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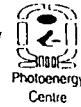
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 **International Centre**
for Science and High Technology

PHOTOENERGY CENTRE/ AIN SHAMS UNIVERSITY



INTERNATIONAL WORKSHOP ON

"PV Applications"

27-29 May 2002
Cairo, Egypt



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International Workshop on
"PV Applications"
Cairo, Egypt 26 – 30 May 2002

CONTRACT NO. 2002/133

Final report

Cairo, Egypt



**UNITED NATIONS INDUSTRIAL DEVELOPMENT
ORGANIZATION
International Center for Science and High Technology**

Organized by
Photoenergy Center, Faculty of Science, Ain Shams University,

International Workshop on
"PV Applications"
Cairo, Egypt 26 – 30 May 2002

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FINAL REPORT

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Prepared by
Professor Dr. M. S. A. Abdel-Mottaleb
Director, Photoenergy Center, Ain Shams University

Cairo, Egypt

June 2002



**UNITED NATIONS INDUSTRIAL DEVELOPMENT
ORGANIZATION**
International Center for Science and High Technology
International Workshop on
"PV Applications"

Organized by
*Photoenergy Center, Faculty of Science, Ain Shams University,
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FINAL REPORT

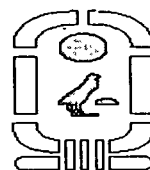
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Cairo, Egypt

June 2002



Photoenergy Center

Final Report

**Workshop on
"PV Applications"**

Organized by

*Photoenergy Center, Faculty of Science, Ain Shams University,
27 – 29 May 2002, Cairo, Egypt*

In collaboration with

International Center for Science and High Technology

UNITED NATIONS INDUSTRIAL DEVELOPMENT
ORGANIZATION

Sponsored by: ICS-UNIDO

Hosted and co-organized by: Photoenergy Center, Cairo, Egypt

The Workshop has been held in Cairo taking into account the advantage of its geographic location between Middle East and North African countries, which have good experience and strong interest in PV applications.

The meeting has been hosted by the Photoenergy Centre, Ain Shams University, Cairo, Egypt from 27 – 29 May 2002. Scientific sessions were conducted at the conference facilities of Sonesta hotel Heliopolis. Detailed program is described in

the book of abstracts that has been distributed among the participants upon arrival. A copy of the program is enclosed.

All participants were received at the Cairo international airport by a representative of Ain Shams University and accommodated at Sonesta Hotel Heliopolis.

Complete list of active participants is also given. Participants are from different countries in the region Algeria, Mali, Tunis, Jordan, Saudi Arabia, and Kuwait and from Egypt together with experts from Germany, United Kingdom and Italy.

In the opening session Professor *M. A. Tag El-Din (The Minister of Health and population)*, Professor Saleh Hashem (*The President of Ain Shams University*), Professor *S. S. M. Hassan (the Dean of the Faculty of Science)*, Eng. *Umberto Moschella (Consultant, ICS-UNIDO)* and Professor *Sabry Abdel-Mottaleb (Director of the Photoenergy Center)* extended a warm welcome to over 80 audience. Professor Tag Eldin, the Minister of Health and Population addressed the importance of the field of PV in the desired development of rural area. He emphasized the role of clean energy in health and its importance in population redistribution. He also stressed on the importance of the Photoenergy Center and its role as one of the most efficient Center in penetrating the field of PV applications in Egypt and on the regional as well as the international levels.

The attendees were representing the invited participants and different VIPs from many Egyptian Authorities and Institutions. Most importantly, the initiative of the ICS of holding and organizing this meeting in collaboration with the Photoenergy Center is highly appreciated from the distinguished Egyptian and International participants and all are encouraging the ICS to keep the topic of PV on the top of its activities.

