
Solar Panels (Photovoltaic Cells)

Introduction

Photovoltaic (PV) cells use light to generate electricity. Installed on a church, they can supply some of its needs for electricity to run lights and heating, particularly where the church building is frequently in use during the day. They can promote the Church of England's commitment to achieving Net Zero Carbon by reducing its carbon emissions through using renewable energy, setting an example of witness to the wider community. Solar panels should be considered as part of a PCC strategy covering every aspect of the church building and its use, rather than being seen as a standalone solution. The PCC should consider whether the use of the church building means there is scope to use the energy produced from solar panels during the day or if this scope is limited.

Well-designed, well-prepared schemes are encouraged. Parishes are strongly advised to talk to the Diocesan Environment Officer and DAC Secretary when first contemplating a scheme, and to take professional and technical advice in developing it.

Locations

Many churches have south-facing roof slopes on which the strongest sunlight falls. On these, installations invisible from all adjacent viewpoints are likely to be accepted by planning bodies even on highly-listed church buildings or churches in a Conservation Area. Visibility is still generally among the main criteria used by planning authorities and heritage bodies to assess applications for solar panels in sensitive contexts, although in some cases the historic importance of a roof may also be relevant. Potential locations include a south aisle roof concealed by a parapet, and the roof of a tower, though space on the latter may be limited. The location must be large enough to make a worthwhile long-term electrical contribution, and be safely accessible for maintenance. The proposed roof area should not be shaded by adjoining buildings, the tower or trees in the vicinity throughout the four seasons of the year, as most systems stop producing electricity if any part of the system is shaded. Installation may be possible on a low-pitched or flat roof, but this should be assessed by a professional at an early stage.

Ground-mounted panels, which have been used within the curtilage of some domestic listed buildings, are unsuitable for a churchyard due to the risk of theft or vandalism.

There may be an option of working in partnership with a local school or other community body. Could the church building host solar panels for use by a school with its greater daytime usage? Or even the other way round in a context where the setting of the church is very sensitive?

Types of PV array and fixings

Two systems are currently available. The first consists of modular cell units in a metal frame attached to the roof without drilling through the tiles or metallic roof covering. On metal roofs such as lead or stainless steel, a system of clips is used on seams. The strength of the roof should be checked to ensure that it can take the additional weight. Promoters of this system see it as likely to have at least a 30-year working life. Maintenance of the original roofing material underneath the panels ought still to be possible, and renewal of the system should cause minimal disturbance to the roof structure. Nevertheless, it is important to ensure that the roof is in a good condition

before an array is installed, to avoid the additional expense and disruption of removing the panels for repairs to the roof covering or structure.

The second system, using solar slates instead of the existing roofing material, is generally more expensive to install. Slates are generally less efficient than other solar panels. It is less suitable for historic buildings because it has a shorter life-span than the historic roofing materials around it. Though the slates do maintain the profile of the roof, they are likely to be more shiny and reflective than adjacent original materials, a less 'honest' addition to the building, and less easily reversible. This system is less common and it may be more difficult to find experienced suppliers. It may be an appropriate solution for an unlisted church, especially as an integral part of the replacement of a roof covering that has reached the end of its life, or where an extension or new roof is planned for other reasons.

Considerations

Parishes must demonstrate their need and that the panels will not detract obtrusively from the character and significance of the church. There is a legal presumption in favour of managing change to historic buildings so that their character and appearance is conserved.

PV panels on a church roof are only one of several potential energy-saving measures. Before considering installation, others should be carefully reviewed, for example through carrying out an Energy Audit. There needs to be a full assessment of the building and its characteristics, the current energy sources and heating and lighting systems, and the existing and future needs of the church. Suitable options should be identified and assessed and recommendations specific to the individual church and parish made. This work should be carried out by a suitable independent consultant with the input of the church's professional adviser.

Where there is a limited 'green budget' there may be more cost efficient ways to reduce carbon emissions. As non-renewable fuel costs are likely to rise year on year at a much faster rate than inflation, a cost/benefit analysis is an important consideration.

The size of PV arrays that can realistically be installed is unlikely to meet all peak-time requirements. In practice, the church would first draw energy from PV-generation and then use the mains supply to make up the shortfall. When the church is not in use, ALL electricity generated will go to the supplier unless batteries are installed to store the surplus electricity for night-time use.

Parishes should contact with their electricity supplier at the outset to check the electricity main supply (e.g. upgrading to 3-phase) and installation requirements and agreement with the supplier. They should also find out whether the electricity meter would have to be changed and establish whether there is space protected from the weather, preferably inside, for an inverter(transformer) and meter which come as part of the supply package. It is important to work with reputable and experienced suppliers – [Parish Buying](#) offers a procurement process for a range of energy-related suppliers including for solar panels.

