

# Report to BWCE Members – 31<sup>st</sup> May 2017

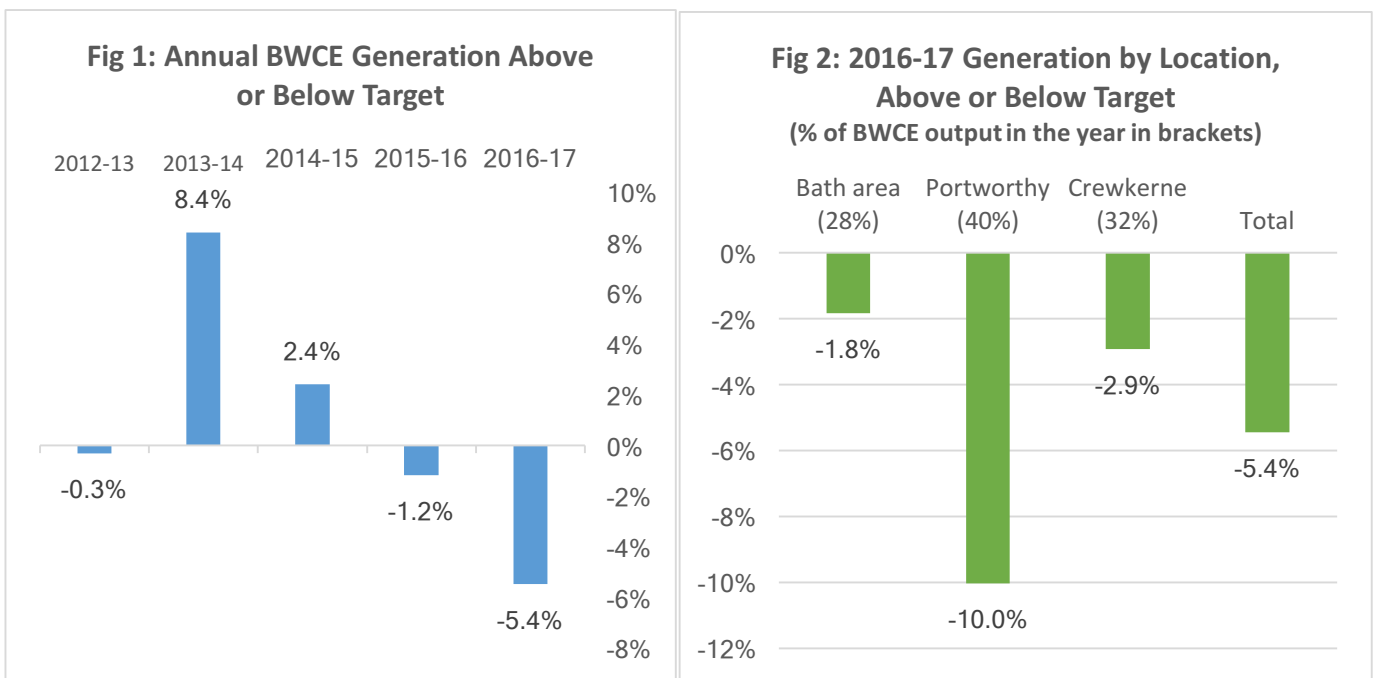
## Understanding Lower Project Performance 2016-17

### Headlines

- Overall our project portfolio performed 5.4% below target in the year April 2016 to March 2017, with the Portworthy project performing 10% below target.
- Whilst there have been some minor operational performance issues, that are now largely resolved, the most significant reason for the lower performance has been lower than average sunshine levels.
- Analysis suggests that sunshine levels during the last two years have been significantly below average at all our sites.
- Evidence suggests that longer term performance should return to predicted levels.
- These performance issues were flagged at last year’s AGM. At that time, we predicted that this year’s interest payment to members would be between 6% and 7%. We now expect payments to be at the lower end of that range.
- Given the abnormally low levels of sunshine over the last two years and lower inflation<sup>1</sup> over the past 4 years, we believe this would be a significant achievement.
- We will communicate with members about our proposals for member interest and community fund payments following the completion of our annual audit.

### Performance against targets

Our targets are based on long term average solar radiation data. So, some years will be below target and other years above target. However, our total project portfolio performed 5.4% below target during the financial year to end March 2017 compared to just below target the previous year (Fig. 1). Fig. 2 breaks down performance for last year by location.



<sup>1</sup> Project income from the Feed in Tariff is adjusted annually in line with the Retail Price Index (RPI), hence the importance of inflation.

As you would expect the BWCE Board are concerned about the causes of the underperformance and any long-term implications, given the impact underperformance has on BWCE's income.

### **Operational performance**

We have had some minor inverter and shading issues during the year on our smaller roof projects which have been, or are in the process of being, resolved. These issues have not had a material impact on the overall performance of the portfolio.

The performance of the actual panels at all three larger sites, Wilmington, Crewkerne and Portworthy has been good. The performance ratio, or the efficiency with which the panels are converting solar irradiation into electricity, has been above target for all three projects. So, the panels are working well.

