This information sheet is produced by the Diocese of Oxford to introduce how solar energy could be used to generate electricity in your church. It will help you assess the suitability of your church and provides a list of things to consider as you develop a project to install solar panels.
Introduction

This leaflet introduces how solar energy can be used to generate electricity in your church. It will help you assess the building's suitability and gives you a list of things to consider as you develop a possible project to install photovoltaic (PV) panels on the roof of your church. By employing this technology churches can reduce their carbon footprint, save money through reduced bills, and could, by using the government Feed-In-Tariff, earn money.

A number of churches in the Diocese of Oxford have installed solar PV cells on roofs of their buildings, some of which are included in the case studies below. There is an online environment map for the Diocese of Oxford, which includes these church renewable projects – it can be viewed at: http://www.oxford.anglican.org/environment/resources/environment-map.html. The diocese has also installed solar panels on 57 of the properties it owns and manages, including many parsonage houses and Church House in Oxford.

What Are Photovoltaic Solar Panels?
Solar electricity systems capture the sun's energy using PV cells. The cells convert the sunlight into electricity, which can be used to run appliances, lighting and electric heating systems. PV cells don't need direct sunlight to work - you can still generate some electricity on a cloudy day – but the greater the intensity of the light, the greater the flow of electricity, so they are most efficient when installed on south-facing roofs. The energy generated can be used as it is being generated (e.g. in the day), stored for later use (e.g. using batteries) or exported to the National Grid.

What are the Feed-In-Tariffs?
The Feed-In Tariffs (also known as FITs) are part of a government scheme that pays people for creating their own "green electricity". The tariffs have been introduced by the Department of Energy and Climate Change (DECC) to help increase the level of renewable energy in the UK towards our legally binding target of 15% of total energy from renewables by 2020 (up from under 2% in 2009).

The FITs have two tariff components:

- **Generation tariff** – a set rate paid by the energy supplier for each unit (kWh) of electricity generated. This rate will change quarterly for new entrants to the scheme, but once signed up the same tariff will be received for 20 years.

- **Export tariff** - a further rate is paid by the energy supplier for each unit (kWh) exported back to the electricity grid (e.g. when it isn’t used on site).

The FITs, therefore, potentially give churches three financial benefits:

- payment for all the electricity produced, even if used on site by the church;
- additional payments for the electricity exported to the national grid;
- and a reduction on the church’s electricity bill, from using the electricity produced and used on site.

Energy Performance Ratings
Since 1st April 2012, the government introduced a new requirement for accessing the FITs - the property where the solar PV installation is attached, or wired to provide electricity, needs to have an Energy Performance Certificate (EPC) of band D or higher. If the building has an EPC of band E, F or G energy efficiency improvements would need to be made before applying for the FITs. If this is not possible you would receive a generation tariff at a lower rate.

The application of this new ruling for churches is not yet entirely clear, although as heated spaces churches are unlikely to be exempt. Due to the historic nature of many churches it is unlikely that many churches will gain a EPC band D, or be able to even with energy efficiency improvements.
However, creative solutions may be possible, such as wiring the installation to feed the power produced to a nearby building that will pass an EPC, such as a church hall or parsonage. Also there is a clause in the new ruling that implies if you can demonstrate that a building cannot reach EPC band D (for example if they are not permitted by English Heritage, DAC or council planners) then it would be exempt and would receive the higher FIT rate. For further details see P13, point 42, of the FIT Government Response document (9 Feb 2012).

Community energy project EPC rating exemption
In July 2012 the DECC announced an exemption on all community energy solar PV projects on non-domestic buildings from the requirement to reach EPC level D (starting from 1st December 2012). However, this exemption only applies to a community project using the definition proposed in the Finance Bill 2012 for similar purposes, which defines them as: a community interest company (CIC); a co-operative society; or a community benefit society. This means that if a church wanted to go down this route it would most likely need to setup the project as a community interest company. You would also still need to at least obtain an EPC (with no specific level required) dated on or before the eligibility date so that you are aware of the potential improvements you may wish to pursue. For further details see points 143 and 148 of the Government Response to Consultation on Comprehensive Review Phase 2B: Tariffs for non-PV technologies and scheme administration issues - July 2012.

Current Rates
The FIT rates have and will continue to change so it is essential that you check the latest FIT rates for the up-to-date rates: www.energysavingtrust.org.uk/fits and www.decc.gov.uk/fits

To give an idea, however, installations that are between 4 and 10kW and holding a EPC band D or higher the FIT generation tariff from 1st August 2012 is 14.5p/kWh and the export tariff is 4.5p/kWh. If the building is band E or less the lower FIT generation tariff of 7.1p/kWh will apply.

