



# PV POWER

Newsletter of the IEA Photovoltaic Power Systems Programme

OCTOBER  
2006

*Contents*

- P.2 'EXTREMELY USEFUL AND INTERESTING...'
- P.3 TEN CHALLENGERS FOR PV IDEAS TOP SPOT
- P.4 THE BILLION \$ QUESTION
- P.5 DESERT STORM
- P.6 IN BRIEF
- P.7 PVPS NEWS
- P.8 PVPS REPORTS & BOOKS

*The power of love? PV is blossoming as a growing stream of investors seek to take advantage of some rather attractive market incentives.*

[PHOTO SOLON HILBER]

## 'EXTREMELY USEFUL AND INTERESTING...'

**'Extremely useful and interesting...'. That is the verdict of Photon International magazine on the statistics published in the eleventh edition of 'Trends in Photovoltaic Applications', the latest in the series of annual surveys of PV in selected IEA countries covering the period 1992 to 2005.**

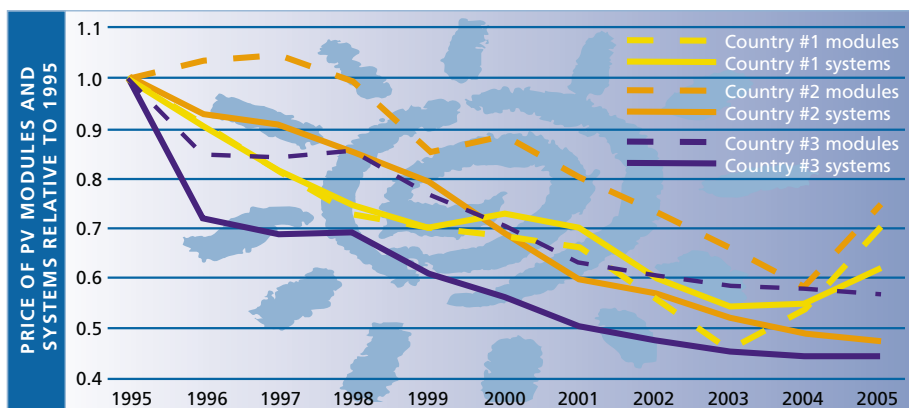
The report also offers some excitement – the amount of PV installed during the year in the IEA PVPS reporting countries exceeded 1 GW for the first time, the annual rate of growth of cumulative installed capacity remained steady at an impressive 42 %, Germany overtook Japan in both installed capacity and installed capacity per capita and, despite the widely reported challenges faced by industry relating to silicon feedstock supply, cell production volume increased by 35 % and production capacity increased by 66 %.

### MARKET OVERVIEW

Global cumulative installed capacity of PV has now grown to about 3,7 GW – however it should be noted that the big contributors to this are Japan and Germany who between them installed 85 % of the 2005 capacity. An important factor behind the levels of growth experienced by these two countries was the stable market support mechanisms that initially concentrated on residential grid-connected applications. Although the global market is increasingly dominated by grid-connected applications in the reporting countries (about 95 % of the 2005 market), one third of countries report off-grid applications as their dominant market.

### INDUSTRY

In 2005 there were seven companies and ten plants producing PV grade silicon in four IEA PVPS countries, and about 11 000 tonnes were sold to the PV industry. The balance of about 4 000 t were sourced from remaining inventories and rejects from the semiconductor industry (recycled wafers, pot scrap, tops and tails etc). The total photovoltaic cell



production volume for 2005 in the IEA PVPS countries was reported to be 1 500 MW, up from 1 109 MW in 2004. The largest growth in absolute numbers took place in Japan (220 MW) and Germany (143 MW). However, the growth rate in Germany (72 %) outpaced the rate in Japan (36 %). Japan is the leading producer of cells (824 MW) and modules (773 MW), accounting for 55 % and 50 % respectively of the IEA PVPS countries' total production in 2005. Germany maintains second position with 23 % and 18 % of production respectively. In the USA, the third largest producing country, cell and module production increased by 13 % and 42 % respectively from 2004. Outside the IEA PVPS countries both China and Taiwan consolidated the significance of their contribution to global PV production with further strong growth in 2005. With the rapid expansion of the worldwide market for grid-connected PV systems, manufacturers of PV inverters reported impressive growth rates in 2005.

