



Harborough Energy Ltd Board Meeting Tuesday 27th February 2024 Minutes

Held on: Tuesday 27th February 2024 at 2pm

Venue: Zoom Video Conference

Attendees: Peter Jones, Carl Tiivas,

Apologies: John Twidell, Stephen Rankine, Darren Woodiwiss

In Attendance: Lesley Burrows – My Admin Support (minutes)

Actions in bold and list of actions at end of minutes

1. Welcome and apologies for absence. (PJ)

PJ welcomed all to the meeting.

2. Minutes acceptance from 23.01.24

The minutes were accepted as a true and accurate reflection of the 23.01.24 meeting and duly authorised and signed by PJ.

3. Action Points from previous Minutes (if not covered in Agenda below)

PJ discussed Stephen Rankine resigning from Harborough Solar One 27.02.24 and to thank Stephen for his contributions.

4. Health and Safety Issues

CT confirmed in the case of Woodnewton we have attended identifiable risks relating to cabling present in rainwater, means of access and no significant issues were encountered during the course of the remedial work.

5. Treasurer role & Financial Report (CT)

a) Overview of operating cash flow

CT reported the following current Finances:

Balance on 26/2/24: £34,628.23

Income to come in up till end Dec: Approx: £5K excl.VAT

Outgoings: Remedial work at:

Woodnewton £3k excl.VAT

NBJ repair: £ 2.5K excl. VAT

Interest payments in March: £ 7.6K
7% capital repayment: £11.7K
Meter installs - £3k excl VAT
Expected balance after March: $\text{Approx} = 39.6\text{k} - 27.8\text{k} = \text{£}11.8\text{k}$

CT commented FiT payments are due to come in imminently and sales invoices to be sent out to hosts for Archway and Woodnewton.

CT reported the AR30 form has been submitted online. Accounts are also being submitted.

b) Shareholder interest payments & HMRC Reporting

PJ commented it was agreed that we would proceed with a 7% redemption for capital repayments to be paid out, interest payments will reduce with this payout. CT to start the payment process to investors.

c) Depreciation of assets in accounts

CT commented potential sale of installations. We have suggested to NBJ that we will need a period after export meters are installed at Woodnewton and Archway to be sure of our income after these have been installed. NBJ was happy to wait. PJ confirmed to contacting Woodnewton to discuss outright purchase.

d) Share Energy – pending due to tying into a 5 year contract.

e) Insurance – (CT)

CT commented Joju Solar to be contacted for their quote and what arrangements to be met. Once a maintenance arrangement is met insurance companies to be contacted for quotes.

6. Governance

a) Annual accounts – (CT)

CT confirmed the AR30 form has been submitted online. Accounts are also being submitted.

b) Interest payments

7. Operational Matters (JT)

a) Technical update / analytical report on performance (JT)

Export Metering. CT commented it has not been possible to get export readings from the existing meters so far, despite attempts. We have suggested to Woodnewton and Archway that we would like to go ahead with fitting export meters during the Easter break 28th March. 2 of 3 meters at Woodnewton can be CT clamp meters and won't require disconnection. 1 meter needs to be an in line meter, which requires turning off the electricity meter for 30 to 60 mins. We are in the process of liaising with the sites and Joju solar to organise this.

b) Output (CT)

c) New Tariffs

Tariff reviews. CT reported all sites have been informed of the new tariffs. There has been no dissent, but Woodnewton are unhappy to pay the new tariff until export metering is installed.

Woodnewton 24.27 p/kWh (approx.67% increase)

Archway 21.89 p/kWh (51% increase)

NBJ: 20.66 p/kWh (a 19 % increase)

Previous estimates were that we needed 18 p/kWh to fulfil our commitments including providing community benefit, even if exports from Woodnewton and Archway are up to 50% of generation, which we don't expect.