A reduction in the efficiency of the solar panels themselves of 0.5% per year has been taken into account within the target figures.

We have had grid outages at both Crewkerne and Portworthy. This is where the network operator shuts down the solar system to allow them to do work on the local grid. At Crewkerne this was for part of 3 days during the winter months and so didn't have a material impact. At Portworthy the impact was a bit greater and amounted to nearly 6 days during spring, summer and autumn months. Since December 2015 this has resulted in just under 2% loss in output at Portworthy.

We would expect there to be continuing grid outages but we do not think they will be a major risk to future output.

### **Solar Irradiance**

All project targets are based on assessments of long term average solar irradiance drawn from PVGIS, a respected European Commission database of solar radiation. At our larger sites, solar irradiance is remotely monitored in real time.

Where data is available, there is a close correlation between lower than average solar irradiance and lower than forecast generation. This demonstrates that irradiation is the dominant factor, rather than technical or operational factors.

However, a key question is, do we expect these low levels of sunshine to continue?

Whilst there are no widely available long-term annual records of solar irradiance for our specific sites, we have been reviewing our performance against publicly available data on sunshine levels, measured in sun hours<sup>2</sup>, to get a sense of how abnormal our experience might be.

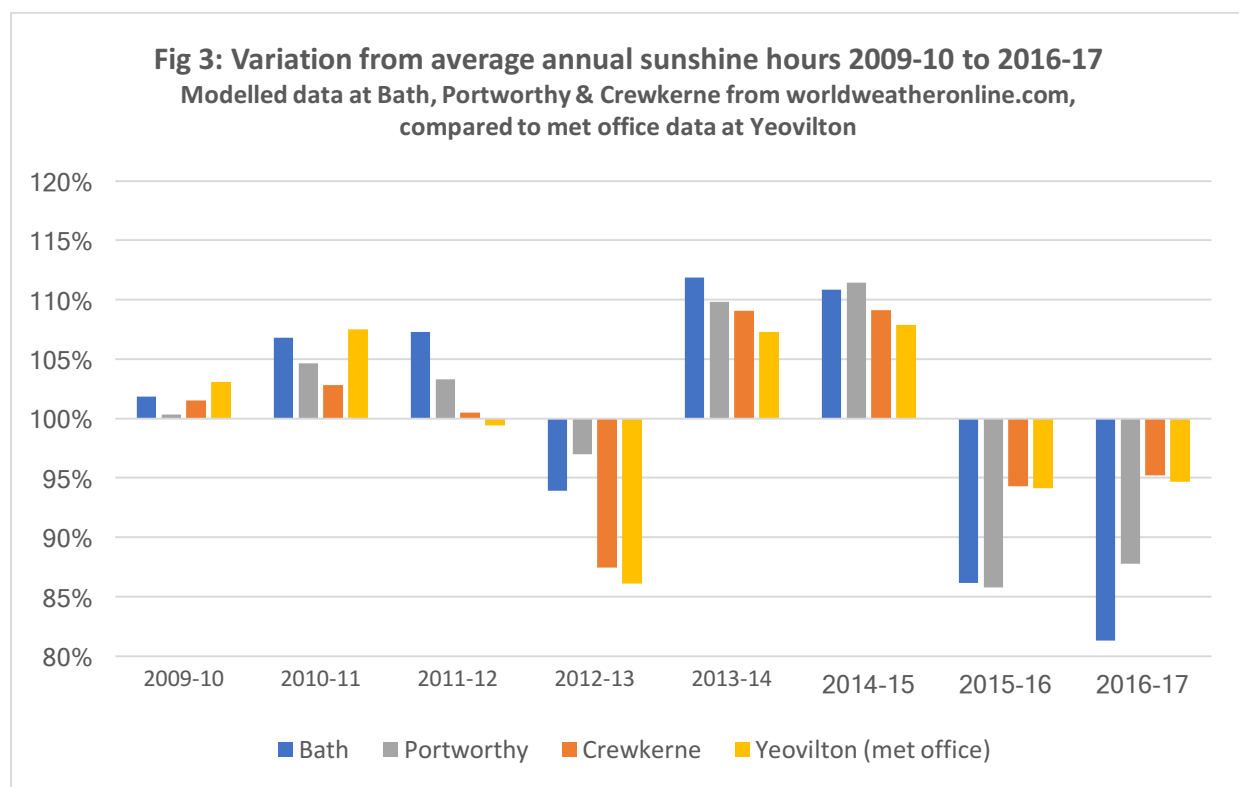
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<sup>2</sup> Sunshine hours are defined by the met office as the amount of time that direct solar radiation exceeds 120 w/m<sup>2</sup>. This is not as accurate as measuring actual solar irradiance, which is what we do at our larger sites. Sunshine hours do not take into account indirect solar radiation, of which we get a lot. However, it has not been possible to source historical irradiance data for comparison.

The data in Figure 3 below, compares variation in sunshine levels against the 8 year average in Bath and at the Portworthy and Crewkerne sites. This is modelled data, that comes from [www.worldweatheronline.com](http://www.worldweatheronline.com).

