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PV IN NORTHERN IRELAND

PV Systems have just completed a photovoltaic façade on the new offices of Patrick McCaul, Energy Consultants, in Omagh, Northern Ireland. The 1 kW system is grid connected via an SMA sunny Boy inverter, and has a custom display in the Foyer, which shows the instantaneous power produced, and the total to date.

The system is mounted in the PV Systems RIS© integration system and is provided with powder coated cap strips and flashings to match the window detailing.

The overall building is very energy efficient, and PV Systems also supplied a 4 sqm solar thermal system to preheat the domestic hot water supply.

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SOLAR TAKE-OFF (Editorial)

2002 may be the year our industry has been striving for, when PV really takes off in the UK. The signs are positive but we will have to work hard to sustain the effort.

The world-wide market for photovoltaics (PV) has been growing at 25 % plus for several years and last year reached 35 % when nearly 400 MW of modules were produced. The annual value of the PV business is now about \$3 billion. National and international programmes are increasingly directed towards developing stable industries founded on secure markets, local manufacture and effective supply chains rather than one-off demonstrations of technology.

In the UK we have seen the extension of the domestic field trial programme, the start of the large-scale BIPV programme and then the Major Demonstration Programme with £20 million available for grants. PV-UK members are growing rapidly to meet demand and new entrants are being attracted to the industry.

There are still lots of barriers to success for PV despite the work that has already been done, for example to make network connection simpler. It is still impossible for small generators to access ROCs and buy-back rates offered by most electricity suppliers are very poor. Skill shortages are serious. Public awareness of the potential is still low. We need to continue to tackle all these problems.

Can the market be sustained until it becomes viable without grants? We need growth in size and drastic reductions in costs that will only come from scaling up the industry and improving the technology. We need to tackle the remaining non-technical barriers. PV-UK's submission to the Government's proposed Energy White Paper sets out our ambitions (see page 2).

There is a dual challenge for solar take-off; to government to ensure the conditions are right and sufficient funds are available, to industry to make it happen. We cannot afford to pass up on the opportunity to develop a significant portion of our future energy supplies from clean, silent, reliable and free at source solar power.

Rod Hacker
Chairman

SOLAR ENERGY INSTALLATIONS

IT Power has recently set up a PV installations company, Solar Energy Installations Ltd., which means that IT Power can now offer its clients a turnkey installation package, offering all services from pre-feasibility studies, to installation and commissioning of PV systems.

Solar Energy Installations was formed after a successful collaboration between IT Power and Michael Holmes of Heath Electrical Services on the installation of 6 grid-connected, domestic PV systems in Homerton, London for the Circle 33 Housing Trust. The company has recently completed the installation of an 8.4 kWp 3-phase, grid-connected system on a sheltered housing complex for Thurrock Council (one of the lowest-cost grid-connected PV installations in the UK to date) and has just installed 17 PV systems for Berwickshire Housing Association and a further 11 for Guildford Borough Council.

*Solar Energy Installations, Jonathan Bates
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PV-UK TARGETS THE WHITE PAPER

PV-UK has made a submission to the proposed government White Paper on energy that sets out our aims for government policy. Over the last few years we have seen much debate and consultation over the future of renewable energy in the UK but the reality of the government measures is that they have been disjointed, conflicting and underfunded. The declared ambition of a PV programme to match those in the leading nations of Germany, Japan and the USA has yet to be met. The proposed White Paper is likely to set the energy policy for years to come and is therefore important to our industry.

The PV-UK submission urges a funding level ten times greater than the £38 million allocated to ALL renewables in the recent comprehensive spending review. It identifies the lack of allocated funding for the renewable industries after 2005 as a major concern to investors and specifically seeks the following measures for PV:

- ◆ a major market stimulation programme featuring a 50% capital grant for 70,000 domestic roofs and a similar grant scheme for larger non-domestic buildings over ten years
- ◆ a mandatory requirement under the Electricity Act requiring electricity suppliers to allow householders to receive the same price for exports of electricity as they are charged for imports (net metering)
- ◆ extend Enhanced Capital Allowances to solar PV (which helps companies), and give individual homeowners a personal tax allowance for installing solar PV
- ◆ a voluntary agreement with the major private and social housing developers to have PV systems installed on a minimum of 5% of their new/refurbished houses per year by 2010
- ◆ a voluntary agreement with major commercial and industrial developers to consider the use of PV laminates as a cost-effective alternative to the expensive cladding which is so often used on such buildings.

Read the full submission on our web site (www.halcrow.com).



ACCELERATED LIFETIME TESTING OF PV CONNECTORS

The installation of photovoltaic modules in building facades and other structures has necessitated the use of push fit connectors to enable quick and easy inter-module dc electrical connection. Each PV module is supplied to site with 'flying leads' attached to the junction box, essentially

connector terminated positive and a negative leads of the required length. The installer is able to simply interconnect the PV system without ever being exposed to a voltage hazard. However, the introduction of such contacts introduces an additional

reliability issue for the system, which, if hard wired, using silicon based PV modules, would be expected to last 25 years or more, with little or no maintenance. The Sustainable Energy Research Group at Southampton University has been developing testing systems and regimes to evaluate the potential lifetime of such PV connectors.

