1 | November 2009

sun connect

rural electrification with photovoltaics

Intersolar goes South

Intersolar, the largest international trade fair for solar technology, is expanding to India and Africa. Following a successful start with a branch in San Francisco in 2008, Intersolar will open its doors in Hyderabad in 2010, and also in Addis Abeba in 2011. With these new trade fair locations, Intersolar will also add a new theme. The focus of the trade fair: Thermal and rural electrification.

"The markets in India and Africa will develop with the same dynamics as European and North American markets have in the past ten years," says Bernd Dallmann from Germany, president of Freiburg Wirtschaft und Tourismus (FWTM). FWTM is one of Intersolar's two organizers. Considering that the application possibilities for solar energy in these regions are far more numerous than in Europe or the US, one arrives at a formidable market volume. Nonetheless, Bernd Dallmann does not count on a huge turnover for the time being. Intersolar India and Africa are not oriented on short-term economic success; instead, they rely on technological progress. Their primary aim is to promote development. Enormous development opportunities exist in specific business fields, and they certainly should be watched closely.

Estimates are that throughout the world, nearly two billion people continue to live without access to electricity. Increasingly, organizations and NGOs recognize that energy is highly important, just as important as agriculture and education, for development in rural areas and they are orienting their programs accordingly. In addition, numerous developing countries have massively improved framework conditions for the expansion of rural electrification. *us*

Like in India in 2009, Intersolar in Addis Abeba will begin in 2010 with a conference and a small exhibition. The first Intersolar Africa will then open in 2011.

CFL or LED?

One is less popular due to its size and brightness; the other still struggles with the image of being an insufficiently developed product. Both kinds of lights have their supporters, but what are the characteristics, the advantages and disadvantages of CFL and LED lights?

When the first energy-saving lamps (compact fluorescent lamps = CFLs) came on the market twenty years ago, they were unpopular, mainly in private households. The bulbs were too voluminous, the light too cold. Through further technical development, rising energy costs, and a growing ecological conscience, this situation has completely changed. Moreover, there is no other choice left to residents of the European Union: As of 1 September 2009, new EU law requires that conventional light bulbs be replaced by energy-saving bulbs. This is meant to decrease carbon emissions throughout Europe by 20 million tons per year.

What for most people meant a large and unpopular conversion did not bother solar energy users. The solar sector has always implemented exclusively lights with low energy consumption. First they used CFLs, today increasingly light-emitting diodes (LED) lights.

CFLs consist of fluorescent light tubes that use between 65 and 80 percent less energy than conventional light bulbs and therefore last about six times as long, with a lifespan of six to fifteen years. However, there is also a large disadvantage: CFLs are made with an electronic ballast that runs on a higher frequency. Through this, electromagnetic radiation is emitted, as is the case for all electronic devices that have a switching power supply. Furthermore, they contain mercury and must therefore be disposed of as hazardous waste.

In contrast to CFLs, LEDs do not contain mercury and have a significantly longer life span. LED technology is enjoying rapid development, and is already a good alternative. The most efficient white-power LEDs optimally achieve a light output of 160 lumens / Watt, whereas a normal CFL only achieves around 70 lumens / Watt. The number of lumens is highly dependent on the color of the light; optimum performance is reached with cold-white light, which is preferred by most Solar Home System owners. The disadvantage here is the efficiency per unit: the greater the brightness of a single LED, the lower its efficiency. LEDs, thus, are used at a lower brightness level than that listed by their manufacturers. This increases energy efficiency and, because of the lower temperature, adds to the longevity of the LED. Furthermore, LEDs are not as susceptible to shaking and are therefore not as easily broken. If new developments can increase their efficiency, the future will belong to the LED. *us*

Self-sustainable PV systems in rural areas

In Nicaragua, 31 percent of the population still lives without electricity. More than 20 years ago, Luis Lacayo began selling and installing photovoltaic cells. Thanks to his pioneering work, numerous radio networks destroyed in the civil war were put back into operation again. Lacayo's firm Ecami received the Ashden Award in 2009.

