

# IEA PVPS International Conference 2003



— PAST, PRESENT AND FUTURE —

SUMMARY OF IEA PVPS International Conference 2003

19-20, May 2003

Osaka International Convention Center

# PVPS



IEA PVPS / NEDO

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## FOREWORD

The International Energy Agency (IEA), founded in November 1974, is an autonomous body within the framework of the Organisation for Economic Co-operation and Development (OECD), and it carries out a comprehensive programme of energy co-operation among its 23 member countries.

The European Commission also participates in the work of the IEA.

The IEA Photovoltaic Power Systems (PVPS) Programme is one of the collaborative R&D agreements established within the IEA. Since 1993, a variety of joint projects have been conducted in the applications of photovoltaic (PV) conversion of solar energy into electricity. The Programme's mission is "to enhance the international collaboration efforts through which photovoltaic solar energy becomes a significant renewable energy source in the near future", and it is divided into nine Tasks, which address specific aspects of photovoltaic technology development and implementation. The Programme is overseen by an Executive Committee. Further details on the Programme are available on the PVPS website [www.iea-pvps.org](http://www.iea-pvps.org).

This report was prepared as a publication of the IEA PVPS International Conference 2003 held in Osaka, Japan, in May, 2003.

In total, 24 countries, which included developing countries, participated in the Conference. Australia, Austria, Belgium, Canada, China, Finland, France, Germany, India, Israel, Indonesia, Italy, Korea, Laos, Mongolia, The Netherlands, Poland, Spain, Sweden, Switzerland, Thailand, the United Kingdom, the United States of America, and Japan

## ACKNOWLEDGEMENTS

This report is based on a summary of the IEA PVPS International Conference 2003 produced by Photovoltaic Power Generation Technology Research Association, Japan.

The IEA PVPS International Conference 2003 was organized and sponsored by the International Energy Agency (IEA), together with the New Energy and Industrial Development Organization (NEDO) of Japan, and in collaboration with the Ministry of Economy, Trade and Industry of Japan, the U.S. Department of Energy, The Solar Energy Industries Association, the European PV Industries Association, the Japanese Photovoltaic Energy Association, the Japan Electrical Manufacturers' Association, and The Federation of Electric Power Companies.

## INTRODUCTION

### Background to the Fourth Executive Conference

Following discussions at the Third Executive Conference in Venice in 1999, the IEA and IEA PVPS made requests on several occasions to Japan that it be the organizer for the Fourth Executive Conference.

In response, Japan presented a proposal at the 17th Executive Committee [hereafter the Exco] in Sacramento, April 2001 that the Fourth Executive Conference be held in Osaka in May 2003. This proposal received the approval of the Committee.

Following the ExCo's decision, the International Conference Committee (the core organizing body for the Conference) set to work strenuously with the IEA PVPS, relevant governments, and industry leaders to formulate an overall theme for the Conference. However, drastic changes in the PV market and lingering doubts about the methods employed by previous Conferences prevented the concerned parties from being able to come to an agreement, and discussion came to a temporary standstill.

In an effort to overcome the deadlock, Japan returned with a new conference theme at the 20th ExCo held in France, October 2002. Japan proposed that since 2003 would mark the 10th anniversary of IEA PVPS, the Conference seize the opportunity to review past experience and to envision future actions. A subheading of "Photovoltaic Power Systems in the Past, Present and Future" was proposed.

After some deliberation, the ExCo approved this proposal and agreed to the following principles in order to facilitate the preparations for the Conference:

- The Operating Agent of Task 9 would provide support to the Conference on behalf of the PVPS; and
- The Conference Committee would have final authority on the agenda and programme of the Conference.

With these principles established, every kind of support was mustered to expedite preparation efforts in view of the limited time available, one of them being the production of a paper outlining the conference theme.

## 1 . Conference Programme

Monday, 19 May 2003

### ■Opening Session (9:45-10:50)

● Scope and Objectives :

In the opening session, the background and objectives of this conference will be introduced. Welcome speeches will be delivered by the Japanese Ministry of Economy, Trade and Industry (METI), New Energy and Industrial Technology Development Organization (NEDO), and IEA.

In addition, Dr. Inamori, Chairman Emeritus and Director of Kyocera, will make a keynote speech.

