Sevenoaks Town Council

Bat & Ball Centre and Solar Energy

Sevenoaks Town Council (STC) overall aim is to install a system to enable the most cost effective and carbon reduction of energy at the Bat & Ball Centre.

To achieve this the proposal would be to install solar batteries for the Bat & Ball Centre.

Installing solar batteries would enable any excess energy produced to be used by the Centre, as opposed to selling to the grid, and help lower the Centres carbon footprint, progressing the goals of the Green Community Investment Plan.

Currently, there is a 8.04kw solar system in place that sells electricity that is not used by the Centre to the grid. Installing a new inverter and solar batteries would allow this excess electricity to be used by the Centre. The estimated annual generation of this solar panel is 6914.40kwh.

The electricity produced by the solar panels installed at the Bat & Ball Centre was initially believed to be sold to the grid, and that STC was not using the 6914.4kwh that the solar panels produce, which is why batteries were investigated. Upon speaking to one of the companies, it was explained that the electricity produced is used by the Centre first before being sold to the grid. As the Centres electricity consumption is generally greater than the solar panels can produce, STC receives a negligible amount of money for selling excess electricity to the grid.

The grid electricity consumption of the Bat & Ball Centre from April 2021 - March 2022 was 35,020.7kwh. Assuming that all the energy produced was used, having access to 6914.4kwh/year from solar means that the total electricity consumption for the year would have been 41,935.1kwh, and so the solar panels reduced grid electricity consumption by 16.5%. The cost of electricity during this period was £0.34/kwh during the day, therefore annual savings would have been approximately £2350.76 compared to if there were no solar panels. Using a carbon emissions calculator, 6914.4kwh of electricity produced by solar would save 1.612 tonnes of CO2. This helps the Sevenoaks Town Council lower its carbon footprint, progressing theme 3.1 of the Green Community Investment Plan for “existing buildings to be more sustainable with reduced carbon footprint where practicable”, as well as save money over time. At the current electricity price of £0.24 during the day, the panels save STC £1,659.45 annually.

It is important to note, however, that not all of the solar energy produced would have been used, as occasionally the centre would not be using as much electricity as the panels are producing, with this excess electricity being sold to the grid (STC receives a negligible amount of money for this). This is why batteries were being investigated for the centre, so that the excess energy produced by the panels can be used at a later time.

Community Infrastructure Committee – 30th January 2023

Two companies have provided quotes for installing solar batteries at the Bat & Ball Centre. Both companies have suggested that a new inverter would be required to allow for the electricity produced to able to charge the batteries, as the current one is unable to do so. As well as this, both companies have suggested that the current installation is rather small to charge the batteries, as the Centre consumes more electricity than can be produced by the panels. Their suggestion is to charge batteries overnight using a cheaper night electricity tariff. For our current tariff, the difference between day and night prices is £0.08/kwh, costing £0.24 during the day and £0.16 at night. In the day the Centre will draw electricity first from the solar panels and if this is insufficient, then the batteries, which are full of any excess electricity from the panels and cheaper night time electricity, and lastly from the grid at the more expensive day rate.

One of the companies suggested installing between one and three 15kwh hybrid inverters with 23.2kwh batteries on each inverter. The savings that would be made would be £2,032.22 a year for three 15kw inverters and 69.6kwh of battery storage for company A, with a payback period of 18.36 years at the current electricity price. Company B provided 2 options, with its first providing savings of £1,314 a year for 3 inverters and 45kwh of battery storage, costing £43,380 and a break even timeline of 33 years. Company B's second option would provide savings of £1,522.92 a year for 3 inverters and 52.2kwh of storage, costing £46,344, with a payback period of 30 years. Both company's quotes were based on one inverter and a number of batteries attached, with these prices reflecting the cost of three inverters and batteries for each of these.

A third company was contacted regarding solar batteries at the centre and came to the conclusion that installing batteries without upgrading the current solar generating system would not be the best course of action. They suggested that the priority should be to install more solar panels, especially since electricity prices are likely to increase substantially when our current contract ends in April (electricity may cost £0.54/kwh). Their advice is to install 34.86kw of new solar panels, capable of generating 32698 kwh a year, as well as 15kwh of battery storage which can be charged with excess solar energy or cheaper night time grid electricity. This will cost £45,944.15, which is estimated to be recouped in 7 years with solar batteries, and 6 years without, assuming current electricity prices stay the same. If electricity prices rise substantially to £0.54/kwh this payback period may be reduced to 2-3 years.

The table below shows the different quotations and options given by each company.

Table 1, break-even point based on day time electricity rate of £0.24 and night rates of £0.16.

Company	Cost	Savings per year	Break-even point
A	£12,439.84 for a 15kwh inverter and 23.2kwh of battery storage	£677.44	18.36 years
	£37,319.52 for three 15kwh inverters and 69.6kwh of battery storage	£2032.32	
B.1	£14,460 for an inverter and 15kwh of battery storage	£438	33.01 years
	£43,380 for three inverters and 45kwh of battery storage	£1314	
B.2	£15,448 for an inverter and 17.4kwh of battery storage	£507.64	30.4 years
	£46,344 for three inverters and 52.2kwh of battery storage	£1522.92	
C	£45,944.15 for a 34.86kw solar system with 17.4kwh of battery storage	£7,847.52 for energy produced by the panels, additional £508.08 if batteries are charged with cheaper night electricity.	7 years for a price of £55,132.97 (including 20% VAT. As STC does not pay VAT will therefore be less time.) Should electricity prices rise in April 2023, the payback period will be lower.

The break-even points above do not consider the lifespan of the solar batteries, which range from 10-25 years. Company A and C offer the same model of battery, with an estimated service life of up to 25 years. This means that company A's proposal for solar batteries is viable as the batteries lifespan is longer than the repayment period. Company B's models estimated service life's are approximately 15 years. Therefore the cost of company B's solar batteries will never be recouped unless the difference between day/night electricity prices increases significantly.

Overall, it would seem that the best course of action would be to upgrade the current solar installation at the Bat & Ball Centre. The payback period for the solar batteries is fairly long (18-30+ years), whereas it is much shorter for adding additional solar panels and batteries together (7 years, to as low as 3 depending on electricity price). Of the quotes provided, company A and company C's are viable, while company B's proposals would not recoup their costs at current electricity prices.

RECOMMENDED:

i) Acquire quotations for the installation of more solar panels as well as batteries rather than batteries alone. This way the centre can reduce its carbon footprint even further by using renewable solar energy first, save money by charging the batteries with night priced electricity when there is not enough solar power to do so, and as a last resort use grid electricity. Generating 32698kwh of solar energy as per Company 3's example quotation would reduce the Bat & Ball Centre's (and STC's) carbon emissions by 7.6 tonnes assuming average UK emissions per kwh.

ii) To note that the research into battery storage for electricity is valuable for other STC sites, as batteries could be installed to access cheaper night time electricity for usage during the day. These batteries do not require any solar panels to install, and can therefore be applied to any site, such as the STC offices.

iii) The budget for the expenditure required be taken from CIL income.