60	-		
	Celcon Block	100	0.15		
	Outer leaf – stone work	102.5	0.77		
	External	<b>u-value</b>	<b>0.16 W/m<sup>2</sup>K</b>		
ROOF – pitched with flat ceiling	Internal	-	-	Developers Specifications	
	Plasterboard & skim	15	0.21		
	Mineral Wool* – between joists	100	0.032		
	Mineral Wool – over joists	300	0.032		
	External - Roof Cavity	<b>u-value</b>	<b>0.08 W/m<sup>2</sup>K</b>		
ROOF - pitched with sloping ceiling	Internal	-	-	Developers Specifications	
	Plasterboard & skim	15	0.21		
	Insulation - Phenolic	20	0.021		
	Rafters & Insulation - Phenolic	125	0.021		
	Rafters & Cavity	25	-		
	Roof Membrane	5	0.23		

	External	<b>u-value</b>	<b>0.17 W/m<sup>2</sup>K</b>	
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The Building Envelope - continued				
Element	Description	Width mm	Lambda W/m.K	Evidence Reference & Comments
ROOF - flat	Internal	-	-	Developers Specifications
	Plaster Board & Skim	15	0.21	
	Insulation - Phenolic	20	0.021	
	Joists & Insulation - Phenolic	100	0.021	
	Joist & Cavity	25	-	
	WBP	18	0.13	
	Roof Membrane	5	0.23	
	External	<b>u-value</b>	<b>0.19 W/m<sup>2</sup>K</b>	

Openings					
Element	Type		u-value	Evidence & Comments	
Windows	Wood Frame		1.4 W/m <sup>2</sup> K	Developers Specifications	
Roof lights	Wood Frame		1.4 W/m <sup>2</sup> K	Developers Specifications	
Doors	Half Glazed		1.5 W/m <sup>2</sup> K	Developers Specifications	
Ventilation					
Air Permeability	Design Target Value		4.48 m <sup>3</sup> /m <sup>2</sup> h	Air Pressure Test Certificate received	
Ventilation	Number of Fans	7	Kitchen, Utility, WC & Bathroom		Developers Specifications
	Passive Vents	1	In room with wood burning stove		
Space Heating					
Heating Method	Air Source Heat Pump		any system - default used		Developers Specifications For best results use a boiler listed on the 'Product Characteristics Database' <a href="http://www.ncm-pcdb.org.uk/sap/searchpod.jsp?id=17">http://www.ncm-pcdb.org.uk/sap/searchpod.jsp?id=17</a>
	Emitter Type		underfloor heating and radiators		
	Efficiency	170 %	PCDB Index	016778	
	Plant Size Ratio		Output	kW	
Heating Controls	Boiler Interlock, Time & Temperature Controls				Developers Specifications
Secondary Heating	Wood Burning Stove – Hetas Approved				Developers Specifications
Water Heating					
Water Heating	From Main Heating System				Developers Specifications
Cylinder Details	Volume	180 litres	Insulation	80 mm	Developers Specifications
	Cylinder in Heated Space, Cylinderstat, Primary Pipework Insulated, Separately Timed				
Electrical					
Lighting	LEDs with efficiency >= 60 lumens/watt		100 %	Developers Specifications	
Summary					
Results	CO2 Emission Rates (kg/m <sup>2</sup> )		Fabric Energy Efficiency (kWh/m <sup>2</sup> )		Energy Efficiency & Colour
Plot 1	Target (TER)	20.53	Target (TFEE)	58.90	B 84
	Dwelling (DER)	13.09	Dwelling (DFEE)	52.90	
Conclusions & Comments	<p>Because the DER &lt;= TER and the DFEE &lt;= TFEE a dwelling built as such would be compliant with Part L1A of the Building Regulations.</p> <p>Because the dwelling is a refurbishment no targets have to be met hence a dwelling built as such would be compliant with Part L1A of the Building Regulations.</p>				
Please Read This >>>	<ul style="list-style-type: none"> <li>Please ensure that you build to these specifications. Failure to do so might result in your dwelling not complying with Part L1A of The Building Regulations and therefore cannot be 'signed off' by Building Control.</li> </ul> <p><i>It is assumed that you now understand what is required for this dwelling to comply with Part L1A of the Building Regulations.</i></p>				
<p><i>As the developer, I confirm that the dwelling has been built in line with the data shown on the above pages.</i> (this document is only to be signed and returned once the dwelling has been completed)</p>					
Print Name	Signature		Company	Date	
	X				

# Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.16  
Printed on 26 March 2019 at 15:27:33

## Project Information:

**Assessed By:** Richard Owen (STRO022801)

**Building Type:** Detached House

## Dwelling Details:

**NEW DWELLING AS BUILT**

Total Floor Area: 337.23m<sup>2</sup>

**Site Reference :** [REDACTED]

**Plot Reference:** Plot 1

**Address :** [REDACTED]

## Client Details:

**Name:** [REDACTED]

**Address :** [REDACTED]

**This report covers items included within the SAP calculations.**

**It is not a complete report of regulations compliance.**

## 1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 20.53 kg/m<sup>2</sup>

Dwelling Carbon Dioxide Emission Rate (DER) 12.05 kg/m<sup>2</sup> **OK**

## 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 58.9 kWh/m<sup>2</sup>

Dwelling Fabric Energy Efficiency (DFEE) 51.8 kWh/m<sup>2</sup> **OK**

## 2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.16 (max. 0.70)	<b>OK</b>
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	<b>OK</b>
Roof	0.14 (max. 0.20)	0.19 (max. 0.35)	<b>OK</b>
Openings	1.41 (max. 2.00)	1.50 (max. 3.30)	<b>OK</b>

## 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

## 3 Air permeability

Air permeability at 50 pascals 4.48 (measured in this dwelling)  
Maximum 10.0 **OK**

## 4 Heating efficiency

Main Heating system: Heat pumps with radiators or underfloor heating - electric  
Air source heat pump with flow temperature <= 35°C

Secondary heating system: Room heaters - wood  
Closed room heater  
Efficiency 65.0 %  
Minimum 65.0 % **OK**

## 5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 1.82 kWh/day  
Permitted by DBSCG: 2.10 kWh/day **OK**

# Regulations Compliance Report

Primary pipework insulated: Yes OK

## 6 Controls

Space heating controls	Time and temperature zone control by device in database	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK

## 7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

## 8 Mechanical ventilation

Not applicable

## 9 Summertime temperature

Overheating risk (East Anglia):	Not assessed	?
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## 10 Key features

Roofs U-value	0.1 W/m <sup>2</sup> K
Floors U-value	0.11 W/m <sup>2</sup> K
Secondary heating (wood logs)	
Secondary heating fuel wood logs	

# SAP Input

## Property Details: Plot 1

**Address:** Jerby Field House, Leziate Drive, Pot Row, KING'S LYNN, PE32 1D  
**Located in:** England  
**Region:** East Anglia  
**UPRN:** 5539953678  
**Date of assessment:** 26 March 2019  
**Date of certificate:** 26 March 2019  
**Assessment type:** New dwelling as built  
**Transaction type:** New dwelling  
**Tenure type:** Unknown  
**Related party disclosure:** No related party  
**Thermal Mass Parameter:** Indicative Value Low  
**Water use <= 125 litres/person/day:** True  
**PCDF Version:** 440

## Property description:

**Dwelling type:** House  
**Detachment:** Detached  
**Year Completed:** 2019  
**Floor Location:** **Floor area:** **Storey height:**  
 Floor 0 176.38 m<sup>2</sup> 2.85 m  
 Floor 1 160.85 m<sup>2</sup> 2.73 m  
**Living area:** 30.94 m<sup>2</sup> (fraction 0.092)  
**Front of dwelling faces:** North West

## Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
front door nw	Manufacturer	Half glazed	low-E, En = 0.05, soft coat	Yes	Wood
boot room door nw	Manufacturer	Half glazed	low-E, En = 0.05, soft coat	Yes	Wood
utility door ne	Manufacturer	Half glazed	low-E, En = 0.05, soft coat	Yes	Wood
windows - brick face nw	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Wood
windows - stone face nw	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Wood
windows ne	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Wood
windows se	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Wood
windows sw	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Wood
rooflights ne	Manufacturer	Roof Windows	low-E, En = 0.05, soft coat	Yes	Wood