The program offered 19 lectures and presentations that were delivered by a group of international experts. Moreover, two practical and hands-on equipment sessions were organized and chaired by Professor Abdel-Mottaleb. One poster session has been also operated. Top experts in the field have chaired the main

sessions of lecture and country representations. Very active discussions and interactions between participants have been noticed. The final recommendations and conclusions are enclosed at the end of this report. The participants represented a very good mix of senior scientists, engineers, industry personnel and economists (from Bank MISR, one of the largest Egyptian Bank in the region) with some of them on the important decision-making level.

All lectures and country reports showed and emphasized the enormous importance of the PV energy for the enhancement of economic and social developments in developing countries in addition of being an infinite source of clean energy with emphasis on PV home systems, telecommunications, grid-connected PV systems, Building integrated PV, Water Pumping for irrigation and water desalination.

All presentations were accompanied by lively discussions indicating the enthusiasm and competence of the participants in the issues under consideration. Actually, these discussions went on over coffee and meals breaks and often well into the night, which was certainly facilitated by the good infrastructure provided in an excellent hotel.

The participants from the region and from Egypt have been pointed out that typical existing successful applications of PV include stand-alone power systems for cottages and remote residences, navigational aides for the Coast Guard, telecommunication sites, military sites, water pumping for farmers and emergency call boxes for highways.

Through lots of field tests all over the world, PV systems have been devised so as to adapt to the various kinds of applications and also substantive know-how has been established on the institutional aspects, pilot project characteristics, implementation process, operational and technological issues.

The cost of PV systems, which had been a long-standing question for PV applications, has decreased to a realistic level due to the improvement of energy conversion efficiency and the development of thin-film cell technology. In fact, recently the cost has remarkably dropped and it is already competitive with the

conventional energy sources especially in rural areas and share an important role of electricity generation in the near future.

In summary, it has been emphasized that the worldwide demand for solar electric power systems has increasingly gained momentum in the last decade. Energy from PV solar cells is one of the most judicious choices, particularly in the non-grid remote areas owing to its reliability, competitive cost and easy maintenance.

As a consequence, PV applications in developing countries will become essential for our every day life not only in rural areas but also inside the newly established towns using building integrated PV.

With the new phase of PV technology - from the R&D stage to industrialization – a practical approach for technology transfer and sharing is strongly recommended.

One of the successful parts of the Workshop attracted the participants were the practical sessions in which PV facilities and experimentations featuring state-of-the-art PV training and demonstration. The participants were impressed to see and to touch these prototypes PV equipment such as Solar Car, charger, radios, fans etc. Detailed information and photos about the workshop is available at the website: www.photoenergy.org

The social events accompanying the Workshop, which included a short sightseeing tour succeeded in creating a warm social atmosphere and good contacts among the participants.

The lecturers and the participants expressed their sincere thanks to the Photoenergy Center for the excellent organization and the outstanding hospitality extended to all and for the friendly atmosphere that created many fruitful contacts that would be last for many years to come.

Directors and Organizers of the Workshop were:

- **Eng. Umberto Moschella, Consultant, ICS-UNIDO**
- **Prof. Sabry Abdel-Mottaleb, Director, Photoenergy Center**
- **Local Organizer: Dr. Sabry Abdel-Mottaleb and the staff members of the Photoenergy Center in collaboration with the Public Relation Department of Ain Shams University.**

NOTES AND FINAL CONCLUSIONS:

The Workshop was held in Cairo, Egypt during 27 – 29 May 2002.

All participants strongly acknowledged the initiative of the UNIDO International Centre for Science and High Technology (ICS) in sponsoring this meeting, and its foresight in conducting a program on photovoltaics and applications.

The participants also acknowledged the Photoenergy center of Ain Shams University for its excellent job in organizing the meeting, and other Egyptian Authorities (Ministry of Agriculture and Lands Reclamation, Ministry of Health, Ministry of Higher Educations and Bank Misr) for their support.