Today still, Ecami's core business is to equip rural areas with solar photovoltaic systems. Households furnished in this way require the so-called Solar Home Systems not only to extend the day with the help of artificial light, but also to run radios, small black-and-white TVs, and cell phones—a luxury for remote regions. The most widespread Solar Home System by Ecami comprises a PV module with 50 Watt-peak (Wp) and 100 ampere battery.

Ecami's founder, Luis Lacayo, started selling and installing photovoltaic cells in 1982. The civil war between the Sandinistas and Contras (1979–1988) destroyed the infrastructure for radio communication throughout the country. Especially for the rural population in remote areas, radios were often the only connection to the outside world and an important source for gathering information about the situation in one's own country. For lack of an existing electricity network, photovoltaics was the most obvious solution.

During their installation tours throughout the entire country, the staff of Ecami recognized the innumerable additional applications for PV modules, for example, for light, to recharge batteries, but also to run refrigerators and water pumps. In many rural regions there is no drinking water. Thanks to water pumps run with PV systems, not only do village dwellers get fresh drinking water, but they can also improve their hygiene. They and their children can shower on a regular basis, and wash vegetables and dirty dishes.

Solar energy is likewise extremely valuable for health centers in rural regions, which can now offer their services round-the-clock and thanks to solar-run refrigerators, can also store urgently needed medications and vaccinations. But also the PV systems for running mobile wireless antennas and for heating hotels are important as they improve the population's quality of life and lower carbon dioxide emissions.

An appeal to taking responsibility

In the past ten years, the firm has installed more than 5,000 renewable energy systems in Nicaragua. After installation, the technicians from Ecami instruct owners of the PV systems on how to service the equipment and carry out minor repairs. "The whole idea is to make the system self-sustainable," explains Luis's son, Max Lacayo, current marketing director at Ecami.

Because Ecami is a private firm, the solar business must be commercially viable. As many of the customers have limited financial resources, the firm offers its products at very reasonable prices. Installation of a 50 Wp Solar Home System, including four lamps and an electrical outlet, costs roughly US$ 600. Ecami often works together with NGOs, local banks, and microfinance initiatives (MFIs). In working with MFIs, Ecami is in direct contact with the end users, but is paid by the MFIs. Yet, due to the MFIs' interest rates, the costs for the customer are ultimately from 24 to 40 percent higher. "We would like to create a revolving fund, in order to keep these rates as low as possible," explains Max Lacayo. "Financing is currently the largest challenge we face. That is why we're trying to get a soft loan and some grant money."

Ecami and its twenty-eight-member team have enough work for many years to come. In order to better absorb the needs of the local population, Ecami is in the process of developing a network of regional divisions. The first was opened in Esteli, a city in the central highlands of Nicaragua and three additional regional divisions are in the planning stages. As Max Lacayo says, "The beauty of solar power is that it's accessible and easy to use. We teach the people how to use the system and to be part of the solution. This is the most important part of this job." *me*

Ecami in figures (since 2004):

- more than 400 kWp PV installed, benefiting 100,000 people
- 2,100 Solar Home Systems, of which 400 PV systems for health and community centers, and schools in rural regions; 70 for telecommunications, 40 for municipal buildings and tourism
- 170 solar-powered heating systems for houses, hotels, and swimming pools
- 40 wind turbines

www.ecamisa.com

Solar mobile phones

Mobile phones are widespread in Asia and Africa. However, users in rural regions often do not have the necessary electricity to recharge them. It thus seems an obvious idea to equip phones with solar cells. But how does a solar mobile phone stand the test of practice?

The first solar mobile phones were already on the market in 2007. Samsung currently markets a solar mobile phone in India for US$ 55, the Kenyan mobile phone supplier Safaricom sells a model made in China for US$ 38. And Sharp even offers a waterproof solar mobile phone. The promise: daily telephoning without bothersome recharging.