Case Study - St George's Church, Newbury, Berkshire
St George's Church was started in the 1930s, completed in the 1960s and is not listed. In early 2011 it installed 129 solar PV panels, with a capacity of 24KW, on the high south-facing nave roof and is now receiving FIT payments. The panels weighed over 3 tonnes and this required strengthening of the nave roof.

- The cost of purchasing and installing the panels and associated equipment, including VAT at 5%, was £80,000.
- All of the costs were covered by grants.
- Income from the Feed-inTariff payments is estimated to be £8,000 per year.

Top tips from the team at St George's:
- Don't forget scaffolding and access costs
- You will probably need a Structural Engineers Report
- Are the present electrics up to the job or do they need upgrading?

More information: www.georgegoesgreen.org

"The installation of the panels was part of Phase 1 of our plans, which also included major ceiling work to enable the ceiling to be insulated, secondary glazing of windows and replacement of rainwater guttering and piping. The total cost was paid half by the congregation and half by external funding. We are now planning for further work, including extracting heat from the ground using deep boreholes, to make the church carbon neutral, warm, welcoming and a major community resource".

Rev Paul Cowan, Vicar, St George's, Newbury
Exploring Solar PV panels for your church

There are many things to consider as you explore whether solar PV panels would be appropriate for your church. Below we bring together a list of actions to consider, the Diocesan Advisory Committee (DAC) guidelines, and information on where to go for advice.

IMPORTANT NOTE
The most important advice at the outset is that any installation of renewable technologies must be an outcome of a comprehensive project to reduce the carbon footprint of the whole church, rather than as a tariff-generator or indeed as a standalone statement of environmental intent.

To help churches get started the Diocese of Oxford has published For Creed and Creation: A simple guide to greening your church. This is a great little book of practical suggestions for making your church more energy efficient. With simple ideas and advice from the way the building is run, to how rubbish is recycled and the light switches used, the guide will help to reduce bills and put your church on the right track to tackling the whole of your carbon footprint in simple and cheap ways.

To read the For Creed and Creation book, and to order copies, visit: www.oxford.anglican.org/environment/resources

Case Study - All Saints Church, Wing, Buckinghamshire

One of the UK’s finest Anglo Saxon churches in the Diocese of Oxford has already successfully installed 54 solar PV panels, with a capacity of just under 10KW, on the nave and south aisle roofs (see main photo on front cover).

The Church is now benefiting from the Feed-In Tariffs.

- The installation cost £50,000 – which was funded by two grants.
- Income from the FITs for All Saints Church is estimated to be £3,500 per year

“It has taken a lot of hard work by the PCC and the congregation but it has paid off and we are delighted that we have installed these solar panels. We are now developing plans for further action to become carbon neutral as soon as possible.”

Martin Findlay, former Church Warden and mastermind behind the project at All Saints, Wing
St Mary the Virgin, Henley-on-Thames, a grade II* listed building, has installed a solar photovoltaic system on two valley roofs, with an estimated peak output of 9.6kW.

The original plan was to install panels along the full length of the north aisle valley roof, however due to visibility issues, it was agreed later to place the panels on only part of the north aisle as well as the vestry aisle.

The key issue of placing panels on the north and vestry aisle at St Mary the Virgin was shading from the tower, which meant the panels would be unlikely to reach their full potential output. The church team requested that a shading analysis was carried out, and this predicted a 40% reduction in total output, but advised using power optimisers on each panel to reduce this loss by half.

The installation was completed in February 2012 and cost £22,000, which was paid for by a grant for £5000 from the Landfill Communities Fund (via TOE2) and by the local group ‘Friends of St Mary’.

The estimated annual yield from the panels is 7911 kWh – which, due to the early completion date, will receive a Feed-In Tariff of 16.8p/kWh over 25 years. The initial estimated annual earnings and savings consist of:

- £1,329 annual FIT payment for electricity generated by the panels
- £570 saving on electricity bill (e.g. church uses electricity generated in daytime)
- plus £123 payment for electricity not used locally and exported to the national grid.

**Installation details**

The installation was carried out by BritishEco, who were chosen as they were based locally in Maidenhead, as well as the advice they provided regarding the shading issue from the tower.

38 panels (250w each) were installed on a tiled roof on brackets screwed to the rafters. This gave a 9.6kW output, with each panel also having a power optimiser.

**Efficiency measures**

The church has also carried out draught proofing measures around the porch, windows and doors, and have reduced lighting use in the day. In the future they plan to add automatic light sensitive switches for daytime light use and modify the lighting system further. The 20 year old gas boiler is still giving 80% efficiency, and so there no plans to replace this at the moment.
Things to do

1. **Carry out an environmental assessment and energy audit** – Using the book *For Creed and Creation* and environmental enthusiasts from your church and local community carry out an environmental assessment and energy audit of your church building and activities. Would Solar PV panels fit within a comprehensive effort to reduce the carbon footprint of the whole church? Or are the panels a longer-term goal? You could also employ a professional to carry out an audit for you - the Directory of Eco-Professionals lists people that could do this for you (see resources at end).

