



PV POWER

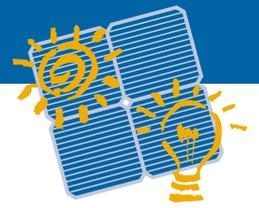
Newsletter of the IEA Photovoltaic Power Systems Programme

DECEMBER
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Emerging from the shadow of their flat-plate cousins: a concentrating PV system provides power to a rural mini-grid in Southern Australia [PHOTO SOLAR SYSTEMS]



JAPAN'S NEW PV BUSINESS VISION

A clear industry development vision and more than a decade of concerted and integrated public support for photovoltaic research, development, demonstration and dissemination has given Japan's PV industry a very strong foothold at both the national and global levels. A new national PV vision with competitive business at its core was recently unveiled.

Japanese companies manufactured over 400 MW or 60 % of global PV module production in 2003, 55 % of which was destined for the local market. A major driver of this national industry and capacity development has been the residential PV system dissemination programme which accounts for some 70 % of total capacity installed in Japan to date and which constituted almost 90 % of the total demand in FY2003. The Ministry of Economy, Trade and Industry (METI), which oversees PV programme budget administration within its 'Promotion of New Energy' remit, has indicated that the residential subsidy programme will close at the end of FY2005. The new development vision will help Japan's industry maintain and strengthen its competitive edge.

SUPPLY & DEMAND CONTEXT

METI's 'Vision for New Energy Business' released at the end of June offers strategic options for contributing to Japan's energy needs to 2030, supporting the Ministry's Long-term Energy Supply and Demand Outlook. The Energy Outlook itself, while assessing the supply and demand balance in the context of local and global industrial, economic and social change, also considers environmental constraints, requirements for robust and flexible energy supply, and supply diversity and decentralisation in order to derive a series of energy sector development scenarios. Alongside the reference case, high and low nuclear power use scenarios and another driven by advanced energy conservation, new energy technologies including PV feature under the 'new energy advanced case'. This foresees a 10 % new and renew-



This 40 kW facade is part of a 480 kW system installed at Saishunkan Hilltop Yakusai Factory Park under the Advanced PV Field Test. [PHOTO RTS CORP]

ables contribution to primary energy supply by 2030, compared to approximately 3 % under the reference case. PV is earmarked to meet 51,3 % – equivalent to 80 GW of installed capacity or 20,24 billion litres of crude oil – of this 2030 figure for new and renewable energy.

STRATEGIC OBJECTIVES

Achieving this new energy future will require strategic technological development, measures to accelerate demand and initiatives to build a competitive, sustainable PV industry. Demand acceleration might include, for instance, the development of new business models such as PV service utilities or preferential loans for PV-equipped houses and other measures to address PV payback period through appropriate electricity buy-back rates. Industry competitiveness and sustainability would demand an expanded skilled work force, supported by appropriate training standards, increased public awareness, for instance through Eco-schools projects, and significantly increased targeting of overseas markets. Coinciding with this and underpinning the strategic technological thrust, NEDO, the New Energy and Industrial Technology Development Organisation, issued its PV 2030 Roadmap focusing on 'mass intro-

duction of PV systems without restriction'. The Roadmap establishes a target for PV power generation costs to be equivalent to industrial electricity prices in 2030. To achieve this, NEDO has identified a series of technological targets for the next 25 years. These include a module production cost reduction – supported by targeted efficiency improvements – from 100 JPY/W (around 1 USD/W) in 2010 to under 50 JPY/W by 2030, a 30 year lifetime and dramatic savings in feedstock consumption to 1 g/W by 2030 (compared to the current 10-13 g/W). As for the industry itself, it is gamely rising to the new business challenge with the four largest producers each aiming to increase production by 25 to 170 % over the next two years and stepping up overseas production or exports. New products are being developed for the housing market, specifically with simpler and quicker installation in mind, and the world's leading PV player is also addressing public awareness by supporting solar lecturers and establishing 10 solar exhibitions throughout the country. About the only grey cloud is a recent announcement by a leading polysilicon manufacturer that it will increase the price of its product – the raw material for silicon wafers – by 20 %, although the extra revenue will be reinvested to support business growth. Contact: Osamu Ikki, RTS Corp. Fax: +81 (0)3 3553 8954