### PRICE EVOLUTION

The lowest achievable installed price of grid-connected PV systems in 2005 varied between countries. The average price was 6,6 USD per watt in 2005, marginally up on 2004. Similar to 2004, the lower reported prices in 2005 were typically around 5,5 USD to 6,5 USD per watt. On average, system prices for the lowest price off-grid applications are double those for the lowest price grid-connected applications. In 2005 the average price of modules in the reporting countries was around 4,5 USD/W, an in-

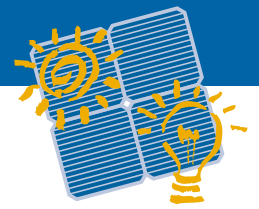
*Evolution of price of PV modules and systems in selected reporting countries accounting for inflation effects – Years 1995-2005 (Normalized to 1995).*

crease of less than 5 % over the corresponding figure for 2004. Interestingly, a number of countries reported a decrease in module prices from 2004 while other countries reported almost no change. It is worth noting that the widely discussed increase in module prices was largely a European phenomenon in 2005.

### BUSINESS INDICATORS

Three-quarters of the countries reporting on economic benefits of PV developments estimated that the net business value increased by over 30 % throughout 2005. Total direct employment is now reported to be at least 55 000 persons across research, manufacturing, development and installation in the IEA PVPS countries, and has increased by around 17 % compared to 2004. A trend for labour intensive manufacturing activities, such as module assembly, to move to low cost base economies can be observed. Many manufacturing companies in Europe have continued to benefit from the strong level of demand within Germany, even when their domestic markets have diminished due to the ending of specific programmes.

More detailed information plus additional topics can be found in the report itself. A downloadable version of the Trends report can be found on the IEA PVPS website. Further analysis of alternative models for promotion of PV and other renewables in the IEA PVPS countries is provided on page 4.



# TEN CHALLENGERS FOR PV IDEAS TOP SPOT

**The Lisbon Ideas Challenge (LIC) international design competition for innovative urban applications of PV is approaching an intriguing climax, following selection of 10 finalists by IEA PVPS Task 10 in Malmö in September.**

Twenty-three novel concepts were submitted for consideration by the panel, following 130 initial expressions of interest from 37 countries since the Challenge was launched at the beginning of the year. The shortlisted projects were selected on the basis of their conformance to the competition's four key design criteria: their integration into the urban environment; their use of new technological PV concepts or new applications for conventional PV technology; the potential for broad replication; and how well they communicate the PV functionality embedded within the design to the general public. The ten finalists – three from Portugal and one each from Brazil, Egypt, France, Ireland, Israel, Netherlands and Turkey – have identified opportunities for PV to meet a wide range of energy, form and function challenges in the urban context. The ideas range from an entire sustainable village concept to specific applications for PV in street furniture and even a novel road safety application.



Three contenders for the Lisbon Ideas Challenge: An inflatable emergency shelter (above); a unique folding design providing flexibility and mobility (below left) and a sheltered seating concept providing power for mobile devices (below right).

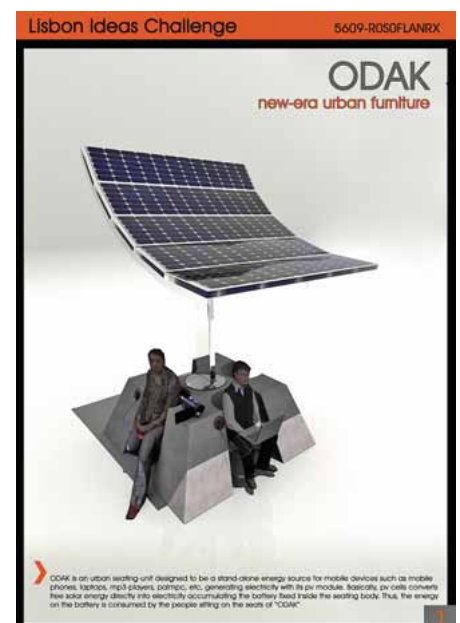
The *Smart Village* project has created a concept for developments based on a series of smart building designs which integrate electronic systems to manage buildings' internal energy, water and waste systems as well as other external community services. Project 602 focuses on the ecologically and socially sustainable renovation of apartment blocks as an alternative to demolition and replacement. The renovation strategy incorporates PV cells into sun-facing facades and roofs, alongside active solar components. Another concept oriented at the residential sector is the *PV Sunroom* module, which proposes an 'energy extension'. The design uses the construction logic of the mass produced timber roof and can be adapted to work as a conservatory.

