



# PV POWER

Newsletter of the IEA Photovoltaic Power Systems Programme

DECEMBER  
2003

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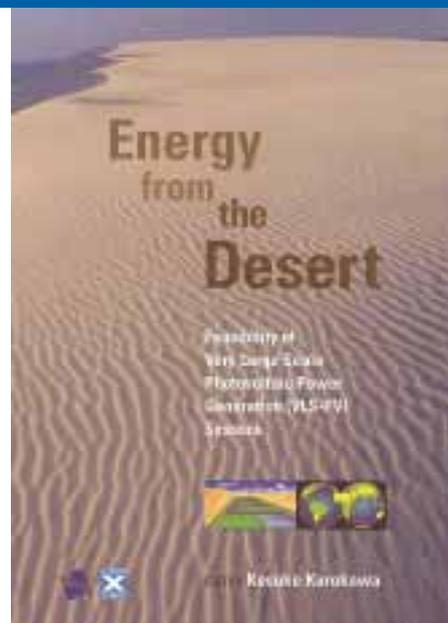
*Eyes on the Prize: One of the winners of the 2003 Swiss Solar Prize, The STMicroelectronics Building in Geneva, designed by Italian Architects, AMA Group. [PHOTO AMA GROUP/ENGENCO SYNERGIES]*

# DESERT PV – A GRAND VISION

**Since 1999, Task 8 has been assessing the prospects, implications and practicalities of developing very large-scale photovoltaic systems or ‘VLS-PV’. The findings of the VLS-PV expert group have recently been published in a new book ‘Energy from the Desert’.**

VLS-PV refers to systems in the 10 MW to multi-GW range, configured either as a single plant or as multiple (large-scale) sub-plants within the same district operating in harmony with each other. Given the comparatively diffuse nature of the solar resource, systems of this capacity imply coverage of very large areas of the earth’s surface – a 1 GW plant packed with standard single-sun modules, for instance would typically cover in the order of 7 km<sup>2</sup>. For many countries such large areas are simply not available, which is why many active PV countries are focusing on multiple, much smaller distributed generators. Nevertheless, about 1,75 million km<sup>2</sup> or one-third of the world’s total land area is barren desert. Using only a very small part of this infertile land for VLS-PV could, over the course of a year, generate the equivalent of current annual global primary energy demand.

Much of this area also happens to be located in the least developed, most energy-deprived regions of the world. Aside from putting this otherwise unproductive land to use, desert VLS-PV offers a number of other benefits, including maximising power generation potential from the inherent high insolation levels, the potential to drive down rapidly PV generation costs through massive and sustained demand for PV equipment, and – importantly for the local economies – huge employment and economic growth potential as local production of PV modules is central to the success of the VLS-PV concept. Task 8 sees the VLS-PV concept evolving in a modular fashion, initially from a construction of isolated bulk systems supplying surrounding villages using imported modules and balance of system components, through construction of local equipment manufacturing facilities to regional interconnection of these remote networks. Eventually major north-south and east-west interconnections can be established which helps balance seasonal and daily supply and demand. The ultimate vision is the creation of a global energy network supplying power through superconductors or other (breakthrough) energy transportation approaches.



As well as expanding the general concept, the 236 page book, published by James and James and priced 60 USD, presents the findings of ‘case studies’ of six potential VLS-PV desert sites, analysing aspects such as likely power generation costs, energy payback times and life-cycle emissions for alternative technologies, local socio-economic impacts, optimal plant configurations and transmission infrastructure concepts. Contact: James and James  
 Fax: +44 (0)20 7387 8998  
 A comprehensive summary is also available for download from the IEA-PVPS website: [www.iea-pvps.org](http://www.iea-pvps.org)

*Summary of the VLS-PV development scenario.*

STAGE	TECHNICAL ISSUES	NON-TECHNICAL ISSUES
R&D (4 years) Scale of system: 5 x 500 kW Module cost: 4 USD/W Module: import from overseas Inverter: import from overseas	Examination of the reliability of a PV system in a desert area Site selection for VLS-PV based on various conditions	Examination of the required ability of a PV system for grid connection Project planning, including training engineers and funding
Pilot (3 years) Scale of system: 25 MW Module cost: 3 USD/W Module: import from overseas Inverter: import from overseas	Development of the methods of O&M for VLS-PV Examination of the control of power supply from a PV system to grid line	Development of the area around VLS-PV to prevent desertification Training engineers for PV module production on-site
Demonstration (3 years) Scale of system: 100 MW Module cost: 2 USD/W Module: domestic/regional production Inverter: import from overseas	Development of the technical standards for O&M of VLS-PV including grid connection	Training engineers for mass production of PV modules and for BOS production on-site Preparation for industrialization by private investment
Deployment (5 years) Scale of system: 1 GW Module cost: 1 USD/W Module: domestic/regional production Inverter: domestic/regional production	Building the concept of ‘solar breeder’ from the viewpoint of technical and non-technical issues	



