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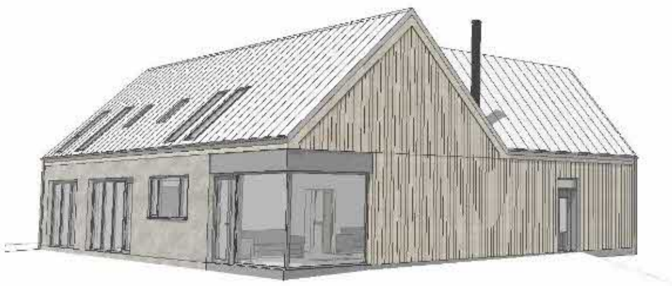
JV
ARCHITECTURAL SERVICES LTD

29th November 2023

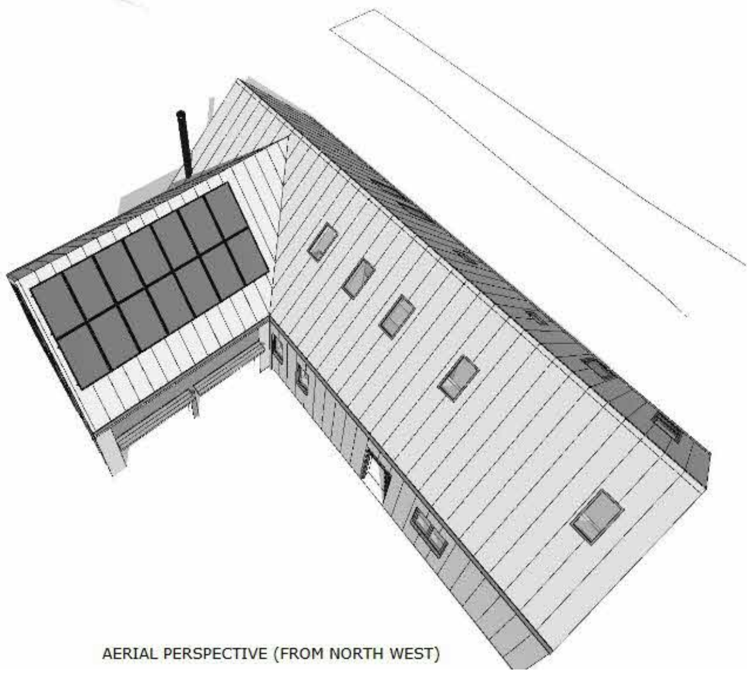
Energy Statement for

Proposed Dwelling at ;

Land East of Lower Town Barn
Trewidland
Cornwall
Pl14 4ST
Ref: Horlsey 2306



PROPOSED PERSPECTIVE (FROM NORTH EAST)



AERIAL PERSPECTIVE (FROM NORTH WEST)

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1. INTRODUCTION

The proposal is for a new 3 bedroom detached dwelling on previously developed land at Trewidland and includes an attached garage. The house is set-out with a room in the roof design without the requirement for dormers. The ethos of the construction design will be based on 'fabric first'. The building will be constructed using a cavity wall method with a U-Value of 0.17W/m2.K , a pitched roof with Attic trusses and a build-up providing a U-value of 0.11 W/m2.K and a ground bearing floor slab (U-Value 013 W/m2.K) all windows and doors will be specified to comply with Part L of the Approved Documents.

Policy SEC1 Part 2b states that The Climate Emergency DPD will Guide Cornwall Council in addressing climate change within planning decisions. Policy SEC1 Sustainable Energy and Construction Part 2b focuses on the energy use of new-build homes in a drive towards net zero.

