



**DRAFT DOMESTIC ENERGY PERFORMANCE CERTIFICATE**  
**and**  
**ENERGY SAVINGS ANALYSIS**



**The Haven  
Lower Kirklington  
Plymouth  
PL18 9RR**

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## Welcome to Your Energy Report

Within this report you will find a complete breakdown of your energy assessment with recommendations to improve the efficiency of your home, thereby reducing operating costs, reducing energy consumption and improving your 'Green Credentials'.

Your overall use of energy has been assessed and results are based upon actual consumption figures. We will also have taken into account the status of your building (i.e. if listed or in a conservation area), the tenure of the building, and other factors before arriving at these results.

The areas that our surveyor has assessed are wide ranging, looking at the entire building and utilising a unique, holistic approach to energy efficiency. Our sophisticated auditing software models many different measures, however only those that represent value for money and provide a good return on investment have been selected for your consideration.

**Please also note that all the measures suggested are interlinked and implementing only certain measures may affect overall energy reductions.**

Overall, these recommendations (both physical and behavioural) will payback their capital investment within approximately 5 years, with several of them paying back significantly more quickly.

Please study the report carefully and feel free to ask any questions that you may have.

We look forward to working with you to help lower your energy and operating costs, whilst improving your green credentials.



## Report Overview

Understood to have been built in 1972, this detached house is largely unimproved (in energy efficiency terms), with the exception of replacement UPVC double-glazed windows installed in around 2000. It was extended in 2012 to provide additional kitchen / diner / family room space.

Originally constructed to 1969 building regulations, the cavity walls are presumed to be non-insulated. Advice has been given that the construction is not suitable for retro-insulation and so this consideration has been discounted. The roof insulation has been increased to a depth of 280mm, and hence has not been considered for upgrade as to do so would be highly disruptive and expensive, with minimal tangible results.

Heating is provided to the majority of the house by a mains gas fuelled upward flow warm air boiler, located off the utility room. This is supplemented by grid electric underfloor heating to the kitchen/diner, including to the extended area. Secondary heating is available from two wood-burning, closed room heaters in the lounge and kitchen/diner.

The hot water system comprises a 180 litre, foam insulated storage cylinder, powered by dual-tariff grid electricity.

Lighting is provided by a selection of tungsten, tungsten-halogen and compact fluorescent lamps.

## Limitations & Assumptions

Annual energy usage has been derived from gas and electricity invoices provided, covering the period 23-December-2014 to 5-January 2016, and interpolated to one year. Standing charges and domestic rate VAT (5%) have been included.

Cost data for proposed improvements have been taken as best current estimates of total cost, including material costs and installation charges.

The proposal for a change of water heating fuel from electricity to gas is dependent upon confirmation that the gas supply to the property is of sufficient capacity for both space and water heating boiler operating concurrently.

**It must be emphasized that these can only be an approximate guide - actual quotations from suppliers / installers following site surveys may vary significantly from our assumptions.**





## Executive Summary

Significant opportunities are present in this building to reduce energy consumption, cut costs and reduce carbon emissions.

The current annual spend on metered utilities during the assessment period is:	<b>£ 1,694</b>
Potential annual savings from all standard measures identified in this report are:	<b>£ 598</b>
This represents an annual reduction on current energy costs of:	<b>35%</b>
Annual reduction of CO <sub>2</sub> emissions:	<b>2,693 kg.</b>
The payback period for the total project as modelled is:	<b>4.41 years</b>
5-year Return on Investment Projection	<b>125%</b>

Two options for energy saving were considered, but discounted due to excessive payback periods (exceeding 40 years) :-

- Upgrading all pre-2002 installed windows to current standards
- Heating boiler replacement.

In addition to the identified opportunities for improvement within the present energy systems, it is also recommended that a solar PV system be considered. The property has ample roof area to support a 4kWp system, since there are sections facing both towards South-East and South-West, which are almost entirely unshaded by trees or adjacent properties. This is covered in detail in the addendum to this report, which shows a potential annual generation figure of some 3,400 kWh (22% of current demand) with a payback period of under 10-years.



## Summary of Potential Savings – Building Energy

Recommendations and Key Actions	Estimated Annual Savings					Estimated Cost	Payback Period
	£	CO <sub>2</sub> (t)	kWh Elec	kWh Gas	cu m	£	Years
Replace existing lighting with LED	186.18	0.676	1,258			112	0.60
Hot Water heating saving	400.67	1.943	6552	-8,294		2,500	6.24
Hot water end use saving	11.69	0.074	121		21	30	2.57
<b>Totals</b>	<b>598.94</b>	<b>2.693</b>	<b>7931</b>	<b>-8,294</b>	<b>21</b>	<b>2,642</b>	<b>4.41</b>

## Solar Technologies

Recommendation	Estimated Annual Savings			Estimated Cost	Payback Period
	£	CO <sub>2</sub> (t)	kWh	£	Years
Install 4.0 kWp solar PV array to SE / SW roofs	476	1.76	3,400	5,000	9.55



## MEASURES IN DETAIL

### Heating

The original warm-air heating system is of moderate efficiency by today's standards, and the partial replacement by electric underfloor heating is also a relatively inefficient space-heating option. The additional heating provided by log-burning closed room heaters is, of course, a very cost-effective solution and should be used to supplement the central system as frequently as is convenient. Heating by natural gas continues to be the best solution in terms of carbon emissions and cost, and this has been the primary focus. Alternatives do exist, but have been discounted for the following reasons: -

#### **Wood-chip/pellet burning boiler**

An efficient fuel in both carbon emission and cost terms, it would require siting in a new location since the existing boiler is in the centre of the house and there is no practical option for delivery and storage of the fuel. There are also limited options for siting a system in an extension to the property.