COORDINATED APPROACH TO DISTRIBUTED GENERATION

Distributed renewable energy technologies such as PV offer a number of benefits to modern electricity businesses, particularly in respect of their relatively benign environmental impact, potential infrastructure support role and increasingly their role in addressing supply security. At the same time, for an industry and infrastructure that has historically been built around centralised, despatchable power plants, distributed generation – particularly from intermittent renewables sources such as solar and wind – poses a variety of problems. How can numerous micro-generators be safely accommodated within the distribution network? What system controls are required? How can supply and demand be effectively managed with resource-variable power generation? Answers to these questions become

more urgent with increasing penetration of renewable and other micro-generation equipment on the network – penetration which is being urgently driven by national, regional and international policies.

The 'IRED' initiative (Integration of Renewable Energy Sources and Distributed Generation into the European Electricity Grid) is aiming to coordinate European research and technological development (RTD) and link with other international experience to address these increasingly pressing issues. IRED is an umbrella programme which initially incorporates a cluster of 7 RTD projects funded under the European Commission's Fifth Framework Programme. This cluster represents a total budget of about 35 million EUR (45,6 million USD), covering aspects such as policy and regulatory roadmaps, analysis of

storage technologies, high penetration of renewable energy sources on low voltage grids, and intelligent monitoring, management and control systems. It involves over 100 participating institutions from research, industry and the utility sector.

IRED expects to build on these initial projects to identify and mobilise further activities through the Sixth Framework as well as at national and international levels. The coordination function covers information exchange through improved links to relevant research, regulatory and policy bodies and schemes, organisation of common initiatives on standards, testing procedures and education, as well as research prioritisation.

<http://ired-cluster.org>

IEA

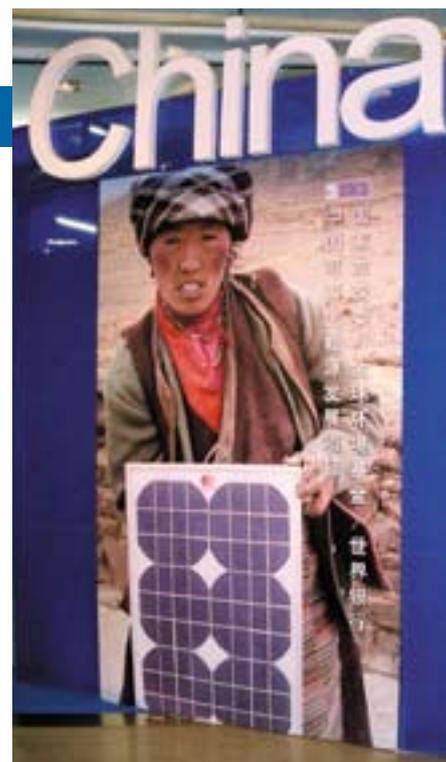
WATCH THIS SPACE

By the end of 2003, a number of government and international development initiatives – most notably the Brightness Project launched in 2000 – had helped raise China's installed capacity to a claimed 58 MW.

This places China fifth only to Japan, Germany, USA and India in terms of PV use. Some 60 % of this was added in the last two years alone, which has been a strong incentive for local industry development. In the five years prior to 2000 production had been stable, if unremarkable, at around 1,5-2 MW/year, driven largely by rural demand for solar home systems. Manufacturing techniques were considered rather outdated by international standards, while questionable quality and above market average prices meant that international demand for Chinese product was limited. However, that situation has rapidly changed: indus-

try investment, including a number of new international joint-ventures are bringing China's production methods, scale and standards in line with current international practice. The largest module manufacturer now exports 60 % of its product to Europe, USA and other markets and is targeting a four-fold increase in production to 100 MW by 2006.

Domestically, with an estimated potential demand for village power of 15 GW, there is considerable scope for much more widespread use of PV. In the face of this, the central government target of 1 GW by 2020 seems rather conservative. Industry itself, backed by the World-Wide Fund for Nature (WWF), is far more ambitious, aiming for over 30 GW in the same timeframe, with a far stronger emphasis on grid-connected and building integrated PV, and large-scale (desert) systems. Despite its cautious target, the national government is investing heavily



in PV and other alternative energy developments, recently committing 140 billion CNY (16,9 billion USD) to non-nuclear new and renewable power generation by 2020. A New Renewable Energy Promotion Law is also under development and could be introduced by 2006.