# GUIDANCE FOR PV IN DEVELOPING COUNTRIES

***PVPS Task 9 (Developing Countries) has released three new Recommended Practice Guides (RPGs) and a compilation of sixteen case studies.***

The new documents, and the others in the RPG series, are all intended to provide assistance to programme designers and project developers that are interested in implementing or improving support programmes for the deployment of PV systems for rural electrification. In particular they are focused at multi- and bi-lateral donors and development agencies, but also at host governments, project financiers, NGOs and other relevant groups.

## **QUALITY, CERTIFICATION AND ACCREDITATION**

Despite good intentions, many developing country PV programmes and projects have failed, and a large number of these failures can be attributed to lack of quality, both in terms of components and installation, as well as in the organisation and management of implementation programmes. Report T9-04:2003 provides a much-needed insight into how quality assurance throughout the project process can improve prospects for delivering a reliable energy service that has real benefits for the end-use community. It also shows how quality protects those involved in the project implementation, particularly the financiers and beneficiary governments.

The document focuses on three key aspects, namely quality management (procedures), technical standards (hardware) and training (personnel), which can each provide some measure of assurance that organisations,



staff and equipment used throughout the project chain are competent or 'fit for purpose'. In each case an overview of international best practice and relevant certification systems and accreditation bodies is provided.

## **PROGRAMME DESIGN, PLANNING AND IMPLEMENTATION**

Report T9-05:2003 aims to lead programme administrators through the process of planning and implementing a PV programme, broken down into four phases, namely preparation, programme design, implementation, and monitoring and evaluation. The purpose of the guide is not to provide an in-depth step by step 'standard' methodology, but rather to highlight the issues pertinent to rural energy programmes in developing countries. To a large degree, programme success or failure is governed by the early preparatory and design phases and the document emphasises this. In particular it outlines the key considerations which should guide the programme development process, notably the national and local context and objectives, end-user needs and the engagement of all stakeholders. From this process issues such as capacity building and training requirements can be clearly identified, as well as the suitability of technical alternatives.

## **INSTITUTIONAL FRAMEWORKS**

Continuing the theme and building on other documents in the series, report T9-06:2003 aims to define the key components and mechanisms of the institutional framework needed to support long term sustainable market development and deployment of PV services. The report consid-

*Planning for success: the new guides are intended to ensure future PV projects receive the 'thumb up'.*  
[PHOTO: IED]

ers five fundamental functions – End-User Education, Regulation and Planning, Installation and Maintenance, Operation and Use, and Facilitation of Implementation – that must be accommodated within the programme's institutional structure. The roles of critical stakeholders in meeting these functions are also presented.

In particular the guide looks at the role of regulation and the Public Authority as well as the creation of an enabling environment for mutual support between end-user groups, the service provider, and the facilitating agents. Again, the issue of quality of PV service over time is highlighted, alongside affordability of the service, financial sustainability and packaging of funding. This is complemented by a review of the range and applicability of instruments available for PV programme finance, including a brief assessment of risk mitigation measures to help mobilise private sector investment.

## **CASE STUDIES**

Examples of the various design and implementation factors that have influenced successes and failures of developing country PV initiatives, highlighting the aspects raised in the RPG document series have been compiled in a case study document. The report T9-07:2003 describes 16 PV deployment programmes covering 27 countries and a range of applications, and highlights the critical lessons that have been learned from these real-life projects.