Performance shows how far apart claim and reality actually are. After an hour of bright sunshine, depending on the model, only between four and twelve minutes of conversation are possible. Additionally, the effects of extreme heat damage not only the housing, which applies to all mobile phones, but also shorten the lifetime of the battery.

The permanent—albeit brief—recharging of the battery by means of the built-in solar module likewise shortens the lifetime of the Lithium-ion battery. A use cycle is a use cycle, even if the battery is not fully charged. In addition, experience shows that there is hardly a user who wants to leave his or her mobile phone unattended outside of the house to recharge in the sun, where it is exposed to theft.

Solar mobile phones are suitable at most for emergencies or for people who telephone very rarely. Thus, they are not quite suitable for their actually intended target group. In rural regions it would probably be significantly safer and less expensive to use alternatives, such as those already offered today by simple solar lamps that have the possibility to charge mobile phones.

Purchasing a solar mobile phone is thus not advisable; they are no more than a good marketing idea. *hs*

Small intervention, major effect

Credit is based on trust and confidence. These two requirements are not always available: even when the credit amounts are relatively small, such as microfinance organizations provide for the creation of Solar Home Systems. Now there is a simple system for motivating inconsistent credit holders to make their payments.

Every purchase bought on an installment plan bears risk. But the risk does not fall on buyers who obtain goods on credit, if they are willing to pay a somewhat higher price for them. The risk belongs to the creditor, especially in developing countries, where, as a rule, people are unable to bring in any securities. Microfinance organizations throughout the world offer the poor a chance to afford something that they are unable to pay for all at once. Solar Home Systems, which are expensive to acquire, belong in this category.

Suntransfer has now discovered a simple and inexpensive way to avoid credit default. It builds a timer device into its larger Solar Home Systems. Suntransfer is a subsidiary of the Stiftung Solarenergie – Solar Energy Foundation which has installed several thousand Solar Home Systems in Ethiopia over the past four years. Suntransfer sells its Solar Home Systems through its own sales network or via microfinance organizations.

Through the built-in timer, the charge controller can be adjusted for a certain time period. Depending on the installment agreement, this can be for half a year or a year. When the time has lapsed and the installment is due, the timer is reset after payments are made. In case of non-payment, the timer will automatically turn off the solar power system. The charge controller keeps working and provides reliable protection for the battery. Although the timer has to be set by a technician on site, the advantage is that a technical check of the system can be done at the same time. In this way, everyone is satisfied. The customer is motivated to pay back the installments, so that the solar system will be regularly serviced, and the creditor has available a penalty, should it be necessary. Both aspects reduce the risk for the creditor. *us*

More information on the product:
www.suntransfer.com

Ubbink East Africa builds a solar power plant in Kenya

Ubbink East Africa, a subsidiary of Centrotec Sustainable, plans for spring/summer 2010, the start of production of solar modules in Kenya as a joint venture with a Kenyan firm. Focus is on production of poly crystalline modules ranging from 1 Wp to 100 Wp. Forecast for the first two years is a production of 400 Kw.

UNEP Study 2009

The United Nations Environment Programme (UNEP) Study on Global Trends in Sustainable Energy Investment 2009 with "Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency" can be downloaded at: www.unep.org

USAID ASIA

"Innovative Approaches to Financing Energy Efficiency in Asia" is the name of a new study by USAID ASIA. The 18-page report includes three case studies: Thailand's Low Interest Fund Sparks High Interest in Saving Energy, Street Light Savings Boost Fortunes of Indian Cities, and India Helps Iron Makers Sponge-Up Energy and Profits.
The study can be downloaded at: www.cleanenergyasia.net/upload/resources/file/file_625.pdf