#### **Air-Source / Ground Source Heat Pump**

Commonly known as 'air-conditioning' (AC), modern systems can deliver both heating and cooling at high efficiency (typically 300 - 500%). However, this option for system replacement is only really cost-effective if there is an existing wet system infrastructure (pipework & radiators). Whilst heat pump systems do commonly work by conditioned air distribution, the existing warm-air ducting is not directly compatible. It is most likely that new heating/cooling fan units would be required in every room, with the associated installation of pipe-runs to the external unit. This is disruptive and significantly increases cost and payback period.

#### **Conclusion**

Having excluded these options, the most convenient alternative is for replacement of the existing warm-air boiler. It has not been possible to ascertain the exact efficiency of the existing unit, but it is likely to be less than 80%, whereas current condensing models can achieve greater than 95%. However, the energy demand of the heating system is modest, and the capital cost of boiler replacement high, so the payback period would be in the region of 40-years, which is considered excessive.

In order to take advantage of a change of water-heating fuel from electricity to gas, we have also investigated the possibility of a 'combi' warm-air boiler which can also deliver hot water 'on demand', replacing both existing boiler and hot water cylinder. This avoids the relatively expensive option of storing a large volume of hot water, and thus would demonstrate significant savings. Unfortunately, we were unable to identify a suitable unit of sufficient capacity to heat both space and water. Consequently, we have



considered a separate gas, 'on demand' water boiler, and this option is covered under the 'water heating' section of this report.



## Water Heating

As explained above, it was proposed to replace the electric immersion water cylinder with 'on demand' hot water from a 'combi' boiler. Since a suitably-sized unit could not be identified, this option is to consider a separate gas-fuelled water boiler, also delivering hot water on demand. Should a storage system be preferred, this could be incorporated with the storage vessel (known as a gas calorifier) but with substantially less stored volume. However, this option would incur a lower saving, since some storage losses would remain.

**Caution: This proposal is dependent upon the capacity of the gas supply to the property being sufficient to serve two independent boiler systems (and, potentially, gas cooking appliances). A survey is recommended before considering this option, since any enhancement of the supply would have a significant financial implication.**

## Water End-Use Saving

The 'mixer-tap' shower unit on the ground floor would benefit from a low-flow head, reducing both hot and cold water demand. Whilst the flow volume is reduced, the pressure is maintained with no loss of amenity. Similar 'aerator' nozzles could be fitted to hot and cold taps, with the same result. These benefit not only through reduced water demand (particularly relevant if water supply is metered) but also in a reduction of water heating energy.

## Lighting

The property is served by a combination of tungsten 'GLS', tungsten-halogen down-lighters and a few compact fluorescent (CFL) lamps. Whilst the general trend has been towards replacement with CFL lamps in domestic property, it is now far more cost-effective to install LED lamps. [One major supplier (General Electric) has just announced that they are ceasing all CFL manufacture to concentrate on LEDs].

There are now available, at reasonable cost, LED equivalent replacement lamps for all traditional types and luminance values. Many are direct replacements, and so lamp-holder replacement is not necessary. However, it is strongly advised that 'supermarket brands' are avoided in favour of mainstream manufacturers, such as GE, Phillips and Osram, to ensure equivalent light output and longevity of lamp life.

As shown above, even taking account of the relatively limited use of domestic lighting, this measure should pay-back in a little over 6-months.



## General Information

Achieving a lower carbon future makes good. Not only will you benefit from lower energy costs, but as the price of energy and water increase, so these savings are magnified.

Encouraging energy awareness can also be an excellent way of cutting energy bills at very little cost. Simple measures such as draught excluders, turning off a light, fixing a dripping tap or closing doors can yield significant savings over time. Further advice is available from your energy consultant.

Your attention is also drawn to the 'Energy Saving Trust' website –

<http://www.energysavingtrust.org.uk/domestic>

where you can find extensive information and guidance on all home energy efficiency matters.

## ADDENDA

### Energy Performance Certificate (Draft, not lodged) - EPC

The EPC attached to this report highlights the potential effect of various proposed improvement measures on the energy rating of the property. However, the financial estimates are very approximate and we believe they do not accurately reflect current trends. As an example, you will see that the estimates for cost and return for a smaller ( 2.5kWp against quoted 4.0kWp ) system are quite different. The EPC does, however, give indicators for other improvements that could be considered.

A handwritten signature in black ink, appearing to be 'Tim Bull', written in a cursive style.

**Tim Bull BSc, DEA, CEA, PBEA**

**10 February, 2016**