

***The Story of our project to install solar photovoltaic panels
on the
South Aisle roof of St Denys' Church, Sleaford.
(- so far -)***

Our journey began in early 2008 following a Church Times article on entries in the Green Church Awards. Among them was St. James, Piccadilly where they had mounted solar, photovoltaic panels on a flat, south facing area of roof. Whilst there are many differences between Sleaford's Parish Church of St. Denys and St James, Piccadilly, both are architecturally important buildings where any attempt to bring things up to date is often opposed (usually by people who do not use the church for worship!).



Mindful of the Church of England's 'Shrinking the Footprint' campaign to reduce the Church's carbon footprint to 40% of our 2006 level and also of the fifth of the Anglican Marks of Mission, 'To strive to safeguard the integrity of creation and sustain and renew the life of the earth', a group of us investigated whether we could do something similar at St. Denys'.

We were already at an early stage in planning a re-ordering of the church which would include renewing the heating and lighting systems. The addition of solar pv panels which generate electricity from God-given light appeared to offer the opportunity to enhance these plans whatever was eventually chosen as well as to create a platform for mission in the local area and perhaps to break some new ground that other churches might follow.

The Vicar and the Parochial Church Council (PCC) accepted the proposal with enthusiasm and authorised a full investigation to see if the idea was practicable.

The first stage was a great deal of research with considerable support being given by the North Kesteven District Council's Sustainability Officer and the Sleaford Town Council's Development Officer. Both Councils already had a strong commitment to renewable energy and sustainable use of resources so saw the potential synergy in this project.

Our focus began to centre on the South Aisle roof as it is a large, south facing area which is ideal for photovoltaic panels. The tower at St. Denys' is centrally placed over the West Door so it will not cast any shadow, even in the evening and there are no trees or tall buildings to block the light.

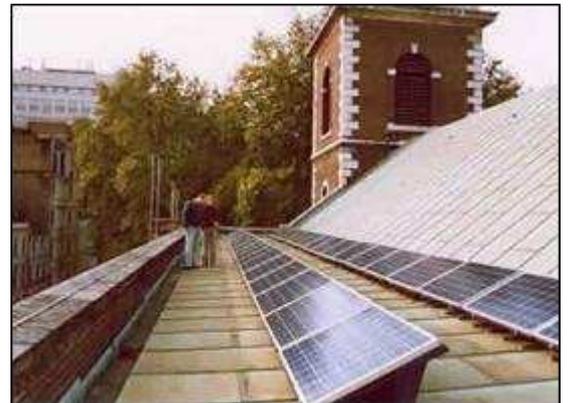
In May 2008 we commissioned structural engineers to confirm that the roof was strong enough to support the weight of an installation. Once we had their report we sought advice from the Diocesan Advisory Committee for the Care of Churches (DAC) and from English Heritage.



The South Aisle Roof in early 2008, before the solar panels.

Representatives from the DAC and English Heritage visited in July 2008 setting us the target of avoiding any damage to the ancient fabric of the building and also to avoid impairing its visual appearance. The DAC were also prepared to give us very helpful advice on possible solutions to these problems.

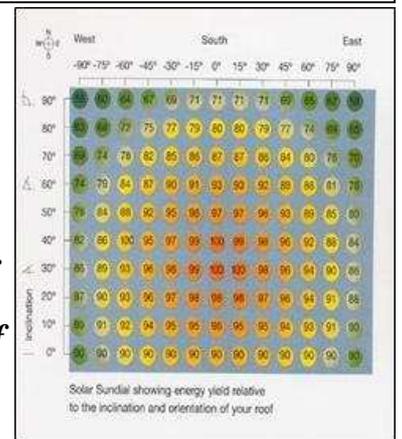
If the project was to succeed we needed a system of attaching the panels that would not require us to drill fixing points into the medieval masonry. A system that had been used before, including at St. James, Piccadilly, involved fixing the panels to specially designed plastic bins which are then filled with ballast to keep them secure on the roof.



Previously solar panels were mounted on ballast filled boxes like these.