All four reports are available for download from the PVPS website: [www.iea-pvps.org](http://www.iea-pvps.org)



## PEAK LOPPING FOR DIESEL MINI-GRIDS

***PV Peak Lopping – using photovoltaics to offset a proportion of peak power requirements either to avoid or defer network investment costs, or as a demand-side tool to reduce peak tariff charges – is emerging as a viable opportunity for grid-connected PV systems in many parts of the world. In Australia’s Northern Territory the same concept is being developed to significantly reduce diesel fuel consumption and part-load operation of generators on isolated grids.***

The Northern Territory (NT) has numerous remote communities, including aboriginal outstations and mining sites which rely on diesel mini-grids for power. The peak profile amongst these communities typically demonstrates a power demand 40-50 % greater than the base load during ‘work’ hours, with maximum demand occurring early in the afternoon. The peak pattern closely matches the solar resource availability, such that a solar array sized to meet roughly 30 % of the peak demand can effectively

allow the diesel engine(s) to serve as the base-load generator, the peak being met virtually exclusively by PV. This extends the period required between refuelling, which can be critical for isolated communities. It also allows a smaller diesel set to be operated at optimal load rather than a larger unit operating inefficiently at part load, which reduces operation and maintenance costs and further assists overall system reliability.

Following a successful small-scale demonstration project which confirmed the diesel-fuel and emissions abatement potential of what has been termed the ‘1/3rd peak lopping’ concept, the NT Power and Water Corporation recently completed two larger systems, assisted by the NT Centre for Energy Research. The project received financial support from the Australian Greenhouse Office and NT Department of Mines and Energy. Together they are expected to save 130 000 litres of diesel and reduce CO<sub>2</sub> emissions by over 400 tonnes each year. The first of these systems, a 56 kW plant at Bulman, an Aboriginal community located

in the tropical zone 350 km southeast of Darwin, has been operating since November 2002. The 2,9 million AUD (2,2 million USD) second phase of the project saw a further 241 kW commissioned in the Kings Canyon national park in Australia’s arid ‘red-centre’, 480 km west of Alice Springs in November 2003. The different climatic conditions and load profiles of the two installations will further help to confirm the viability of the concept for future commercial projects.

Power and Water Corp are expected to replicate the concept in other locations in the Northern Territory, but there is also good potential for transferring the same principle to other remote village communities, particularly in South East Asia and Latin America.

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*Kings Canyon is a major tourist area attracting up to 1000 visitors per day during high season. The new PV system will meet up to a third of the area’s peak power requirements.* [PHOTO: WOLFGANG MEIKE, NTCER]



# PVPS FOCUSES ON ITS SECOND DECADE

## ***IEA-PVPS held its tenth anniversary conference in Osaka, Japan in May.***

The meeting was an opportunity to review the achievements of the first decade of international PV co-operation under the IEA's umbrella, but more importantly it provided a forum for almost three hundred industry and government representatives to consider future development priorities and how PV and PVPS can best contribute to delivering a more sustainable global energy future. For the first time, a number of non-member state representatives were invited to participate in the deliberations, reflecting the IEA's, and in particular PVPS's growing commitment to seeing sustainable energy development opportunities extended to less developed countries.

Following the welcome presentations from amongst others Ms. Sanae Takaichi, Vice Minister of Japan's Ministry of Economy, Trade and Industry and Ms. Marianne Haug, Director, of Energy Efficiency, Technology and R&D at the IEA, Rick Sellers, Head of the IEAs Renewable Energy Unit, presented the global energy context and imperative for key OECD economies to move beyond current policies to ones with a stronger focus on renewables in order to break the trend of continued growth in carbon emissions. If implemented, enhanced policies which are already under discussion could reduce 2030 CO<sub>2</sub> emissions by over 2 000 million tonnes and see global emissions stabilising by that time. In line with the subsequent conference structure, he also proposed that PV's notable value, and therefore the best focus of PVPS activities in the immediate future, is for the rural development and distributed generation markets.

### **GRID-CONNECT PRIORITIES**

In terms of the priorities for grid-connected PV markets, the conference agreed that continuing cost reductions are clearly essential to demonstrate that public funding is delivering outcomes. But more work also needs to be devoted to developing and stimulating customers' willingness to pay



for PV's premium values, to assessing and reporting the impact of different public and private approaches to PV deployment and the possible interrelationship between these components, and to forming good working relationships with new stakeholders, particularly from the building, planning and finance sectors.

### **OFF-GRID PRIORITIES**

During the session discussing the off-grid market, representatives from China, India, Mongolia and Thailand provided an overview of respective experiences of the impediments to and relative successes of approaches for rural PV deployment. The experiences covered small single-dwelling solar home systems to battery charging stations and water pumping for villages and small communities. The general consensus that emerged was that diffusion efforts would be best assisted by further addressing the non-technical barriers, particularly system or service finance and education of users and project/programme implementers.