Contact: Zhu Li, li.zhu@ispq.org



TRAINING FOR THE FUTURE

While the installation rate of multi-MW PV systems has been rapidly increasing in recent months, the vast majority of PV systems installed worldwide are focused at a much smaller scale – typically for single household or small community use.

This distributed generation focus, be that for grid-connected or off-grid services, requires a dispersed resource of installation and maintenance technicians and businesses to serve decentralised markets. In many locations, however, and particularly in developing countries, such infrastructure is non-existent or of variable (often low) standard. This is a particular concern for PV-based rural energy service programmes, where appropriate technician training is at least as important as hardware standards to the prospects for programme success and is a prerequisite for sustainable longer term business development.

As reported previously in PV Power (#13, September 2000), the Institute for Sustainable Power (ISP) is a non-profit organisation

which is working internationally to coordinate, develop, and maintain standards for evaluating and qualifying trainers, training programmes, and auditors in order to establish minimum standards for energy practitioners. Technicians who have successfully completed an ISP accredited training course would be deemed to have the competence to deliver appropriate levels of support to keep systems running and ideally also to further grow the energy service business. From its original PV remit, ISP has expanded to address other renewables, energy efficiency and distributed generation in general.

The Institute works with appropriate national standards agencies and training organisations to determine the minimum skills and knowledge which would be required for, say, a solar home system installer to perform a quality installation job. Other jobs could be similarly evaluated as required. Existing ISP quality standards may be appropriate for adoption without changes, though often

Following a train-the-trainers project in 2000, over 400 trainers and installers have been trained by the Sri Lankan Solar Energy Industry Association [PHOTO GSES]



INTERNATIONAL PROGRESS

ISP is now active in over a dozen developing countries, most notably China, under the Brightness Programme, and Sri-Lanka working with the Solar Energy Industry Association. Several OECD countries have set-up or are in the process of establishing appropriate training initiatives and certification schemes to ensure installation and service staff have the requisite technical skills and knowledge to safely and competently support their customers. ISP is supporting this process in Canada, Germany, Mexico, Netherlands, Poland, Switzerland, UK and USA. Australia, which in 1994 was one of the first countries to initiate a national accreditation programme for PV designers and installers is now looking to harmonise its scheme with the International Standard developed by ISP.

some adaptation will be needed to ensure conformity with specific national codes and practices. An accreditation committee ensures that the final standards are relevant and satisfy appropriate international benchmarks. Training programmes (organisations) and continuing education programmes are accredited to, and instructors and master trainers are certified to, these standards. On receiving accreditation/certification the training organisations or trainers can certify technicians.

Contact: Mark Fitzgerald,
markfitz@ispq.org, website: www.ispq.org

MAKING TRAINING WORK

The Role of Quality Management, Hardware Certification and Accredited Training in PV Programmes in Developing Countries is the subject of a recent report prepared by IEA-PVPS Task 9 (PV Services for Developing Countries). For a training accreditation and practitioner certification programme to succeed, it must:

- have the support of the industry it represents and be credible to funding, government, and member groups (in this respect, accreditation of training organisations should be steered by an independent non-profit organisation);
- provide a benefit to its users and stakeholders that outweighs its costs;
- be based on valid standards of knowledge and skills competency and on auditable measures of capability and process;
- have a chain of responsibility that extends from the national and/or international standards and oversight group to the participating organisations and individuals.

At the same time, any such initiative will only be sustainable where there is a viable market that provides adequate work for certified practitioners.

The report, T9-04:2003, can be downloaded from the PVPS website.