- Chairpersons: Mr. Stefan Nowak (Chairman of IEA PVPS ExCo)  
Mr. Ichiro Hashimoto (NEDO, Japan)
- Speakers: 0-1 Opening Remarks  
Mr. Stefan Nowak (Chairman of IEA PVPS ExCo)  
0-2 Welcome speech  
Ms. Sanae Takaichi (Vice-minister of METI, Japan)  
0-3 Welcome speech  
Mr. Tsutomu Makino (Chairman of NEDO, Japan)  
0-4 Welcome speech  
Ms. Marianne Haug (Director of Energy Efficiency, Technology and R&D of IEA)  
0-5 Keynote speech  
Dr. Kazuo Inamori (Chairman Emeritus and Director of Kyocera, Japan)

Coffee Break

### ■Session 1: PV Achievements & Future Prospects (11:05-12:05)

● Scope and Objectives:

In this session, various efforts being undertaken for renewable energy and photovoltaic power technologies will be described. Specifically, representatives of the IEA will make a presentation on their efforts to date in promoting renewable energy technology, and future prospects. The Chairman of the Executive Committee of the IEA PVPS Programme will make a presentation on its achievements so far.

- Chairpersons: Mr. Harry Schaap (Deputy Chairman of IEA PVPS ExCo, Australia)  
Mr. Ichiro Hashimoto (NEDO, Japan)
- Speakers: S1-1 Mr. Rick Sellers (Renewable Energy Unit of IEA)  
S1-2 Mr. Stefan Nowak (Chairman of IEA PVPS ExCo)

Lunch

## Monday, 19 May 2003

### ■Session 2: National Issues and Needs – Grid-connected PV Systems (13:30-15:20)

#### ●Scope and Objectives:

This session will be a panel discussion session dealing with national issues and needs for the promotion of grid-connected PV systems.

First, representatives from Japan, the United States, and the EU will introduce technologies and the development of renewable energies, including PV power, policy trends in expanding the introduction of such energies, and goals and issues for the future.

Representatives of other countries active in promoting grid-connected PV systems will also participate.

In addition, there will be discussion of technical and non-technical problems in expanding the introduction of the PV systems as well as possible international cooperation for overcoming such problems.

- Chairpersons: Ms. Maria Malmkvist (Swedish Energy Agency, Sweden)  
Mr. Takao Kashiwagi (TUAT, Japan)
- Rapporteur: Mr. Greg Watt (IEA PVPS Task 1 OA, Australia)
- Speakers: S2-1: Mr. Hitoshi Ito (Director of Energy Observation and Renewable Energy Dept., ANRE, METI, Japan)  
S2-2: Mr. L. Kazmerski (NREL, U.S.A.)  
S2-3: Mr. C. Hünnekes (FC-Juelich, Germany)
- Commentators: Mr. Gary Shanahan (DTI, U.K.)  
Ms. Alison Reeve (SEDA, Australia)  
Mr. Jürgen Schmid (Institut für Solarenergieversorgungstechnik, Germany)  
Ms. Lise Nielson (Eltra, Denmark)

#### Coffee Break

### Session 3: National Issues and Needs on PV Technology – Off-grid PV systems (15:35-17:35)

#### ●Scope and Objectives:

This session will be a panel discussion session on national issues and needs for promoting stand-alone PV systems.

Representatives of countries actively promoting stand-alone PV systems will introduce their current efforts for such systems, and problems in promoting them. Speakers and commentators will then discuss technical and non-technical issues in promoting and expanding PV systems as well as international cooperation needed for realizing such promotion and expansion.

- Chairpersons: Mr. Jinsoo Song (Korea Institute of Energy Research, Korea)  
Mr. Kazutaka Ihori (Sharp, Japan)
- Rapporteur: Mr. Philippe Jacquin (IEA PVPS Task 3 OA, France)
- Speakers: S3-1: Ms. Zhu Li (IT Power, China)  
S3-2: Mr. E.V. R.Sastry (MNES, India)  
S3-3: Mr. Namjil Enebish (Ministry of Infrastructure, Mongolia)  
S3-4: Mr. Sawad Hemkamon (Ministry of Energy, Thailand)
- Commentators: Mr. Martin Djamin (The Agency for Assessment and Application of Technology, Indonesia)  
Mr. Chris Zamora (ASEAN Center for Energy, Indonesia)

#### Conference Banquet (18:00-20:00)

**Tuesday, 20 May, 2003**

**■Session 4: International institutional Issues and Needs on World PV Markets (9:00-11:00)**

● Scope and Objectives:

In this session, international institutional issues and needs for the sustainable expansion of PV markets will be discussed.

First, recent international activities in PV deployment will be introduced.

The speakers and other commentators will then hold a panel discussion on technical and non-technical issues in the sustainable use of PV systems as tools for international assistance as well as on expectations of international PV markets.