ODAK, *Sun Square* and *Parasol Solaire* incorporate PV into urban furniture for some familiar applications. ODAK is a stand-alone energy source and seating unit for public areas which allows users to recharge mobile devices, while *Sun Square* is conceived as a structure for the creation of a solar powered multimedia esplanade. As its name hints, *Parasol Solaire* provides daytime shade against sun exposure, but also incorporates PV to charge a battery which allows the units to function as lights at nighttime. Also focused on street furniture, but with versatility highlighted above specific functions, *PV4All* explores PV overlaid onto a simple spatial container that may provide many other functions from water storage to communication transmitters. *Power Fold*

takes this further still, emphasizing flexibility and mobility integrated into a foldable design that promises 'a multitude of energy generation possibilities'.

At the other end of the scale, with specific functionality very much in mind, *Skin* incorporate PV power cats' eyes into painted stripes for pedestrian crossings, while the *Basic Housing Unit for Urban Natural Hazards* meshes a 3rd generation PV film and an inflatable composite structure to create a self-powered temporary shelter for natural catastrophe victims.

The LIC is organised by the Centre for Innovation, Technology and Policy Research at the Technical University of Lisbon on behalf of IEA PVPS Task 10. The winning concept, selected from the shortlist by an international jury, will be announced at a ceremony in Lisbon in November. Contact Joana Fernandes, joana.fernandes@dem.ist.utl.pt or visit [www.lisbonideaschallenge.com.pt](http://www.lisbonideaschallenge.com.pt)



## THE BILLION \$ QUESTION

**Amongst the IEA PVPS countries total public funding for PV is around the one billion USD per year mark, roughly evenly split between R&D and demonstration on the one hand and market stimulation measures on the other. At the same time regulatory measures to promote renewables are now becoming more commonplace within electricity markets worldwide.**

These topics are reported by all countries participating in the IEA PVPS Programme as part of the annual national survey process. In practice, public support can involve a combination of measures and will usually function more effectively when this is the case. Enhanced feed-in tariffs (which will be the subject of a special feature in the next issue of PV Power) are reported in Austria, France, Germany, Italy, Korea, The Netherlands and Spain. Direct capital subsidies have featured in the PV markets of Australia, Austria, Denmark, France, Germany, Japan, Korea, The Netherlands, Sweden, Switzerland, the UK and the USA.

A number of governments, notably those of Australia, Austria, Japan, Sweden and the USA, considering longer-term approaches to climate change and energy security issues, are implementing the regulatory approach commonly referred to as the 'renewable portfolio standard' (RPS) to increase renewable energy deployment in their countries. Other regulatory measures to

promote renewables reported by participating countries include disclosure on electricity bills, tradable certificates, and branding and labels, although their application is not so widespread.

Within the electricity utility sector different business models of PV promotion are emerging, partly in response to public policy and regulation and partly to realize business opportunities. There are a number of 'green power' schemes offered by electricity businesses. In principle, these rely on part of the customer base giving some environmental or other value to renewable energy – and paying a premium for the privilege.

### POLICY CHALLENGES

Some challenges for PV policy makers have become evident. Enhanced feed-in tariffs are inherently unpredictable where specific results such as limited capacity installed or rates of deployment are being sought. They can result in overheated markets on the one hand if rates are set too high, but also to negligible impacts if rates are too low. Consequently issues that can arise for policy makers range from the inability of local industry and services to meet the demand, to poor cost-benefit outcomes for the programme. Setting a cap to control the market growth can introduce start/stop effects which destroy the confidence of the market participants.

Capital subsidies are often too simplistic and do not encourage broader consideration of customer energy usage or willingness to

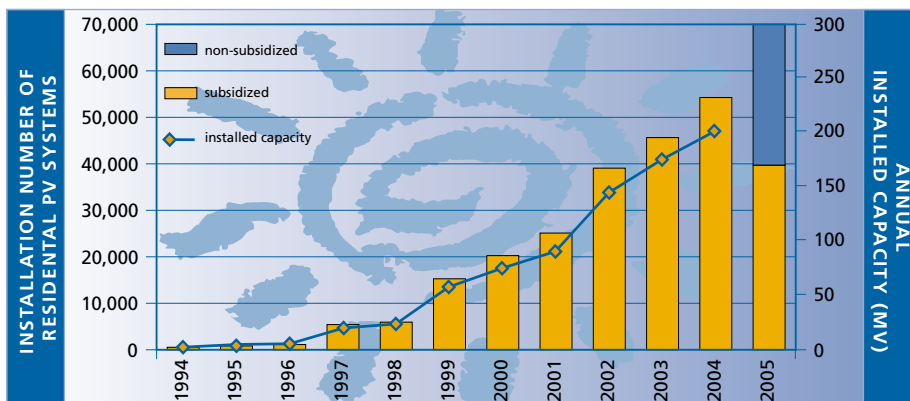
pay for PV. They have also been criticized for inflating system prices and subsidizing more affluent consumers.

