



Small PV-Applications

**Rural Electrification and
Commercial Use**

May, 25th/26th, 2009 in Ulm, Germany



OTTI  Training
Seminare
Tagungen

Location:



Visit Ulm – Ulm's main sights are the minster, with the tallest church spire in the world, the captivating old town and quaint fishermen's quarter, Wiblingen Abbey and Neu-Ulm, Ulm's modern „sister town“ across the Danube.

Location/travel:

Rail: Ulm main station (Hauptbahnhof): ICE/IC/EC trains; also regional trains (IR and NZ)

By road: A7, A8

Airports: Stuttgart, Munich, Memmingen

Supporting Organisations:



Symposium Focus:

- Description of existing markets and state of art technology
- Open discussion of good and of bad examples of systems and distribution strategies
- Development of a vision for small PV-applications, their technologies and markets

Symposium Chairman:



Dr. Hansjörg Gabler

Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg, Germany
Hansjörg Gabler held responsible positions at two German Solar Research Institutes and at the Physics Department of a German University. To him, remote electrification is the most distinguished application of Photovoltaic Solar Energy because it may help to make the world a better place.

You will meet:

A colourful and fascinating group of people from all continents who are interested in the topic as:

- manufacturers, suppliers and installers of small PV systems for remote industrial use
- manufacturers, suppliers and installers of small PV systems for rural electrification
- energy consultants, politicians and rural electrification programme planners
- financiers from banks and foundations
- students, engineers and scientists

Scientific Committee:

Prof. Peter Adelman

Phocos AG and University of Applied Sciences Ulm, Germany

Georg Bopp

Fraunhofer-Institut für Solare Energiesysteme ISE, Freiburg, Germany

Prof. Achim Bubenzer

University of Applied Sciences, Ulm, Germany

Prof. Dr. Walter Commerell

University of Applied Sciences, Ulm, Germany

Dr. Izael Da Silva

University of Kampala (CREEC), Uganda

Dr. Namjit Enebish

National Renewable Energy Centre, Mongolia

Dr. Hansjörg Gabler

ZSW, Stuttgart, Germany

Prof. Dr. Shaidul I. Khan

Centre for Energy Studies (BUET), Bangladesh

Michael Müller

Steca, Memmingen, Germany

Kilian Reiche

Worldbank, USA

Prof. Dr. Dirk Uwe Sauer

RWTH, Aachen, Germany

Michael Wollny

SMA, Niestetal, Germany

Prof. Roberto Zilles

University Sao Paulo, Brazil

Information about OTTI:

OTTI is a non profit organisation founded in 1977. Its aim is the stimulation of the industrial economy and the support of the co-operation between science and industry. OTTI has a 34-person strong team who proffer seminars, specialist forums and conferences. About 6200 specialists and managerial personnel from business, administration and science take part every year.

OTTI is one the leading European conference organisers of purpose-oriented seminars and conferences in the field of renewable energies. Furthermore, we offer courses in the fields of building, construction and the efficient use of energy. Our conferences with the accompanying specialist exhibitions in Kloster Banz belong to the definitive meetings of the solar energy sector in the German-speaking area.

For more detailed information please visit www.otti.de

A beautiful and vigorous flower grows in the shadow of the exploding market for grid connected Photovoltaics. It might almost be ignored, and yet, the market for ‚Small PV Applications‘, delivering light to remote rural homes or electricity for remote infrastructure equipment in industrialised and in developing countries is a most interesting part of the PV world. Estimations, uncertain as they may be, speak of 150 MW of PV power which is installed annually in small off-grid applications, they speak of stable annual market growth rates of 10 to 15 percent, in terms of money they speak of an annual turnover of well over one billion euro. The bigger part of this market segment is not depending on political support of renewable energies: for small off-grid needs of electricity, PV is often the least cost solution under first investment, operation cost and reliability aspects.