The meeting reached the following conclusions:

- **There is an urgent need for low cost and certified PV systems to the development process of remote and rural areas in the region.**
- **The potential market for PV applications, especially for lighting, home systems, water pumping and desalination in the Arab and African regions is very large. “Two billion people in the developing world still live without electricity -- to light their homes, to pump pure water, to refrigerate vaccines, to connect to the wider world.”**
- **There is still an urgent need for making feasibility studies concerning establishment of a factory for PV in the area (Egypt is willing to establish such a factory to meet with the needs of the region).**
- **The dual benefits of bringing elective power to remote areas through PV are poverty alleviation and reducing climate change.**
- **There is a need for programs on financing PV solar-powered projects such as solar-powered schools, clinics, water pumping and desalination projects as well as awareness building and training in PV systems, their assembly installation, repair and maintenance, design and calls on ICS –**

UNIDO and other international and Governments and organizations in the Middle East and North African region to address this.

- **There is universal agreement on the importance of networking among group members concerned with PV applications. Sharing of experiences and know how of groups working on and promoting PV is invaluable in facilitating future development and cooperation.**
- **Based on the Mobile phone story, increased focus is needed in the application and commercialization of PV systems. Commercial activity should have the largest impact on increasing the uptake of PV technology.**
- **There is a myth on the high cost of PV due to lack of Standard Documentation about the economics of the PV systems. In many cases PV is the only viable solution, particularly if life cycle costs are compared. There is an existing market and this will expand as the cost of PV continues to fall.**
- **Monitoring of PV systems to obtain performance data is important.**
- **Success stories need to be publicized and replicated elsewhere.**
- **Supportive National Policy as to encourage usage of clean technologies and its impact on the environment protection and regional initiatives such as establishment of demonstration projects of PV applications are necessary to achieve optimum growth of PV and renewable energy systems.**

The participants of the Workshop made the following recommendations:

- **Calls upon the regional authorities to establish - or to include to the already existing - technical institutions to build up the qualified needed technicians of PV systems (similar to those specialized in other public equipments such as TV, electronics, etc).**
- **Establish specialized university degrees (Diploma and Master) and training programs leading to certification in fields related to PV technologies. These programs should cover areas including technology management and development as well as installation, operation and maintenance of systems. This initiative aims to create a future generation of professionals with an educational background in these important fields.**
- **Calls upon banks, donor organizations and countries to support and contribute to feasibility studies needed for the establishment of a PV factory in the region.**

- **Calls upon different countries and different sectors to make statistical studies about their needs from the PV systems.**
- **The “important” task to influence the public and political opinion must be undertaken by any entities, which may be helpful: Universities, Experts, Authorities and govern mental institions. The goal must be to convince the government that RE deserves a similar subsidings as conventional power and fuel (and food).**
- **Only “qualified” information should be given to the public and the politicians. (Avoid contradictory information) Prepare a “standard documentation” about Renewable Energy and their advantages. (Don’t leave the essential truth about RE to “accidental” talks and publications).**
- **Preparation and Developments of a standard Educational and Course ware in the field of the renewable energy in general (different level of education) and encourage research in RE and particularly in PV.**
- **Calls upon national and international Banks and financial organizations to offer soft loans for establishing demonstration and monitoring projects for different PV applications.**
- **Encourages sharing and cooperation in national programs on PV, and inviting participants to each other’s training programs and participation of experts in various centers of expertise.**
- **Encourage link and integration between researcher/Government and industry. This could involve commercialization and local production of technologies, policy initiatives and determining priority areas of research.**
- **Project development workshop by ICS – UNIDO in different countries to bring together stakeholders on renewable to develop good projects.**
- **Calls upon UNIDO to develop in cooperation with other international and regional organization regional GEF projects for capacity building on PV and renewable energy in developing countries and the region.**
- **Calls upon ICS to continue and expand its programmes on PV and renewable energy in general as it fits both the area of high technology and new materials, and the environment.**
- **Establishment of an electronic information exchange and the development of a website to be managed by ICS/UNIDO.**
- **Initiating the monitoring of PV systems to obtain performance of data as a high priority. The information is to be shared. The collection (and analysis) of data will assist resource assessment and planning, and evaluation of systems.**
- **Developing training in the effective planning and design of PV based, and PV hybrid systems.**
- **More research has to be done for two objectives: enhance performance of PV systems and reduce costs. Theoretical modeling and simulation, using new ideas about production of energy, has to be considered in similar workshops.**