Potential sale of installations. We have suggested to NBJ that we will need a period after export meters are installed at Woodnewton and Archway to be sure of our income after these have been installed. Neil at NBJ was happy to wait. In the meantime:

How do we value the price of sale. Still in discussions.

d) Site visits

e) Woodnewton

CT commented Woodnewton remedial works were completed on 21/02/2024 to secure connectors above the level of the roof, so they don't sit in pools of water after rain on the KS2 building, which is all on flat roofs. They changed any connectors that had degraded or were faulty. The insulation resistance checks after these works were satisfactory, so all strings have been reconnected and are working. Early output data shows good output and the system withstood a day of heavy rain without dropping out. Volunteers cleaned the panels and checked all the mounting bolts. See separate report on remedial works.

f) NBJ

CT commented: We are still awaiting NBJ to repair wind damage. This has been chased up. Current issue is that Sunfixings seem to have changed the design of their mountings and the original parts used don't seem to be available. EE are having to do additional checks to make sure that updated parts that are available will fit on our mountings. They stated they would go out (27/02/2024) to NBJ to do the checks they need. Currently 5 of 6 rows of panels are still connected and generating, so we are getting 83% (5/6) of normal output.

Repair of the wind damage is needed but the rest of the mountings have been checked for stability.

g) Archway House

h) Selection of Maintenance Contractor for all Sites

As mentioned in 5 (e) Jojo Solar to be contacted by **CT** to clarify maintenance arrangements and cost.

1. All other bids, initiatives and other matters

- a) Community Benefit Fund** – CT commented funds will be available to contribute to CBF, previously JT highlighted whether there was a charitable fund at the school for the students. CT has contacted Woodnewton school – waiting to hear back. **PJ** commented he would offer Woodnewton with regard to the CBF.

~~b) Big Solar Co-op~~

c) Good Energy

Previously JT asked CT to look into a better FiT tariff from another supplier. **CT** to seek other suppliers.

CT commented photographs to be taken at Woodnewton School as requested by Good Energy for their audits. **CT** to combine with the JJS visit whilst installing export meters.

- d) Website (DW)** – **DW** is now being updated accordingly.

2. A.O.B

3. Date & location of next meeting

Tuesday 30th April 2024 at 2pm



Signed
Peter Jones (Chair)

Action Points from Board Meeting 27.02.24

Action	Who	By When
Contact Woodnewton Bursar re: outright purchase (Feb 25)	PJ	
Contact Jojo Solar re: Maintenance arrangements	CT	
Contact Bursar at Woodnewton to offer CBF	PJ	
Contact /Seek other supplier for FiT tariff	CT	
Photo's to be taken at Woodnewton for Good Energy	CT	
Capital Repayments to be carried out	CT	

Woodnewton School Solar Photovoltaic Installation

Roof 3 Remedial Works and Maintenance Report February 2024

History Of Solar Outputs

Table 1 below, shows the yearly outputs for all the installations relative to the installers original predicted output.

Table 1 Yearly Outputs Relative to Installers Predicted Output

	2017	2018	2019	2020	2021	2022	2023	2018-2022 Average
Roof 3 % Predicted Output:	98.4	107.6	105.1	102.5	75.8	83.5	67.9	94.9
Roof 1+2 % Predicted Output:	96.6	102.1	100.7	95.3	91.5	101.2	95.1	98.2
Roof 4 % Predicted Output:	99.4	105.0	100.9	107.1	98.7	105.3	72.1	103.4