- Chairpersons: Mr. Bernard McNelis (IEA PVPS Task 9 OA, U.K.)  
Mr. Kazuo Yoshino (Yoshino Consultants, Japan)
- Rapporteur: Mr. Peter Ahm (PA Energy, Denmark)
- Speakers: S4-1: Ms. Marianne Haug (Director of Energy Efficiency, Technology and R&D of IEA)  
S4-2: Mr. Sandeep Kohli (IFC, U.S.A.)  
S4-3: Mr. Noboru Yumoto (Energy & Environment Institute Inc, Japan)
- Commentators: Mr. Mark Fitzgerald (Institute for Sustainable Power, U.S.A.)  
Mr. Harry Schaap (IEA PVPS ExCo, Deputy Chairman, Australia)  
Mr. Emil Ter Horst (Horisun, Netherlands)

Coffee Break

**■Session 5: Future Visions of PV Industries (11:15-13:05)**

● Scope and Objectives:

The session will open with a discussion on the PV industry vision, with speakers from Japan, Europe and U.S.A. PV industry associations, followed by discussion by other major PV suppliers. To realize the visions, issues to be discussed include: industry key activities, the public authority support that can be expected, desirable international cooperation, and expectations regarding PVPS activities.

- Chairperson: Mr. Gary Shanahan (D.T.I, U.K.)  
Mr. Kosuke Kurokawa (TUAT, Japan)
- Rapporteur: Mr. Lisa Dignard-Bailey (CANMET, Canada)
- Speakers: S5-1: Mr. Winfried Hoffman (EPIA, Belgium)  
S5-2: Mr. Tetsuzo Kobayashi (JPEA, Japan)  
S5-3: Mr. Robert Hassett (Department of Energy, U.S.A.)
- Commentators: Mr. Masami Abe (Sharp Corporation, Japan)  
Mr. Junichi Honda (Kyocera Corporation, Japan)  
Mr. Hiroshi Inoue (Sanyo Electric Corporation, Japan)  
Mr. Yukio Uehara (Mitsubishi Electric Corporation, Japan)  
Mr. Ernesto Macias Galan (EPIA, Belgium)  
Mr. C.F. Gay (Sun Power, U.S.A)  
Mr. David Hogg (Pacific Solar, Australia)

Lunch

**Tuesday, 20 May, 2003**

**■Round Table Discussions: Future Role and Missions of the IEA PVPS toward the Second Decade (15:00-17:00)**

● Scope and Objectives:

In this round table session, the future roles and functions of the IEA PVPS in contributing to the healthy development of the international PV market will be discussed, on the basis of discussions on topics of other sessions. A summary of this conference will then be compiled

- Chairpersons: Mr. Stefan Nowak (Chairman of IEA PVPS ExCo)  
Mr. Ichiro Hashimoto (NEDO, Japan)

- Session summaries from rapporteurs (Session2, 3, 4 and 5)

Discussion member: Session chairpersons, rapporteurs and representatives from IEA, governments and PV industries.

## 2. SUMMARY OF THE CONFERENCE

### Opening Session

#### *Session Summary*

The background and objectives of the international conference were stated. Welcoming addresses were made by the Ministry of Economy, Trade and Industry, NEDO, and IEA. In addition, Kazuo Inamori, Chairman Emeritus of Kyocera Corporation, provided the keynote address.

**Co-Chairs:** Stefan Nowak (Chairman of the Executive Committee of IEA PVPS Programme, Switzerland)  
Ichiro Hashimoto (NEDO, Japan)

#### *Speakers*

Opening address: Stefan Nowak (Chairman of the Executive Committee of IEA PVPS Programme, Switzerland)  
Welcome address: Sanae Takaichi (Senior Vice-Minister of Economy, Trade and Industry)  
Tsutomu Makino (Chairman of NEDO)  
Marianne Haug (Director of Energy Efficiency, Technology and R&D, IEA)  
Keynote address: Kazuo Inamori (Chairman Emeritus of Kyocera Corporation)

#### *Summary*

Opening remarks: Stefan Nowak (Chairman of the Executive Committee of IEA PVPS Programme, Switzerland)

It is timely to be able to discuss at this conference on the 10th anniversary of the founding of the PVPS Programme the ideal nature of international cooperation and the future of PV power generation. I hope that through the support of stakeholders the conference will be productive and yield many results that can be reflected in future PVPS activities.

Mr. Nowak also extended his appreciation to the host nation, Japan.