The general renewable portfolio standards are unlikely to have a positive impact on PV deployment and may even have unforeseen negative implications. This occurs where electricity utilities that may previously have actively pursued PV are faced with a need to firstly, devote their (fixed) renewables resources to new administrative / regulatory issues and secondly, source most of their renewable energy from the lowest cost options (such as wind and hydro). However a number of PV-specific regulatory approaches have emerged.

Green power schemes, especially in their infancy, are often characterized by the same problems for PV seen in the government-driven RPS schemes. However, as with the RPS approach, a number of PV-specific green power schemes have emerged – partly in response to a particular utility's approach to its customers and PV, and partly as a function of market diversity and competitive pressures.

More recently, various forms of tax credits appear to be emerging in a number of countries as an attractive support measure. Also, as the PV market matures and opportunities for business are identified, various non-utility as well as utility-based commercial initiatives are emerging. These include activities such as preferential home mortgage terms and green loans from commercial banks, share offerings in private PV investment funds plus other schemes that all focus on wealth creation and business success using PV as a vehicle to achieve these ends.

When developing the public policies that underpin the deployment of PV the big unanswered (or maybe unanswerable) question seems to be the target market's willingness to pay for the real and perceived benefits of PV. With the recent ending of Japan's residential PV support programme and a continuing healthy investment in PV by this market sector, maybe some answers will be forthcoming in the not-too-distant future.



Some 30 000 residential PV systems were installed without subsidy in Japan in 2005 [GRAPH COURTESY NEF/RTS]



## DESERT STORM

***For the last seven years, IEA PVPS Task 8 (Very Large Scale PV), has been something of a voice in the wilderness, quietly progressing its analysis of the feasibility of multi MW to GW scale desert-based PV systems. However, if the level of interest in the VLS-PV work experienced at the recent European PV Solar Energy Conference in Dresden is any indication, desert PV really could be 'the next big thing'.***

Task 8's publication of its latest book 'Energy from the Desert: Practical Proposals for Very Large Scale Photovoltaic Systems' is timely. There is considerable interest in PV investments at the present time and the emerging trend is towards installation of ever larger PV systems, particularly in those markets where favourable feed-in tariffs are on offer.

The new book, a summary of progress during Phase 2 of the VLS-PV Task over the past three years, provides encouragement for those interested in large centralized PV systems, asserting that, based on existing PV technology, VLS-PV could directly compete with fossil fuels as the principal source of electricity for any country that has desert areas. At the same time there are some caveats, notably that, as a financial invest-

ment, at present PV system prices VLS-PV is still reliant on additional incentives such as high feed-in tariffs to be viable. Module costs account for a very large proportion – up to 75% – of the total cost of VLS-PV systems so developments in this area offer the main potential for future cost reductions and more widespread economic viability. On the positive side, the development of cells and modules with higher conversion efficiencies, and other technical innovations in areas such as hydrogen production and high-temperature super conductors, are all conspiring to make VLS-PV projects increasingly attractive.

As reported in PV Power #24, Task 8's work has focused on proposals for the Mediterranean region, the Middle East, Asia (China and Mongolia) and Oceania. Each region has been tackled in a slightly different way with for instance the Mediterranean project analysing PV generation costs against available feed-in tariffs and conventional electricity prices in Spain, Portugal and Tunisia based on respective local irradiation and using current best system prices for large-scale plants. On this basis, Spain emerges as a potentially viable market for VLS-PV in the next 2 to 5 years.

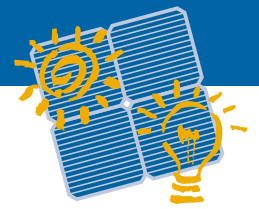
In the Middle East, a 'Top-Down' approach for the introduction of VLS-PV Systems has been considered. This focused on land avail-

ability for solar harvesting, electricity requirements, technology optimization and rate of deployment and the financial implications of VLS-PV. An example for Israel assessed the construction of production facilities for existing concentrator PV technology building to an annual capacity of 1,5 GW within 4 years, coupled to an annual addition of 3 GWh of storage (0,5 GW for six hours). The case study found that the credit line necessary to achieve this level of VLS PV installation would be fully repaid after 21 years by which time revenues would be sufficiently high to enable both the continued annual production of VLS-PV plants with no further investment, and the decommissioning and replacement of old plants after 30 years of service. This is an important observation, as after the initial investment has been paid off the price of electricity no longer depends upon any factors related to its generation. It becomes a purely arbitrary figure that can be fixed at any desired level.

