Updated Solar Power Report and Recommendations

From Earth Ethics Action Team Member, Richard Reis

Solar at WES

The Washington Ethical Society (WES) has valuable, but somewhat neglected solar photovoltaic system (PV system for short).

History

About 11 years ago, a group of WES members realized an opportunity to install a PV system on WES to reduce climate and health-harming pollution. However, WES, as a non-profit institution could not benefit from the significant tax benefits from installing solar. At the same time, we realized that WES needed a new roof. To address the problem and the opportunity, we formed and invested in Ethical Community Solar (ECS) to get the PV system. The investors donated proportionally for the new roof. We engaged a DC-based contractor to install the PV system which went into service 10 years ago. The system consists of 108 solar panels that produce direct current (DC) energy. Four large inverters convert the DC energy to AC energy for WES's use and for the grid. Over these years, the system has provided about half of WES's electrical energy needs and paid dividends to ECS investors. Around the same time the Earth Ethics Action Team converted all lighting at WES to more reliable and lower energy demand LED technology. They also instituted many other energy-savings measures.

In 2021, ECS donated the PV system to WES.

Revenue

In the years 2014 to 2021, the PV system produced about 30 MWh per year as reported through the former solar inverter monitoring system (known as "the Sunny Portal").

For each MWh our PV system produces, WES gets one Solar Renewable Energy Credit (SREC); the 30 MWh translates to 30 SRECs. Each SREC generated in Washington DC has a market value of \$440. Thus,



WES could get about \$13,000 per year by selling those SRECs. The 30 MWh of free solar electrical energy per year, also saves WES nearly \$5,000 that WES would otherwise have to pay our local utility. These benefits total about \$18,000. The clean renewable energy has vast health and climate benefits as well.

Recent developments

The link between the PV system and the Sunny Portal stopped working during April 2022.

We also discovered that one of the 4 large inverters was not working. Fortunately, the inverter was under warranty (although expiring in 2 weeks from the date we contacted the company!), so we were able to get it replaced at no cost. Now all 4 inverters are working.

Getting System Data

WES had a revenue-grade meter installed in late 2022 that is providing the energy production data so that we can again bank valuable SRECs. In early 2023, we improved the meter performance and accuracy to better capture the system energy production; we can now see the power production of each of the solar inverters separately as well as the total power and energy output. You can view the solar energy production remotely at: https://egauge81840.egaug.es/632E1/classic.html. You can also select various time intervals (upper left) and parameters (bottom section). For example, if you deselect the top 4 boxes for total power and energy, you can choose to view the <u>real</u> power output of inverter 1 by checking the box by "Inv 1 Power gen/use". Note: Inv 1 Power* [with asterisk] denotes apparent power for Inverter 1. You can also view the power factor for each inverter. Since the power factor approaches 1 during most of the day, we know that the inverters' voltage and current are in synch, efficiently producing real and useful energy when the sun is shining.

Preventative Maintenance

Solar PV systems can easily last 25 years (until 2038 in our case) with a modest amount of maintenance. Most of the items listed below would increase energy production they would lead to greater revenue from the sale of SRECs and utility savings.

- 1. Cleaning debris under and around the solar panels would allow them to run cooler, more efficiently, and more reliably.
- 2. There may be some overhanging branches that should be removed.
- 3. Washing the solar panels.
- 4. The system design document tells us that each inverter is fed by 27 panels, but the document does not contain valuable wiring details. These details would make it easier to fix issues like the following item.
- 5. Although each of the 4 inverters is fed from the same number of solar panels, the solar power from some inverters is less than from others. This may indicate that there are defect(s) in the wiring or in one or more panels feeding the lower-producing inverter(s). Fixing these defect(s) would increase energy production.
- 6. Restoring the link between the 4 inverters and the Sunny Portal would better monitor the health of the inverters and issue an alert for any fault.
- 7. Programming the solar energy meter may be a way to provide some types of alerts.

In summation, increasing reliability and production can only help. Now the system provides about \$18,000 in benefits. For example, a modest 20% increase would increase benefits by \$3,600 per year.

New System

When searching for a service company for our system, I discovered that some solar providers would be happy to scrap the WES-owned PV system and install a new one on our roof that they would then own; they may charge WES for electricity from the system, and they would reap and sell the SREC production. This would waste materials and stop \$13,000 of the income stream and may require WES to pay about \$5,000 more per year for electricity.

Recommendation

We should do as much as we can safely or with other WES volunteers, such as cleaning debris and washing the panels. We may be able to do more depending upon our skill sets and interests. We should also seek professionals who would provide services at a reasonable and affordable cost. The additional production may more than pay for these services.