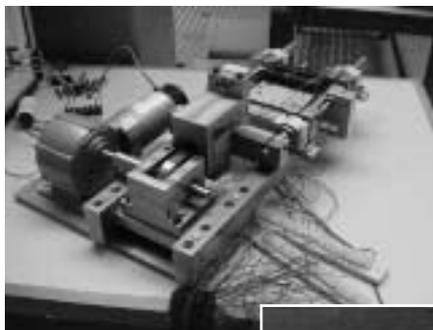
The day-night variation in temperature within a PV roof creates an expansion-contraction cycle of components. This diurnal cycle leads to small amplitude motions, termed fretting at the

connector interface. Fretting leads to wear of the metallic surfaces, which may eventually result in connector failure. If one fretting cycle is assumed per day, over the 25 year lifetime of a PV system, the connectors would be subjected to 9125 fretting cycles.

The commonly used Multi-Contact (MC) connector consists of a tin plated electrical contact housed in a rubber surround, which acts as both the electrical insulation and environmental protection.

module for example will be lost. However, lower fretting amplitude occurs when PV modules are connected using flying leads resulting in longer periods before the onset of failure. 'Solarlok' an alternative connector system produced by TYCO is currently undergoing fretting testing at the University. Corrosive gas and high humidity studies on both systems are also in progress. Further details can be seen at SERG website (www.serg.soton.ac.uk).

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Above: Figure 1 - Accelerated fretting test rig.

Right: Figure 2 - Wear track scarring on a MC pin contact after fretting.



Tin, although an excellent plating material, is prone to fretting wear. Test studies of the MC connector have shown that when subjected to high amplitude fretting (~ 100 microns amplitude), connector failure begins at ~ 10,000 cycles (A in Fig. 3). The contact resistance increases rapidly to an open circuit value after this point. In this situation any power produced by a

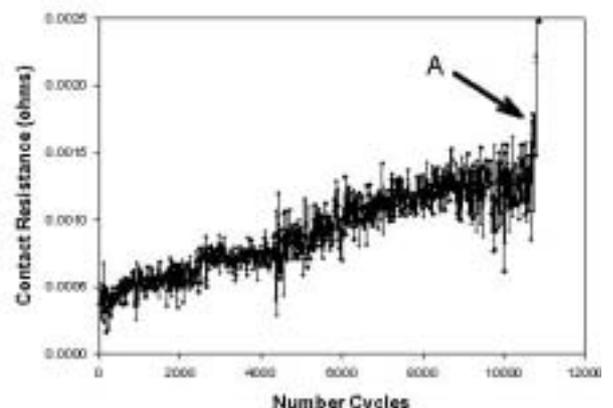


Fig. 3. Change in contact resistance with number of fretting cycles (100 mm amplitude) for an MC connector. 'A' corresponds to onset of connector failure.

WALES EXPORTER OF THE YEAR

The renewable energy company Dulas Ltd have a lot to celebrate in 2002.

Dulas were awarded the Wales Exporter of the Year Award, sponsored by the Western Mail, Welsh Development Agency, ELWA and KPMG. Dulas proudly received the award at a Gala Diner hosted by the Cardiff International Arena in front of 750 business people.

Dulas have operated in the developing world markets of Africa, the Middle and Far East and South America, exporting solar powered medical equipment for vaccine and blood storage, lighting and water pumping. Ian Draisey, Marketing Director at Dulas said

"This prize is a fantastic accolade for the Solar department within Dulas. Considering the stiff competition from the highly respected companies also competing, the title of Exporter of the Year is particularly special" Opportunities exist in Afghanistan, Western Africa and the desert regions of the middle east for all our solar equipment. To date we have received fantastic support from The Export Association, WalesTrade International and the Welsh Development Agency



who have recognised the vibrant market place in which Dulas is now operating.

The Exporter of the Year Award follows the Innovation Award, presented to Dulas by the Welsh Development Agency in April of this year. This prize was for the solar powered reverse osmosis system that Dulas are developing, to complement their range of solar powered equipment for the humanitarian aid market. The systems will be targeted toward the island and coastal communities, in poor, water starved regions, where a single system could sustain a village of 150 people.

Ian Draisey, Dulas Ltd,
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NEW INSTALLATION GUIDES FOR DISTRIBUTED GENERATION

Halcrow Group Limited have helped develop a DTI guide on photovoltaic installation called Photovoltaics in buildings - Guide to the installation of PV systems ref: DTI/pub URN 02/768. The guide has been written in conjunction with Sundog Ltd, EA Technology and BRE to provide information on current UK standards and best practice recommendations for mains-connected PV systems, primarily for small-scale photovoltaic installations (of less than 5kW). The guide is intended to be a reference tool for system installers and designers and is a free publication that can be downloaded from the DTI website at: http://www.dti.gov.uk/renewable/install_guide.htm



Halcrow Group Limited have also been involved in the last ten years been on developing the installation and connection standards for building integrated photovoltaics. Recently, work has included aiding in the drafting of the new G83 code that will eventually replace the previous G77 code for connection of small-scale systems to the electricity network. The code is likely to come into effect in October 2002 and will include provision for the use of solid-state disconnection as an anti-islanding control strategy.