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
front door nw	16mm or more mm	0.7	0.7	1.5	4.14	1
boot room door nw	16mm or more mm	0.7	0.7	1.5	2.1	1
utility door ne	16mm or more mm	0.7	0.7	1.5	2.1	1
windows - brick face nw	16mm or more	0.7	0.7	1.4	12.09	1
windows - stone face nw	16mm or more	0.7	0.7	1.4	8.64	1
windows ne	16mm or more	0.7	0.7	1.4	4.82	1
windows se	16mm or more	0.7	0.7	1.4	39.06	1
windows sw	16mm or more	0.7	0.7	1.4	39.24	1
rooflights ne	16mm or more	0.7	0.7	1.4	1.4	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
front door nw	Door (1)	Timber Frame - stone face	North West	0	0
boot room door nw	Door (1)	Timber Frame - brick face	North West	0	0
utility door ne	Door (1)	Timber Frame - brick face	North East	0	0
windows - brick face nw	Windows (1)	Timber Frame - brick face	North West	0	0
windows - stone face nw	Windows (1)	Timber Frame - brick face	North West	0	0
windows ne	Windows (1)	Timber Frame - brick face	North East	0	0
windows se	Windows (1)	Timber Frame - brick face	South East	0	0



# SAP Input

windows sw	Windows (1)	Timber Frame - brick face	South West	0	0
rooflights ne	Roof windows (1)	Pitched Roof - Sloping Ceiling	North East	0.001	0

Overshading: Average or unknown

## Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
Timber Frame - brick face	12.29	108.05	204.24	0.15	0	False	N/A
Timber Frame - stone face	3.58	4.14	39.44	0.16	0	False	N/A
Pitched Roof - flat ceiling	84.26	0	84.26	0.1	0		N/A
Pitched Roof - Sloping Ceiling	10.99	1.4	100.59	0.16	0		N/A
Flat Roof	10.48	0	10.48	0.19	0		N/A
ground floor	176.38			0.11			N/A
<u>Internal Elements</u>							
single block walls	100						N/A
stud walls	100						N/A
first floor	100						N/A
<u>Party Elements</u>							

## Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0871				
	<b>Length</b>	<b>Psi-value</b>			
[Approved]	59.4	0.5	E1	Steel lintel with perforated steel base plate	
[Approved]	38.7	0.04	E3	Sill	
[Approved]	133	0.05	E4	Jamb	
[Approved]	71	0.16	E5	Ground floor (normal)	
[Approved]	71	0.07	E6	Intermediate floor within a dwelling	
[Approved]	47.5	0.06	E10	Eaves (insulation at ceiling level)	
[Approved]	13.6	0.24	E12	Gable (insulation at ceiling level)	
[Approved]	26	0.04	E13	Gable (insulation at rafter level)	
[Approved]	57.75	0.09	E16	Corner (normal)	
[Approved]	34.5	-0.09	E17	Corner (inverted internal area greater than external area)	

## Ventilation:

Pressure test:	Yes (As built)
Ventilation:	Natural ventilation (extract fans)
Number of chimneys:	0
Number of open flues:	0
Number of fans:	7
Number of passive stacks:	1
Number of sides sheltered:	2
Pressure test:	4.48 (Assessed dwelling is tested)

## Main heating system:

Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 214
	Air source heat pump with flow temperature <= 35°C
	Underfloor heating and radiators, pipes in screed above insulation
	Central heating pump : 2013 or later
	Design flow temperature: Design flow temperature >45°C
	Room-sealed
	Boiler interlock: Yes

# SAP Input

## MCS Installation Certificate

### Main heating Control:

**Main heating Control:** Time and temperature zone control by device in database  
Control code: 2208

### Secondary heating system:

**Secondary heating system:** Room heaters  
Solid fuel room heaters  
Fuel :wood logs  
Info Source: SAP Tables  
Closed room heater  
HETAS Approved

### Water heating:

**Water heating:** From main heating system  
Water code: 901  
Fuel :Electricity  
Hot water cylinder  
Cylinder volume: 180 litres  
Cylinder insulation: Factory 80 mm  
Primary pipework insulation: True  
Cylinderstat: True  
Cylinder in heated space: True  
Solar panel: False

### Others:

**Electricity tariff:** Standard Tariff  
**In Smoke Control Area:** Unknown  
**Conservatory:** No conservatory  
**Low energy lights:** 100%  
**Terrain type:** Rural  
**EPC language:** English  
**Wind turbine:** No  
**Photovoltaics:** None  
**Assess Zero Carbon Home:** No

Site Information	
Site Name	DE19-009
Reg Number	
Street 1	
Street 2	xxxxxxxxxx
Area	xxxxxxxxxx
Town or City	
Post Code	xxxxx

