



£774

The anticipated reduction in annual energy costs as a result of the installation



# Solar savings

The Scottish Maritime Museum is slashing its electricity bills and cutting carbon by taking a long-term view around its solar PV installation, with a little help from Ceiba Renewables

By Andrew Brister

**W**hat do the Scottish Maritime Museum, the Solar Impulse 2 airplane and the catamaran MS Türanor PlanetSolar have in common? OK, the word solar may be a bit of a giveaway, but all three make use of what is said

to be the world's most advanced solar PV technology. Such is the reliability and performance of SunPower's silicon cells that they have been used by Solar Impulse 2, the first airplane to travel around the world solely powered by the sun. And, of particular relevance to the Scottish Maritime Museum, the catamaran MS Türanor PlanetSolar is the first vessel to sail around the world powered only by solar power.

Now NICEIC accredited contractor Ceiba Renewables, based in Prestwick, has installed an 8.04kWp SunPower solar PV system at the Scottish Maritime Museum in Irvine, Ayrshire. The system will generate over 6,800kWh a year, powering the museum and its offices and workshops.

"The museum is very much a working building; indeed they train apprentices in boat building there, so it does have a high

electricity consumption, which they were keen to reduce," explains Duncan Crosthwaite, director at Ceiba Renewables.

The Maritime Museum holds an important, nationally recognised collection, encompassing a variety of historic ships, artefacts, shipbuilding machinery, machine tools and fascinating personal items. Many of these exhibits can be found inside the Linthouse Engine Shop in Irvine, a unique Grade A listed, 19th-century cathedral of engineering.

## Premier league

Ceiba Renewables is a SunPower Premier Partner and advised the Scottish Maritime Museum to opt for SunPower's solution on account of its solar yields and durability. The PV system uses SunPower X21 335W all-black panels and

**Panels needed to be able to withstand the harsh coastal weather conditions, with high winds and salt mist exposure'**



> The Scottish Maritime Museum posed a particular challenge in being very much a working building in a conservation area

SolarEdge power optimiser inverter technology. SunPower's X21 series of panels holds the world record for efficiency of any commercially available solar panel and uses the company's Maxeon technology, which is said to deliver superior performance and greatly enhanced durability over conventional solar PV panels.

SunPower's panels come with a high capital cost, but patented features such as the copper back plate, cell connectors, tin backing to the copper plate and use of phosphorus instead of boron to coat the silicon mean that increased efficiencies more than cover the costs over the life of the cells. "Over time you will get a better yield than any other panel – approximately 8 per cent better per rated watt compared with a 15.3 per cent efficient conventional panel," says Crosthwaite. "This translates to 20 per cent more energy after 25 years."

The SolarEdge power optimiser technology further improves the yield of the PV system, allows firefighters safe isolation of each solar panel and provides detailed monitoring so that should a fault ever develop it can be identified and fixed quickly and with minimal hassle. The efficiency gains are also backed up by a 25-year warranty; Ceiba Renewables is a service partner for SolarEdge.

## Coastal challenge

Although Crosthwaite modestly describes the project as relatively straightforward, Ceiba Renewables has had to overcome some particular challenges. "The Scottish Maritime Museum had some very specific design considerations as the building is part of a conservation area, and we wanted to maximise the available roof space," he says. "In addition, the panels needed to be able to withstand the harsh coastal weather conditions, with high winds and salt mist exposure."

The team tackled access by scaffolding across the warehouse roof to minimise disruption to the workshop. Favourable weather was also needed for installation.

The 24 SunPower X21 335 modules will deliver 8.04kWp, with an estimated annual electricity production of 6,825kWh. "This will save the Scottish Maritime Museum £774 per annum in electricity costs, rising to £1,239 with income from export and the feed-in tariff, and achieve an estimated annual CO<sub>2</sub> reduction of 3.5 tonnes," says Crosthwaite. "It's an ideal installation for solar PV because the museum will be able to use at least 80 per cent of what they are generating on-site." The payback for the solar PV technology is around 10 years.

Chris Woodland, commercial manager at the Scottish Maritime Museum, says: "We are always looking for ways to minimise our operational expenses without impacting on the visitor experience, and this is an excellent example of the museum's dedication to improving its energy efficiency."

## The next evolution

For installations where you are not able to use all of the electricity generated during the day, Ceiba Renewables reports a surge in interest in battery storage systems to work in tandem with solar PV. While undoubtedly still high cost, the advances being made by the likes of electric car manufacturer Tesla will eventually see prices tumble.

Ceiba Renewables has completed its first installation of the Tesla Powerwall battery storage system for a customer who has been undertaking a *Grand Designs*-style newbuild in the beautiful highland surroundings of Spean Bridge. The eco-house is served by a 9.81kWp SunPower PV system and two SolarEdge inverters, and has the Tesla Powerwall integrated so the homeowners can benefit from solar PV power at night.

The PV system will produce around 8,764kWh per annum and, with the demand of the house estimated to be 8,250kWh per annum, the property should be a net exporter of energy. Without battery storage, as much as 70 per cent of the solar PV power would have been exported to the grid, which would have meant lower financial gains for the homeowner. Instead, the PV power that would have been exported can now charge the Powerwall to be used in the house later at night.

"We're really pleased with how the installation has gone, and it's great to be able to monitor the performance of both the PV system and the Tesla Powerwall using the SolarEdge monitoring portal," says Crosthwaite. "This technology will revolutionise home energy usage and be crucial in helping homes and businesses reduce their electricity bills."

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