Chair for renewable energies in Ethiopia

The International Solar Energy School in Addis Ababa in cooperation with the state ecbp program is planning to develop a chair for renewable energies at an Ethiopian university. The selection procedure for a suitable university should be completed by the end of 2009. The university will be chosen from among the circle of universities whose docents in the field of electrical engineering participated in the 2nd University Program at Adama University, July 6–12.
For further information: workeneh@solar-energy-foundation.org or samson@solar-energy-foundation.org

World Bank approves US$ 130M credit for solar power in Bangladesh

The credit is designed to increase access to electricity through the installation of solar systems in rural areas. This credit is supplemental financing added to the Rural Electrification and Renewable Energy Development Credit.
Part of the financing will also be used to purchase and install roughly 10 million energy efficient compact fluorescent lamps in densely populated areas throughout the country. These will replace an equivalent number of incandescent lamps.

South Africa: Photovoltaic excluded from feed-in tariff

South Africa will introduce feed-in tariffs for all renewable energies, but not for photovoltaic systems. On March 26, 2009, the National Energy Regulator of South Africa (Nersa), which is overseen by Eskom Holdings, agreed on a feed-in tariff for renewable energies. The only winners in the area of solar power, however, are solar thermal power plants (CSP); Solar Home Systems, which are widespread in South Africa, will not benefit.

Energy for Life

The project Energy for Life began in April 2009. Its goal is to promote renewable energies as a tool for sustainable development and improvement of living conditions in developing countries. Core of the project is an information campaign in Europe on the theme "Energy and Development," with which project partners aim to make their contribution to achieving millennium goals. Laid out as a three-year project, work has already begun in four European countries and another four developing countries in Asia, South America, and Africa. The project is financed by subsidies from the European Commission's Co-operation Office EUROPE AID. Contact: energy4life@dgs.de

Ethiopia

Geography/demography/education

Location (continent): East Africa
Form of government: Federal Parliamentary Republic
Surface: 1 104 300 sq km
Population: 80.7 m
Population density: 75/sq m
Per-person-income: US$ 870
Life expectancy: 55 years
Urbanization: 17 %
Literacy rates: 36 %
Religions: Christians (62.1 %), Muslims (33.9 %)
Human Development Index (HDI): 0.406

Economy

Gross national product (PPP): US$ 70.16 bn
Economic growth: 11.3 %
Share of agriculture: 46.3 %
Inflation rate: 29.1 %
***Economic transformation index (Bertelsmann):** 3.96
***Corruption index (Transparency International):** 2.6
***International Property Rights Index (IPRI):** 3.7

Electricity

Electricity consumption: 2567 GWh
Electricity production: 3269 GWh
Electricity export: –
Electricity import: 1739 ktoe
***Share of PV in electricity production:** –
Percent of the overall population with access to electricity: 13 %
***Percent of the rural population with access to electricity:** 22 %

Photovoltaic (PV)

Daily sun-hours: 5.34 kWh/sq m/day
***Tax exemptions/incentives for Photovoltaic:** no
***Market introduction programs for PV, general:** no
***Market introduction programs, special for off grid:** no
Amount of installed PV capacity: 1.2 MW_p

Rural Solar Energy Index: 1.56 (1 = poorest, 10 = best performance)

*included for calculation of Rural Solar Energy Index

Sources: Africa Development Indicators 2006, Bertelsmann Transformation Index 2008, Human Development Report 2007/08, International Energy Agency, International Property Rights Index 2009, Internet Center for Corruption Research, Rural Poverty Portal, Unctad, World Bank

Harald Schützeichel

How to put together a successful solar power project 5 tips from the field

Many solar projects fail after just a short time. That does not necessarily have to be the case, as solar technology is actually simple and highly suitable for long-term use. There are, however, a few basic things that must be taken into consideration. Laid out in the following are five points that must be attended to when setting up a solar power system in a rural region:

1. Analysis of need

Think carefully about how great the electrical need is, for example, in public facilities: how many hours of light are necessary in how many spaces? On how many days of the week? Is the need the same in all spaces? Are there also computers and radios that must be supplied with electricity, how long are they used each day?

