

CASE STUDY

A REMOTE CHURCH FUNCTIONS OFF-GRID WITH NEW SOLAR PV PANELS AND LED LIGHTING



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

Key Points

- A small, remote church has modernised its lighting system to become entirely self-sustaining in energy production and consumption.
- The scheme was kept simple, minimising embodied carbon whilst creating a net-zero solution.
- Services have become more regular and more comfortable.



1 St Michael's sits in a remote position atop a knoll and adjacent to Dartmoor National Park. As a result, it is not connected to the National Grid.

2 The effectiveness of the new floodlights can be seen here, as well as their positions inside the small building.

3 Solar PV panels were fitted to the church following significant repairs to the roof.

The context

St Michaels is a small (67m²), 13th century, Grade I-listed church positioned in close proximity to Dartmoor National Park. It sits on an earthwork Scheduled Monument and within a Site of Special Scientific Interest, at an altitude of 320m. The church has an active congregation and is also popular with visitors.

For more information, visit the church's [website](#), or its entry on the [Church Heritage Record](#).

The need for change

St Michaels previously operated a lighting system from the 1880s, which ran on natural gas carried in canisters up to the building. Following a pipe rupture, the church was unable to find an engineer appropriately licensed and insured to fix it. Needing to find a new way to light the building, they decided to take a more sustainable approach.

What were the options?

Due to its remote location, this church has no connection to the National Grid. As a result, on-site renewable energy generation would be required to power an electrical lighting system, without incurring great costs and the installation of significant infrastructure in this rural locale.

The idea behind the entire approach was, therefore, to limit the impact of the building on its local environment, as well as contributing to more generalised environmental protection by generating and using renewable energy.

What was done?

- The scheme followed on from a larger one, completed under a separate faculty application, which saw the roof extensively repaired.
- First, engineers assessed the site, to create a proposal for the PV panel supports.
- Once Faculty had been granted, the work went ahead, with 6 250W solar PV panels fitted to the south side of the roof of St Michael's, supported by stainless steel brackets attached to timber substrates.
- New lighting was fitted, consisting of 8 stirrup-mounted LED floodlights. These are attached at wall plate level on either side of the narrow building, with 2 in the chancel and the remaining 6 illuminating the nave.
- A battery bank was included, allowing the new lighting to operate at any time, whilst a standard socket has also been added for general use. This meant that the church did not need connecting to the National Grid, which would have involved much more infrastructure, and therefore embodied carbon.

How well does it work?

As well as being a more sustainable option, the new system lights the church far more effectively than the previous one. Indeed, the lights are dimmable, which facilitates flexible usage.

The PV panel and battery set up gives 3kWh of usable stored power, enough to run the lights all day with some spare capacity. If the lighting were to be used for 10 hours per day, every day (far more than they actually are), then the system would only run out of power 3% of days in the year.

Alongside the existing schedule of weekly services from Easter to Christmas, the church has benefited from the capacity to run occasional services more frequently throughout the winter.

There is also enough spare battery capacity to host a small portable radio transceiver for Dartmoor Rescue Service, and future plans include the addition of a contactless donation point.

How much did it cost?

- The total cost of installing the new infrastructure was £15,360 (incl. VAT).
- A further £936 went towards engineering assessments.
- As the building is off-grid, excess electricity cannot be sold. But, for the same reason, the church does not face any energy bills.
- All of the funding from this work came from existing internal reserves, which had been built up by the Friends of St Michaels.
- The List Places of Worship Grant Scheme allowed the church to claim back VAT on most of the costs, which amounted to £2560.

“We moved from the 19th century to the 21st—and now we have bright, reliable and sustainable lighting for services throughout the year. Not having to carry gas canisters up the Tor is an added bonus, but we were and are all very aware that this is a solution that should see us into the second half of the century with basic maintenance, and with no further environmental impact.”

Dr David Harris, Churchwarden