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EETS SUNVIEW

A leading solar technology company has unveiled a novel way to see how much a domestic solar electric ('Photovoltaic' or 'PV' for short) system is producing. Many owners of domestic PV systems have no idea whether their system is working well, or indeed working at all.

SUNVIEW is a new display that puts that information in front of the users eyes and provides a record of recent values at the touch of a button.

"Every morning I can see the 'generating' light is on as I walk out through my front door", said a user, "and I stop and press the button to see how much I generated the previous day".

Sunview has been installed in all the PV houses of the DTI field trial in Green Lanes Nottingham. "This gives our tenants a good feeling about the PV

systems on their roofs" said a spokesman for the Nottingham Community Housing Association.

The breakthrough of this system is that it uses a radio signal to transmit the power measurement to the display unit. Therefore there is no need to disturb decorations or drill holes to fit the unit, and the display can be fitted anywhere in the house. An LED 'bar graph' indicates how much the system is generating, and the user can push a button to see historical data for the last 24 hrs, and the last 28 days. The unit is also compatible for use in Europe and USA, and negotiations are underway to sign up distributors worldwide.

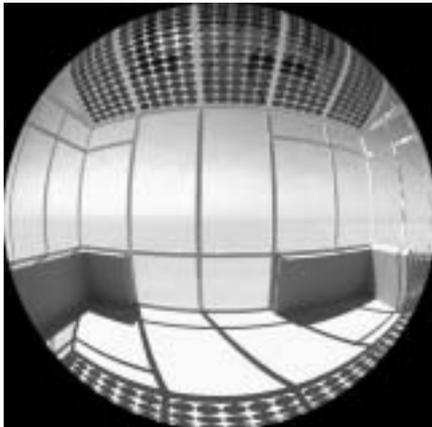
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SOLAR CONSERVATORIES WINS SMART AWARD

IT Power has recently set up a new company, Solar Conservatories, for the research and development of PV systems for integration into conservatories. Solar Conservatories have just won a Smart Award from the DTI to develop this new generation of grid-connected solar electric systems for conservatories which will operate lights and domestic appliances. The PV conservatory roof panel will cost around £4,000, but this cost could be halved by taking advantage of current government grants. It is predicted that this research project will actually enter the market in about 18 months.

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MAJOR PV DEMONSTRATION PROGRAMME IS UNDERWAY

The £20 million DTI major photovoltaic demonstration programme (MDP) was launched in May 2002 with the aim of developing photovoltaics as an important carbon-free electricity generation technology in the UK. The programme is divided into two different application streams for which EST and Halcrow

Group Limited are organising the administrative and technical aspects respectively.

Stream One provides funding up to 50% towards the cost of small-scale systems (between 0.5kWp and 5kWp) with the grants being awarded on a rolling basis and acceptance is relatively automatic provided that applications meet the criteria. There have been over 70 applications for stream one with 9 systems installed so far.

Stream Two provides funding for large-scale systems (above 5kWp). The grant levels are dependent on the type of organisation applying for grants on a competitive basis. For



social housing groups and public authority buildings the grant funding is up to 65%, for Small and medium enterprises is up to 50% and for large commercial organisations is up to 40% on applications between 5kWp and 100kWp. Of fifteen projects submitted in round one of stream 2, eight projects were successful and will give a combined installed capacity of 355kWp at a grant cost of £1.32 million. The projects include Ford's Centre for Engineering and Manufacturing Excellence in Dagenham, roofing refurbishments of social housing in London, a school in Wales, a social housing project in Carmarthenshire and refurbishment of 50 houses in Braunstone, Leicester. Other calls are scheduled for mid-October 2002 and January 2003. The ultimate aim of the three-year project is to facilitate the installation of 3000 systems on domestic houses and 140 large-scale systems on commercial, SME and public buildings by 2005.

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FORTHCOMING EVENTS

22-24 October 2002 - Sustainable Energy and Energy Efficiency Expo, Olympia, London www.energy-expo.org www.sustainable-expo.org

30 November - 7 December 2002 - Renewable Energy, World's Best Energy Option, Brighton www.wrenuk.co.uk

12-16 May 2003 - 3rd World Conference on PV energy Conversion, Osaka, Japan www.tuat.ac.jp/~wpec/

13-15 May 2003 - SUSTAIN 2003, Amsterdam, The Netherlands www.sustain2003.com

14-19 June 2003 - ISES 2003, Göteborg, Sweden jod@vsect.chalmers.se

26-30 January 2004 - International PVSEC-14, Bangkok, Thailand www.chula.ac.th/pvsec-14/



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