Plan a reserve of at least 30 percent for growing demand. It makes no sense to have to immediately install a new solar unit simply because you have installed an additional computer or television.

The complexity involved in appraising energy needs varies according to use. For public facilities (schools, health centers, administration facilities) a precise analysis of demands is a primary requirement.

2. Sizing

In setting the dimensions of a solar power unit, the solar radiation situation during the rainy period must be considered, as the unit should, ultimately, function efficiently throughout the year. Solar insolation values can be as much as 30 to 40 percent less than average during the rainy period! Make sure that the solar technician does not take the middle of the year (peak sun availability) as a base for sizing the module and battery. The month with the least hours of sun should serve as the base for calculations. Additionally, the battery capacity should be calculated in such a way that it can store the requisite electricity for a minimum of three use days. In this way, it is possible to assure electrical supply during simultaneous high demand and bad weather. Particularly important is the electricity reserve for crucial equipment, such as refrigerators for medication.

3. Required of the installation firm

The installation firm must present a coherent plan corresponding with your goals. In this, price should not be at the forefront, but rather, the quality of the employed components (module, batteries, lamps, etc.). Solar power technology is more expensive to set up than common technology. Many solar power firms attempt to foolishly balance out this disadvantage by using cheap products. Cheap products are, however, usually a very poor choice in solar power technology.

In rural regions, extreme climatic conditions are the general rule. The technology used must therefore meet the highest demands in terms of robustness and stability. This is the only way for the decisive advantages of solar power technology to take effect: minimum operating and maintenance costs for decades.

Pay careful attention to the benefits offered by the installation firm with regard to maintenance and service. Does the firm even have the capacity to carry out the necessary service, or does it only have one office in the capital? Choose a firm that has a workshop close to your facility. Even if it's more expensive. Numerous projects fail financially due to the enormous costs for service work because the solar power company is stationed in a distant capital. If possible, gather several offers and consult independent rural electrification experts.

4. User training

Whereas most people in rural areas are highly skilled with kerosene lamps and diesel generators, solar power technology, as a rule, is something entirely new. The people who are meant to use it must be prepared and made familiar with it. The new technology must be presented to them in a practical way. User training should contain the following five points:

- Energy saving: solar energy is valuable, it should not be wasted.
- Correct use of the solar power system
- What are the consequences of incorrect use?
- What errors can be repaired by the user? What is the course of action?
- To whom should questions or problems be addressed?

With solar power systems in public buildings it is, of course, difficult to make individual users aware of their responsibility. Yet strict rules are needed, in addition to enforcement. Otherwise, the solar system will most likely work for a short time only.

Necessary for setting up clear rules is precise knowledge of local conditions: What are the structures like on site? Which people are to be included already in the project planning phase? Finally: Who is the actual owner of the solar power system? This is simple for private households, but often complicated for schools, health stations, and other public buildings.

5. Plant management

Nowadays, many solar projects end with the inauguration celebration. Users, installation firms, and financers, full of joy over the new energy source celebrate the new facility. In doing so, they overlook the fact that the greatest challenge is yet to come. In order for a solar power system to function for a minimum of twenty-five years, it requires permanent, effective plant management that rests on three pillars: organization, technology, and financing.

- Organization
  Who is responsible for the plant and ensures that the facility is not misused? In buildings where occupation changes frequently, for example, health stations or schools, one person should be responsible.
  The responsibility for all involved must be clearly formulated and communicated, possibly also in a written agreement. What must likewise be considered is how to deal with an anticipated growing demand for solar electricity. With the first functioning solar power system, new ideas, new demands, and new desires soon emerge.
- Technology
  Who is responsible for the routine control of the facility? What are the tasks of the installation firm? Where are replacement parts stored and who has access to the storage? How and by whom is information passed on to the servicing firm?
- Financial
  How will the required repairs and maintenance work be financed? Who pays for the exchange of batteries after several years? Should monthly sums be saved for this, who is responsible for collecting the money? Who has to give his or her consent for spending the money? What happens if a payment is not made?

