solarcentury

The Eden Centre

Background

The award-winning Eden Project has been one of Cornwall's most popular tourist attractions since it opened in March 2001. The remit of the site is to promote the understanding and responsible management of the relationship between plants, people and resources to create a sustainable future for all. So when the next stage of the development began – the construction of an Education and Resource Centre ('The Core') – the design of the building was always going to be of great interest, with Tim Smit, Eden's Chief

Executive predicting that it will be 'one of the most sustainable, finest modern buildings in the world'.

The building's design, inspired by plant formations, was created by world-leading architects Nicholas Grimshaw & Partners. The main contractor, McAlpine Joint Ventures, worked with Solarcentury on the project to integrate solar PV panels within the building's 'Fibonacci' roof design. The Core is the most geometrically complex roof structure into which Solarcentury has incorporated solar PV.

Solar design

In order to meet the architect's desire for the 'Fibonacci' roof curves, solar panels were intricately faceted over a bespoke mounting structure constructed from a spiral of steel tubes. Solarcentury met this design using a combination of 338 Sharp 80W panels and 42 Kyocera 40W panels; each 'petal' of the flower formation on the roof was constructed using standard PV panels. The intricate shape of each 'petal' was achieved through descending row lengths of PV panels, extending from the centre.

At the eave of the roof over the solar terrace, bespoke Romag 80W glass-glass laminates form a ring that completes the centre of the flower. These panels are mounted using bolt-through glass fittings and provide a canopy to protect the building's timber exterior finishes with the added benefit of offsetting building material costs.

The Core's orientation was not ideal for solar energy generation due to partially north facing roof angles and potential shading problems from surrounding roof lights. Solarcentury therefore optimised the system's electrical design to improve the performance of the array, in addition to careful inverter selection and PV module interconnection.

Funding

The Core has taken two years to construct at a cost of £15 million. Major sponsors included the Millennium Commission Lottery, South West Regional Development Agency, European Regional Development Fund, via Objective One.

The Core demonstrates the possibility of using solar energy in combination with complicated architecture and how standard PV panels can be incorporated within complex structures to deliver a highly aesthetic, practical solution. Despite the challenge of The Core's intricate design, the PV was fully installed within the project's build programme.

Summary of electricity comparisons

- Generates total electricity for 7 average three-bed houses each year.
- Generates enough electricity each year to light an average three-bed house for over 33 years.
- Generates enough electricity to make 750,000 pieces of toast/over 1 million cups of tea every year.

Summary of Carbon Dioxide (CO2) comparisons

- Annually saves over 11 tonnes of CO2 emissions, a major greenhouse gas, equivalent to 829,000 party balloons or 6 Olympic swimming pools.

- Annual CO2 savings: account for 15 trees required to absorb CO2 over 100 years.
- To achieve the Kyoto Protocol, the UK is required to reduce CO2 emissions by 12.5% below 1990 levels by 2010. This installation offsets the contribution of 33 UK individuals to this target every year.

Date commissioned	2005.07.22
Technology	Solar PV
Installation Type	Pitched roof
	Glass laminates
System size (kWp)	30.47
Forecast electricity generation / year (kWh)	20000
Panel area (m2)	270
Building integrated	Yes
CO2 saving / year (kg)	11360
Energy produced (kWh)	5000
Date of last energy reading	2005.09.19
Type of project	Commercial