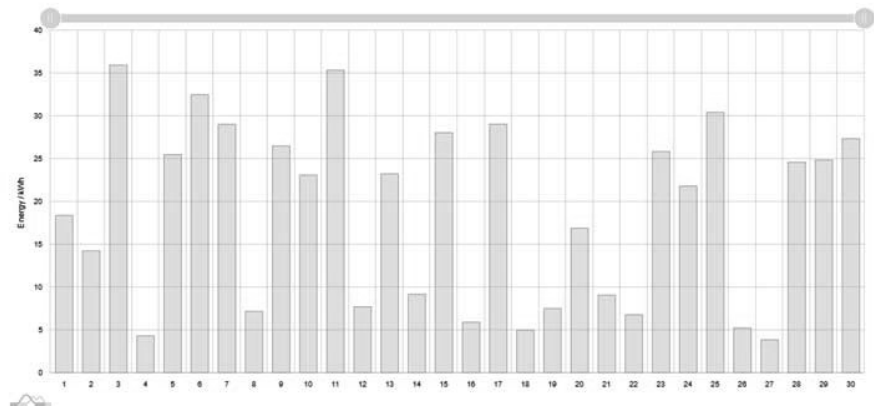
Roof 1+2 (Key Stage 1, Foundation Stage 2 Building) has a 20 kWp capacity array which has generally performed as predicted. Over the 2018 to 2022 period Roof 1+2 generated at 98.2% of the installers predicted output. Roof 4 (Muggleton Building) has a 16 kWp capacity array that has generated well at 103% of the installers predicted output over the period 2018 to 2022. 2023 output was reduced due to downtime for re-roofing. Roof 3 (Key Stage 2 Building) has a 20 kWp capacity array which performed slightly above expectations at 105% of the installers estimated output over the period 2018 to 2020. However in 2021 and 2022 the output dropped by about 20% overall. The output was intermittent with periods of poor output, then periods of satisfactory output. Sometimes the output would drop to zero for about a day or sometimes 2 or 3 days. Consideration was given to calling in engineers to inspect the installation, but we were worried that this would require expensive scaffolding and if the installation was generating well at the time of inspection the fault might not be found. It was calculated that the drop in output was costing about £500 per year in reduced income. We monitored the output and quite often there would be a better period of generation in the summer, but the pattern was not very clear. By the end of 2023 the output dropped further to 68% of predicted output. The summer showed reasonable output, but this seemed worse in the Autumn with November showing particularly poor output. It was decided that we needed engineers to perform an inspection and fault finding visit for all our sites. Quotes were solicited from several MCS accredited installers. Joju Solar provided the most satisfactory and competitive quote and appeared to have a proportionate attitude to maintenance.

A site visit on 12th Jan 2024 by Joju Solar showed no significant issues with Roof 1+2 or Roof 4. However, it was discovered that the insulation resistance was low for Roof 3. Particularly, one string of panels had very low insulation resistance that required isolating and disconnecting this string to protect the inverter, which could have been damaged by persistent low insulation resistance. The likely cause of this was thought to be water ingress into the MC4 connectors, due to many of the connectors lying directly on the flat roof, which would be expected to cause a problem if water pooled on the roof during and after rainfall. This was a deficiency of the original installation. The installers should have secured the connectors several centimetres above the flat roof surface.

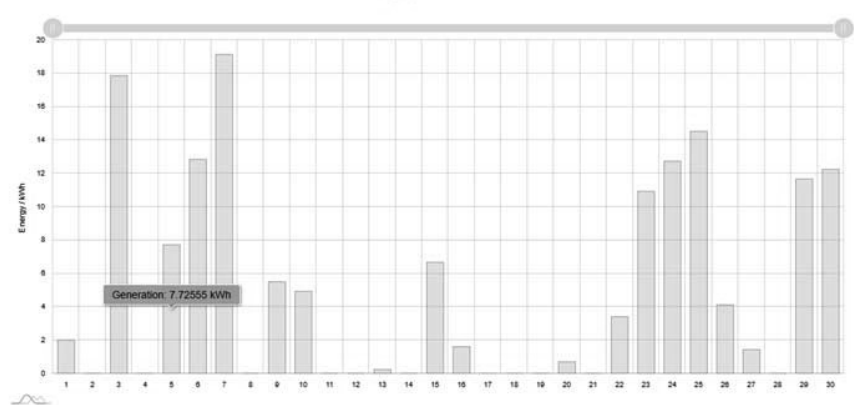
The other main finding was that the Roof 3 panels needed cleaning due to algal and lichen growth, which is more of a problem on panels mounted at a low angle of 10 degrees found on flat roof installations.

The figures below show the daily outputs from Roof 3 and a well behaved Roof 1+2 during the worst months of November 2023 and February 2024 up to 25th Feb.

Roof 1+2 November 2023.