By carefully considering these five points in planning your solar energy system, it will not only please you at its inauguration, but will also continue to do its job for years to come.

Harald Schützeichel is the founder and chair of the Stiftung Solarenergie – Solar Energy Foundation, www.stiftung-solarenergie.org.

Jacob Winiecki

Linking solar energy and microfinance

Many potential customers without access to electricity have trouble mobilizing sufficient capital to buy solar products. Microfinance loans for solar products can increase sales and allow solar enterprises to reach clients with low or irregular incomes. Arc Finance, a US-based non-profit organization, focuses on addressing many of the challenges to scaling energy lending.

At present, roughly 1.6 billion people do not have access to electricity and over 2.5 billion people do not have access to clean cooking options.[1] Most of the people without modern energy access also lack access to financing that would enable them to purchase cleaner energy services. People on low incomes in developing countries typically spend a large proportion of their income on energy. For many rural customers, buying and installing a Solar Home System typically costs at least US$ 250 (depending on the system size and where it is in the world), but it can provide light and electricity for many years with minimal ongoing costs aside from routine maintenance and occasional battery replacement. However, experience has shown that most potential customers without access to electricity have trouble mobilizing sufficient capital to make a lump-sum cash payment for solar products. As such, it is often easier for solar enterprises to serve higher-income people who can purchase products on a cash basis rather than find ways to target lower-income people.

More potential for energy-lending

Lack of affordable, appropriately designed loans and other financing options is a key barrier limiting wider access to clean energy products and services. Without end-user finance options available for their customers, it can be difficult for most solar energy enterprises to achieve significant scale. Microfinance institutions (MFIs) have demonstrated that providing credit to micro entrepreneurs and households can be efficient, responsive, and profitable to both the borrower and institution. If appropriately designed, loans offered by MFIs can provide clients with access to high-quality modern energy services by closely matching loan payments to existing energy expenditures or income flows. Such loans can offset the high upfront costs associated with cleaner, more efficient energy technologies, including solar. Despite its being the largest expenditure in many poor households, the potential for energy lending is currently underutilized, due in large part to a knowledge and resource gap between consumers, MFIs, and energy providers. However, evidence suggests that access to modern energy can be greatly enhanced with access to innovative lending and microfinance options and can provide a new, profitable product line for both microfinance institutions and the larger financial community.

Reaching clients with lower incomes

For many sustainable energy enterprises, market potential is limited to customers who are able to purchase products and services on a cash basis. The potential market for solar energy can be transformed into actual customers if end users are able to access financing for the purchase of energy products and services from MFIs. Building strong linkages between MFIs and energy enterprises can benefit many stakeholders.

Households and small businesses are able to purchase solar products and services that bring economic and livelihood benefits otherwise out of reach if they were required to pay on a cash-only basis. Microfinance loans for solar products can increase sales and allow solar enterprises to reach clients with lower incomes or irregular income streams. For MFIs, the introduction of special energy loans offers the potential to increase client retention, diversify product offerings, increase competitiveness, and ultimately expand the client base while having added social and environmental impacts.

Microfinance partnership

Experience has shown that linking energy and microfinance can be effective, but requires serious commitment on the part of both the MFI and energy enterprise. For example, partnering with an MFI may require a solar enterprise to invest significant financial and human resources in client and loan officer training beyond core operations. As many MFIs can have a nation-wide reach, solar companies may also find that a new microfinance partnership often requires a rapid expansion of installation and after-sales service coverage to currently underserved geographic areas. On the MFI side, energy loans need to be designed carefully and may require technical training of loan officers, modifying operations, introducing energy-specific monitoring and evaluation processes, and identifying dedicated capital to fund an energy portfolio. Finally, the structure of a partnership agreement between energy enterprises and MFIs must clearly outline roles and responsibilities of each stakeholder, communication and coordination channels, warranty and after-sales service provisions, and training requirements.