We are preparing for you, the experts for small PV application, for component development and production, for system layout and optimization, for market development and financing a symposium which shall be dedicated in particular to the questions of small ‚off-grid‘ electricity supply with PV. The first initiative to launch this meeting, which we hope may develop into a regular event, came from industry. The University of Applied Sciences in Ulm, which will host the symposium, the Zentrum für Sonnenenergie- und Wasserstoff Forschung (ZSW) in Stuttgart and the Fraunhofer Institute for Solar Energy Systems in Freiburg discussed the first concepts. A scientific committee, selected from the most experienced actors worldwide from industry, from academia and from market development and financing has prepared the Symposium and has chosen speakers and publications.

We will concentrate on the following fields of applications:

- power for remote rural households in systems which do not need a distribution grid, known as ‚Solar Home Systems‘,
- power for off-grid civil infrastructure like schools, medical clinics, churches, mosques and temples, administration offices, water pumping and the like,
- power for industrial infrastructure like telecommunication equipment or remote sensing,
- power for integrated equipment which ‚needs no power supply‘ like solar lanterns, solar street lights, solar radios and the like.

We hope, that you will be open to discuss all aspects of these small PV applications, from the components, including the batteries or other alternatives for energy storage, to the systems, from market development to the questions of financing.

As the chairman of this first ‚Symposium on Small PV Applications‘ it is my pleasure to invite you. Hoping to meet you in May 2009 for a most interesting exchange of experience, for presentations of the state of art and of new developments and maybe also for the common development of a larger vision for this fascinating field,

Hansjörg Gabler

Monday, May 25th, 2009

Registration and Check-in starts at 9:00

10.00 Opening Address

Achim Bubenzer, University of Applied Sciences, Ulm, Germany
Eckardt Günther, OTTI, Regensburg, Germany
Hansjörg Gabler, ZSW, Stuttgart, Germany

SMALL PV-APPLICATIONS: CUTTING EDGE PROJECTS

Chair: Hansjörg Gabler, ZSW, Stuttgart, Germany

10.30 Photovoltaics for Rural Electrification

Hansjörg Gabler, ZSW, Stuttgart, Germany

10.55 Brazilian Ordinance for Solar Home Systems

Roberto Zilles, University of Sao Paulo, Brazil

11.20 Solar Recharging Stations Selling Hours of Solar Lighting in the Evenings

Andy Schröter, Sunlabob Rural Energy LTD, Vientiane, Laos

11.45 A Wide Decentralised Rural Electrification Project in Morocco, Roughly 60 000 SHS Installed

Jean-Christian Marcel, Tenesol SA, La Tour de Salvagny, France

11.55 Discussion

12.20 Lunch

SHORT PRESENTATIONS

Chair: Georg Bopp, Fraunhofer ISE, Freiburg, Germany

Walter Commerell, University of Applied Sciences, Ulm, Germany

14.00 Posters on Systems and Components

A1 Euro-Solar Programme. Renewable Energy Kits to Fight Poverty
M. Cendagorta, Instituto Tecnológico y de Energías Renovables, S. A. (ITER), S/C de Tenerife, Spain

A2 Canada's Xeni Gwet'in First Nation Remote Community
Andrew Swingler, Xantrex, Burnaby, Canada

A3 Sunny - a Simple Mobile Electricity Generator
Richard Feichtinger, Ammersee Solar GmbH, Herrsching, Germany

A4 Small PV Applications at Mugla University
Sadun Özden, Mugla University Clean Energy Research & Development Center, Mugla, Turkey

A5 Remote Operation Monitoring for Solar Home Systems
Andreas Paul, Phocos AG, Ulm, Germany

A6 Experiment Kit for Training and Education in Grid-Independent PV-Applications
Ronny Timmreck, leXsolar GmbH, Technische Universität Dresden, Dresden

A7 Innovative Small PV System for Supplying Public Illumination in Peru
Santiago Gual, AGNEUS PV, Castellar del Vallès, Spain