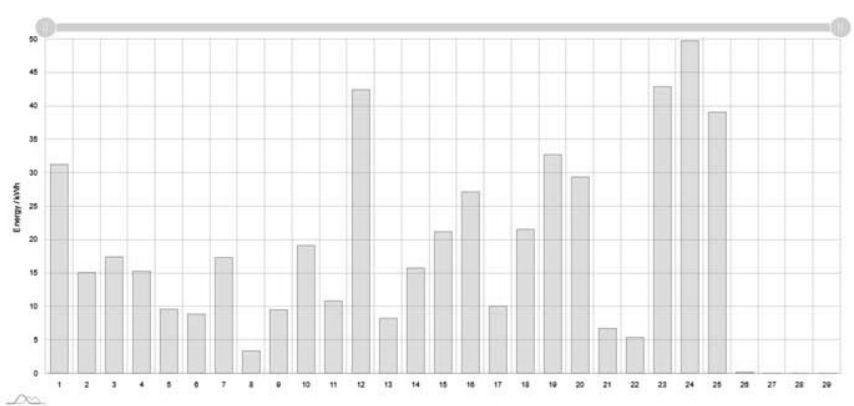


Roof 3 November 2023

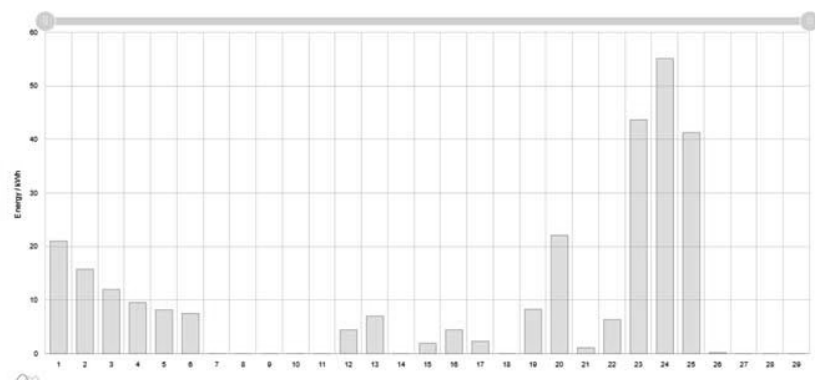


It can be seen in retrospect that periods of low output for Roof 1+2, which would be expected during cloudy/rainy days, correlate with drops in output to zero for Roof 3.

Roof 1+2 February 2024



Roof 3 February 2024



MAINTENANCE AND INSPECTION VISIT 21ST FEBRUARY 2024

Joju Solar were commissioned to secure the MC4 connectors above the roof and check all the connectors for degradation. Scaffolding was required and volunteers (CT,BM) took the opportunity to clean the panels and check all the PV panels mounting bracket bolts for tightness.



Joju Solar reported that the insulation resistance was low on arrival, but improved after securing the MC4 connectors above the roof and replacing a number of the connectors that had degraded. Some recommend cleaning solar panels every year, but the evidence for this is poor, as solar panels output can remain good for many years without cleaning. Reduction of output can still be quite good, even with subjectively dirty panels. The downsides to cleaning are the cost, time and effort, risk of working at height and potential wear to anti-reflective coatings on the panels. Leaving the panels for too long however, may make it more difficult to remove patches of lichen, which once established can grow exponentially. The judgement of how often to clean should probably be a local decision based on evidence of reduction of output and subjective dirtiness. Flat roof installations would be expected to need cleaning more often. Some recommend cleaning with just water, others have suggested using detergent. There doesn't seem to be any evidence as to which is best. Often algae will start to grow on solar panels, after which lichen can become established. Lichen is quite hard and difficult to remove when dry, but softens when wet and then becomes much easier to remove. Guano can also be a problem.

Inspection before cleaning showed a general low level of algae covering all the panels and patches of lichen, which were generally light, but a few panels showed moderate amounts of lichen. Lichen was prevalent at the edges of the panels and around the rims, particularly at the bottom edge. There was a little guano in places, but not very much generally.