### **INTERNATIONAL INSTITUTIONAL ISSUES**

This theme was further developed in the following session which reflected the needs and roles of the major international agencies supporting PV deployment worldwide. It is clear that PV dissemination models need to be tailored to individual country or even local requirements if they are to deliver maximum benefit. At the same time, new international opportunities such as the Clean Development Mechanism could provide a

*Inspirational location: The IEA-PVPS conference was held in Osaka in May. The prefecture is also home to the magnificent 20 kW PV Skylight at the Kansai Gaidai University. The design won the New Energy Foundation Chairman's Award in 2002.*

[PHOTO FUJISASH CO LTD]

useful co-funding stream for PV in developing countries, though approaches for preparing numerous small PV projects for the CDM process must be significantly streamlined if this is to be successfully harnessed.

### **INDUSTRY'S FUTURE VISIONS**

The final presentation session enabled regional industry representatives to present their own visions, expectations and priorities for continuing market diffusion, as well as how policy makers can assist in creating an enabling environment to allow manufacturers to deliver these objectives. It is clear that long-term, stable policies and the decoupling of political risk are critical to the process. The meeting conclusions are being taken on board by the PVPS Executive Committee and are helping to define the programme's future priority activities, particularly within Tasks 9 (Developing Countries) and 10 (Urban PV). The critical role of electricity utilities to the success of distributed PV has also been highlighted and is the subject of a new special information activity of Task 1 (Information Dissemination). See page 8 for further details of the proposed Utility PV Forum.

The conference summary and key presentations are available for download from the PVPS website.

## IN BRIEF

**AUSTRALIA**

The PV Industry with support from the Commonwealth Government's Department for Industry, Tourism and Resources is finalising a national PV Roadmap. The document, which is likely to highlight the distributed rooftop sector, public facilities demonstration and regional exports as the key to local industry development is due for public release in first quarter 2004.

**AUSTRIA**

The Green Electricity Act announced in January 2003 remains the major regulatory framework for renewable energy systems and PV. The cap which limited the subsidy for grid connected PV under the Act to a total of 15 MW has already been reached. To avoid stagnation of the PV sector, some provinces (upper and lower Austria) are now offering a separate investment subsidy of up to 3700 EUR per kW installed. Austria is also developing its own PV roadmap with support from the Federal Ministry for Transport, Innovation and Technology.

**CANADA**

The Federal government is working with the newly established Canadian Working Group on the Carbon Market (CWGCM) to design a domestic emissions trading system. The system is eventually expected to link to those of other countries that have ratified the Kyoto Protocol, to enable Canada to take advantage of international emissions trade opportunities.

**DENMARK**

The SOL 1 000 programme targeting roof-tops is progressing well. Both the Danish Energy Authority and the Danish network operators (responsible for funding research into new environmental benign energy tech-

nology under a Public Service obligation) are working on strategies for PV. The national PV strategy, under the Danish Energy Authority, is expected to be ready by the end of 2003.

**FINLAND**

Finland's Solar Roadmap (covering both PV and active heating systems) has established targets for 2010 of 22 MW total installed PV to generate 100 GWh of electricity and an annual domestic market of 6,25 MW. An interim milestone of 5-6 MW installed capacity has been set for 2006. Industry turnover is expected to reach 150 million EUR in 2010 of which 80 % will be from exports.

**FRANCE**

The French Agency responsible for administering the energy and environment programme, ADEME, is undergoing restructuring. The implications for renewable energy are expected to become clear early in 2004.

**GERMANY**

The revision of the German Renewable Energy Law seems to be largely favourable for PV, particularly building integrated systems. As of January 1st 2004, Feed-in tariffs will increase from the current level of 0,48 EUR/kWh to 0,59 EUR/kWh for rooftop systems and 0,64 EUR/kWh for facade systems. For systems > 30 kW, the incentive is 0,04 EUR/kWh less in both cases, while ground mounted arrays will receive only 0,434 EUR/kWh.

**ISRAEL**

The Israel Institute for the Research of Seas and Lakes commissioned a special research vessel for their Laboratory for Lake Kineret [Sea of Galilee] Research. The vessel has a 1,5 kW PV system on board which provides power for water pumping,



refrigeration, testing equipment and illumination and can power the motor if needed.

**ITALY**

Despite very high public demand, the roof-top sector, supported by government and regional budgets, is experiencing rather slow growth due to ongoing bureaucratic issues. As a consequence only about 3,5 MW out of the anticipated 23 MW have so far been installed.