Installation Type	Average Capacity/Flow Rate	Litres/Person/Day
Single Flush WC's	0	0
Dual Flush WC's	3.47	15.35
All WC's	3.47	15.34
Kitchen/Utility Room Taps	10	14.76
Other Taps	7.5	13.43
Baths	150	16.5
Showers	10	43.7
Dishwashers	1.25	4.5
Washing Machines	8.17	17.16
Water Softener		
Waste Disposal Unit	Not Present	0
Total Water Use	125.39 Litres/Person/Day	
Contribution from Rain Water	0 Litres/Person/Day	
Contribution from Grey Water	0 Litres/Person/Day	
Normalisation Factor	0.91 Litres/Person/Day	

Code for Sustainable Homes - Consumptions & Credits	
Water Consumption (Code for Sustainable Homes)	114.1 Litres/Person/Day
Credits Scored	1

Building Regulations 2000 AD Part G (2010 Ed) - Consumption	
External Water Use	5 Litres/Person/Day
Water Consumption (Building Regulation 17 K)	119.1 Litres/Person/Day

Kitchen/Utility Room Taps						
Description	Flow Rate	Qty	Total Water	Grey Water	Rain Water	Net Water
Kitchen	10	1	10	0	0	10
Utility	10	1	10	0	0	10
Total Litres/Person/Day Gross						14.76
Total Litres/Person/Day Gross						14.76

Other Taps						
Description	Flow Rate	Qty	Total Water	Grey Water	Rain Water	Net Water
WC - ground floor	5	1	5	0	0	5
Master Bedroom - en suite	8	2	16	0	0	16
Bedroom 3 - en suite	8	1	8	0	0	8
Bathroom	8	1	8	0	0	8
Bedroom 4 - en suite	8	1	8	0	0	8
Total Litres/Person/Day Gross						13.43
Total Litres/Person/Day Gross						13.43

Baths						
Description	Capacity	Qty	Total Water	Grey Water	Rain Water	Net Water
Bathroom	150	1	150	0	0	150
Bedroom 3 - en suite	150	1	150	0	0	150
Bedroom 4 - en suite	150	1	150	0	0	150
Total Litres/Person/Day Gross						16.5
Total Litres/Person/Day Gross						16.5

Showers						
Description	Flow Rate	Qty	Total Water	Grey Water	Rain Water	Net Water
Bathroom	10	1	10	0	0	10
Master Bedroom - en suite	10	1	10	0	0	10
Total Litres/Person/Day Gross						43.7
Total Litres/Person/Day Gross						43.7

Washing Machines						
Description	L/Kg Dry Load	Qty	Total Water	Grey Water	Rain Water	Net Water
default value	8.17	1	8.17			8.17
Total Litres/Person/Day Gross						17.16
Total Litres/Person/Day Gross						17.16

Dishwashers						
Description	L/Place Setting	Qty	Total Water	Grey Water	Rain Water	Net Water
default value	1.25	1	1.25	0	0	1.25
Total Litres/Person/Day Gross						4.5
Total Litres/Person/Day Gross						4.5

Single Flush WC's						
Description	Flush Volume	Qty	Total Water	Grey Water	Rain Water	Net Water
Total Litres/Person/Day Gross						0
Total Litres/Person/Day Gross						0

Dual Flush WC's						
Description	Flush Vol (P/F)	Qty	Total Water	Grey Water	Rain Water	Net Water
WC - ground floor	4/2.4	1	3.47			0
Master Bedroom - en suite	4/2.4	1	3.47			0
Bedroom 3 - en suite	4/2.4	1	3.47			0
Bathroom	4/2.4	1	3.47			0
Bedroom 4 - en suite	4/2.4	1	3.47			0

Total Litres/Person/Day Gross	15.35
Total Litres/Person/Day Gross	15.35

Ion Exchange Water Softener	
% of Total Capacity Used Per	
Water Consumed Per Regeneration	
Average Regeneration Cycles Per Day	
Occupants Served by the System	
Water Consumed Beyond 4%	
Water Consumed Beyond 4%	

Rain Water Collection	
Collection Area	
Yield Co-Efficient	
Hydraulic Filter Efficiency	
Average Rainfall	
Daily Rain Water Collection	
Number of Occupants	
Daily Rain Water Per Person	