The third phase of Task 8 is now commencing and will continue until 2008 further developing specific case studies as well as general instructions for the implementation of practical project proposals. The results are certain to be of widespread interest.

Contact Keiichi Komoto,  
[keiichi.komoto@gene.mizuho-ir.co.jp](mailto:keiichi.komoto@gene.mizuho-ir.co.jp)  
See page 8 for ordering details.





## IN BRIEF

### AUSTRALIA

Prime Minister Howard announced some good news for renewable energy for remote area applications in August. An additional 123,5 million AUD (73 million EUR) has been earmarked for the four years from July 2007 for the Renewable Remote Power Generation Programme (RRPGP). Initiated in 2000, the RRPGP encourages the replacement of fossil-fuel (predominately diesel) consumption for power generation and water pumping with renewable sources of energy. The programme has been an important stimulus for off-grid residential and agricultural PV applications accounting for approximately 25 % of Australia's remote-area PV market over the past five years. This has sustained numerous small installation businesses that constitute much of Australia's PV industry. The new funding boosts the original 200 million AUD budget by 60 % and will enable the programme to be extended across the country.

### AUSTRIA

Hopes of a major boost for the PV market in Austria were effectively dashed with the recent revisions to the Green Electricity Act, approved in May. The national program is now targeting 10 % of electricity generation from 'new renewables' (i.e. excluding existing hydropower) by 2010. This is a substantial increase from the current 2 %, however the target is based on a portfolio of options which sees biomass as the predominant energy source, accounting for 60 % of the 17 million EUR per year assigned for preferential feed-in tariffs. Wind power is also earmarked for a substantial (30 %) slice of the funds. PV on the other hand, is lumped together in the 'other sources' category to battle for a share of the remaining 10 % of the budget. This allocation is intended to achieve

'optimized use of available budgets'. For PV a tariff of 0,49 EUR/kWh has been proposed for systems under 20 kW and 0,42 EUR/kWh for systems larger than 20 kW. That is assuming that the provinces come to the party and contribute 50 % towards the proposed tariff. Austrian analysts anticipate that these restrictions are likely to limit the annual domestic PV market to approximately 6 MW for the foreseeable future.

### FRANCE

A further modification has been made to the French feed-in tariff system following an announcement by Prime Minister Villepin on 15 May. This heralded an increase to 0,55 EUR/kWh for electricity generated from building integrated PV projects (BIPV). This rise, 60 % up on the previous tariff for industrial and public buildings which itself only came into effect at the end of March, reflects the government's and ADEME's (administering agency) policy of promoting the BIPV concept.

### ITALY

Following on from our overview of developments with the Italian feed-in tariff system in PV Power #24, we can provide some further information on the rather complex incentive arrangements: In addition to the 20 year feed-in tariffs of between 0,445 and 0,49 EUR/kWh, system owners retain the financial benefits of net metering or on-site consumption of the electricity generated, i.e. they reduce their power purchases from their electricity supplier. For plants up to 20 kW, an additional 0,15 EUR/kWh value is derived from net metering. Plants in the range 20 to 50 kW will see an extra 0,14 EUR/kWh if power is used on-site or 0,095 EUR/kWh if selling their power. Plants above 50 kW can bank on 0,13 or 0,08 EUR/kWh for on site consumption or sale respectively. This



*PTM's showcase Zero Energy Office in Malaysia incorporates 91 kW of PV into various roofing elements. The project is due for completion in first quarter 2007.*

means, for example, that a simple 51 kW system could potentially accrue up to 0,62 EUR for each kWh of PV generated electricity. A further 10% will be added to the feed-in tariff for building integrated systems.

For those who are still confused, we aim to clarify this further in the feed-in tariffs feature in our next edition! Not surprisingly, the demand for PV in Italy continues to go through the roof, with applications for the feed-in tariff totalling almost 390 MW since it was launched just over a year ago.

### KOREA

In addition to the 70 % capital subsidy currently available under its 100 000 rooftop programme for systems under 3 kW, Korea is also implementing its feed-in tariff for PV systems over 3 kW. This provides a fixed price of 716,40 KRW/kWh (0,6 EUR/kWh) guaranteed for 15 years. The tariff, currently limited to a total of 20 MW, is scheduled for revision after October 2006. 1,3 MW are now operating with support of the FIT, with several multi-MW scale projects reportedly in the planning stage, involving discussions between local government, local utilities and some foreign companies.



