Growing Application Range as Challenge for the Global PV Off-Grid Market

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Agenda

1. Energiebau Solarstromsysteme GmbH
2. PV Off-Grid Market
3. Growing Application Range
4. Challenging Factors in PV Off-Grid Systems
Energiebau – The Company

- Established in 1983 in Cologne, Germany
- Today one of the leading system houses in Europe
- Three pillars of Energiebau corporate culture are: responsibility – partnership – progress

Our subsidiaries and sales agencies (Founding year)

- Energiebau solar power benelux bv (2006)
- Energiebau Sunergy Ghana Ltd. (2006)
- Energiebau Italia s.r.l. (2007)
- Energiebau France sas (2009)
- Bisam Cephe Sistemleri Sanayi ve Ticaret A.Ş, Türkiye (2010)
- Energiebau North America, Inc. (2011)
With almost 30 years of experience, Energiebau today is a professional partner in any aspect of solar power generation.
Energiebau – The Company

- Germany: Water quality measuring
- Peru: Children’s village
- Chile: Holiday house
- Benin: Radio station
- Vietnam: Children’s house
- Bangladesh: Children’s house
- Poland: Farm
- Slovakia: Backup system
- Burundi: Pumping system
- Mauritius: Business Building
- Kenya: Business Building
- Ethiopia: School
- Iran: Pumping system
- Venezuela: Hotel

PV Rural Electrification - Intersolar 2012 • 13.06.2012 • 5
The PV Off-Grid Market
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Global Access to Electricity Distribution


source: Breyer Ch., Werner C., et al., 2011. Off-Grid Photovoltaic Applications in Regions of Low Electrification: High Demand, Fast Financial Amortization and Large Market Potential, 26th EU PVSEC, Poster 5BV.1.45
The PV Off-Grid Market

Major market drivers

- Decreasing RE technology costs
- Increasing electricity needs in off-grid areas
- Increasing international financing for climate change and energy access
- Rising fuel prices
- Introduction of government support schemes for RE technologies

Source: EPIA / Greenpeace Solar Generation V - 2008
Growing Application Range
Growing Application Range

**Industry**
- Telecom
- Oil/Gas
- Traffic control
- Cathodic protection
- Measurement System

**Rural Electrification**
- Solar Home Systems
- Solar Residential System
- Village Power Supply

**Maritime and Leasure**
- Caravans
- Boats
- Camping
- Weekend Houses

**Lighting**
- Streetlights
- Pico-Lights
- Handlamps

**Water**
- Pumping systems
- Treatment

**Mixed Applications**
- Backup
- Reducing Fuel Costs
- Mini Grids & Hybrid Systems
3 Growing System Size

- Piko Systems
- Solar Home Systems
- Solar Residential Systems
- Village power supply
- Large-scale power supply

- Lighting
- Supply of single houses
- Supply of schools, hospitals
- Supply of complete villages
- Supply of industrial applications
Off-grid power supply for a street lighting system
3 Industrial applications

Off-grid power supply for a radio station in Benin
Off-grid system for a SOS childrens village in Peru
Solar Pumping System

Solar module

Pump controller

Solar direct pump

Source: Grundfos

Solar pumping system in Rwanda

Source: Grundfos
Solar Backup Systems

Backup system for grid failures at a hotel in Slovakia
Several technologies can be used in Hybrid Systems:

- **Photovoltaic (PV):**
  - suitable for almost any location
  - comparatively easy to install and maintain
  - high initial investment costs

- **Hydro power:**
  - cheapest technology
  - most site dependent

- **Wind power:**
  - very site specific

- **Diesel / Bio-Fuel Generator:**
  - ensuring quality of service
  - fuel is costly
Challenging Factors in PV Off-Grid Systems
The appropriate **sizing** of a PV off-grid system is essential, as this provides the basis for a **safe and reliable power supply**

Every application has different requirements and therefore all parameters and requirements of **each application** have to be **checked in detail and individually**

Detailed individual sizing and system design for each project is **time-consuming and costly**
Sizing key parameters

System location
- Solar irradiation [Wh/m²/d]
- Environmental temperature [°C]
- Restricting site parameters (shadow, orientation, inclination, etc.)
- Special environmental conditions (wind, snow, earthquakes, etc.)

Power demand and load profile
- Daily power demand and max. load power are basis for an elementary sizing
- A detailed load profile is necessary for sophisticated sizing and system optimization
High-Quality products

- For a safe and reliable power supply a sufficient system design, correct installation and the use of high-quality products is essential.

- According to the different requirements of every application the best suiting system design and products have to be chosen.
To guarantee a **sustainable and long-lasting power supply** well-trained installers, a well organized maintenance and the acceptance of the uses is needed.

Therefore **close contact to the users and detailed data mining** is necessary.

Furthermore **training and maintenance** should be addressed in an early stage.
Training and Maintenance

The German Solar Academy was opened in June 2011 as a joint cooperation from Energiebau Solarstrome systeme GmbH, SCHOTT Solar AG, SMA Solar Technology AG and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in the framework of Public Privat Partnership (PPP).

Until now about 120 participants from research institutes, power companies, private business and politicians from different African countries were trained in solar power.

Opportunity to visit the 515 kWp solar-power system at the new United Nations Environment Programm (UNEP) headquarters in Nairobi.
Thank you for your attention!

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