- **Developing strategies to influence National Policy (and Regional Initiatives) and that will assist the uptake of renewable energy technologies. Establish and maintain international collaborative links.**
- **Call upon the European community to help in transferring the simplest technology for production of the PV cells and components locally, to decrease its initial cost.**

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Workshop on "PV Applications"

27 – 29 May 2002, Cairo, Egypt

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Workshop on "PV Applications"

27 – 29 May 2002, Cairo, Egypt

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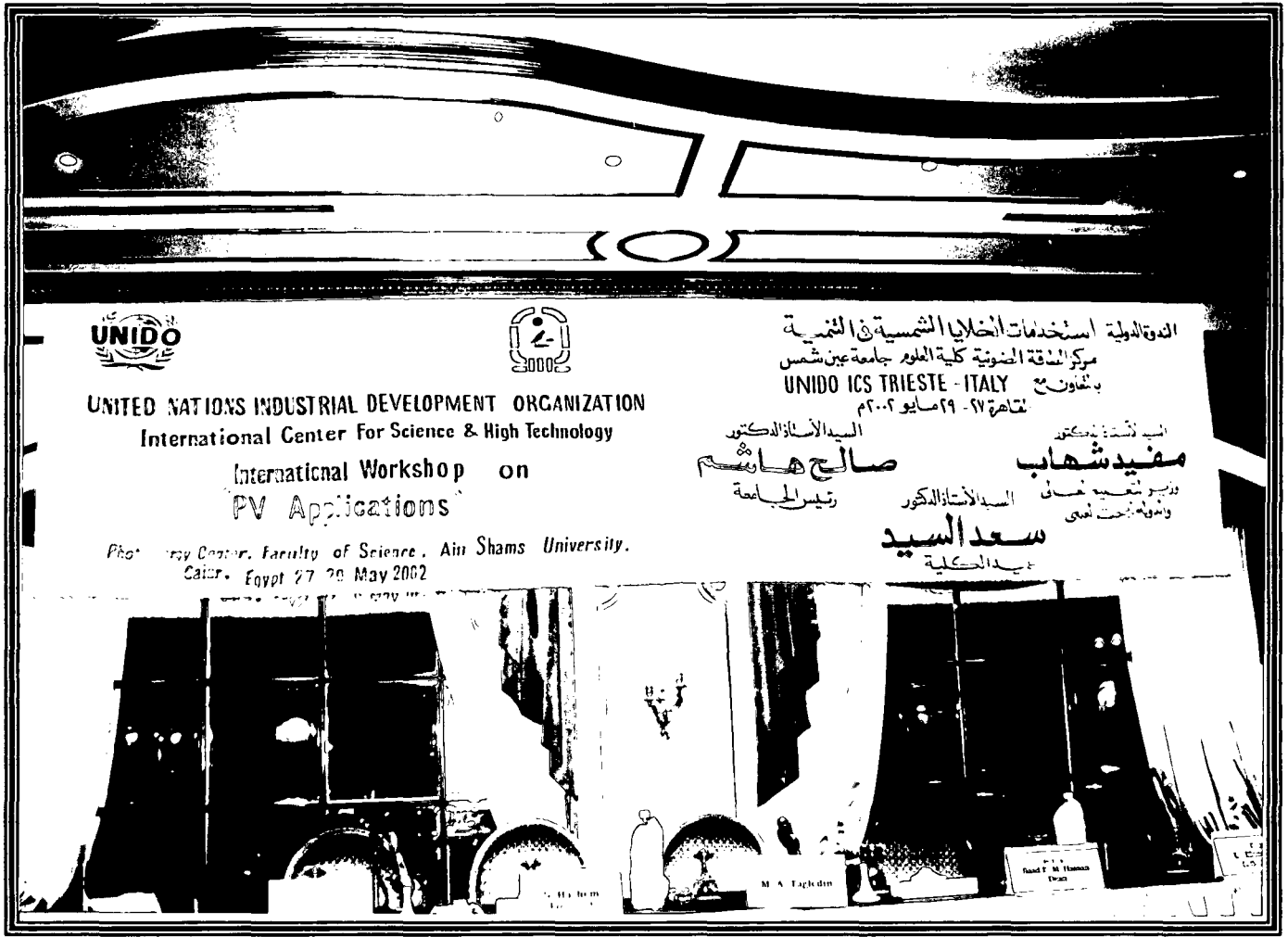
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Opening of the Workshop on PV Applications









