CASE STUDY SOLAR PANELS ON A TOWER ROOF

N.B. This case study considers only one possible approach, which will not be suitable for every church. Always seek professional advice.

Key Points

- The use of solar panels was achieved at North Petherwin, St Paternus by installing them in a discreet position on the roof of the tower.
- Although the panels occupy a small area on the tower, they are capable of producing approximately 20% of the church's electricity. The use of a 'green tariff' scheme and electrical heating enable St Paternus to be net zero carbon.
- Helped by the generous donation of a set of solar panels, the use of existing hardware, and an application for a grant, the work was affordable for this rural parish.

1 The solar PV panels sit discreetly behind the crenellations on the tower roof, angled to the south to maximise the amount of light they can capture.

2 The tower of North Petherwin, St Paternus from ground level.

3 The panels were installed on the pre-existing wind turbine frame, saving costs and avoiding further changes to the existing masonry.

The context

North Petherwin: St Paternus is a Grade-I listed church in the Diocese of Truro. It has Norman origins and was expanded in the C15, then restored in 1878. The large building is perpendicular in style, with a 3-stage tower, constructed of ashlar blocks and standing 75 feet high at the west end.

In 2010 a micro-wind turbine was installed as part of a diocese-wide drive to reduce the carbon footprint of churches.

For more information visit the church's page on A Church Near You or its entry on the Church Heritage Record.

The need for change

By April 2016, the wind turbine had broken down. When the St Paternus team found that the manufacturer had gone into liquidation shortly after receiving the machine for repair, it became clear that an alternative solution would need to be found. As the turbine had also caused some minor issues for the church's immediate neighbours, through the noise and reflection of the sun, the decision was taken to replace it. The parish were determined to find a new source of renewable electricity generation, rather than moving backwards environmentally.

What were the options?

- Obtaining a new wind turbine was deemed to be a risky option given the lack of manufacturers that make suitably small machines, as well as the previous issues encountered.
- By contrast, solar panels were deemed to be a reliable option, which would require little change to the existing setup. However, they would have lower energy production rate than the turbine.
- Heat pumps were considered, as heating is the predominant energy cost for the church, but would have required significantly more building work and cost for the church.

What was done?

A local wind farm owner kindly donated four solar panels to the church.

Following the faculty application process, the frame that originally held the wind turbine was rotated 90° to face south and the four 250W solar panels were fixed to it.

A new inverter had to be fitted to convert the captured energy, though much of the existing system remained in place to be used.

The new solar power system was in place by April 2018, hidden from view at ground level.

How well does it work?

The solar panels produce approximately 20% of the church's energy consumption, in comparison to the 29% produced by the turbine (both calculated in comparison to 2021 consumption figure of 1878 kWh/year). However, they require significantly less maintenance and sit more discreetly on the church tower. Furthermore, in this case, the original wind turbine produced less power than had been advertised.

Electricity is the only form of energy now used at the church, with pew heaters the main source of consumption. While the new panels do not cover all of this, the excess electricity required is purchased from entirely renewable sources.

How much did it cost?

The generous donation of all four solar PV panels saved a lot of the potential cost, leaving the new inverter, labour and extra hardware as the only expenses for the church, totalling approximately £1,400.

Due to the nature of the work, St Paternus was eligible for funding from the Cornwall Community Foundation Grant Authority which covered these costs in their entirety.

"The project including the wind turbine brought the Parish a much greater understanding of renewable energy possibilities and importantly that climate change required everybody to consider what they might do to reduce their own carbon footprint"

- Bill Andrews, St Paternus Church Renewables Advisor