Welcome address: Sanae Takaichi (Senior Vice-Minister of Economy, Trade and Industry)

It is extremely meaningful to hold this international conference for the first time in Asia on the 10th anniversary of the start of the PVPS Programme. Developing responses to global environmental problems has become an important international issue. It is therefore extremely important for academia, industry, and government around the world to cooperate in expanding the market for PV power generation systems, a technology making use of natural energy. Japan has established an installation target for PV power generation systems for 2010 and is actively promoting policies to expand the market for such systems. Technology development is part of these policies and is achieving considerable results. We intend to continue our market expansion activities as we closely cooperate with related international organizations. We hope that the market for PV power

generation systems will expand worldwide and that this conference will clarify the direction toward this goal.

Welcome address: Tsutomu Makino (Chairman of NEDO)

This year marks the 30th anniversary of the inception of the Sunshine Plan, which became the foundation for technology development for PV power generation in Japan. It is also the 10th anniversary of the establishment of IEA's PVPS Programme. Major research results on PV power generation have been achieved by NEDO and other institutions, and I offer my respects to the efforts of those who have been involved in such research activities in Japan and in foreign nations. PV power generation is said to have a global market size of around ¥200 billion. This market is still small and has yet to become self-sustaining. A report of the G8 Renewable Energy Task Force indicates however that PV power generation is the energy source experiencing the highest growth rate. The direction for international cooperation on technology development and market expansion to achieve a sustainable market should be based on:

- Vigorous international exchanges of technology development information as well as competition
- Solution of issues related to and international cooperation on grid connection technology for power systems including renewable energy sources other than PV power
- Promotion of suitable national measures based on international cooperation to encourage the deployment of PV power generation systems in non-IEA member nations

Keeping these points in mind, I hope that vigorous discussions will take place at this conference and that these discussions will be reflected in the new activity guidelines of the IEA PVPS Programme.

Welcome address: Marianne Haug (Director of Energy Efficiency, Technology and R&D, IEA)

It is an honor to have so many people from around the world attend this conference commemorating the 10th anniversary of the IEA PVPS Programme. I offer my thanks as representative of the IEA and extend my appreciation to the hosts METI and NEDO. Japan's achievements in promoting the spread of PV power generation are serving as a catalyst for the spread of such power generation in other nations. This international conference will be an important milestone transcending previous conferences. When considering future energy demand, the trends for developing nations will have an enormous effect on world energy conditions. The continued interest of IEA member nations and non-member nations will be important. I hope that this conference will provide an important opportunity to look back over the last decade and to anticipate the next decade in moving toward the realization of a competitive PV power generation market.

Keynote address: Kazuo Inamori (Chairman Emeritus of Kyocera Corporation)

As a founder of the PV power generation business in Japan, Mr. Inamori reflected on its history at Kyocera, provided a background to the establishment of an industry organization, offered his thanks for the installation support programs of the government and electric power companies, and made valuable proposals regarding the further diffusion of PV power generation systems.

- The diffusion of PV power generation systems will require a change in the nature of society.
- This shift must be to a society that is content with what it has, a change that will enable

coexistence with nature.

- The idea that mass consumption is good must be changed. The mass consumption of fossil fuels and the desire for economic growth must be questioned.
- The teaching of Buddha of being content with what you have offers the key to the solution of global environmental problems and promoting the diffusion of PV power generation.
- Society must shift from being a selfish society to an altruistic society whose aim is coexistence with all living things.

The time has come for humankind to reflect very seriously on a society that places priority on economic growth. The philosophy of being content with what you have, that searches for a way of life that can keep desires in check, contains the key to solving global environmental problems and promoting the further diffusion of PV power generation.

I hope that this conference will promote the global diffusion of PV power generation systems through technology innovation and that it will be a historical conference promoting a shift in consciousness toward a new society of coexistence. I also hope that it will be a fruitful conference regarding its aim of promoting, through international cooperation, PV power generation as an important renewable energy source in the near future.

## **Session 1: PV Achievements and Future Prospects**

### ***Session Summary***

Presentations were made on developments in renewable energy and in PV power generation technology, on IEA achievements and the future outlook, and on IEA PVPS activities and results.

**Co-Chairs:** Harry Schaap (Vice-Chairman of the Executive Committee of IEA PVPS Programme, Australia)  
Ichiro Hashimoto (NEDO, Japan)

**Presentations:** “PV: Progress and Promise”  
Rick Sellers (IEA Renewable Energy Unit)

“The IEA PVPS Programme: 10 years of International Co-operation”  
Stefan Nowak (Chairman of the Executive Committee of IEA PVPS Programme)

### ***Summary***

Rick Sellers: There is a need for a technology development program that will enable new energy to become socially and economically accepted. The PVPS Programme is regarded as a successful model that has contributed to the development and expansion of the market for PV power generation systems.