A8 Mobile Stand-Alone Power Supply Devices for Small Electrical Appliances and Industrial Applications
Oliver Lang, SOLARC Innovative Solarprodukte GmbH, Berlin, Germany

A9 Quality Assessment of Solar Lanterns
Roman Grüner, GTZ- German Technical, Eschborn, Germany

A10 A New LED Driven Technique for Stand-Alone Solar System

- Bin-Juine Huang, New Energy Center, National Taiwan University, Taipei, Taiwan
- A11 A Photovoltaic Ice Machine Using Standard Variable Speed Induction Motor Drive
Carlos Driemeier, Universidade de São Paulo, São Paulo, Brazil
- A12 Breakthrough Technology in Off-Grid Energy Storage: Smart VHT Module
D. Blake Frye, Saft, Rechargeable Battery Systems, Nersac, France
- A13 Four Configurations of Small Photovoltaic Pumping Systems
Roberto Zilles, University São Paulo, Brazil
- 14.35 **Posters on Field Experience**
- B1 Six Years Performance of Stand Alone PV Systems Used to Electrify Isolated Villages in Libya
Noureddin Kreema, REAOL, Tripolis, Libya
- B2 What's the Job of a Socket in a Remote Rural Household
Friedrich Berghuber, Aktionskreis Ostafrika e.V., Ulm, Germany
- B3 PV Based Rural Electrification in Sudan
Mohamed Ali Hamid Ahmed, Private Consultant, Khartoum, Sudan
- B4 Evaluation and Simulations of a PV-Wind Hybrid System
Frank Fiedler, Högskolan Dalarna Solar Energy Research Center (SERC), Borlänge, Sweden
- B5 Assessing Implementation of Renewable Energy-Based Rural Electrification Programm, Township Electrification Programm, in Remote Rural Areas of Western China
Chian-Woei Shyu, Center of Development Research (ZEF), Bonn, Germany
- B6 Small scale Carbon Sequestration Scheme Using LED Solar Powered Lantans to Replace Kerosene Lamps
Izael Da Silva, University of Kampala (CREEC), Uganda
- 14.50 **Posters on Market Development**
- C1 Financing Sustainable Solar Photovoltaic (PV) Systems for Poor Rural Dwellers in Ghana
Frank Yeboah Dadzie, ARB Apex Bank, Accra, Ghana
- C2 Evaluating the Performance of Solar Home System Subsidies
Arne Schweinfurth, Consultant iiDevelopment GmbH, Berlin
- C3 Financial Evaluation of Technology for Solar Streetlight Systems
Frank Fiedler, Högskolan Dalarna Solar Energy Research Center (SERC), Borlänge, Sweden
- C4 The Impact of Solar Home Systems in the District of Monaragala in Sri Lanka
Dino Laufer, Technische Universität Berlin, Berlin, Germany
- C5 The Microenergy Certificate
Noara Zohra Kebir, University of Luxembourg MicroEnergy International, Berlin, Germany
- C6 Mental Models in Technical Development Cooperation – Exemplary Analysis of Rural Electrification with Solar Home Systems
Annika Tillmans, Technical University Berlin, Berlin, Germany
- 15.10 **Posters on Hybrid Systems**
- D1 Optimal Design of a Mini-Grid for Sustainable Integrated Coastal Development Using Genetic Algorithms
B K Bala, Bangladesh Agricultural University, Mymensingh, Bangladesh