www.iea-pvps.org

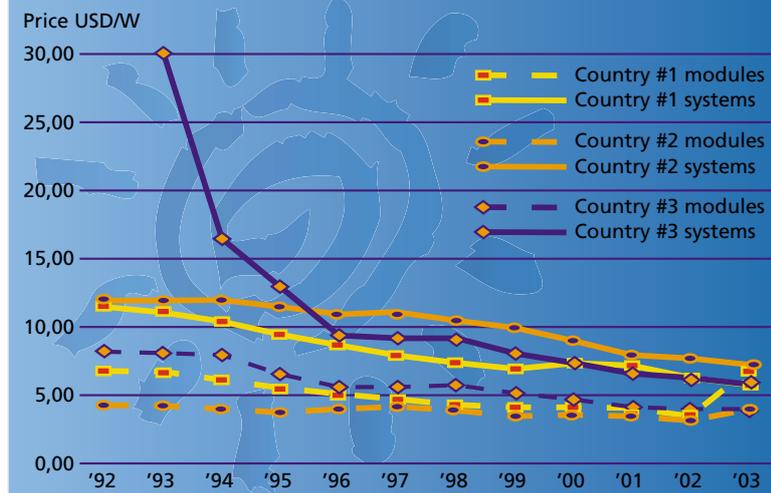
TRENDS IN PV APPLICATIONS

The IEA-PVPS annual international survey report, 'Trends in PV Applications' is always eagerly anticipated by PV industry and policy planners, being widely regarded as an accurate yet freely-available analysis of developments in the PV industry and markets in the participating OECD countries.

The latest edition of PV Trends, updated to account for 2003 data, was published in September. This edition contains a number of new features to provide better global market context and extra analytical value. In addition to the traditional IEA country-by-country scrutiny of installed capacity in the four main application segments (off-grid domestic; off-grid non-domestic; grid-connected distributed and grid-connected centralised), the new report presents estimates of installed capacity and annual sales volumes for the major non-OECD markets. This is a direct response to requests from the readers. The status of emerging manufacturing capability outside the IEA member countries is also presented alongside that of the IEA nations. Although these external data are more difficult to gather with the same degree of accuracy, these new features correspond to the IEA PVPS strategy to cover the global dimension of the photovoltaic market. The important topic of feedstock production is summarised for the first time and more details on the economic aspects of PV are included.

The report acknowledges that 'real', 'self-sustaining' or 'competitive' markets for large-scale adoption of PV lie somewhere in the future, with public support still important in the near-term, but the signs – public interest, industry innovation and stakeholder engagement – are on the whole quite positive.

In terms of the market for PV power applications in IEA-PVPS countries, the 476 MW installed in 2003 equated to 36 % annual growth; annual sales volumes are currently doubling in little more than two years. Total installed power now amounts to 1 809 MW.



MODULE AND SYSTEM PRICES IN 2003
/ COMPARED TO PREVIOUS YEARS

Between 1992 and 2003 the proportion of grid-connected PV capacity increased from 29 % to 78 % of the total, up from 74 % in 2002. This is mainly due to large-scale urban or suburban focused, government or utility supported programmes in Japan, Germany and the USA. However, off-grid applications still account for more total installed capacity and new capacity installed in 2003 in around one half of the reporting countries. Annual cell production rose by 32 % in 2003 to 686 MW while cell production capacity increased by 17 % to 934 MW – both growth rates considerably lower than last year. Currently 53 % of cell production and 60 % of module production in the reporting countries occur in Japan (both proportions up on last year).

Climate change policies have raised the profile of renewable energy in general and security of supply issues have raised political interest in all domestic and distributed energy supplies, but the implications specifically for PV remain uncertain. The report

also notes that the industry development aspects of PV (including the opportunities to provide jobs) have received attention with the publication of a number of 'technology roadmaps'.

Total national budgets for R&D, demonstration/field trials and market stimulation measures remain strong. In 2003 R&D budgets totalled over 235 million USD, with R&D receiving a clear emphasis in about one third of the reporting countries. Another third of the countries were significantly focused on market stimulation (but also funded R&D). Nominally market stimulation budgets amounted to some 1,78 billion USD in 2003, though this includes a significant proportion of loans (Germany) and state tax credits (USA). Funding of targeted demonstration and knowledge generation did increase somewhat compared to 2002, but remains small (63 million USD) in comparison to R&D and market stimulation.

The full report can be downloaded free-of-charge from www.iea-pvps.org.

GOOD THINGS COME...

One of the few criticisms levelled at the PVPS Trends report is that it takes a long time for the data to be published – typically nine months after the end of the reporting year. The process used to gather the base data is necessarily rigorous, in order to ensure the high levels of accuracy that users expect of IEA information.

IEA-PVPS Task 1 national representatives contact known industry, research, policy and other relevant stakeholders in their respective countries during the first quarter of the calendar year to gather updated

information. This is summarised in the national survey reports, which are completed by the end of May (these are now also posted on the PVPS website around mid-June).

The International Trends report is then compiled during June and July, and undergoes a further series of meticulous reviews to confirm data integrity. The final document is printed and distributed in September/October, and an electronic version is published online as soon as the layout is complete.