The three elements of this are A) a space heating energy threshold –30kWh/m2/year B) a total energy threshold –40kWh/m2/year C) a renewable energy requirement –equal or greater than the total energy demand

2. ENERGY DATA

A SAP assessment has been carried out to demonstrate compliance. The tables below summarise the SAP results

Quantity	Plot Name	Bedrooms	Number of storeys	SAP Floor Area	Volume	Site Exposure
				m2	m3	
	Box numbers from SAP calculation printout --->			[4]	[5]	
1	***EXAMPLE - Semi Detached House***	***3***	***2***	***93.2***	***235***	***Normal***
1	Detached House	3	2	232	594	Normal

Results			
Space heat demand	Total energy use	Renewable generation	Renewable deficit
kWh/m² TFA/ yr	kWh/m² GIA/ yr	% total energy	kWh/year
Required values:			
<30	<40	100%	0
63.8	***42.2***	***0.8528769***	***579***
68.2	35.3	0.6999649422	2459

Inputs - Space Heating Demand																		
Air permeability @50Pa	Total area external elements	Total area party elements*	Ventilation system	Heat recovery	Thermal mass	Fabric heat loss	Solar gains											
m3/m2/hr	m2	m2		%	kJ/m2/K	W/K	W											
[17]	[31]	[32]+[32a]+[32b]		[23c]	[35]	[37]	[83]											
							Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	*193*	*39*	*MVHR*	*0.792*	*124*	*55.6*	*91*	*139*	*203*	*285*	*322*	*357*	*307*	*287*	*238*	*162*	*106*	*77*
3.1	490	0	MVHR	0.783	250	131.4	803	1187	1706	2344	2604	2839	2430	2333	1975	1352	916	701

Inputs - Total Energy Use									
Space heat source	**Heating efficiency**	**Space heat source**	**Heating efficiency**	**Fraction of heat**	**Domestic hot water source**	**Water heating efficiency**	**Hot water storage losses**	**Pumps and fans energy**	**Lighting Efficacy**
(Primary)		(Secondary)					kWh/day	kWh/year	Lumen/Watt
	[206]		[207]	[201]		[216]	[48]	[231]	
Heat pump - air to water	***3.109954***				***Heat pump - air to water***	***1.885224***	***1.4***	***189***	***100***
Heat pump - air to water	2.499				Heat pump - air to water	1.751	1.75	568	75

Inputs - Renewables
Renewable Generation
kWh/year
[233]
-3160
-5400

3. REVIEW OF RENEWABLE ENERGY / LOW CARBON OPTIONS

Photovoltaic Panels (PV Panels)

Photovoltaic (PV) systems convert energy from the sun into electricity through semi-conductor cells. Systems consist of cells connected and mounted into south facing modules. Modules are connected to an inverter to turn their direct current (DC) output into alternating current (AC) electricity for use in buildings or export to an electrical grid at a fuse box. PV systems require only daylight to generate electricity so energy can still be produced in overcast conditions. A typical capital cost is £220/m2 equating to approximately £7000 per kW output. Due to a sufficient south facing roof area available, the use of PV panels along with a battery storage bank has been considered as the most practical renewable technology for the development as well as meeting the obligations to policy SEC1.

Air Source Heat Pumps

These are fitted externally, take heat out of the air and can be used for radiators or underfloor heating and supply of hot water. They do not take up a lot of space. This technology has been considered both suitable and practical for the development to both fulfil the SAP requirements and renewable policy SEC1

Solar Hot Water

Solar thermal panels collect solar radiation to heat water that can then be used for either domestic hot water generation or space heating. There are two types of solar thermal collectors: flat plate and evacuated tube. Evacuated tube technology being the more efficient, and therefore, requiring less active collector area than that of a flat plate system. However, the capital cost is comparable for the two technologies. The system consists of solar collectors that are often roof mounted. Water is passed through the collectors and then to a heat exchanger in a hot water cylinder that will also incorporate a top up heat source to ensure adequate temperatures are achieved. Solar thermal systems can produce energy from diffuse sunlight and are therefore less susceptible to the effects of orientation and angle on the performance. Systems are normally sized to provide 50% of the annual domestic hot water for a typical development to avoid over-sizing issues. A dedicated domestic hot water cylinder is required along with sufficient space to install it. Due to this not meeting the 10% reduction or the SAP requirements as a stand-alone measure for the development, this has not been considered as an option.