- D2 New Trends in Hybrid Systems with Battery Inverter
Pierre-Olivier Moix, Studer Innotec, Sion, Switzerland
- D3 Hybrid System in Ksar Ghilène, Tunisia: Installation, Set-Up and First Results
M. Cendagorta, Instituto Tecnológico y de Energías Renovables, S. A. (ITER), S/C de Tenerife, Spain
- D4 Application of Photovoltaic Systems in Community Radios Located in Remote Conservation Units in the Amazon
Joao Tavares Pinho, GEDAE/UFPA, Belém - Pará, Brasil
- D5 PV-Wind-Diesel Hybrid System of Tamaruteua: Acquired Experiences, Comparisons with Similar Systems and Contributions for Future Development
Joao Tavares Pinho, GEDAE/UFPA, Belém - Pará, Brasil
- D6 Independent Power Systems
Jürgen Schopp, SOLARtec s.á r.l., Blaschette, Luxembourg
- 15.30 **Dialogue Session and Coffee break
Visit to the Poster and Trade Exhibition**

MARKET DEVELOPMENT, DISTRIBUTION, FINANCING

Chair: Roberto Zilles, University Sao Paulo, Brazil

- 16.30 Types of PV Systems for Rural Electrification
Peter Adelman, Phocos AG and University of Applied Sciences Ulm, Germany
- 16.45 Dissemination Schemes for Solar Home Systems in Ten Developing Countries
Mirko Gaul, SiNERGi Beratungsgesellschaft für Erneuerbare Energien, Berlin, Germany
- 17.00 Outcome-Based Approach for the Dissemination of PV in Developing Countries: Lessons Learnt from the Energising Development Programme
Carsten Hellpap, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, Eschborn, Germany
- 17.15 Implementation of Quality Assurance Procedures in Rural Electrification with PV Systems
Miguel A. Egido Aguilera, Instituto de Energía Solar, Universidad Politécnica de Madrid, Madrid, Spain
- 17.30 Topologies of Solar Charge Controllers - State of Art Overview and Application Advices
Michael Müller, Steca, Memmingen, Germany
- 17.45 **Discussion
Visit to the Poster and Trade Exhibition**

PUBLIC LECTURE

Introduction: Peter Adelman, Phocos AG and University of Applied Sciences Ulm, Germany

- 18.45 Solar Light for the Villages, Dipal C. Barua, Bangladesh
Dipal C. Barua is General Manager of **Grameen Shakti**, a not-for-profit company in Bangladesh, established in 1996 to promote, develop and popularize renewable energy technologies in remote, rural areas. Grameen Shakti was awarded the 'Right Livelihood Award', which is sometimes called the 'Alternative Nobel Prize' in 2007 for 'bringing sustainable light and power to thousands of Bangladeshi villages promoting health, education

and productivity'. Grammeen Shakti is member of the Grameen Family of organisations founded by the Grameen Bank. Grameen Bank shared the Nobel Peace Prize in 2006 with its own founder Muhammad Yunus.

20.30 **Dinner, Ratskeller Ulm**

Tuesday, May 26th, 2009

FIELD EXPERIENCE

Chair: Kilian Reiche, Worldbank, USA

- 9.00 Impacts and Challenges of Solar PV Remote Rural Electrification in Ghana
Frank Yeboah Dadzie, ARB Apex Bank, Accra, Ghana
- 9.15 Experience with the Electrification of the Health Centre of Darsilami in the Gambia
Michel Vandenberg, Institut für Solare Energieversorgungstechnik (ISET) e.V., Kassel, Germany
- 9.30 Off-Grid Lighting Solutions for Rural Areas in Developing Countries
Reinhard Weitzel, OSRAM GmbH, München, Germany
- 9.45 Small/medium AC Solar Home System: Benefit and Prejudice
Claude Ruchet, Studer Innotec, Sion, Switzerland
- 10.00 Non Subsidised Private Solar Markets in Morocco
Christoph Couderc, ITRI Environment, Marrakech, Morocco
- 10.15 The Natural Off-Grid Market in Greece - an Example for World-Wide Sustainable Rural Electrification
Marios P. Sigalas, Photovoltaic, Athens, Greece
- 10.30 **Discussion**
- 11.00 **Coffee Break and Visit to the Trade Exhibition**

