

PV



in The Built Environment

December 1998

UK Activities for Task VII of the IEA Photovoltaic Power Systems Programme

This is the second newsletter in a series designed to inform those interested in Building Integrated Photovoltaics (BiPV) of recent activities associated with IEA Task VII - PV in the Built Environment. It summarises the latest developments in building integrated photovoltaic systems including activities undertaken in the UK under the DTi PV programme, actions on-going within Task VII and some major international projects and programmes.

Responses to fax-back questionnaire

Thank you to all those who took the time to reply to the questionnaire circulated with the previous issue of this newsletter. Your comments were greatly appreciated and the suggestions made have been taken into account when preparing this issue. The responses were very mixed with all sections of the report being marked as most interesting by a significant number of readers, we hope this means we have got the balance about right. The results are summarised as follows: the area of most interest was UK Activities, next was Future Events, closely followed by DTi Programme Activities, International PV Activities and last, though not by far, was Task VII. The most useful source of information within the newsletter was project overviews followed by technical information on building integration techniques and PV, contact points, and implementation information, while the web site was voted least useful, but again not by far. We welcome any further feedback regarding the PV newsletter, so if you have comments or questions please contact Donna Munro at the address given below.

Task VII Activities

Products for Roof Integration

The primary focus of Task VII is on the integration of PV into the architectural design of roofs and façades of buildings, and other structures in the built environment. Part of this work involves the development of building integration concepts for PV systems. A summary of existing PV-mounting systems is currently being compiled as a Task VII activity. In total, more than 50 BiPV products are known to be available world-wide, ranging from tiles and modules for sloping roofs to PV mounting systems for flat roofs and PV façades and awnings. A

selection of three PV roof tiles and shingles is briefly described below.

UNI-SOLAR PV Shingles

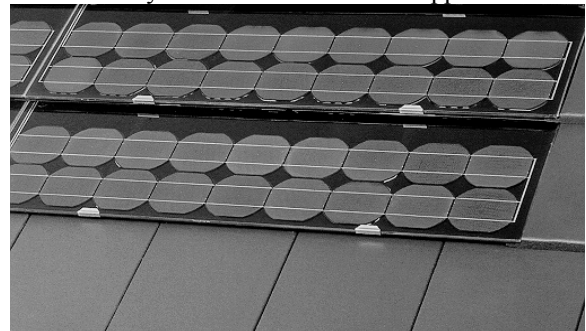
United Solar Systems Corp. have developed flexible amorphous silicon PV modules available for integration with conventional North American style roof shingles. The individual shingles are nailed in place and interconnected in the attic space. Each shingle is rated at 17 W_p and carries a 10 year guarantee. For further details contact United Solar Systems Corp., tel. +1 248 362 4170, fax. +1 248 362 4442.



Southface Energy and Environmental Resource Centre, Atlanta, Georgia (photograph courtesy of Solar Design Associates)

Braas Solar Tile

The PV tile developed by Braas Dachsysteme GmbH is equivalent in size to a row of four standard concrete tiles. They are constructed of a glass-glass laminate with monocrystalline cells and are clipped



Braas Solar Tile (photograph courtesy of Braas)

onto stainless steel brackets directly screwed on the roof lattice. The modules, which are dark blue, are rated at 35 W_p. The tiles are available as part of the

PV 700 package, with a total capacity of 700 W_p and an approximate area of 8 m². They are designed to be integrated into a Redland concrete tile roof, and are beginning to be marketed by mainstream roof manufacturers, Redland Roofing Systems Ltd. in the UK. For more information, tel. 01306 872000, fax. 01306 872111.

Atlantis Sunslates™ PV Shingles

Sunslates are small PV modules integrated on fibre reinforced shingles with a total active surface area of 0.11 m². They consist of a Glass/EVA/Tedlar laminate glued onto a fibre reinforced concrete base plate. Each Sunslate is fixed with a metal clamp attached directly to the roof battens. The Sunslates are available with crystalline cells rated at 90 to 123 W_p and amorphous silicon cells rated between 4.5 and 9 W_p. For further details, contact Atlantis Solar Systeme AG, tel. +41 31 300 3280, fax. +41 31 300 3290.



Residential House in Basel, Switzerland (photograph courtesy of Atlantis Solar Systems Ltd)

Once available, the summary report of state-of-the-art BiPV systems will form the basis for a workshop on PV integration concepts to be held in Lausanne, Switzerland on 12 and 13 February 1999. It is intended that the outcome of this workshop will be an agenda for new products and systems which could be developed with the involvement of Task VII experts to the benefit of the developers and Task VII (see Future Events on back page).

International Activities

Amersfoort 1MW Project

A 1 MW_p grid connected PV system is currently under construction in the city of Amersfoort in the Netherlands. This exciting project in the new housing development of Nieuwland will result in PV being distributed on the roofs of approximately 500 houses, a crèche, school, sports hall and an apartment building. The project is led by REMU the Regional Energy Company of Utrecht.