In balancing environmental and financial costs and benefits, parishes should bear in mind:

- (i) Economic as well as environmental benefits should be considered. The Feed-In Tariff (FIT) is no longer available for new installations, so the church's own electricity use is likely to be the main determining factor.
- (ii) The sizing of an array should be calculated to allow the electricity generated to be used or fed into the national grid, or else battery storage would be needed.
- (iii) PV cells are not carbon neutral, due to the amount of energy required to

manufacture them. The carbon needed to make and fit the panels should be assessed so that the net decrease in carbon produced is known.

- (iv) In assessing the payback period for investment in solar panels, all relevant costs should be taken into account, including manufacture, set-up, maintenance, renewal, de-commissioning and disposal. This will show how much it will cost to reduce a certain amount of carbon and whether the investment is justified on those grounds too.
- (v) Electricity is commonly used for lighting (which contributes less than a fifth of the carbon produced by most churches) and for specific types of electrical heating systems. Current examples of the latter are under-pew heaters and panels located so that they directly warm people. As well as taking into account the type of heating users of the building will need, the impact of removing or keeping existing heating systems should be considered in terms of comfort, carbon use and cost.
- (vi) Installation on some listed churches may be too difficult to achieve without adverse visual impacts on their character and appearance. It may also require the lopping or felling of nearby over-shadowing trees. Both these aspects will be of interest to the wider community. Avoiding such impacts by not installing PV panels in its own way contributes to environmental conservation.

Churches in general have relatively low usage of hot water, which means solar hot water panels are usually not economically viable.

Permissions

A Faculty is always required for the installation of PV cells. In advising the Chancellor, the DAC will consider each proposal in its merits. It will also require sufficient information about fixings, fixing points and cable runs to ensure that there will be no immediate or long term-term damage to the fabric of the church.

Installing PV cells that affect the external appearance of a listed building requires planning permission. Preliminary enquiries should be made at an early stage in case it is unlikely to be granted by the local authority or supported by Historic England.

If the installation of equipment and cabling is likely to have any impact on the churchyard, its trees, lichens, flora and fauna, or is likely to disturb any bat roosts, this will need to be taken into consideration in the appraisal of the scheme. The DAC will be able to offer advice on these aspects.

Checklist

Before you focus on solar panels...

- Undertake an Energy Audit – *The DAC Team can provide information about how to find an experienced energy consultant.*
- Develop and document a PCC strategy for the church building – *consider church building maintenance and repairs; heat-loss reduction; energy saving measures including heating controls; lighting and heating system; renewables – consider signing up for EcoChurch if the PCC has not already done so*
- Consider and document why you want solar panels and what the “public benefits” will be – e.g. lower electricity costs, supporting a low-carbon heating system, promoting green energy in the local community, working in partnership with a school or community group

For a proposal for a PV array

1. **Which roofs may be appropriate for an array?** Talk to your church quinquennial inspector (architect or surveyor) and obtain an initial assessment from a reputable installer. Take into account the orientation and elevation of each roof, its structure and covering material and condition as well as the surrounding environment (trees, overshadowing buildings) and views.
2. **What size of array will be possible and appropriate?** How does the calculated maximum and average supply which would be generated correspond with the church's usage?
3. **What layout is planned?** Factors to take into account include visual appearance, capacity and the need to allow margins for access to roofs for maintenance.
4. **What is the condition of the roofs?** Check the most recent QI report, talk to your quinquennial inspector and plan to undertake any repairs before installation of the solar panels, or for the cost of removal and reinstallation at a later date.
5. **Check the existing fixed electrical installation and mains supply.** Sometimes a new supply or upgrading of the fixed electrical installation or meter will be required to support to installation of solar electricity generation.
6. **How will the solar panels be fixed?**
7. **Where will the inverter and meter be located within the church building and where will cables be run?**

Further information

The Church of England's Practical Path to Net Zero:

<https://www.churchofengland.org/resources/churchcare/net-zero-carbon-church/practical-path-net-zero-carbon-churches>

The Church of England's Renewable Energy Advice:

<https://www.churchofengland.org/resources/churchcare/advice-and-guidance-church-buildings/renewable-energy>, including guidance about solar panels and faculty permission: https://www.churchofengland.org/sites/default/files/2021-09/Solar_Panels_and_Faculty_Guidance_0.pdf

Parish Buying Details of PV Suppliers:

<https://www.parishbuying.org.uk/categories/net-zero-2030/45-categories/net-zero-2030/230-solar-pv>

Historic England Solar Panel Guidance:

<https://historicengland.org.uk/images-books/publications/eehb-solar-electric/>

CPRE's Guidance on Solar Panel design:

<http://www.cpre.org.uk/resources/energy-and-waste/climate-change-and-energy/item/4384-ensuring-place-responsive-design-for-solar-photovoltaics-on-buildings>

MORE INFORMATION AND ADVICE

- Visit the Church Buildings pages of the St Albans Diocese website at <https://www.stalbansdiocese.org/churches/buildings-and-churchyards/>
- Contact the DAC team at dac@stalbands.anglican.org

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