

# Operation EDEN - Photovoltaic (PV) panels in churches



Photovoltaic panels are frequently considered as renewable energy for churches because church roofs are often south-facing and pitched at the correct angle (10-50°). However, they can be very expensive and should only be considered if energy efficiency measures have been implemented first - it is cheaper to prevent a kilowatt (kW) of energy from being wasted than to generate a kilowatt.

Below is some information about type of systems, costs and 6 PV installations on churches.

## Types of system (Information from Centre for Sustainable Energy)

There are three main types of photovoltaic panels:

Mono-crystalline	Most efficient (15%) but most expensive
Poly-crystalline	Cheaper & medium efficiency (8-12%)
Thin film	Cheapest & lowest efficiency (4-6%) but most flexible & best in diffuse sun

## Cost and maintenance (Information from Energy Savings Trust)

Prices for PV systems vary, depending on the size of the system to be installed, type of PV cell used and the building on which the PV is mounted.

For the average domestic system, costs can be around £4,000-£9,000 per kWp (kilowatt peak) installed with most domestic systems usually between 1.5 and 2 kWp. Panels that are integrated into a roof are more expensive than those that sit on top. However, if you intend to have major roof repairs carried out it may be worth exploring PV tiles as they can offset the cost of roof tiles.

Systems connected to the national grid require very little maintenance, generally limited to ensuring that the panels are kept relatively clean and that shade from trees has not become a problem. The wiring and components of the system should however be checked occasionally by a qualified technician. For stand-alone systems, i.e. those not connected to the national grid, further maintenance is required on other system components, such as batteries.

At an electricity tariff of 10p per unit (kWh) 1 kWp systems would save £80 - 90 per year, **if you used all of the electricity generated**. If you export electricity back to the grid you would receive less than 10p per unit. You may find an electricity supply company (e.g. Good Energy) who will buy the power back from you.

Funding is currently available through the Government's *Low Carbon Building Programme* - [www.lowcarbonbuildings.org.uk](http://www.lowcarbonbuildings.org.uk) 0800 915 0990.

## Typical sizes







Assuming a south-facing roof with optimum tilt the size of a 1 kWp (domestic) system would be as follows:

System	Size (m <sup>2</sup> )	Approx dimensions	Typical energy output / year (kWh)	Comments
Mono-crystalline	8	1m x 8m	800	
Poly-crystalline	10	1m x 10m	800	
Thin film	20	1m x 20m	900	Higher output because generates electricity in diffuse light

NB Peak output of 1 kWh would power a 1 bar fire or 16 x 60W light bulbs.  
900 kWh per year is equivalent to an average of 0.1kWh = 1.6 x 60W light-bulbs

## UK examples

The table below has details about actual PV installations on church buildings. Four of these examples give enough information to calculate cost per kWp installed. These range from £5,100 to £7,900 per kWp installed, with the average being £6,500.

<b>Church</b>	<b>Image</b>	<b>kWp installed power</b>	<b>Cost &amp; Funding</b>	<b>Savings / Output</b>	<b>Link</b>
St James C of E, Piccadilly. Grade 1 listed. Christopher Wren design, consecrated in 1684.  PV Installed 2005		5 kWp	£36,000  £16.5k EDF Green Energy Fund  £12.5 EST Grant	Est £340 saved per year  Estimated 4,100 kWh per year  1.8 tonnes CO <sub>2</sub> per year	<a href="http://www.simondawson.com/sjpenv/sjppv1.htm">www.simondawson.com/sjpenv/sjppv1.htm</a>
St Aldhelms C of E, North London 1903 Brick & pitched roof building Installed on 3 south-facing roofs 2006		Estimated at 18 kWp (see CO <sub>2</sub> savings)	£92,000  £79,000 in grants: EST, EDF, Enfield Council	6.5 tonnes CO <sub>2</sub> per year  Excess power sold to Good Energy	<a href="http://www.london.anglican.org/NewsShow_6016">www.london.anglican.org/NewsShow_6016</a>
St Oliver Plunkett's RC Church, Northern Ireland  Installed 2005		Estimated at 5kWp (see energy output)	50% from EST  25% from Northern Ireland Electricity	Est 4,000 kWh per year	<a href="http://news.bbc.co.uk/2/hi/uk_news/northern_ireland/4308112.stm">http://news.bbc.co.uk/2/hi/uk_news/northern_ireland/4308112.stm</a>
St Mark's Church, Mark's Gate  Installation March 2006		Estimated 2.9 kWp	£23,000  DTi Solar initiative + C of E	2376 kWh of electricity  £200 savings  997kg of carbon dioxide emissions	<a href="http://www.barking-dagenham.gov.uk/2-press-release/press-release-menu.cfm?item_code=2358">www.barking-dagenham.gov.uk/2-press-release/press-release-menu.cfm?item_code=2358</a>
St Mary's RC Osterley. Part of new community hall, built in 2003		30 kWp	£169,000  90% from DTi grant	Est 24,600 kWh per yr (based on kWp)	<a href="http://www.indcatholicnews.com/powr.htm">http://www.indcatholicnews.com/powr.htm</a> and <a href="http://www.stmarysosterley.org.uk/buildings.htm">http://www.stmarysosterley.org.uk/buildings.htm</a>
St Peters C of E, Brockley, Lewisham		3.9 kWp (80 kW pellet boiler also installed)	Clear Skies, MPVDP, EDF Energy & C of E	Est 83 tonnes CO <sub>2</sub> per year (Majority of CO <sub>2</sub> reduction from pellet boiler)	<a href="http://www.cen.org.uk/biomass/pdf/St_Peters_Church.pdf">www.cen.org.uk/biomass/pdf/St_Peters_Church.pdf</a>