Stefan Nowak: The focus of PV power generation systems will switch to the development of large markets. The PVPS Programme will promote activities toward the establishment of sustainable markets and toward moving from demonstration to implementation. It will be important for the Programme to emphasize the major role that PV power generation will fulfill as a natural energy

source.

In response to a question from the audience on whether cooperation with developing nations is possible within the framework of the PVPS action plan, the following was stated as a common view. The Action Plan says that advanced nations will constitute the core of the promotion of cooperation with developing nations. There is also a plan to promote education activities as a first step.

## **Session 2: National Issues and Needs—Grid-connected PV Systems**

### ***Session Summary***

Following presentations on national issues and needs for the promotion of grid-connected PV power generation systems, a panel discussion session was held on technical and non-technical problems in spreading grid-connected PV power generation systems as well as on possible international cooperation for overcoming barriers.

**Co-Chairs:** Maria Malmkvist (Swedish National Energy Administration, Sweden)  
Takao Kashiwagi (Professor, Tokyo University of Agriculture and Technology, Japan)

**Rapporteur:** Greg Watt (Australian PVPS Consortium, Australia)

**Presentations:** “Japan’s New and Renewable Energy Policies”  
Hitoshi Ito (New and Renewable Energy Division, Ministry of Economy, Trade and Industry, Japan)

“Solar Energy Policies and Trends in the United States”  
Lawrence Kazmerski (NREL, U.S.A.)

“Support for R&D and Market Introduction of PV in Germany”  
Christoph Hünnekes, Research Center Jülich, Germany)

**Commentators:** Gary Shanahan (DTI, U.K.)  
Alison Reeve (SEDA, Australia)  
Jürgen Schmid (ISET, Germany)  
Lise Nielson (Eltra, Denmark)

### ***Summary***

Government representatives from Japan, the United States, and Europe presented the current situation and future outlook for policies to promote PV power generation.

In the presentation for Japan, it was stated that an annual installation rate of 34 percent would be necessary to increase the share of new energy sources (a target of 3 percent by 2010) and to achieve the target for the installed base of PV power generation systems (4,820,000 kW by 2010). To reach these targets, it will be particularly important to reduce costs over the next four years.

In the presentation for the United States, it was reported that support is chiefly for distributed energy, and the issue is how to manage PV power generation.

In the presentation for Europe, it was reported that integrated European research is seeking to reduce the cost of modules, realize new technologies, establish grid connection technologies, and achieve a target of 1 euro/W thin-film technology.

Commentators then reported on domestic measures for promoting PV power generation systems and/or on current situations.

Questions were raised from the audience on prospects for commercializing hydrogen energy and on the outlook for Germany's 100,000 roof program for 2004 and beyond.

It was explained that the application of hydrogen energy in automobiles will become the driving force and that vigorous investment should make hydrogen energy practical by 2030. It was also stated that the future conception of PV power generation should emerge in Germany in relation to the current review of the electricity purchase law.

### **Session 3: National Issues and Needs—Off-grid PV Systems**

#### ***Session Summary***

After presentations on national issues and needs for the promotion of off-grid PV power generation systems, a panel discussion session was held on technical and non-technical problems in expanding the market for stand-alone PV power generation systems as well as on possible international cooperation for overcoming barriers.

**Co-Chairs:** Jinsoo Song (KIER, Republic of Korea)  
Kazutaka Ihori (Sharp Corp., Japan)

**Rapporteur:** Philippe Jacquin (PHK Consultants, France)

**Presentations:** “PV in China”  
Zhu Li (IT Power, China)

“The Photovoltaic Program in India”  
E.V.R. Sastry (MNES, India)

“Recent Status and Future Prospects of Photovoltaics in Mongolia”  
Namjil Enebish (Ministry Infrastructure of Mongolia, Mongolia)

“Photovoltaic Development and Deployment -- Status and Prospects in Thailand”  
Sawad Hemkamon (Department of Alternative Energy Development and Efficiency, Thailand)

**Commentators:** Martin Djamin (Agency for the Assessment and Application of Technology, Indonesia)

### ***Summary***

Government and other representatives from China, India, Mongolia, and Thailand made the following presentations on the current situations of PV power generation in their respective countries.