Like a fine wine it's worth the wait!

IN BRIEF

AUSTRALIA

The Federal Energy White Paper, 'Securing Australia's Energy Future', was released in June, with mixed news for PV.

Notably, a 75 million AUD (58 million USD) four year 'Solar Cities' initiative will fund a series of large-scale trials (typically involving 1 000 houses per project) to gauge the benefits of the concerted use of solar and energy efficient technologies combined with interval metering. Off-grid, however, the economic viability of remote area PV has been damaged by the removal of excise from diesel for stationary applications. This effectively makes diesel costs for power generation some 30 % cheaper.

AUSTRIA

PV investment is largely at a standstill for the time being. The Green Electricity Act 'Ökostromgesetz' is currently under review and the feed-in tariff model is under discussion. However, there is no clear indication that the 15 MW cap, which was surpassed in January 2003, and which is largely to blame for the hiatus, will be increased or removed. A number of states are offering their own investment subsidies to re-stimulate the market.

CANADA

The Canadian PV thrust is focused on overcoming the barriers to integration of small distributed generation in the grid. Natural Resources Canada has initiated a 4-year programme which, amongst others, will address grid interconnection standards and codes, products standards and certification, the impact of large-scale distributed generation on the grid and integration of PV into energy efficient homes.

DENMARK

The Danish national PV strategy has highlighted four R&D priorities. Action Plans will be developed for dye-sensitised cells, silicon feedstock, electronics and building integration. The strategy also calls for further investigation and development of deployment mechanisms and targeted demonstration to support industry; indeed government support for demonstration has recently been re-established. Several major new projects are currently under preparation, including a new 5 000 rooftops programme, which will pave the way for the complete removal of investment subsidies for PV by 2011.

FRANCE

France has a market incentive programme with the intent to install 20 MW of building integrated PV by 2006. Grants of up to 80 % and a feed-in tariff of 0,15 EUR/kWh are supporting this aim. A tax credit equivalent to 40 % of the investment cost will be introduced in 2005.

R&D priorities currently focus on building integration of PV (notably tiles and facades), storage, power conditioning equipment and electronic management of systems for rural areas.

GERMANY

Two new ground-mounted PV installations – which have a combined power output greater than the capacity installed in all but four of the PVPS countries during 2003 – were inaugurated in September. Within days of each other, a 4 MW plant was opened in Geiseltalsee, Saxony-Anhalt, and a 5 MW installation was unveiled in Espenhain near Leipzig. Built on a polluted brownfield lignite-mine ash site, the Espenhain plant is (currently) the largest grid-connected system in the world, though plans are afoot to add a further 2 MW to the Geiseltalsee installation.

ITALY

Installed capacity under the Italian rooftops programme amounted to some 10 MW as of July. A further 13 MW is expected to be added by the end of 2005. A new decree is expected to be finalised by the end of 2004 which will extend subsidies from the current 20 kW limit to systems of up to 300 kW and initiate the much-discussed feed-in tariffs. A rate of 0,5 EUR/kWh is anticipated, guaranteed for 15 years, with facades attracting a 10 % premium. The tariff will decrease by 3 %/year. A purchase obligation on the utilities is also anticipated.

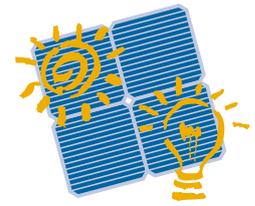
SPAIN

A new Royal Decree RD436/2004 gives a very favourable feed-in tariff of 0,4 EUR/kWh for plants of less than 100 kW, guaranteed for 25 years from the date of commissioning. Despite the favourable buy-back rate, an investment grant of around 40 % is needed to achieve the 10 year payback deemed acceptable for a typical household system. Grants of 30 % or more are now available in many regions of the country.

SWEDEN

A special subsidy for PV in public buildings was announced in April 2004. A maximum of 100 million SEK (13 million USD) has been allocated in an economic government bill. These funds are to be consumed in 18 months, and would correspond to about half the cumulative installed power to date. The scheme details have yet to be fully defined, however, the Swedish Energy Agency has recommended that the timeframe be extended. Separately, a feed-in tariff programme has also been proposed,

A number of grid-connected PV demonstration projects are emerging in Sweden. 'Harmonihuset' built for a housing exhibition in Malmö, features an 8 kW semi-transparent canopy.



though this is expected to be limited to 3 MW total installed capacity.

