

BASELINE ENERGY DEMAND AND CO2 EMISSIONS

The baseline energy demand Target Emission Rate (TER) has been calculated using the Standard Assessment Procedure (SAP 2012) and for this dwelling is **13.96 kgCO₂/m²**.

ENERGY DEMAND REDUCTION

In considering the options for the project the site limitations (planning and conservation) were also taken into account. In addition to practical minimum u-values for the windows and walls (see Appendix A) we modelled outcomes for different combinations of energy efficient boilers and heating controls, heat recovery ventilation, building air tightness criteria, heatpumps and PV panels.

SUPPLY ENERGY EFFICIENCY

As part of the assessment we considered decentralised district heating and combined heat and power, however there is no local district heating system and the demand of the building does not efficiently match a combined heat and power option.

RENEWABLE ENERGY

To provide a Dwelling Emission Rate (DER) with a 1% improvement above the TER the strategy included 2kWp of Photovoltaic panels on the roof. In order to achieve a DER with a 20% improvement over the TER an additional 4kWp has been added giving a total of 6kWp (see Appendix B for layout)

PLANT NOISE (REPORT)

The energy strategy for the project avoids the need for external mechanical plant with moving parts, therefore there is no impact on the ambient noise levels. No noise assessment report will be required.

SUMMARY

The strategy adopted includes a gas fired boiler with an efficiency of 89.1%, a high efficiency whole house heat recovery ventilation unit, building air tightness of 5 m³/hrm² and 6kWp of Photovoltaic panels on the roof to achieve a DER with a 20% improvement over the TER. The final TER will be approximately **11 kgCO₂/m²**