In the presentation for China, it was reported that promotion is centered on the spread of solar home systems (SHS) as a rural electrification program. More recently, a research and development program centered on building-integrated PV systems is being pursued. The World Bank and UNDP-GEF are involved in market expansion projects. While PV installation is taking place under government and other promotional programs, issues faced are: (1) the inability so far of such installations to contribute to the development of sustainable markets, and (2) the fact that understanding for PV power generation has failed to deepen due to the inadequate number of successful projects. The development of educational and other projects will be needed in the future.

In the presentation for India, it was reported that the country has a production capacity of 32 MW and that more than 500,000 households use PV power generation through rural electrification programs. Water pump systems as part of rural electrification programs are found to be effective, and subsidies are provided by the government. Solar energy centers undertake examinations, evaluations, and the establishment of standards. The renewable energy agency provides support to users and manufacturers. Government support includes tax breaks and a reduced depreciation period.

In Mongolia, PV has found effective application as a source of power for telecommunications, given the country's large geographic area and the ample availability of sunlight. A 100,000 Solar Ger Program was established in 2000. The plan is now in its second phase, installation is scheduled to be completed for 25,000 households by the end of 2003, and the intent is to complete the program as planned for all households by 2010.

In the presentation for Thailand, it was reported that PV power generation is promoted through the efficient use of energy and through economic incentives. Efforts are being made to improve technology, and a diversified energy policy is being promoted. The installed base is currently 5.6 MW, and PV power accounts for about 80 percent of the power for battery charge stations, telecoms, and water pumps. A budget of \$150 million has been established for the PV solar home project to install PV systems for 300,000 households (120 W) by 2005. An installed base of 100 MW is being planned for 2011, and energy use will be promoted through the strengthening of research.

Commentators noted that the use of PV power generation systems requires the development of regional management systems and that government support other than through financial institutions is necessary.

Questions were raised from the audience on issues related to expanding the market for PV power generation systems. The comment was made that market expansion would require a proper understanding of the nature of promotion programs, financing policies, deployment of service providers, policies to reduce the government burden, and promotion of private-sector participation as well as the dissemination of information on the use of promotion programs. The majority view

was that efforts were needed to address non-technical problems.

#### **Session 4: International Institutional Issues and Needs for World PV Markets**

##### ***Session Summary***

International institutional issues and roles for the sustainable expansion of the PV market were discussed. Following presentations on the endeavors of major international organizations involved in promoting the spread of PV systems, a panel discussion session was held on technical and non-technical issues on the sustainable use of PV systems as an international support tool as well as on expectations for international PV markets.

**Co-Chairs:** Bernard McNelis (IT Power, U.K.)  
Kazuo Yoshino (Yoshino Consultant, Japan)

**Rapporteur:** Peter Ahm (PA Energy, Denmark)

**Presentations:** “The PV Challenge”  
Marianne Haug (Office of Energy Efficiency, Technology and R&D, IEA)

“A Current Overview of World Bank Group PV Activities”  
Sandeep Kohli (IFC, U.S.A.)

“Application of CDM to PV Rural Electrification Projects”  
Noboru Yumoto (Energy & Environment Institute Inc., Japan)

**Commentators:** Mark Fitzgerald (Institute for Sustainable Power, U.S.A.)  
Emil ter Horst (Horisun, The Netherlands)  
Harry Schaap (Vice-Chairman of the Executive Committee of IEA PVPS Programme, Australia)

##### ***Summary***

The presentations below were made, followed by comments from commentators, questions from the audience and a lively exchange of views.

Marianne Haug (Office of Energy Efficiency, Technology and R&D, IEA):

For PV power generation, vigorous support programs in various countries are stimulating investment by industry and are powering the development of PV technology, but it must not be forgotten that PV power must survive competition with other clean energy sources.

PV is competitive in a number of ways including the following, and this advantage should be exploited.

- It is clean energy (and can be sold at a premium).
- It is an independent source of energy (developing nations are greatly dependent on PV).
- It offers a source of electricity for people in remote locations.

- Its products can readily be turned into applications desired by consumers

The PVPS Programme intends to promote the participation of developing nations and to enable the development of a sustainable market.

Sandeep Kohli (IFC, U.S.A.):

PV usage differs by nation for developing nations where governmental systems may differ. This should be understood in thinking about commercialization. A universal model does not exist, and determining which model will be the winner will take some time.

Noboru Yumoto (Energy & Environment Institute Inc., Japan):

Taking the example of the PV rural electrification program of Laos, he raised the issue of including PV in CDM (installation costs, comparative baseline, conditions for sustained use for 21 years, etc.) and proposed that this issue be solved through international cooperation activities.