SWITZERLAND

Draft Legislation is proposing a 5400 GWh target for new renewables (i.e. in addition to existing hydropower) by 2030. That is equivalent to some 10 % of the Swiss electricity consumption in 2003. However, no specific targets have been set for PV.

UNITED KINGDOM

The UK's Major PV Demonstration Programme (MDP), which started in 2002, has recently been extended by one year to March 2006 and its total funding increased to 31 million GBP. The MDP has enabled continued growth in the UK PV market which has been increasing at an average of over 40 % in each of the past 5 years, with a total of 5,9 MW installed at the end of 2003. Recent investments in the UK include Sharp's 20 MW module assembly plant in North Wales and Romag's 6 MW glass/glass lamination facility near Durham.

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



PVPS NEWS

URBAN-SCALE PV

Task 10 is the 'Let's Do It' body of work targeted at building energy business solutions and creating global market opportunities for Urban-Scale PV. Task 10 participants have been very active in the first few months of the workplan. A workshop for Italian architects, planners and other stakeholders was held in Florence in October. Presentations from the event, 'Integrazione di Sistemi Fotovoltaici nelle Aree Urbane' can be downloaded from the conference organisers website www.etaflorence.it. The next workshop, targeted at the Portuguese construction industry, is under preparation. 'Photovoltaics in Buildings: Opportunities for Building Product Differentiation', will be held in Portugal on March 16, 2004. Work is also underway on a number of early deliverables. Four reports covering 'Mass Market Solar Builders', 'Urban Planning', 'Task 10 Best Practice Case Studies' and a sociological study on 'PV Value Analysis' are expected to be completed early in 2005. A new online resource presenting the work and outputs from Task 10 is under construction and will be accessible via the PVPS main website.

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: New report – 'Trends in PV Applications in selected IEA Countries 1992-2003'; Presentations from the Workshop 'Responding to the challenges of the expanding global demand for photovoltaics', Paris, 9 June '04.

Visit www.iea-pvps.org



PHOTO HAKUSHIN CORPORATION

TASK 2 EXTENDED

PVPS's collection and analysis of performance data from PV power plants around the world, will continue until at least August 2007. Four new participants, Canada, EU, Sweden and US join the six existing countries (AUT, CHE, DEU, FRA, ITA, JPN), while Poland will enter as an observer. This will add valuable information to the PV performance database and will further assist the group's work on system optimisation with respect to long-term performance, reliability and economics. A number of new activities are planned; in particular, the group aims to provide technical assessments and technology trends of PV systems and components. Technical analysis of the enlarged database will also enable the group to derive more reliable PV technology performance predictions. Of particular importance are plans to undertake an economic analysis of actual PV system costs including maintenance and failure costs for a variety of system configurations and applications. Task 2 is seeking volunteers to contribute relevant data via an internet-based survey. The questionnaire will be online in March 2005. Parties can register their interest to participate in the survey by contacting Task 2 Operating Agent, Ulrike Jahn: ujahn@easy.net.de.



DIARY DATES...