BP Solar are one of the turn-key suppliers for the project supplying a total of 180 kW_p and installing 64 systems on house roofs. Half of these systems are mounted on flat roofs using the Ecofys Console system and the remainder are integrated into sloped roofs using the aluminium profiling system developed and

supplied by Energy Equipment Testing Services Limited in Cardiff. The Braas roof tiles described on the previous page are also being installed on a number of houses.

The emphasis of the Nieuwland development is on sustainability, quality and low environmental impact. Measures have been taken throughout the design stages to ensure that the highest standards are met in each of these areas. It was considered very important to have a balanced social mix, therefore the housing included is available at a variety of price ranges and to a wide range of age groups. When the project is completed, a number of the PV systems will be sold with the houses to the future residents. The rest of the systems will remain the property of REMU, with the home owners receiving 20 % of the revenue from the system as payment for the use of their roofs.

The electrical design of the PV system is standardised in order to cut the capital cost and ensure that replacement parts are cheap and readily available. The systems are based upon a modular design with one inverter per house. This leads to low costs in cabling and grid connection. The cost of the inverters is also reduced due to the quantity in which they will be manufactured.

The systems will be monitored and controlled by REMU and in the case of any faults the inverter in question will automatically switch off. REMU will automatically be notified of the problem and procedures followed to resolve the situation. This monitoring system will also enable REMU to check that each system is performing as it should.

Those involved in the project hope that it will act as a demonstration of the practicality and economy of PV systems on a large scale and will be only the first of many such projects.



PV Roof Installations on Luxury Owner-occupied Houses in Amersfoort (photograph courtesy of REMU)

For further information relating to the aluminium profiling system for sloped roofs, contact Bruce Cross at Energy Equipment Testing Services Limited, tel. 01222 490871, fax. 01222 454887. For further details on the BP Solar PV systems, tel. 01932 779543, fax. 01932 762686.

DTI PV Programme Activities

This section reviews briefly some of the on-going projects managed by ETSU under the Department of Trade and Industry's Photovoltaic Programme. The emphasis of the programme is on gaining an understanding of the opportunities and barriers to photovoltaics so as to inform industry and government. Building integrated applications are one of the priority areas identified within the programme.

Copies of ETSU research project publications are available on loan from the New and Renewable Energy Enquiries Bureau, Tel. 01235 432450/433601, Fax. 01235 433066. Please quote the report number. Report lists are also available.

An Action Plan for PV Standards

The development of PV standards is an important issue for the UK PV industry. Codes of practice and standards are needed to integrate PV into the UK building and electricity supply sectors, and to protect the status of UK products and services in overseas markets.

IT Power have been commissioned to assess the present status of international standards development regarding PV systems and components; to identify barriers to commercial development of PV resulting from the lack of appropriate standards and codes of practice; and to prepare an action plan for UK activities to address these barriers, focusing on underpinning research and development relating to PV standards. A kick-off meeting with industry has been held and a briefing document on the current status of international PV standards has been circulated. Four sector groups have been set up:

- Cells and Modules
- Building Integrated PV
- Mains Connection Network Studies
- Stand-alone Systems

Sector meetings were held between 16-20th November at Southampton University with a view to producing draft action plans by the end of December, which will be finalised in the New Year.

Anyone from the construction industry with a specific interest in participating in this work should contact Ray Noble at BP Solar, PO Box 191, Chertsey Rd, Sunbury-on-Thames, Middlesex TW16 7XA Tel. 01932 763622.

Type Testing PV Inverters

Halcrow Gilbert Associates are currently working to develop type test procedures for PV inverters. The widespread introduction of small grid connected PV systems will bring a need for simple approval procedures for each installation. A key component will be a type approval system for inverter equipment, so that the electricity supply industry (ESI) and the purchaser can be assured that the

inverter offered meets essential standards for safety and quality of the power output. Outline requirements for type approval have been developed in a previous project in which Halcrow Gilbert Associates and EA Technology worked with the ESI to develop guidelines for grid connection.

The same team are now working on the type approval development project, with experimental work being carried out by the Solar Testing and Research Centre at Southampton University. The objective is to develop a test procedure, trial it to confirm its suitability and define the quality of results required. The test procedures will then support a type approval process. The project will also identify potential test houses and promote acceptance of the scheme. There will be consultation with the ESI and the PV industry throughout the twelve month project.

Anyone wishing to participate in the consultation exercise should contact Rod Hacker at Halcrow Gilbert Associates

Planning Issues Relating to BiPV

Terence O'Rourke are currently researching planning issues relating to the integration of PV power systems in buildings. The research will lead to the preparation of planning guidelines for local authorities and planning consultancies in the UK. The central benefit of the project should be the encouragement of a more favourable professional outlook and planning policy context for the consideration of future planning proposals which incorporate PV technology. A contributory benefit will be an enhanced awareness amongst planners of the nature of the technology and the practical requirements for its use.