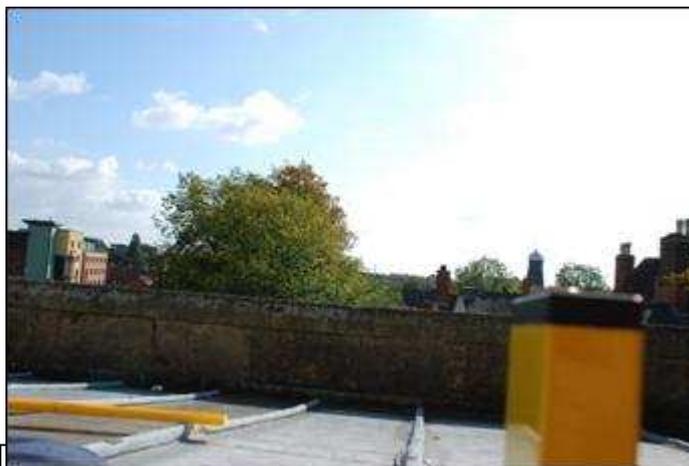
This had two disadvantages, firstly they weigh a great deal so the roof could only support a limited number of panels and secondly, they would be unsightly and impossible to hide. This was not a problem at St James where the church is surrounded by an urban landscape, but would be unsuitable at St. Denys'.

After much measuring and photography to prepare a detailed brief, installers were invited to visit and offer solutions and a cost. Two companies stood out as they understood the issues of working with such an important building and the requirements of the DAC.



They both pointed out that we could lay the solar panels flat to our roof as, even though at around 10 degrees they would be much flatter than the optimum, the actual loss of efficiency would only be under 5%! As the South Aisle of St. Denys' has an 8-900mm parapet it would be possible to hide the whole installation from view with the sole exception of a window in a stairwell on the 4th Floor of 'The Hub', some 200 yards away.

The two companies, Freewatt Electrical of Stow and Beco Solar of Totnes both presented very good proposals and were similarly priced.



Measuring the height of the panels to estimate what would be seen from 'The Hub', (the building on the left).



The 'Solstice' lead roll clamps in action on a tradition church roof.

It was decided, rather cheekily, to ask them to work together on the project and to use the newly designed 'Solstice' lead roll clamps proposed by Freewatt as these offered the most reliable way of attaching lightweight frame for the panels to a traditional church lead roof without the need to drill holes into masonry or cause any other damage to the fabric.

The finished proposal was put before the PCC who had taken a keen interest at each stage of the research. Whilst they recognised the importance of the project in terms of its compliance with the aims of the 'Shrinking the Footprint'

campaign and its many opportunities for mission, theirs was the financial responsibility.

The costs would be around £57,000 and a grant of 50% was available through the government's Low Carbon Buildings Programme (Phase2). Other grants were available, but were not guaranteed and would have to be applied for.

Despite this risk, the PCC were so convinced of the value of the project that they unanimously agreed to underwrite the project from their own funds if no further grants were available.

The proposal then went forward to receive approval from the DAC, the North Kesteven District Council and the Sleaford Town Council and a Faculty was granted.

An application to the BIG Lottery's 'Community Sustainable Energy Programme' was prepared asking for a contribution of 45% of the costs. This grant went before the adjudicators and we were successful and they described the project in their award as, 'A good example of retro-fitting solar PV on a historic listed church building.'

Our church architect completed the Quinquennial Inspection of the fabric of the building at this time and discovered that the gutters on the South Aisle needed urgent treatment so experts from Norman & Underwood were asked to carry out the works as soon as possible.

This was an unexpected extra expense, but it was a necessary expense and gave the opportunity for the experts to check the integrity of the lead before the work began on the installation of the panels.

The scaffolding went up in late May 2009 and the installation was timed to take place as soon as the new guttering was in place so that the same scaffolding could be used.

The start by the teams from Norman & Underwood was delayed when they hit a snag on their job at Canterbury Cathedral so they began three days later than we hoped, but the weather was kind and they made up the time.



Our architect found that the boards supporting the gutters were rotten and needed urgent replacement.

The team from Norman & Underwood are interrupted by the Curate, (photo with thanks to John Foreman).



By mid June Freewatt began fitting the framework for the panels and running the cable which would carry the electricity generated down from the Tower to the distribution board by the South West door.

