Energy Audit

Low Carbon Dorset were asked to assess a variety of energy saving opportunities for Ibberton and Belchalwell Village Hall near Sturminster Newton. The site visit was undertaken by Dr Erik Blakeley on the 26th June 2019 and was facilitated by Annette Newman.

The hall was originally built as a temporary church, with a timber-framed structure overlaid with corrugated iron externally and timber internally. In recent years extra structural support was undertaken, with modernisation to the kitchen and other facilities. This enabled the introduction of some improved insulation. The roof skin has also been updated but is now in need of some attention.

During the summer most of the usage is in daylight hours but in winter evening activities are more frequent.

2. ASSESSMENT

Energy Consumption

Energy spending at the hall is not high, amounting to about £200 per year on electricity and £477 per year on oil.

Lighting

Some of the lighting has already been converted to LEDs, but there remain some halogen spotlights that would greatly benefit from being replaced with LEDs. There are also some high-power stage lighting units. These, however, are rarely used and would be very expensive to replace, so it is unlikely that it would be sensible to replace these until they wear out. It is therefore recommended that a small LED project be undertaken with Low Carbon Dorset's assistance. This would need to be part of a larger grant application in order to meet the minimum project cost (£2k) needed to be eligible for a Low Carbon Dorset grant. One quote has already been given for such a scheme suggesting a cost of around £450.

Heating and Hot Water

The boiler in the hall is a Grant Vortex oil-fired c 95% efficient condensing boiler is newly installed in 2022. As the spend on oil is under £500 p.a. this suggests that a saving of around £50 p.a. is now possible because of the change of boiler. It will take a 40 year payback on the cost of boiler and installation.

Heat is supplied via fan assisted radiators. The controls are set up to provide heating when needed and frost protection at other times. It is believed that frost protection consumes a significant proportion of the heating demand.

One option for reducing the carbon footprint of the hall might be to install roof suspended long wavelength radiant panel heaters in conjunction with solar PV as a top up heating measure. This would allow lower thermostat and/or lower flow temperature settings to be used on the main boiler. These would reduce warm up times needed for the hall and would allow more clean "free" electricity to be used from a solar PV, or solar PV and storage, system to be consumed on site.

Building insulation

There has been some improvement in the insulation carried out as part of the upgrading of the kitchen and toilet facilities. More wall insulation could be added but would require the removal and replacement of either the internal panelling or the external corrugated cladding. This may not be possible without unforeseen additional restoration work on sections that were not fit to be simply taken off and replaced. Again, the likely savings in energy costs will be small (£100 p.a. or less), so this is hard to recommend unless facilitated by other structural work, as occurred in 2001. Additional roof insulation could be added internally but this would significantly alter the current appearance which may not be acceptable and would also not generate huge savings.

There is already recently installed double glazing in place.

Refrigeration

It was noticed during the visit that a fridge in the hall was kept switched off with a special device to hold the door open to avoid mould issues. In addition, there is a clear notice informing users how to manage the fridge to minimise wasted energy. This is excellent and far from common, with many halls having at least one, if not more, fridges or freezers permanently running with little or nothing inside them.

Other kitchen energy demand

As the kitchen is not heavily used it is unlikely to be sensible to proactively replace any equipment purely on energy saving grounds. However, if any equipment is required in the future, it is highly recommended that *high energy efficiency ratings be prioritised* over marginal savings in purchase price.

Renewable Energy Generation

It is the case that for most village halls the easiest and best way to significantly reduce the net carbon footprint of the building is to add solar PV on the roof. The issue is whether a good financial case can be made. If the carbon savings are regarded as a worthwhile end in themselves, and money can be raised, it might be justifiable to proceed without too much concern for financial payback periods. If this cannot be done then the deciding factor on payback period will be the usage patterns of the hall. If the hall is under used in the middle of the day or the base load is very low, for example if the natural light is such that the lights don't need to be on during the hours of daylight, then financial savings will be poor. If, as seems likely, the options for energy efficiency measures would struggle to achieve the £2,500 minimum total cost required to be eligible for a Low Carbon Dorset grant then a small solar PV array might be viewed as a base of expenditure onto which a package of smaller measures can be built to allow for an eligible grant application.