Water / Ground Source Heat Pumps

Water/Ground source heat pumps are used to extract heat from the water/ground during the heating season and to reject heat to the ground/water during the cooling season. Typical capital costs are £1800- £2000 per kW of installed plant for ground source, making it one of the more expensive renewable / low carbon energy technologies. Due to amount of ground space required to install the thermal piping, or alternatively boreholes, this has not been considered as an option.

Biomass

The most common form of energy generation using biomass is the direct combustion of wood in treated or untreated form. Potential fuel sources include solid wood fuel, wood chips, pellets and briquettes. Combustion of the wood generates energy that can be used directly for space heating and hot water. Biomass heaters range from simple wood burning stoves to large fully automated boilers intended for large commercial/public buildings. With limited outside building space available for wood/pellet storage this option is not practical.

Combined Heat & Power (CHP)

CHP is generally considered a low carbon technology, rather than a renewable energy source unless a biofuel is used. CHP systems use either a gas or a biofuel engine to generate both heat and electricity in a 2:1 ratio. A CHP unit can be located within a dedicated plant room or within a dedicated ‘energy centre’ connected via a district heating main. To ensure a CHP unit offers maximum efficiency, the heating load must be constant throughout the year. For this reason, CHP systems are often used for heating swimming pools.

Small Scale Wind Turbines

Wind turbines convert the power of the wind into electrical energy. They can range from small domestic turbines producing a few hundred watts to large offshore turbines with capacities of 3MW. A detailed study of the wind speed, turbulence and potential noise issues is required to be carried before considering this type of technology to ensure that it is suitable for the particular application. Small scale turbines are available in a range of costs, from £1500 for a domestic sized 0.6kWp turbine to £20,000-30,000 for 6kWp turbines. Due to the site constraints, there is little scope on site to install a turbine and not considered to be a proposal that would be accepted due to the significant visual impact. Therefore, the use of this technology has not been considered further.

4. WATER EFFICIENCY MEASURES

The specification will designed to not exceed 125 Litres per person per day usage and have been factored into the SAP Calculations.

5. OVERHEATING

Simplified calculations in line with Part O of the Approved Documents, have been carried out and show that the dwelling complies with the allowable glazing percentages and therefore meets the 'simplified requirements with cross ventilation'.

6. CONCLUSION

Following analysis of the energy usage data along with predicted carbon emissions using SAP 10 Methodology, an Air Source Heat Pump to supply heating and hot water with the addition of a solar PV array is the most viable option within the constraints of the site.

As described in the introduction, the property complies with Policy SEC1 Part 2b of the Climate Emergency DPD through the following measures:

1. Detailed design following a fabric first approach to the construction through the following

U-Values

U-Values that are in line with the notional dwelling in Part L of the Approved documents and actually improve upon the PassiveHaus thermal element standards of 0.15W/m2.K in all but the walls.

Thermal Bridging

In addition the specification of low thermal conductivity lintels and the careful detailing of junctions will reduce the potential for heat loss as a result of thermal bridging.

Air Tightness

Careful detailing of airtight layers and installation of windows and doors with flexible air-tight tapes will also reduce uncontrolled air-leakage and provide for a highly air tight property (although not an exact science due to variations caused by the construction phase, the air permeability is likely to be at or below 3 m3/m2.hr at 50Pa.

2. Controls

Efficient heating and lighting controls and efficient lighting will help to minimise energy usage.

3. Ventilation

An MVHR (Mechanical Ventilation with Heat Recovery) unit is likely to be employed to provide adequate ventilation and reduce heat loss through doing so. The unit and ductwork will be specified and designed by specialists to ensure an appropriate size and ductwork layout and to reduce the chances of air-leakage as a result of poorly considered service runs and sequencing.

Because the renewable energy target is met , no offsetting payment is needed.