**JAPAN**

A new 'Field Test Project on Advanced Photovoltaic Power Generation Technology' commenced in FY 2003. 157 projects with a total capacity of 4820 kW were selected, with the objective of investigating and developing new modules, building integration products and control systems, and of encouraging overall system efficiency improvements. Separately, The Renewable Portfolio Standard Law came into effect on April 1st. The law places an obligation on electricity retailers to match an increasing proportion of their sales with electricity from 'new energy sources'. The target for new energy use in 2010 is 12 200 GWh, 1,35% of Japan's total electricity supply.

**KOREA**

South Korea is expected to launch its rooftop programme in early 2004. Current plans still envisage a 90 MW, 30 000 rooftops scheme supported initially via a 10 666 KRW/W (8,9 USD/W) rebate, equivalent to 70 % of the typical installed cost.

**SWEDEN**

A new scheme for renewables promotion was initiated this year. Renewable energy producers receive certificates that can be sold on the market, while energy consumers are required to buy them in proportion to their consumption. This will assist renewables production, but it is not certain it will benefit PV in particular.

**UNITED KINGDOM**

Engineering Recommendation G83 governing Connection of Small-Scale Embedded Generators (<16A per phase) to L-V Distribution Networks was released in September. This supercedes the PV-specific ER G77. Funding of 11,5 million GBP for 3,3 MW had been approved by the end of October under the Major PV Demonstration Programme.



*Semi-transparent PV modules on the atrium roof of the Insolvency Service building in London, one of the projects supported under the UK's large-scale BIPV field trial.*

**USA**

The Solar Energy Industry (Trade Association, SEIA, and the utility focused Solar Electric Power Association, SEPA, are reportedly considering a merger to create a single strong lobbying voice for solar and to make more effective use of solar interest groups' limited financial resources.

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

## PVPS NEWS

### SURVEY CONFIRMS JAPAN'S CONTINUING PV DOMINANCE

*The latest IEA-PVPS annual survey 'Trends in Photovoltaic Applications' covering the period 1992-2002 was published in September, and once again progress in Japan dwarfs developments elsewhere.*

Total generation capacity installed in the IEA-PVPS countries to date now exceeds 1300 MW. With over 184 MW of new generation capacity, Japan accounted for approximately 55 % of the 337,8 MW total new plant identified in IEA-PVPS countries during 2002. Together with Germany's 82,6 MW and USA's 44,4 MW, these three countries accounted for over 92 % of new installations.

Virtually all (178 MW) of the Japanese total was for grid-connected systems, while overall 88 % of new systems were grid-connected.

Overall, market growth in terms of cumulative installed capacity exceeded 34 %, with 8 countries reporting growth of around 25 % or higher. The UK topped the growth

league with an increase of slightly over 50 % compared to the 2001 total to reach 4,1 MW.

Total public budgets PV market stimulation, R&D and demonstration generally increased in the participating countries, the exceptions being Switzerland, Finland, Israel, Norway and USA. Austria, Canada, Israel, Norway and Sweden emphasised R&D spending, while others, for example, Australia, Italy and Japan, focused on market stimulation. However, in general, the 2002 budget for the demonstration and field trials of PV systems continues to represent a small proportion of public support, with the exception of the Korea and UK.

Total photovoltaic cell production volume for 2002 was reported to be 520 MW, an increase of 51 % from 2001. The cell production capacity (maximum production achievable if plants are fully utilised) grew 62 % to 801 MW. Module production and production capacity enjoyed similar strong growth throughout 2002.

Again Japan's influence on the global industry is evident, as it produced 47 % of the cells (244 MW) and 54 % of the modules (260 MW) reported. Germany showed an expansion of over 40 % for module production, to account for 8,5 % of the total reported market. Interestingly, however, the German production is reported to account for less than half of the local demand in 2002. Over 80 % of modules shipped in 2002 were either single or multicrystalline silicon.

As in previous editions, the 2002 report also summarises major projects and programmes in each country as well as price trends, emerging policies and other factors that may influence future PV markets.

The report is available for download from the PVPS website or from national newsletter contacts.

### NEW ON OUR WEBSITE

*A visit to the IEA-PVPS website is well worthwhile, with numerous statistics, reports, news and other features to view or download. The site is regularly updated. Recent additions include:*

'Quick Find' – tools to help you locate common topics or subjects for different interest groups.

The latest Survey Report of IEA-PVPS Markets and Applications for PV by Task 1.

The latest update of the Task 2 performance database providing data on 372 monitored plants.

Three new Recommended Practice Guides and a report of 16 case studies on PV in developing countries by Task 9.