UNITED NATIONS INDUSTRIAL DEVELOPMENT
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International Center for Science and High Technology
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Financial Statement in US\$*

Travel Expenses	10323.0
DSA	06600.0
Equipment (PV Systems)	00910.9
Transportation conference facilities	01500.0
Honorarium (local lecturers)	00880.0
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Total	20213.9 \$

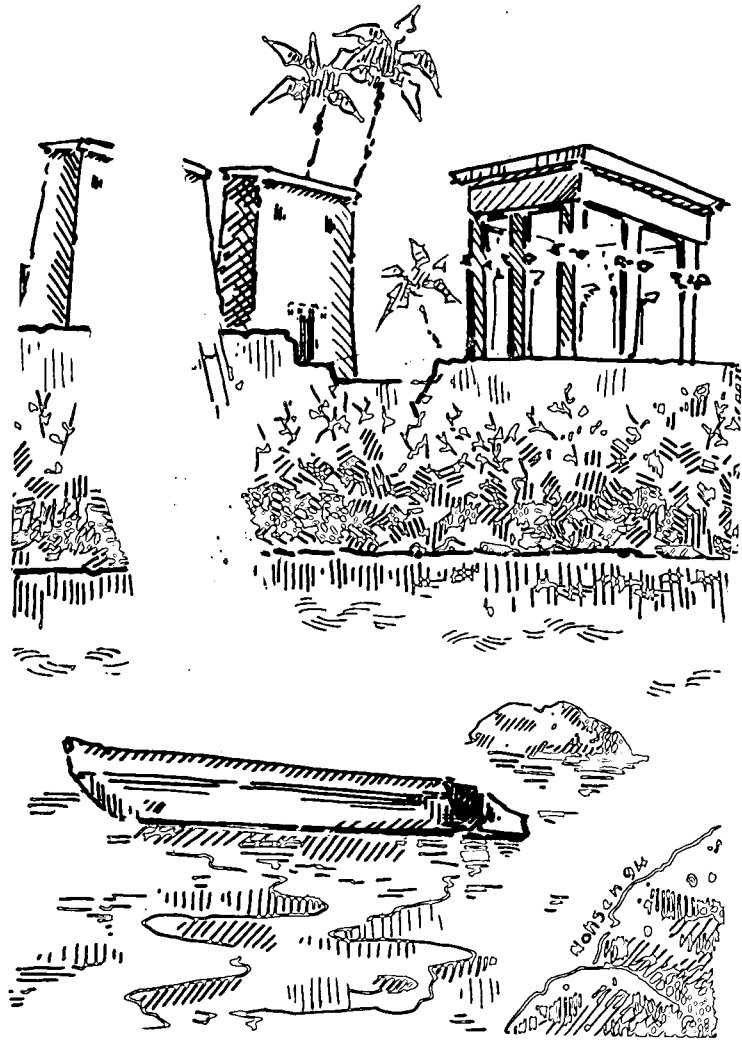
*The Photoenergy Center will defray the extra expenses (20213.9 – 19000 = 1213.9 \$)

Abdel Mostafae
Wahid



مركز الطاقة الضوئية
كلية العلوم





Cairo, Egypt