*'Green Village' with 97 kW on 46 homes in Kwangju Metropolitan City under Korea's 100 000 Rooftop Programme.*

### MALAYSIA

The Malaysia BIPV project which commenced in July 2005 is starting to see its extensive information campaigning and industry development actions bear fruit. Almost 450 people attended four information seminars between April and August, many from the Malaysian business community, and over 70 engineers have participated in grid-connected BIPV design workshops in preparation for the launch of the SURIA 1 000 initiative at the end of November.

SURIA 1000 aims to catalyse the general public to install PV, targeting a total of 1,2 MW on homes and small businesses by 2010. Initially grants will contribute up to 75 % of the installed system cost, gradually reducing to 40 % over the next four years. The MBIPV also incorporates a number of high-profile showcase projects and building developer demonstrations. Some 150 kW is currently being constructed under the showcase component, and over 80 kW in the demonstration pipeline.

### SWITZERLAND

The Swiss parliament gave in principle agreement in early September to a feed-in tariff for new renewables, including solar PV. The proposal currently sees the FIT capped at approximately three times the retail electricity price. A final decision on the operation of the incentive scheme is expected by the end of March 2007.

*For further information about any in-brief articles, contact the relevant national newsletter representative (see list on P7).*

## PVPS NEWS

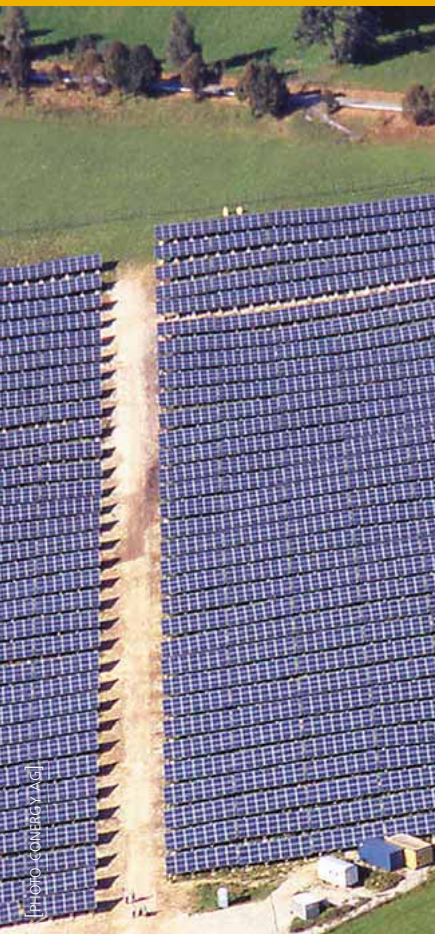


Photo: OMBG/AGF

### BANKING ON SOLAR PV

A workshop on PV and Finance will be held in Zürich, Switzerland on 14 November 2006 under the banner of the IEA PVPS Programme. The workshop, *Solar photovoltaic electricity: a wealth of investment opportunities under the sun*, is organized by Nova Energie GmbH of Switzerland and RTS Corporation of Japan, with the support of the Swiss investment and finance sector through INRATE AG, and also the Swiss PVPS Pool and the European Photovoltaic Industry Association.

With an expected audience of green fund managers, industry development financiers, investment institutions and policy advisers, the workshop will address a number of the questions being asked of PV: Can the current PV technology deliver on its promises? Are there sustainable markets for the products? Are the costs (and prices) competitive and in line with potential returns? Could the 'PV bubble' burst? And where exactly do the risks and opportunities lie?

The full-day workshop will feature expert presentations in the morning covering innovative investment initiatives, PV business and its potential, a look back at how the international PV markets and applications have evolved over more than a decade, a PV technology perspective, various national outlooks covering Japan, the USA, Europe and developing countries, an overview of the whole industry value chain, PV and the Millennium Development Goals and an environmental safety and health overview. The afternoon will largely be devoted to a 'hot issues panel' and discussions.

The event will take place in Zürich on Tuesday 14 November 2006. The cost of registration is 480 EUR including workshop documentation, coffee breaks, networking lunch and evening drinks reception. Registration forms and other information can be found at [www.pvps.ch/workshops](http://www.pvps.ch/workshops)

### NEW ON OUR WEBSITE

The IEA-PVPS website holds numerous PV-related statistics, reports, news and other features to view or download. The site is regularly updated.

#### Recent additions include:

The IEA PVPS Annual Report for 2005. The latest version of the annual survey report 'Trends in Photovoltaic Applications: Survey report of selected IEA countries between 1992 and 2005'.