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

### DIARY DATES...

*ICORE 2004 - Intl Congress on RE for Sustainable Development*  
Bangalore, India

26-30 January 2004

☛ Elpro Energy Centre

Fax +91 80 3487396

*14th International PV Science and Engineering Conference*

Bangkok, Thailand

26-30 January 2004

☛ Dusit Kruangam,

Chulalongkorn University

Fax +66 2 2 518991

[www.chula.ac.th/pvsec-14](http://www.chula.ac.th/pvsec-14)

*Power-Gen Renewable Energy*

Las Vegas, USA

1-3 March 2004

☛ Lisa Gasaway, Penwell Corp.

Tel +1 918 832 9245

[pgre04.events.pennnet.com](http://pgre04.events.pennnet.com)

*Physics, Chemistry & Engineering of Solar Cells*

Badajoz, Spain

16-19 May 2004

☛ SCELL-2004 Secretariat

Fax +34 924258615

*19th European PV Solar Energy Conference and Exhibition*

Paris, France

7-11 June 2004

☛ WIP

Fax +49 (0)89 720 12 791

[www.wip-munich.de](http://www.wip-munich.de)

*EuroPV 2004 - From Laboratory to Mass Production*

15-20 October 2004

Kranjska gora, Slovenia

☛ Marko Topic, PV-NET

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[www.pv-net.net/europv2004.htm](http://www.pv-net.net/europv2004.htm)

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### 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.

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## ZERO ENERGY FAMILY HOME

### CASE STUDY

#### PROJECT SUMMARY

- Location: Dintikon, Switzerland
- PV System: 6,3 kW grid-connect
- Annual electricity production: 5700 kWh (balances annual electricity demand)
- Passive building construction minimises thermal fluctuations  
Roof/wall insulation: 38-40 cm  
Windows U-value: 0,74 W/m<sup>2</sup>K
- Electrical heat pump: 2,2 kW<sub>th</sub>
- Solar thermal collector: 4,5 m<sup>2</sup>

Contact: Werner Setz, Architect  
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***PV, solar water heaters, a ground-source heatpump and sensible passive solar design have been combined to create an energy neutral house in Dintikon, Switzerland.***

Over the course of the year, the 6,3 kW grid-connected PV installation is expected to generate 5700 kWh of electricity, sufficient for the entire household's electrical needs, including heatpump, lighting, ventilation and even cooking. To achieve this, the building design uses the principles defined by the Passive House Institute in Darmstadt, Germany to conform to the new Swiss 'Minergie-P' building standards. Notably

this includes a compact building shell, high levels of insulation, minimal winter shading, windows oriented and sized to maximise winter daytime solar gains and minimise heat losses, and heat recovery on the ventilation system. This holistic design keeps the annual heating load for space and water to just 26,5 kWh/m<sup>2</sup>. 4,5 m<sup>2</sup> of thermal collectors provide 2000 kWh/a for water heating, topped up by the heat pump in winter. Overall the heat pump and ventilation system require less than 2000 kWh/a to maintain comfortable living conditions, allowing the balance of the PV system's output to meet the needs of the other household appliances.



## UTILITY PV FORUM

***Although – or perhaps because – attitudes towards and experience of PV technology differ vastly amongst electricity utilities in IEA-PVPS participating countries, generators, network operators and suppliers can have critical influences on the success or failure of grid-connected PV projects.***

During the IEA-PVPS Osaka Conference (see page 5 for details), the concept of a utility forum emerged as a potentially valuable tool for assisting the electricity utility sector to share experiences and information on how to handle PV and potentially also other

decentralised generators such as fuel cells and micro-cogeneration systems which are achieving increasing penetration on distribution networks.

The challenge of defining such an international forum has been taken on by PVPS Task 1 (Information Exchange and Dissemination). Under Denmark's leadership and with financial support from the Danish Network Operator ELTRA, Task 1 is developing the utility concept further with a view to formally launching the forum with a 2-day workshop in Denmark in April/May 2004. The workshop will serve to identify and present examples of problems and opportunities, such as network integration and

management of RE technologies; modeling & forecasting of decentralised generators; conditions and regulations for grid-connection; standardisation; value of electricity from decentralised stochastic generators; decentralised generation as a business area, etc. It will also serve to establish membership and practical operating structures, work content and distribution of responsibilities, communication approaches and future development of the Forum.

Interested parties from electric utilities, network operators and regulators should contact Peter Ahm at PA Energy for further information. Fax: +45 86 93 36 05