COMPONENTS

**Chair: Michael Müller, Steca, Memmingen, Germany
Michael Wollny, SMA, Niestetal, Germany**

- 11.30 Comparison of Different Storage Technologies for Rural and Off-grid Electrification
Dirk Magnor, RWTH Aachen University, Aachen, Germany
- 11.45 New Storage Technologies for Small PV Applications
Arnaud Delaine, INES - Recherche, Développement et Innovation, Le Bourget Du Lac, France
- 12.00 Investigations and Tests of LED Based PV Powered Lanterns
Norbert Pfanner, Fraunhofer-Institut für Solare Energiesysteme ISE, Freiburg, Germany, Roman Grüner, GTZ, Eschborn, Germany
- 12.15 Standard Variable Frequency Drive with Integrated MPP-Tracking for Autonomous Solar Cooling Systems
Wolfgang Henschler, Institut für Luft- u. Kältetechnik Gemeinnützige Gesellschaft mbH, Dresden, Germany
- 12.30 Technical Issues of Solar Home Systems in Rural Bangladesh: A Post-installation Survey
Monjur Mourshed, Loughborough University, Loughborough, United Kingdom
- 12.45 **Discussion**
- 13.15 **Closing Remarks**
Hansjörg Gabler, ZSW, Stuttgart, Germany
- 13.30 **End of the Symposium**

Organisation Committee:

Eckardt Günther, Gabriele Struthoff-Müller

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Accommodation:

**Please book your accommodation as soon as possible by yourself.
www.hotel.de**

Symposium Venue

University of Applied Sciences Ulm
Campus Aula
Prittwitzstr. 10
89075 Ulm, Germany
Phone +49 731 50-208
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info@hs-ulm.de

Symposium Fee

If registered until April 10th, 2009

Per Person: € 450,00

Member of OTTI: € 350,00

If registered after April 10th, 2009

Per Person: € 550,00

Member of OTTI: € 420,00

Reduced fee for

Presenters: € 250,00

Employees of

Universities: € 310,00

From the third participant on, every other participant of your company profits from our 15% discount on the conference fee.

Fees cover admission to all sessions, invitation to all coffee breaks, a lunch, a dinner, the conference proceedings and a ticket for the InterSolar Munich.

The Symposium Language is English.

Photo Credits

H. Gabler, Solar Home System in Qinghai, China P.R.
Ulm/Neu-Ulm Touristik GmbH (UNT)

Symposium Small PV-Applications

May 25th – 26th, 2009 (PVA 3273)

OTTI e.V.

Headword: Symposium Small PV-Applications

**Wernerwerkstraße 4
93049 Regensburg
Germany**

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Registration Conditions

You will receive the relevant papers and confirmation as soon as we have your registration. The fees are exempt from value-added tax (VAT) and are payable in full upon receipt of the invoice. **Payment must be received no later than 14 days before the conference begins (it has to be settled in EURO). All bank charges have to be covered by the transmitter!** OTTI reserves the right to refuse admission if the amount has not arrived, unless said amount is paid by cheque on the day. In case transferring occurs later than 14 days before the conference, please keep a copy of the transfer order ready and show it in the organisation office at the conference. OTTI reserves the right to change the programme at short notice for urgent reasons. There is no charge for cancellations made at least 35 days before the event starts. If the booking is cancelled 34 days before the start of the conference a service charge of € 120,- will be made. It is possible to rebook once without extra charge. All cancellations must be in writing. It is possible to send a substitute delegate at any time without additional cost, but we need a written message about the change before the conference starts. Legal domicile and place of fulfilment is Regensburg.

- I will participate Symposium Small PV-Applications.
- We are interested in sponsorship. Please send us information and the registration form.
- I cannot participate but wish to order the conference proceedings at the price of € 150,00 (incl. VAT) plus postage and packing – delivery after the conference.
- We would like to present our products in the exhibition. Please send us information and the registration form.

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