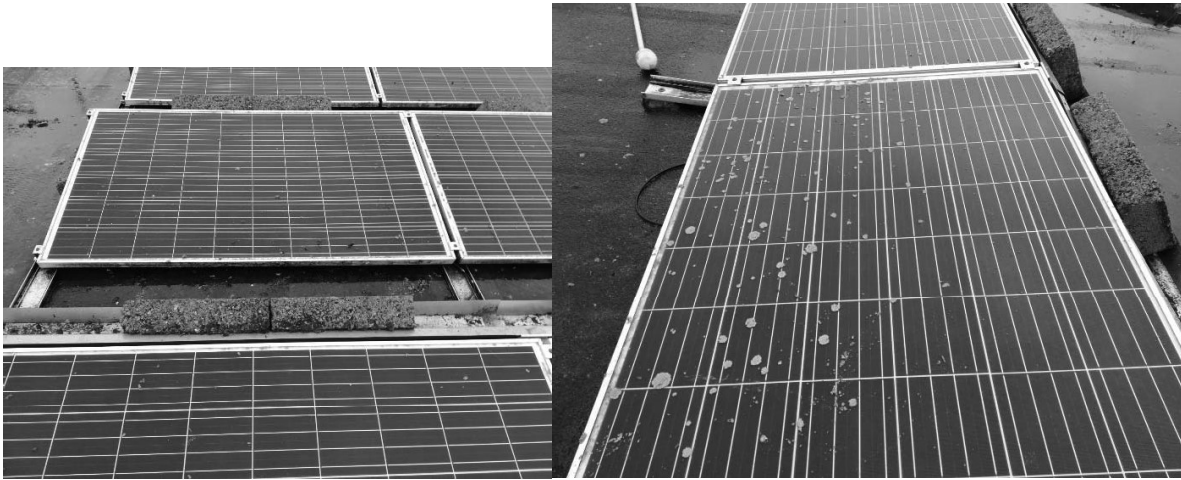


For pitched roof solar PV systems a waterfed pole window cleaning brush is very useful (eg. Gardiner SL-X22 – 22 foot pole). The yellow tubing is fed through the centre of the pole to supply water to the brush. Water can be through a standard hosesock connector, using an adaptor, if an outside tap is available. Alternatively a backpack hand pumped water container (eg. Silverline 20 litre backpack sprayer) can be connected to the pole. Gardiner have an electric pumped backpack system, but this is relatively expensive. For individual removal of stubborn lichen patches, the lichen needs wetting first, then an old tennis ball can be mounted on the end of the pole and is effective at removing the lichen.

In practice, the KS2 Building flat roofs had enough space to walk between the rows of panels, and there was a wide roof margin around the panels providing reasonable safety. This meant the pole system was not needed. On the day of cleaning the weather was very wet, so the backpack pump was not needed very often. Cleaning was most effectively performed using an ordinary kitchen mop and dishcloths. All 80 panels were thoroughly cleaned and rinsed, including the edges and rims of the panels. This was easy, but arduous and took 2 people about 4 to 5 hours.

In retrospect and subjectively, it was felt that Roof 3 could probably benefit from a thorough clean every 5 years.





OUTPUT BEFORE AND AFTER REMEDIAL WORK AND CLEANING

Outputs for Roof 1+2 and Roof 3 should be very similar as they are both 20 kWp capacity installations. In practice, between 2018 and 2020 the yearly output of Roof 3 was 5% higher than Roof 1+2. However in February, because Roof 1+2 is mostly pitched, Roof 3 output tends to be about 3% lower when both are functioning well. This is because the sun is at a lower angle relative to the panels for Roof 3 at this time of year. Output in February from 1st to 21st was only 34% of that for Roof 1+2. This is because February had been a very wet month and also, one of the strings of panels on Roof 3 had been left disconnected after the inspection visit in January discovered the low insulation resistance problems.

Output after the remedial maintenance visit between 22nd and 25th Feb for Roof 3 was 103% of the output for Roof 1+2. This included the 22nd of Feb, which had heavy rain all day. These early signs suggest that output from Roof 3 has been restored to normal levels and can withstand heavy rain without dropping out. We will continue to monitor the output.

In addition to the cleaning, all the panel mounting bolts were checked and torqued to manufacturers recommendations (16 N.m) using a torque wrench. It was found that about 60% of the bolts needed some tightening and about 2% of the bolts needed significant tightening. Otherwise, there was no signs that any of the mountings had shifted. Also all the wind deflectors and ballast were satisfactory.