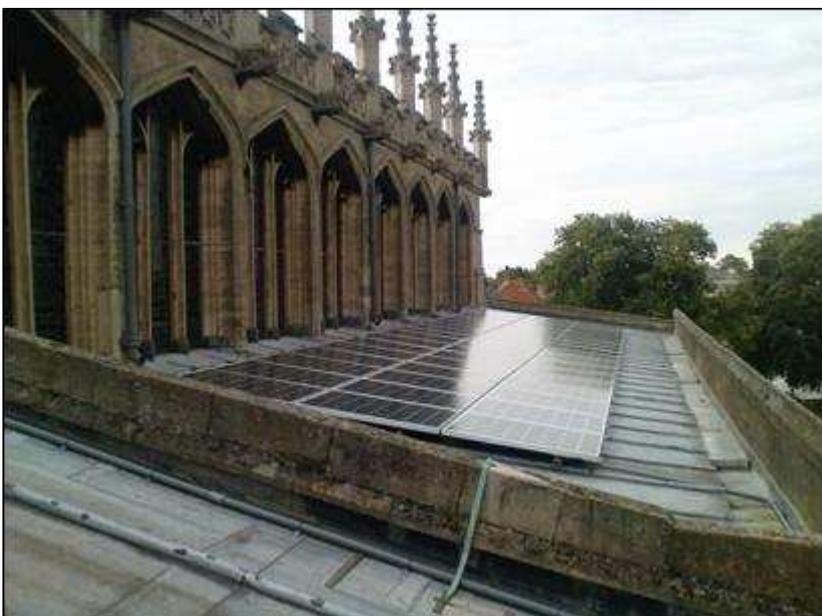
The team from Beco Solar then arrived to install the inverters, but a delay in the panels arriving from Germany meant that the final installation could not begin until the first week in July.



The panels are fitted to the framework and the cables are laid to carry the dc electricity generated by the panels to the inverters where it is converted to ac electricity ready for use in the church, or to be fed into the Grid.



At 13.00 on Friday, 11th July the display board was finally connected up and we could see the system in action. It took just 40 minutes, on that rather grey day, to generate the first 1kWh of electricity from God-given light!



The fine weather we enjoyed during the installation gives way to overcast skies and rain, but the panels still convert the God-given light into electricity.

Precisely one week later, at 13.00 on Friday 17th July the display board showed that the system had generated 227kWh, saving 129kgs of CO2 when compared with the national figures for electricity generation, even though the weather was generally grey after the kindness it had shown during the time when the teams were working on the roof.

This project is not about saving money on the electricity bills at St. Denys' church, that is merely a beneficial side effect. The main aim is to witness to a theological perspective on creation and the sustainable use of natural resources.

The installation and the story so far is just the beginning.

According to the approved, government formula this installation will save some 4.5 Tonnes of carbon emissions per annum and has a guaranteed life expectancy of 25 years, but the actual life expectancy (with a minor degradation of efficiency) is much longer.

To this end the installation will include equipment which continually monitors and records the performance of the Inverters. This data is then made available through the internet to anyone who wishes to log on from wherever they are. The opportunities this provides are many, but include:

- i. A continuous display of the panels' performance available anywhere through an internet connection allowing easy access to the data to all, not least in all six of Sleaford's schools, for use in both curriculum and extra-curricular projects to be offered via diocesan and regional education advisors.*
- ii. The opportunity to report regular and accurate data on the church website, in the parish magazine, local media etc.*
- iii. Making the experience gained at St. Denys' available to all who are interested. (Already two other churches in the Diocese of Lincoln are at an advanced stage in preparing their own plans for solar pv). Conferences demonstrating not only solar pv, but other sustainable technologies appropriate for church buildings are being prepared by the team at St Denys' in association with the Diocesan Environmental Chaplain.*
- iv. Complimenting the campaigns being run by both Sleaford Town Council, North Kesteven District Council and Lincolnshire County Council to encourage the sustainable use of resources in their areas.*
- v. A continuing witness to the Church of England's commitment to 'strive to safeguard the integrity of creation and sustain and renew the life of the earth' and to the 'Shrinking the Footprint' campaign to reduce church's carbon footprint to 40% of our 2006 level.*

*But don't let this project be limited by our imagination!
If you are interested and would like more details –
or if you would like to become involved in any way, however small,
please contact us at St Denys', Sleaford.*

*The Vicar, Church Wardens, Parochial Church Council
and the worshipping community at
Sleaford Parish Church of St Denys' wish to thank,*

In the planning stages, for their advice and support

David Webb, NKDC Sustainability Officer

Debbie Scott, Sleaford Town Council's Development Officer

Matthew Naylor and the Diocesan Council for the Care of Churches

For the solution to fixing the panels without damaging the fabric

Julian Patrick of Freewatt Electrical

*For the careful installation of the panels, the inverters and all the
wiring showing sensitivity and care for this magnificent
Grade 1 Listed building.*

Bob Blanchard and the team from Beco Solar

Julian Patrick and the team from Freewatt Electrical

Tim Cieslik from Spot-On Electrical

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Low Carbon Buildings Programme (Phase 2)

The BIG Lottery through their Community Sustainable Energy Programme