Many MFIs and energy enterprises find it helpful to seek technical assistance in one or more of the above processes. Arc Finance is a US-based non-profit organization focusing on addressing many of the challenges to scaling energy lending. Founded in 2008, Arc Finance now has operations in seven countries in Africa, Asia, and Latin America developing and scaling energy lending portfolios with microfinance institutions and energy enterprises.

Arc Finance offers a comprehensive package of technical advisory services and technical expertise to financial organizations, particularly microfinance institutions, as well as to energy enterprises that are interested in introducing energy-lending programs. These services include market research and energy needs assessments, technical assistance for designing business models and energy loan products, facilitation and development of partnership arrangements with energy enterprises, and design and evaluation of pilot programs. Arc Finance also assists financial institutions with building the capacity of staff and management, client training and awareness-raising, and establishing monitoring and evaluation systems. For those financial institutions with some experience in lending for energy services, Arc Finance offers a comprehensive scale-up package aimed at identifying obstacles, refining processes, diversifying product offerings, and reaching scale.

1 International Energy Agency, World Energy Outlook 2006 (Paris: IEA, 2006), www.eia.org

Jacob Winiecki is a Senior Program Specialist at Arc Finance. In this capacity, he focuses on developing and scaling new energy-lending programs within financial institutions.

New books

Damian Miller
Selling Solar. The Diffusion of Renewable Energy in Emerging Markets
306 pages, hardcover, English
earthscam, 2009
ISBN 978-1-84407-518-8, € 49.95

To solve the climate crisis, the world must make a wholesale shift to renewable energy technologies. *Selling Solar* considers how such a shift might happen. Focusing on the case of solar photovoltaics, it shows how, at the start of the 21st century, this promising technology began to diffuse rapidly in select emerging markets, after years of struggling to take off. The authors of this book show how entrepreneurs affected profound technological change not just through the solar systems they sold, but through the example they set to both new market entrants and policymakers.

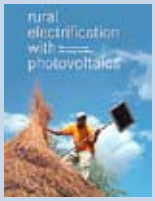
Comprehensive and based on examples from the field: for administrators of solar programs, solar energy entrepreneurs, and anyone who believes in a renewable energy future and wants it sooner rather than later.

Palagummi Sainath
Everybody loves a good drought. Stories from India's poorest districts
470 pages, paperback, English
Penguin Books, 1996
ISBN 978-0-140-25984-1, $ 19.75

Even ten years after they first appeared, the collected reports that Palagummi Sainath wrote for the *Times of India* are still entirely relevant. The poor in India are too often reduced to statistics. The dry language of development reports and economic projections overlooks the true misery of the 312 million who live below the poverty line, or the 26 million displaced by various projects, or the 13 million who suffer from tuberculosis. In this thoroughly researched study of the poorest of the poor, we get to see how they manage, what sustains them, and the efforts, often ludicrous, to do something for them. The people who figure in this book typify the lives and aspirations of a large section of the Indian society, and their stories present us with the true face of development. The author has been recognized for his work with thirteen awards, including the renowned European Commission's journalism award and the Lorenzo Natali Prize.

Precise and well researched: A "must" for employees of NGOs and government programs, as well as for travelers to India and people interested in development collaborations.

Stiftung Solarenergie (ed.)
Rural Electrification with Photovoltaics
178 pages, 96 diagrams, softcover, spiral binding,
www.stiftung-solarenergie.org, 2009
ISBN 978-3-033-01926-3, € 28.00



Well-trained technicians are the key to bringing clean, affordable electricity to rural areas, skilled professionals familiar with the opportunities and limitations of solar power who are able to correctly size installations and provide sound operational management. At present, however, there is a dearth of such technicians versed in the field of rural electrification; nor can would-be experts depend on up-to-date, practical reference works.