2. **Check the DAC guidelines** - PV panels can be visually intrusive and may damage building fabric so will not be advisable on every church building. Read through the guidelines from the Diocesan Advisory Committee (DAC), on page 6 below, and ensure you will be able to comply with the criteria given. If in doubt contact the DAC Secretary for an initial conversation (see contacts at the end).

3. **Follow the example of others** - There are other churches in the Diocese of Oxford and elsewhere that have already achieved the installation of solar PV panels (the diocesan environment map is a good place to indentify local examples – see www.oxford.anglican.org/environment/resources). Visit local examples to see what was involved, ask for copies of relevant documents, take photographs and feedback to your PCC. Ask the PCC for permission to do a feasibility study for your church.

4. **Community involvement** - Winning the hearts and minds of your Community and stirring enthusiasm will help make your project run more smoothly and increase your funding opportunities. Meet and talk to as many people as you can – the local school, community groups (such as parents and toddlers), local environmental groups, the Parish Council, your PCC, your whole congregation. Help others see that becoming ‘greener’ is possible, desirable and relevant to the life and mission of your church.

5. **Feasibility study** - Get some quotes from installers and speak to the DAC Secretary (see *Installers and Professionals* section on page 5 and DAC contact details on page 7). Also start looking at ways of funding the project (see *Funding* section on page 5).

6. **Put together a proposal** - If the PCC is happy with the feasibility study findings then set up a group to prepare a proposal. This will be useful for obtaining funding and for the Faculty. Involve your Church Architect, the treasurer and the DAC. Remember that you are more likely to be successful in gaining funding if you can show that there is community-wide involvement in your project.

7. **Work with English Heritage, SPAB and the District Council** - If your building is listed then you will need to work alongside English Heritage and SPAB (Society for the Protection of Ancient Buildings). This will involve a number of visits to prove that the panels do not harm the building and are not visible. A Faculty from the DAC will probably take about 4-6 months to achieve. Planning permission is given by the District Council and your Church Architect should be able to help with this.

8. **Work with your electricity supplier** - You will need to register your church as an electricity supplier. You do this by speaking to the energy company that supplies your church with electricity. The supplier will provide you with a Feed-In-Tariff application form. If you wish to change supplier to a green electricity supplier, before registering for the FIT would be a good time (although switching energy supplier can be done at any time and is not affected by the pV panels). The *Diocese of Oxford* has negotiated schemes with two of the UK’s leading green energy providers that make switching to green electricity easy and make donations to the *Church of England’s Climate Justice Fund* – for information visit www.oxford.anglican.org/environment/resources/.

The energy supplier will pay you the Feed-In-Tariffs (FITs) quarterly and may install a meter to measure how much electricity you have generated. To register, your church will need its MPAN (a unique serial number found on your electricity bill).
9. **Installation** - Having received your Faculty, approvals and planning permission, gained your funding and become confident you are eligible for receipt of Feed-In-Tariffs, you are in a position to install your PV panels. The installation is fairly easy, especially on lead roofs where the panels can be clamped onto the ridges where the lead sheets meet. Inform your insurers about the installation. It shouldn’t raise your insurance premium, especially if the panels are in an accessible place.

10. **Celebrate** - Throw a party, thank the community for their help, tell your local media, hold a special service of thanksgiving with some guests.

### Funding

Churches that have successfully installed solar PV panels have so far managed to access grants and raise the remaining funds locally. Financially you will be better off funding the installation yourself, as you will then be able to keep the FIT payments. However, there are other ways to fund an installation, you may consider using an ethical co-operative that matches investors with ‘green’ projects, splitting the profits of the FITs between the investors and yourself. Some banks may lend you the money. Alternatively there are companies offering schemes that will install solar panels on your roof in exchange for the FITs. Start exploring funding options at the same time as starting the process of gaining a Faculty.

- **Grants** – There are grant making foundations that will consider this sort of project, for example you may be able to apply to the the Landfill Communities Fund (www.entrust.org.uk). Look for local foundations and use the contacts of your congregation. You may also contact the diocesan Environment Officer (environment@oxford.anglican.org) for the latest suggestions.

- **Local fundraising** – Many people are happy to contribute to projects of this nature, especially if it is part of a reordering project that improves the wider community use of the building. They will also like the fact that the project will provide a long-term income for the church through the FITs.

- **Cooperative or community funded options** – It would also be possible for a group of people to fund the installation under a community share issue, or similar funding mechanisms, in return for the FIT payments. An example of such a scheme would be The Solar Co-op (www.thesolar.coop).