For more information about this project, please contact Julian Wilczek at ETSU, Harwell, Didcot, Oxon, OX11 0RA, Tel. 01235 433147, Fax. 01235 432331, e-mail. julian.wilczek@aeat.co.uk.

Other DTI Projects

ETSU, on behalf of the DTI, are currently in the process of commissioning a number of studies on building integrated PV. These include:

- Four PV design studies based on real building designs. These studies aim to increase the knowledge and experience of building experts in the successful integration of PV into buildings.
- A study of the implications of the Construction (Design & Management) Regulations for building integrated PV systems. BSRIA will carry out the study which will culminate in the production of a guide for planning supervisors and designers.

These projects are expected to start in the New Year and complete in the summer of 1999.

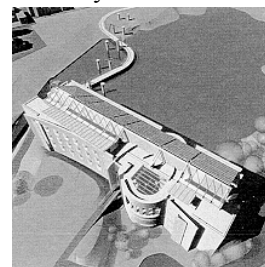
UK Activities

Progress in Photovoltaics: 2nd Joint DTI/EPSC PV Conference

The DTI and EPSRC are organising the Progress in Photovoltaics: 2nd DTI/EPSC Conference, listed below. Following the successful conference in 1996, and responding to encouragement from industry, the conference will be a forum for information exchange for those involved, or interested, in PV activities in the UK. All sections of UK industry and academia are invited to participate in this meeting, to share experiences, forge alliances and hear about new developments and research results. Leading industry specialists and representatives from the DTI and EPSRC will present keynote papers on the major issues affecting PV today. In view of the amount of information for dissemination, technical papers will also be invited for visual display during the conference. A key feature will be an exhibition for UK businesses to display goods and services.

Zero Energy Offices, Accrington

Earlier this year Hyndburn Borough Council commissioned Jestico + Whiles Architects to design a zero energy office for their new headquarters. Halcrow Gilbert Associates were engaged as building services, energy and environmental consultants to help achieve the zero energy target. The building will feature high levels of insulation, optimal use of daylight and natural ventilation and an airtight construction. The total energy demand is predicted to be 184 000 kWh p.a. (52.5 kWh.m⁻²) and this will be partly met by renewable energy generated from PV, wind and hydro. The PV element comprises a 370 m² roof mounted system with a 35 kW_p output, generating some 35 000 kWh p.a. The building has been designed to outline stage and is awaiting approval to proceed to detailed design.



Future Events

	Date and venue	Description of Programme
Building with Photovoltaics - Products, Systems and Opportunities	11 & 12 February 1999 EPFL, Lausanne, Switzerland	This workshop will review existing PV building products for building integrated PV systems. It will bring architects and product suppliers together in working groups to evaluate the current 'state of the art' and identify opportunities for the development of existing or new PV products and systems.
	For further details contact Mrs Stephanie Sayer, HGa, Burderop Park, Swindon SN4 0QD Tel. 01793 814756, Fax. 01793 815020, E-mail: RudkinEJ@hga.co.uk	
Progress in Photovoltaics 2nd DTI/EPSC Conference	17 & 18 February 1999 The Ramada Hotel Manchester	The conference will be a forum for information exchange for those involved or interested in PV activities in the UK. Technical papers are invited for visual display during the conference.
	For further details contact Sheena Newell at ETSU, Harwell, Didcot, Oxon, OX11 0RA Tel. 01232 433 602, Fax. 01235 433 737, E-mail: sheena.newell@aeat.co.uk	
The World Sustainable Energy Fair	25 - 27 May 1999 R.A.I. Centre, Amsterdam	This wide ranging fair covers renewable energy, waste-to-energy, energy efficiency and sustainable transport.
	For further details contact European Media Marketing Ltd, PO Box 259, Bromley, BR1 1ZR, UK Tel. 0181 289 8989, Fax. 0181 289 8484, E-mail: sustain@emml.co.uk	
16th European PV Conference and Exhibition	1 - 5 May 2000 Glasgow	This is the main European conference specific to Photovoltaics, covering all aspects from basic cell research through building integrated PV systems to policies and markets.
	For further details contact WIP-Munich, Sylvesteinstr. 2, D-81369 München, Germany Tel. +49 89 7201235, Fax. +49 89 7201291, World Wide Web: http://www.wip.tnet.de	
World Renewable Energy Congress VI	1-7 July 2000 Brighton	The first call for abstracts for this conference has been announced.
	For further details contact Prof. Ali Sayigh, 147 Hilmanton, Lower Earley, Reading RG6 4HN	
Upcoming Task VII Meetings	April 1999, Austria Mar/April 2000, Australia	Fifth Task VII Expert Meeting The Task VII Intermediate Conference is to be held in conjunction with the ISES Pacific Conference