Commentators noted that:

- Financial institutions should revise program criteria and consider skills development in addition to financial considerations. Affirmation was given to the World Bank's emphasis of infrastructure development and system quality.
- International cooperation activities are needed to promote utilization of CDM for small scale energy.
- PV should seek to develop niche markets and products.

## **Session 5: Future Visions of PV Industries**

### ***Session Summary***

The session opened with presentations by representatives of national or regional industries regarding future visions developed by the PV industries of Japan, Europe, and the United States. This was followed by comments from major PV suppliers and by a panel discussion session on the future shape of the PV industry based on industry visions.

**Co-Chairs:** Gary Shanahan (DTI, U.K.)  
Kosuke Kurokawa (Professor, Tokyo University of Agriculture and Technology, Japan)

**Rapporteur:** Lisa Dignard-Baily (CANMET, Canada)

**Presentations:** "3GW cumulative PV installations as goal in EU Whitebook assured by cost effective feed-in law"  
Winfried Hoffman (European Photovoltaic Industry Association, Belgium)

"Future Vision of U.S. Photovoltaics Industry"  
Robert Hassett (Department of Energy, U.S.A.)

“PV Industry Vision”

Tetsuzo Kobayashi (Japan Photovoltaic Energy Association, Japan)

**Commentators:**

Masami Abe (Sharp Corp., Japan)  
Jun’ichi Honda (Kyocera Corp., Japan)  
Hiroshi Inoue (Sanyo Electric Co., Japan)  
Yukio Uehara (Mitsubishi Electric Corp., Japan)  
Ernesto Macias (Isofoton, Spain)  
C.F. Gay (SunPower, U.S.A.)  
David Hogg (Pacific Solar, Australia)

**Summary**

The following presentations were made on the future visions of PV industries in Europe, the United States, and Japan, and on the roadmap for achieving targets.

Targets for the installed base of PV power generation systems in the roadmaps of Europe, the United States, and Japan were introduced with various conditions (subsidy trends, R&D results, percentage share of electricity demand, etc.). The table below depicts these targets in the 10-year units used by Japan.

(thousands of kW)

<b>Installed Base Target</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>
Europe	3,100	--	--
United States	--	36,000	--
Japan	4,820	28,700	82,800

The key points of the presentations were as follows.

Europe: The program requires a long-term vision. Subsidies should be understood as an investment in future energy supply.

United States: Individual states have more influence than the federal government regarding the issue of market development. Incentives differ by state, and the risk of capital investment is high for the industry.

Japan: The achievement of an installed base of 4,820,000 kW by 2010 is an essential condition, and further cost reductions and market expansion are imperative. PV is a unique source of energy where individuals can become directly involved in environmental issues. Whatever changes occur over the next decade will not come as a surprise.

*Commentators*

Commentators remarked that the support of R&D is necessary. For companies, market size based on total amounts was preferable. Expanding the market means gaining the trust of and satisfying users, and quality improvements will be important (product, sales, and installation). In short, future visions are meaningless in the abstract; it is when efforts are made to achieve the vision that value

increases. Healthy competition between companies will become the driving force for achieving the vision.

C.F. Gay remarked that the issue is communicating the vision to as many people as possible and that each person in the industry can take the lead in publicizing the vision.

The concluding remarks were made as follows. PVPS is effective as an international network for exchanging information on PV power generation. It is important to be guided by PV power generation visions to create strategies, schemes, and frameworks for achieving goals.

### **Round Table Discussion: Future Role and Missions of the IEA PVPS Programme in its Second Decade**

#### ***Session Summary***

Discussions taking place in other sessions were reported. Based on this, the future roles and functions of the IEA PVPS Programme in contributing to the sound development of the international PV market were discussed, and a summary of the international conference was provided.

Rapporteurs presented the outcomes of the other sessions and reported on the nature of discussion. Following a period of questions and answers, a co-chair provided the following summary report.

#### ***Concluding Remarks of Co-Chair Stefan Nowak***

This international conference presented and discussed the future of PV power generation from the two perspectives of government organizations and industry. The future visions of the industries of Japan, the United States, and Europe, economies with a majority share of the world market, were provided along with a road map for achieving targets.

Asian nations reported on the current situation and future challenges for the market introduction of PV power generation systems. In another session, such international frameworks as IEA, IFC, and CDM were indicated as offering opportunities for PV power generation.

While the market for PV power generation is growing rapidly, competition with other renewable energy technology will increase, and new efforts are needed to survive this competition and to achieve further growth for the industry.