The individual national survey reports which form the basis for the Trends data summary will also be available for download very soon.

Visit [www.iea-pvps.org](http://www.iea-pvps.org)

### DIARY DATES...

*Energy Autonomy Through the Storage of Renewable Energies*  
Gelsenkirchen, Germany

30-31 October 2006

☛ EUROSOLAR

Tel: +49 (0)228 362373

[www.eurosolar.org](http://www.eurosolar.org)

*Solar Photovoltaic Electricity: a wealth of investment opportunities under the sun*  
Zürich, Switzerland

14 November 2006

☛ Pius Huesser, Nova Energie

[www.pvps.ch/workshops](http://www.pvps.ch/workshops)

*Photovoltaic Technology Show 2007*

Munich, Germany

3-5 April 2007

☛ Martin Lehmann, Solar Verlag

Tel: +49 (0)241 4003 115

[www.photon-magazine.com](http://www.photon-magazine.com)

*ISES Solar World Congress 2007*  
Beijing, China

18-21 September 2007

☛ Zhen Yingjun, SWC2007

Tel: +86 (0)10 6218 0145

[www.swc2007.cn](http://www.swc2007.cn)

*Solar Power 2007*

Long Beach, CA, USA

24-27 September 2007

☛ Solar Electric Power Assoc.

Tel: +1 202 8570898

[www.solarpowerconference.com](http://www.solarpowerconference.com)

*17th International PV Science and Engineering Conference*

Fukuoka, Japan

3-7 December 2007

☛ Yoshio Ohshita

Tel: +81 (0)52 809 1875

[www.pvsec17.jp](http://www.pvsec17.jp)

## IEA-PVPS NEWSLETTER

### NATIONAL NEWSLETTER CONTACTS

If you have any comments or require further information about any articles appearing in PV Power, or if you have suggestions for new features, please contact your national representative. Full contact details are provided on the PVPS website.

#### AUSTRALIA

Greg Watt

#### AUSTRIA

Roland Bründlinger

#### CANADA

Josef Ayoub

#### DENMARK

Peter Ahm

#### EUROPEAN UNION

David Anderson

#### FRANCE

André Claverie

#### GERMANY

Lothar Wissing

#### ISRAEL

Yona Siderer

#### ITALY

Salvatore Guastella

#### JAPAN

Osamu Ikki

#### KOREA

Kyung-Hoon Yoon

#### MALAYSIA

Wei-nee Chen

#### MEXICO

Jaime Agredano Diaz

#### NETHERLANDS

Job Swens

#### NORWAY

Fritjof Salvesen

#### PORTUGAL

Luis Silva

#### SPAIN

Javier Sanz

#### SWEDEN

Ulf Malm

#### SWITZERLAND

Pius Hüsser

#### UNITED KINGDOM

Sarah Davidson

#### USA

Susannah Pedigo

### PV POWER

PV Power is the newsletter of the IEA PVPS Programme. It is prepared by IT Power under supervision of PVPS Task I.

This newsletter is intended to provide information on the activities of IEA PVPS. It does not necessarily reflect the viewpoints or policies of the IEA, IEA PVPS Member Countries or the participating researchers. Articles may be reproduced without prior permission, provided that the correct reference is given.

Editor:

Paul Cowley

Associate Editor:

Greg Watt

Layout and production:

De Boer & van Teylingen, The Hague, Netherlands

Office for correspondence:

PV Power Newsletter, Suite 352, 4 Young Street

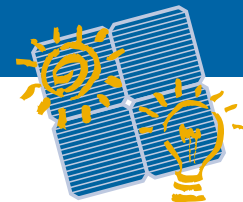
Neutral Bay, NSW 2089, Australia

E-mail:

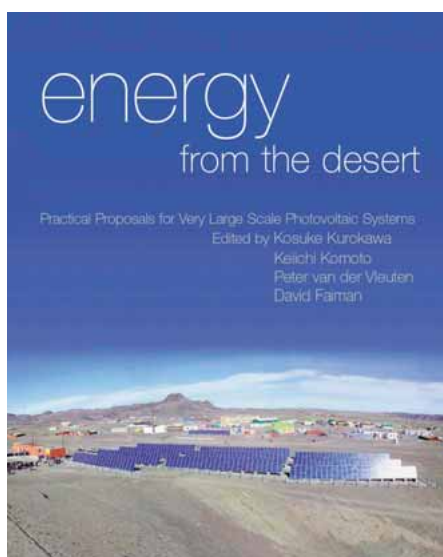
[pvpower@itpowergroup.com](mailto:pvpower@itpowergroup.com)

Website:

<http://www.iea-pvps.org>



## PVPS REPORTS & BOOKS



### PRACTICAL PROPOSALS FOR VERY LARGE SCALE PHOTOVOLTAIC SYSTEMS

Edited by Kosuke Kurokawa, Keiichi Komoto, Peter van der Vleuten and David Faiman.