Because the publicly available data, is modelled rather than actual observed data, we also wanted to check how accurate the modelled data might be compared to the real world. So, the graph also provides observed data from the Meteorological Office Station at Yeovilton, which is in the same area as the Crewkerne site.

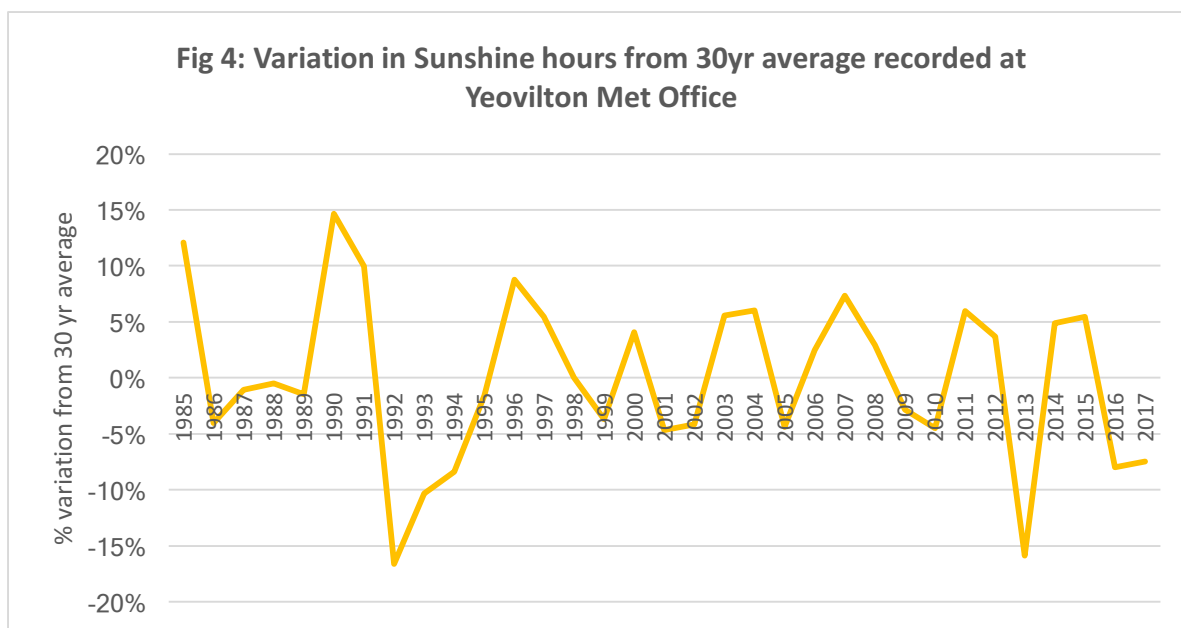
The actual observed data at Yeovilton shows a strong correlation with the modelled data we are using at Crewkerne. The strong correlation between the observed and modelled data here, increases our confidence in the modelled data for our other sites as well.



The overall trends in the modelled data summarised in Fig. 3 show a good if not exact correlation with our project generation performance outlined in Fig. 1.

The long-term data from Yeovilton, illustrated in Fig. 4 below, emphasises the unusual nature of the last couple of years. The data in Fig 4. illustrates both the normal range of variability that you might expect around a target based on average solar radiation, as well as the degree to which sunshine levels in 3 of the last 5 years have been abnormally low. The last time there was this concentration of low sun years was in the early 90s.

The long-term average from actual observations at Yeovilton, is within a couple of percent of the 8 year average shown in Fig. 3.



Research<sup>3</sup> suggests that long term, climate change is likely to increase rather than decrease solar radiation in the South of England, with some increase in seasonal variability.

Overall, our conclusion is that the last two years have delivered significantly below average levels of sunshine at all three locations and that in the long term we should see better performance.

### **Impact on BWCE income and member returns**

Members’ return on their investment is dependent on the performance of our projects. As noted above, performance depends upon several factors – not all of which are within BWCE’s control.

A 5.4% reduction in electricity generation by BWCE projects will reduce project income by around £75,000 over the year. This was exacerbated by a further £25,000 reduction in income through exposure to a lower than forecast price for electricity sales at Portworthy in the year. This is an issue that we do not expect to be repeated in the future. We have also seen a lower than expected increase in RPI (Retail Price Index) since 2012. As annual increases in our Feed in Tariff payments are linked to RPI, this has acted as another downward pressure on income.

We flagged our project performance issues at our AGM in September and said at the time, that as a result we expected to be able to pay a return to members for this year of between 6% and 7%. Once we have our annual audited accounts we will communicate further with members about our proposals for interest and community fund. However we expect member payments to be within, but at the lower end, of this range.

<sup>3</sup> Burnett, Barbour & Harrison: 2014, The UK Solar Energy Resource and the Impact of Climate Change, Institute for Energy Systems, School of Engineering, University of Edinburgh, United Kingdom. <http://www.sciencedirect.com/science/article/pii/S0960148114002857>