- **Investor funded options** – there are a number of schemes, sometimes referred to as ‘rent your roof’ schemes, that will pay the costs of installing PV panels in return for the FIT payments. The owner of the building will usually in return benefit from the electricity generated by the panels (but note you would need to be using the building in the daytime to benefit from this electricity and listed buildings are not eligible for many of these schemes). Shrinking the Footprint have produced a list of useful questions (www.shrinkingthefootprint.org/misc_lib/66.pdf) to ask when considering such schemes.

### Installers and professionals

The Diocese of Oxford has put together a directory of eco-professionals that have had experience of working with churches and that offer a range of services, such as energy efficiency audits and renewable energy installations. This is not necessarily a recommended list, but rather a starting place for those wanting to find companies with experience of working in renewable advice and installations with churches. To see the current list visit:

www.oxford.anglican.org/environment/resources/eco-professionals-list.html
DAC Guidelines

Below are the Diocese Advisory Committee (DAC) guidelines for the installation of photovoltaic cells that any parish seeking to install photovoltaic cells must meet. If your parish does not meet these criteria please contact the DAC secretary for advice. Meeting all of the criteria is by no means a guarantee of approval.

The introduction of these criteria is intended to do two things:

1. Give parishes clear guidance on what is viable (prevent resources being wasted on formulating proposals that could never be approved).

2. Give a clear pathway/framework of conditions that the DAC can require parishes to follow (ensuring that proposals are part of a well considered green package, and that learning from parishes who have installed PV cells is passed back to the DAC).

CRITERIA

The site

1. The proposed installation site should not be visible from the ground. Presuming the installations will in the main be on church roofs, this means that the roof will have to be a) of low pitch behind a parapet, or b) a valley (for example between a nave and aisle roof)

2. The roof structure should be assessed by a suitably qualified professional to ensure that it can carry the additional weight of the equipment

3. Discreet and secure space should be identified for the inverter equipment

4. All wiring is subject to normal DAC wiring conditions

5. The fixing of the panels must be reversible, and must not compromise the roof covering (for example by piercing or restricting thermal movement)

The panels

6. Should have a minimum 25 year performance guarantee

7. Should be inspected annually by a suitably qualified engineer, together with the wiring and inverter equipment.

Preparation

1. Parishes should provide the DAC with statements of need and significance. The desire to get the Feed-In Tariff alone does not constitute a need.

2. Parishes should prove to the DAC that the proposed installation is part of a wider package of measures they have already taken towards better environmental stewardship. Ideally parishes should be following the eco-congregation or Shrinking the Footprint paths (see further resources) below.

3. There should be a current and competent energy audit of the building

4. Contractors should provide a feasibility document identifying the expected efficiency of the installation (%), annual energy production, monetary and carbon payback periods.

5. The comment of the inspecting architect is essential, and wherever possible he/she should be closely involved in the proposals

Consultation

1. Parishes should consult with (dependent on grade etc): EH, SPAB, VicSoc, local planning authority

2. A letter of consent from the insurers is essential

Post-installation

1. After the first twelve months an evaluation report is to be produced detailing the levels of energy produced across the year, FIT earnings, and remaining energy bills.

2. Monitoring should continue throughout the lifetime of the installation, and a summary of that monitoring be provided to the inspecting architect for inclusion in QI reports.
Further Resources

Environment related news and further information on the Diocese of Oxford and the environment can be found at www.oxford.anglican.org/environment

Church building resources:

- Shrinking the Footprint website: www.churchcare.co.uk/shrinking-the-footprint/taking-action/sustainable-building/renewable-technology
- Church Care website: www.churchcare.co.uk
- Eco-Congregation website: www.ecocongregation.org

Feed-In-Tariff resources:

- Energy Saving Trust: www.energysavingtrust.org.uk/fits
- Department for Energy & Climate Change: www.decc.gov.uk/fits

Diocese of Oxford Contacts

DAC Secretary: Natalie Merry | natalie.merry@oxford.anglican.org | 01865 208229
Environment Officer: Matt Freer | matt.freer@oxford.anglican.org | 01865 208745

Earthing Faith

Earthing Faith is a network to resource and encourage churches and individuals in the Diocese of Oxford as we connect our faith with the earth.

The network has been established help the sharing of ideas and experiences around the environment, and help us to be creative and collaborative in our engagement with the earth.

The network is resourced both online and through physical gatherings – for further information visit: www.earthingfaith.org

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This guide was written and edited by Matt Freer (Environment Officer), Natalie Merry (DAC Secretary) and Lesley Fellows (Renewable Technology Advisor) at the Diocese of Oxford, with input from All Saints, Wing, St George’s, Newbury and Stephen Munday.

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