APPENDIX A – U-VALUES

Design SAP Data Input Table				
		Reference / Source	Details	Comments
Floor U-Values	Basement Floor	Calculated	0.14 W/m ² K	75mm Screed, Vapour Control Layer, 160mm Kingspan Styrozone N300, Damp Proof Membrane, Damp Proof Membrane, 300mm Reinforced Concrete
	Ground Floor	Calculated	0.15 W/m ² K	100mm Polished Concrete Slab, Vapour Control Layer, 100mm Kingspan Kooltherm 103 Floorboard Insulation, Damp Proof Membrane, 250mm Medium Density Concrete Slab
	Exposed Floor	Calculated	0.34 W/m ² K	20mm Omnise Underfloor Heating Insulation, Vapour Control Layer, 25mm Kingspan Kooltherm 103 Floorboard Insulation, 200mm Reinforced Concrete, 170mm Unventilated Cavity Between Gypliner, 2 x 12.5mm Plasterboard, 3mm Plaster Skim to Bin Shed
Wall U-Values	External Walls - A	Calculated	0.14 W/m ² K	3mm Plasterskim, 12.5mm Plasterboard, 18mm Plywood, 25mm Unventilated Cavity Between Battens, 200mm Thermalite HI Strength 7 Low Density Block, 90mm Kingspan Kooltherm K106 Cavity Board, Damp Proof Membrane, 10mm Ventilated Cavity, 108mm Brick Outer Leaf
	External Walls - B	Calculated	0.16 W/m ² K	3mm Plasterskim, 12.5mm Plasterboard, 18mm Plywood, 25mm Unventilated Cavity Between Battens, 200mm Reinforced Concrete, 90mm Kingspan Kooltherm K106 Cavity Board, Damp Proof Membrane, 10mm Ventilated Cavity, 108mm Brick Outer Leaf
	External Walls - C	Calculated	0.15 W/m ² K	3mm Plasterskim, 12.5mm Plasterboard, 18mm Plywood, 25mm Unventilated Cavity Between Battens, 140mm Thermalite HI Strength 7 Low Density Block, 90mm Kingspan Kooltherm K106 Cavity Board, Damp Proof Membrane, 10mm Ventilated Cavity, 108mm Brick Outer Leaf
	External Walls - D	Calculated	0.13 W/m ² K	3mm Plasterskim, 12.5mm Plasterboard, 18mm Plywood, 25mm Unventilated Cavity Between Battens, 200mm Reinforced Concrete, Kingspan Kooltherm K15 Rainscreen Board, Damp Proof Membrane, 20mm Ventilated Cavity, 50mm Lime Stone External Finish
	External Walls - F	Calculated	0.17 W/m ² K	3mm Plaster Skim, 12.5mm Plasterboard, 18mm Plywood, 25mm Unventilated Cavity Between Battens, 100mm Thermalite HI Strength Low Density Block, 80mm Kingspan Kooltherm K106 Cavity Board, Damp Proof Membrane, 10mm Ventilated Cavity, 108mm Brick Outer Leaf
	External Walls - G	Calculated	0.20 W/m ² K	3mm Plaster Skim 12.5mm Plasterboard, 18mm Plywood, Vapour Control Layer, 70mm Kingspan Kooltherm K112 Framing Board Between Gypframe, Damp Proof Membrane, 250mm Reinforced Concrete to Existing Ground
	External Walls - H	Calculated	0.22 W/m ² K	3mm Plaster Skim, 12.5mm Plasterboard, 18mm Plywood, Vapour Control Layer, 70mm Mineral Wool Quilt Between Gypframe, Damp Proof Membrane, 200mm Reinforced Concrete, 100mm Kingspan Styrozone N300, Damp Proof Membrane, 108mm Brick Outer Leaf
	External Walls - S	Calculated	0.35 W/m ² K	3mm Plaster Skim, 12.5mm Plasterboard, 18mm Plywood, 100mm Thermalite HI Strength 7 Low Density Concrete Block, 25mm Unventilated Cavity, 70mm Kingspan Kooltherm K112 Framing Board Between Gypframe, Damp Proof Membrane, 18mm Plywood, 12.5mm Plasterboard, 3mm Plaster Skim to Garage
Roof U-Values	Flat Roof - RFT1	Calculated	0.13 W/m ² K	3mm Plaster Skim, 2 x 12.5mm Plasterboard, 170mm Unventilated Cavity Between Gypliner, 250mm Reinforced Concrete, Vapour Control Layer, 170mm Kingspan Thermaroof TR27 to Roof Finish
	Flat Roof - RFT2	Calculated	0.10 W/m ² K	3mm Plaster Skim, 12.5mm Plasterboard, 9mm Moisture Resistant Board, 100mm Unventilated Cavity Between Joists, 75mm Unventilated Cavity Between Firrings, 20mm External Grade Plywood, Vapour Control Layer, 50mm Kingspan Optim R Roof System, 50mm Kingspan Thermaroof TR27 to External Roof Finish
	Flat Roof - RFT3	Calculated	0.11 W/m ² K	3mm Plaster Skim, 2 x 12.5mm Plasterboard, 170mm Unventilated Cavity Between Gypliner, 150mm Unventilated Cavity Between Joists, 25mm Unventilated Cavity Between Firrings, 20mm External Grade Plywood, Damp Proof Membrane, Bauder FA-TE Flat Roof Insulation to Green Roof Finish
	Flat Roof - RFT4	Calculated	0.12 W/m ² K	3mm Plaster Skim, 2 x 12.5mm Plasterboard, 30mm Unventilated Cavity Between Gypframe Channel, 200mm Unventilated Cavity Between Joists, 18mm External Grade Plywood, 18mm Unventilated Cavity Between Firrings, 18mm External Grade Plywood, Damp Proof Membrane, 170mm Kingspan Thermaroof TR27
Opening U-Values	Windows	Assumed	1.60 W/m ² K	Double Glazed, Argon Filled, Low-E Coated - G Value: 0.63
	Door - Solid	Assumed	1.80 W/m ² K	Solid Wood or Composite Door
	Roof Lights	Assumed	1.60 W/m ² K	Double Glazed, Argon Filled, Low-E Coated - G Value: 0.63

APPENDIX B - ROOF PV LAYOUT

Proposed location of PV shown in blue