The handbook was published by the Solar Energy Foundation and is the fruit of the labor of numerous specialists.

Detailed and topical: a handbook for rural solar energy technicians throughout the world.

Agenda

November 18–20, 2009
Clean Energy Expo Asia
Singapore
A platform for international and regional policy makers and industry players to discuss pertinent energy issues and strategies affecting the world today.
www.cleanenergyexpoasia.com

November 9–10, 2009
2nd German-Nigerian Business Forum
Abuja, Nigeria
The forum will inform about the opportunities of Nigerian-German partnerships in various business sectors.
www.german-nigerian-business-forum.com
E-Mail: modersohn@afrikaverein.de
E-Mail: doherty@ngba-africa.org

March 1–3, 2010
PV + Solar Expo India
Mumbai, India
1st international conference and exhibition of photovoltaics, solar thermal, solar architecture, equipment, material and systems at the World Trade Center, Mubai.
Fax: +91 22 26730547/2673 054

March 30–April 1, 2010
AsiaSolar Photovoltaic Expo
Shanghai, China
Exhibition and specialist industry conference
www.asiasolarexpo.com
E-Mail: info@aiexpo.com.cn

May 18–20, 2010
2nd Global Business Conference & Trade Fair for Off-Grid Lighting
Nairobi, Kenya
Includes Lighting Africa Conference and Knowledge Exchange/Premiere Off-Grid Lighting Trade Fair/Business-to-business networking opportunities/Lighting Africa Quality Assurance Product Awards Ceremony.
www.lightingafrica.com
E-Mail: conferences@lightingafrica.com

Imprint

sun connect magazine,
Josefstrasse 92, 8005 Zurich, Switzerland,
mail@sun-connect.org
Editorial staff Marion Elmer, elmer@sun-connect.org; Ursi Schachenmann, schachenmann@sun-connect.org
English translation Lisa Rosenblatt and Charlotte Eckler
Graphic design Bernet & Schönenberger, www.typographie.ch
Publisher Stiftung Solarenergie – Solar Energy Foundation, Josefstrasse 92, 8005 Zurich, Switzerland

Sun connect magazine is published quarterly. US$ 40 p. a.

Subscriptions sun connect magazine
Josefstrasse 92, CH-8005 Zurich
Fax: +41 (0)44 272 34 51
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making life brighter

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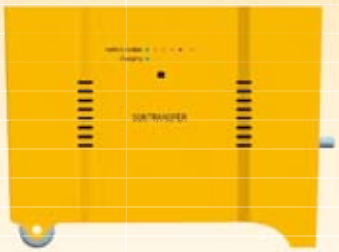
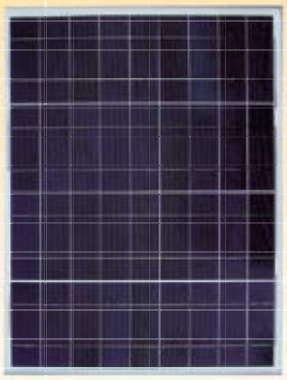
Solar TV* –
Enjoy your life with sun power!





*Registered product,
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- **15.6´´ WXGA LCD Television**
- **Power consumption: 12W only**
- **Resolutions (H/V): 1280 x 800 pixel**
- **Brightness: 200 cd/m2**
- **Contrast 300 : 1**
- **DC and AC power input**
- **PAL, NTSC or SECAM**

Power supply standard

- Solar box: Strong plastic box, GEL battery 12V / 60Ah, Charge controller, Size: 321 x 278 x 268 mm
- Solar module: 50 Wp

Power supply extended

- Solar box: Strong plastic box, GEL battery 12V / 80Ah, Charge controller, Size: 321 x 278 x 268 mm
- Solar module: 65 Wp

For further information about our solar products
www.suntransfer.com

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SunTransfer is project partner of the dena Solar Roofs Programme for Foreign Market Development, supported by the German Federal Ministry of Economics and Technology

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