Decentralized grid-connected applications and rural electrification in developing nations were identified as the most important areas for supporting the ongoing deployment of PV power generation. The solution of technical and non-technical problems was confirmed as a significant area for future international cooperation.

This international conference provided a unique opportunity to address and discuss the major issues for the further deployment of PV power generation.

The views and recommendations voiced during the conference will be studied and deliberated in the Executive Committee of the IEA PVPS Programme and are likely to be incorporated in the

strategies and activities of the Programme.

### 3. PRESS RELEASE

May 21, 2003

#### **“IEA PVPS International Conference 2003” successfully completed**

The International Energy Agency (IEA) Photovoltaic Power Systems International Conference was held on May 19 and 20 in Osaka, jointly sponsored by the IEA Photovoltaic Power Systems Implementing Agreement (IEA PVPS) and New Energy and Industrial Technology Development Organisation (NEDO). The conference was held on the occasion of the 10-year anniversary of IEA PVPS, marking the first decade of international co-operation within the IEA. The aim of this conference was to present the achievements of this important international co-operation programme and to discuss the future needs to create sustainable growth and expanding markets of photovoltaic power systems. Attended by 258 participants including not only IEA PVPS member states but also, and for the first time, non-member state representatives, the conference has been successfully completed.

At the opening, guest addresses were made by Ms. Takaichi, Vice Minister, Ministry of Economy, Trade and Industry and Ms. Haug, Director, Energy Efficiency, Technology and R&D, IEA; a greeting address from the hosting country was made by Mr. Makino, Chairman, NEDO, and a keynote lecture was given by Mr. Inamori, Chairman Emeritus, Kyocera Corporation— all of which I deeply appreciated as the chairman of the IEA PVPS Executive Committee.

During the conference, the future visions for photovoltaics from both country and industry perspectives were presented and discussed. The industrial communities of Japan, the United States and Europe, which dominate the world market, indicated their future visions and road maps to achieve their goals. Asian countries presented their current status and experiences with the market introduction of photovoltaics. A further session addressed photovoltaics and its opportunities in the framework of international institutions, namely the IEA, the International Finance Corporation (IFC) and the Clean Development Mechanism (CDM). While photovoltaics enjoys a rapid market growth and industrial expansion, the competition with other clean energy technologies will continue to increase, representing new challenges for the growing industry.

To support the ongoing deployment of photovoltaics, the needs of the most important markets were addressed, namely for decentralised grid-connected applications and rural electrification in developing countries. Both technical and non-technical issues were identified which will constitute further subjects of international co-operation.

The conference was a unique opportunity to address and discuss the main critical issues for the further deployment of photovoltaic markets. The outcome and recommendations from the conference will be immediately introduced into the discussion of the future strategy and activities of the IEA PVPS programme, starting with the meeting of its Executive Committee today.

#### 4. Breakdown of Participants

	<b>Japan</b>	<b>Europe (12 Countries)</b>	<b>U.S.A</b>	<b>Other countries (10 countries)</b>	<b>Total (24 countries)</b>
<b>Government</b>	41	13	3	13	70
<b>Electricity</b>	45	13	1	6	65
<b>PV</b>	65	7	3	4	79
<b>Finance</b>	1	0	1	0	2
<b>Consultant</b>	11	4	0	3	18
<b>Others/Secretariat</b>	36	4	0	0	40
<b>Press</b>	16	4	0	2	22
<b>Total</b>	215	45	8	28	296

## ANNEX

### International Conference Committee

	<b>Name</b>	<b>Institution</b>
Chairs	Stefan Nowak	IEA PVPS ExCo, Chairman
	Ichiro Hashimoto	NEDO(Japan)
Deputy-Chairs	Harry Sharp	IEA PVPS ExCo, Deputy-Chairman
Members	Hanns-Joachim Neef	IEA
	Robert Hassett	DOE (U.S.A.)
	Bernard McNelis	IT Power(U.K.)
	Greg Watt	Australian PVPS Consortium
	Winfried Hoffman	EPIA
	Tetsuzo Kobayashi	JPEA(Japan)
	Glenn Hamer	SEIA(U.S.A.)
	Kazuhiko Kato	AIST(Japan)

### Conference Secretariat

<b>Name</b>	<b>Institution</b>
Mary Brunisholz	IEA PVPS Executive Secretary (NET Ltd.)
Yukihiko Kimura	New Energy and Industrial Technology Development Organization
Tsunehisa Harada	Photovoltaic Power Generation Technology Research Association