*A unique, extensive and high-level international study, representing the accumulated research of the world experts. The authors, participants in IEA PVPS Task 8, present case studies of worked projects, in full colour throughout.*

The world's deserts are sufficiently large that, in theory, covering a fraction of their landmass with PV systems could generate many times the current primary global energy supply.

This new *Energy from the Desert* volume examines and evaluates the potential of very large scale photovoltaic power generation (VLS-PV) systems. The authors present case-studies of both virtual and real projects based on selected regions (including the Mediterranean, Sahara, Chinese Gobi, Mongolian Gobi, Indian Thar, Australian Desert and the US) and their specific socio-economic dynamics, and argue that VLS-PV systems in desert areas will be readily achievable in the near future.

As the essential companion to the previous IEA volume it reiterates and develops key concepts introduced by the original study and provides firm practical recommendations to achieve long-term targets for policy makers and investors.

#### Bibliographic details

Hardback RRP £75.00 ISBN 1844073637

Publication date January 2007

224 pages; 297 x 210 mm;

Figures, tables, maps, photographs.

Preorders, saving 10% on the RRP, can be made online at [www.earthscan.co.uk](http://www.earthscan.co.uk)

**The IEA PVPS Programme has produced a wealth of reliable market data and technical information to help decision makers evaluate PV project and programme implementation. PV Power #18 reported on publications from the IEA PVPS Programme from 1998 through to early 2003. Following is an update for 2003 through to 2006. Further information about these, and other titles and products, is available from the IEA PVPS website [www.iea-pvps.org](http://www.iea-pvps.org), with many of the reports available for download free-of-charge.**

#### UIEA PVPS ANNUAL REPORTS AND EXECUTIVE CONFERENCES

- Implementing Agreement on Photovoltaic Power Systems Annual Reports 2002-2005 (4 editions)
- Photovoltaic power systems – past, present and future. Proceedings of the IEA PVPS International Conference, 19-20 May 2003, Osaka, Japan

#### MARKET AND TECHNOLOGY SURVEY REPORTS

- Trends in photovoltaic applications in selected IEA countries. Annual editions.

#### PERFORMANCE, RELIABILITY AND ANALYSIS OF PHOTOVOLTAIC SYSTEMS

- Country reports on PV system performance, December 2004
- The availability of irradiation data, December 2004
- CD-ROM: Performance database, May 2004

#### PV FOR STAND-ALONE AND ISLAND APPLICATIONS

- Survey of national and international standards, guidelines and QA procedures for stand-alone PV systems, 2nd edition, May 2004
- Managing the quality of stand-alone photovoltaic systems – case studies, April 2004
- Managing the quality of stand-alone photovoltaic systems – recommended practices, January 2004
- Common practices for protection against the effects of lightning on stand-alone photovoltaic systems, October 2003
- Guidelines for monitoring stand-alone photovoltaic systems – methodology and equipment, October 2003

#### GRID INTERCONNECTION OF BUILDING INTEGRATED AND OTHER DISPERSED PHOTOVOLTAIC POWER SYSTEMS

- Grid-connected photovoltaic power systems – survey of inverter and related protection equipment, December 2002 (not reported previously)

#### VERY LARGE SCALE PHOTOVOLTAIC POWER GENERATION SYSTEMS

- Energy from the desert: feasibility of very large scale photovoltaic power generation (VLS-PV) systems, May 2003

#### CO-OPERATION WITH DEVELOPING COUNTRIES

- Summaries of the Task 9 recommended practice guides, November 2005
- Sources of financing for PV-based rural electrification in developing countries, May 2004
- 16 case studies on the deployment of photovoltaic technologies in developing countries, September 2003
- Institutional framework and financial instruments for PV deployment in developing countries, September 2003
- PV for rural electrification in developing countries – programme design, planning and implementation, September 2003
- The role of quality management, hardware certification and accredited training in PV programmes in developing countries, September 2003

#### URBAN SCALE PHOTOVOLTAIC APPLICATIONS

- Compared assessment of selected environmental indicators of photovoltaic electricity in OECD cities, May 2006