31st IEEE PV Specialists Conference

Lake Buena Vista, FL USA

3-7 January 2005

☛ Mr. Americo F. Forestieri

Fax: +1 440 234 1574

ieeepvsc.org

Rio 5

World Climate & Energy Event

Rio de Janeiro, Brazil

15-17 February 2005

☛ RIO 5 - LAREF

Fax: +55 21 25 18 22 20

www.rio5.com

3rd International Solar Concentrator Conference

Scottsdale, Arizona USA

1-6 May 2005

☛ NREL

www.nrel.gov/ncpv/scc

20th European PV Solar Energy Conference and Exhibition

Barcelona, Spain

6-10 June 2005

☛ WIP-Munich

Fax: +49 (0)89 7201 2791

www.photovoltic-conference.com

2005 Solar World Congress (ISES) and Solar 2005 (ASES)

Orlando, FL USA

8-12 August 2005

☛ IPS-15 Secretariat

Fax: +33 (0)1 4771900 5

www.swc2005.org

15th International PV Science & Engineering Conference

Shanghai, China

10-15 October 2005

☛ Shanghai Jiao Tong University

Fax: +86 21 54741040

pvsec15.sjtu.edu.cn

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

Rolf Öiström

FRANCE

André Claverie

GERMANY

Frank Stubenrauch

ISRAEL

Yona Siderer

ITALY

Salvatore Guastella

JAPAN

Osamu Ikki

KOREA

Kyung-Hoon Yoon

MEXICO

Jaime Agredano Diaz

NETHERLANDS

Job Swens

NORWAY

Fritjof Salvesen

PORTUGAL

Luis Silva

SPAIN

Manuel Blasco

SWEDEN

Lars Stolt

SWITZERLAND

Pius Hüsler

UNITED KINGDOM

Sarah Davidson

USA

Ward Bower

PV POWER

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Managing Editor:

Bernard McNelis

Editor:

Paul Cowley

Layout and production:

De Boer & van Teylingen, The Hague, Netherlands

Office for correspondence:

PV Power Newsletter, The Manor House,

Chineham Court, Lutyens Close, Hants RG24 8AG, UK

E-mail:

pvpower@itpowergroup.com

Website:

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

PV IN FOCUS

CASE STUDY

PROJECT SUMMARY

- **Location:** Umuwa, S. Australia
- **Solar Power Station:** 10 x 22 kW CS500 units
- **Receiver:** 64 x 36 cm² cells (22 % efficiency) per dish
- **Reflector:** 130 m² per dish
- **Annual Diesel Saving:** 160 000 litres
- **Annual CO₂ abatement:** 432 000 kg

Contact: Dave Holland, Solar Systems, dholland@solarsystems.com.au

Concentrating PV systems are beginning to gain recognition as a viable source of power for rural communities in areas with good direct sun. The indigenous Anangu Pitjantjatjara people of northwest South Australia are amongst the first to benefit from full-scale concentrated PV power. A 220 kW power station comprising 10 solar dishes was com-



missioned in 2003 to provide a renewable energy solution to reduce diesel consumption. The plant now provides power to the administration centre in Umuwa and the Ernabella community 40 kilometres away. Concentrating solar PV systems consist of mirrored collectors which direct the sun's rays onto a receiver located at the focus. PV concentrators operate most effectively in direct solar radiation, so reflectors should be kept free from dust and dirt and tracking systems are essential to ensure that the sun remains accurately focused on the receiver. The bank of PV cells at the receiver have to withstand concentrations in the order of 500 suns which, coupled to space-technology derived high efficiency, makes them

expensive units. However, as only a small number of cells are needed per dish, the total investment is very competitive with conventional flat-plate PV. In the right location, the generation cost can be 30 % less than from a comparable flat-plate system. Another major benefit is that the receiver can be designed to allow retrofitting of newer, more efficient cells without rendering the rest of the original investment obsolete. High-concentration PV efficiency improvements of 50-60 % (i.e. 35 % efficient cells) are anticipated within the next year, which could see cost-effective grid-support applications emerge in certain markets within the next five to ten years.

PVPS STAKEHOLDER CONSULTATIONS



The European PV Solar Energy Conference in Paris in June provided a useful forum for IEA-PVPS to meet with its stakeholders.

Task 1 (Information Exchange) hosted a half-day industry workshop to report on PVPS's market, policy and production analysis activities and to allow a number of other international groups to present recent roadmapping activities. The industry presentations highlighted a broad degree of commonality between regional industry development strategies and some common development needs such as stronger analysis of health and safety and broader lifecycle

issues. EPIA, the European PV Industry Association, expressed its keen intent to collaborate more closely with IEA-PVPS during the workshop. This has subsequently been consolidated by positive and constructive discussions between EPIA and the PVPS Executive Committee.

Task 9 (PV Services for Developing Countries – PVSDC) also utilised the Conference as an opportunity to hold a half day workshop for French industry and agencies at the Direction des Relations Economiques Exterieures (DREE) of the French Ministry of Finance. Amongst a number of points raised during the discussions, it was noted

that regional, national and local individualities require project developers to be flexible and inventive in finding suitable solutions for PV energy services delivery. Establishing the right institutional and regulatory frameworks were highlighted as crucial to the success of a rural electrification project, though the time and energy needed to achieve this has been underestimated in the past. The discussions also noted that large-scale, profitable business opportunities in Europe and Japan are causing a scarcity of panels, leading to higher costs and reduced interest for the developing country markets. Presentations from both workshops can be downloaded from the PVPS website.