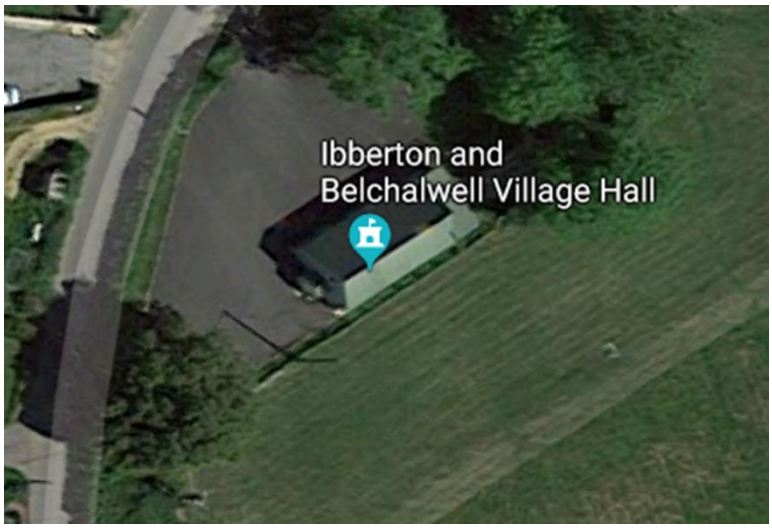

Figure 6: Roof of Village Hall. Image from Google Maps

The above image demonstrates how well orientated the roof of Ibberton and Belchalwell Village Hall is for solar PV. The roof is pitched and faces almost slightly South of South East with no potential for shading issues. This should ensure that each day PV output is rising before the hall comes into use and will peak about

"coffee time". The access to the roof should be very easy requiring a minimum of scaffolding, with plenty of level ground all around the building on which to erect that scaffolding. This roof should accommodate 10kWp, but anything in excess of 3kWp would be worthwhile considering the low energy usage on site.

Although battery storage is currently expensive in comparison with the savings offered, this is likely to change in the next 2-5 years. It is likely that many people and organisations that have fitted PV in the past may choose to add storage to maximise the benefits they receive from their PV arrays. Battery storage will also allow them to engage with demand side response schemes to generate further income by assisting the grid to maintain the correct frequency at times of mismatch of supply and demand. This may increase the feasibility of a scheme to install solar PV with Low Carbon Dorset support, and then assess self-consumption over the first 1-2 years of operation in order to determine whether and when to install storage. To this end, if a PV array is initially installed without storage, it is recommended that the installers be asked to include an export meter in their quotes to allow measurement of both the generation and exports during the first years of operation. A relatively small battery could be used to time shift consumption from the middle of the day to the following evening, allowing the potential for the hall to become self-sufficient in electricity in the summer months especially if LED lighting is also installed throughout given that the average daily electricity consumption is only about 4 kWh at present. It may be that a sufficiently competitive quote for the sort of PV inverter with 2-4 kWh of storage built in may even be available now, allowing its cost to be included in a Low Carbon Dorset grant.

It has now also been confirmed that the government will be introducing the Smart Export Guarantee System (SEGS). This will allow solar PV to be installed with the expectation of a 5p per kWh payment for any excess PV generation exported. It will also mean easier access to smart tariff, demand side response schemes which should improve the business case for PV with or without storage.

3. RECOMMENDATIONS

All the recommended measures discussed throughout this report are presented in the table below.

4. Applying for a Low Carbon Dorset Grant

You may proceed to undertake the work with or without a grant, and further technical support may be available through the programme to assist you.

IMPORTANT NOTE - If you intend to apply for a Low Carbon Dorset grant it is critical that you fully understand the requirements for a grant application before you take any action (e.g. seeking acceptable quotes). Please discuss this with the Low Carbon Dorset Team.

Once acceptable quotes are in place for the initial tranche of measures for which grant funding is desired, a full low carbon grant application can be made with the help of the Low Carbon Dorset team. A further application for other measures may be made at a later date, so long as grant funds remain.

If the grant application is successful an offer letter will be issued detailing the sum of grant money on offer (typically 40% of total project costs), and confirming the work that will need to be completed before the funds are released. If a Low Carbon Dorset grant is sought work must not begin, and no contracts can be signed, until an offer of grant has been accepted.

The client will have to complete the agreed works and then submit a claim with evidence to include invoices and proof of payment (usually in the form of redacted bank statements) and allow a site visit to confirm correct installation. On completion of a claim a transfer of funds will be undertaken for the agreed grant.

Measure	Likely Cost	Likely Savings	Impact on Carbon footprint	Options	Action
LED lighting	£400-500	c 60% on current lighting spend which is likely to be in the region of £150 p.a.	Significant. LED lighting is usually one of the most cost-effective energy efficiency measures.	Change the lighting units on the two lighting bars - ??	Quotes and unit details Quote dated 24/11/18 (details in folder)
Stage lighting	£600 including fitting		Significant. LED lighting is usually one of the most cost-effective energy efficiency measures.	Replace lanterns Equipment £424.80 plus fitting	Quotes from Dacombes of Wimborne Jan, 2023
PV array with or without built in storage	c £3,000 for a 3kWp array, c. £6,000 for a 3kWp array with 3kWh storage built in.	Only about £100- p.a. without any storage. More when battery storage becomes affordable	High. Output will be around 3,000kWh per year for a 3kWp system. This will exceed the hall's current electricity usage. greatly reducing net carbon footprint.	Consider when roof material renewed – only able to change materials 25% at a time – link to planning	
Long wavelength Radiant heaters	c. £1,000	£100 p.a. in oil	Moderate. Possibly higher if combined with PV installation heating control.		
Notices to reduce energy usage	N/A	Electricity	Reducing unnecessary electric usage		Notices on Freezer & fridge Switch the cookery main switch off & water boiler

Highlighted achieved