Wuppertal Institute
for Climate, Environment
and Energy

Good-practice examples of different small-scale sustainable energy projects under WISIONS initiative

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GENUS
Slum electrification: challenges to be addressed
Nairobi 26 - 28.10.09

Overview

- General Background
- WISIONS - approach and activities
- SEPS project examples
  - **Small Wind Power Generation Systems in Peru**
  - **Solar Shops in Unelectrified Areas of Namibia**
  - **Introducing solar lamps for night fishing at Lake Victoria**
  - *Biogas power as an off-grid electricity generating source in Sri Lanka*
  - *Micro-Factories For Led Based Household Lighting Systems In Tanzania*
  - *Electricity For Social Development (Phase I) (Togo; JVE)*
- Conclusions and Outlook

General Background

Why did we build up WISIONS initiative?

Access to clean and affordable energy is

- necessary for future security of energy supply
- helping to reduce GHG-emission
- a prerequisite for economic + human development and for
- reducing poverty and health risk

➔ **vital for achieving Millennium Development Goals**

There's increasing attention on Renewable Energy by political arena

("Renewables 2004" in Bonn; Founding of IRENA; Current climate change and energy future discussion...)

Promising examples and ideas exist, but **still implementation often hindered**

- **Lack of technical know-how;**
- **Lack of co-operation and**
- **Financial, administrative and social barriers**

➔ Necessary to **foster more innovative sustainable energy projects** especially on smaller scale and **promote knowledge transfer on good practices**

WISIONS

objective and activities 2004 - 2009

WISIONS is an initiative of Wuppertal Institute, financially supported by ProEvolution
It is successfully working since 5 years (since 2004)

- WISIONS objective is to to **combine spreading knowledge** of existing successful good-practice projects with progressing the **realisation of new project ideas**

Activities

- **PREP - Promotion of Resource Efficiency Projects**
  - Brochures on specific issues to showcase good-practices on successful projects
  - Decision process based on SD criteria
  - Closed 2008
- **SEPS - Sustainable Energy Project Support**
  - Annual call for applications with a budget of 0,5 Mio. €
  - Innovative project ideas with high replication potential
  - The applications have to fulfil SD criteria and need an implementation strategy
  - 5 rounds so far; support of 47 projects in more than 25 countries
- **Technology Radar (currently developed)**

WISIONS Criteria

to ensure sustainable character of projects

SEPS

- Obligatory Criteria
  - Technical feasibility
  - Economic feasibility
  - Local and global environmental benefits (e.g. CO_2-Reduction)
  - Marketability and replicability
  - Sound Implementation strategy must exist
- Additional Criteria
  - Social and gender aspects
  - Employment potential
  - Co-operation with other stakeholders

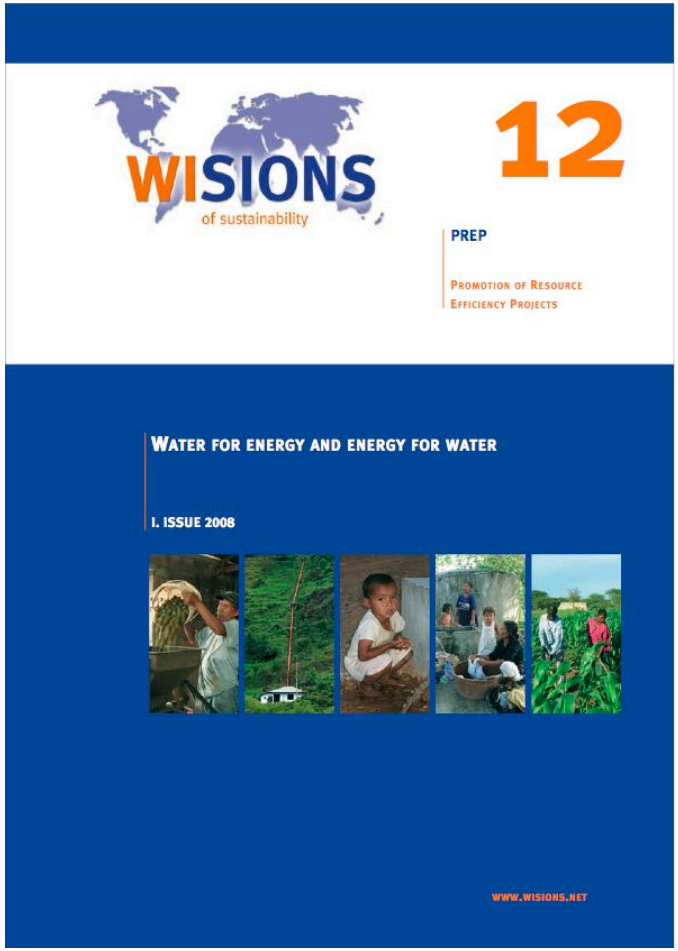
PREP

- Obligatory Criteria
  - Project success
  - Replicability
  - Economic and technical feasibility
  - Innovation in solving market, technologies or other challenges
  - Durability and sustainability
- Additional Criteria
  - Social and gender aspects
  - Employment potential
  - Co-operation with other stakeholders

PREP
Outputs

- **Twelve brochures**
  - Resource efficient construction
  - Energy and water
  - Sustainable Transport
  - Sustainable Tourism
  - Microfinance and Renewable Energy
  - Energy in Schools
  - Corporate Energy and Material Efficiency
  - Sustainable Biofuel Production and Use
  - Energy and Sustainable Food Processing
  - Energy and Poverty Reduction
  - Solar Cooling
  - Water for Energy and Energy for Water

All still available as download or paper brochure



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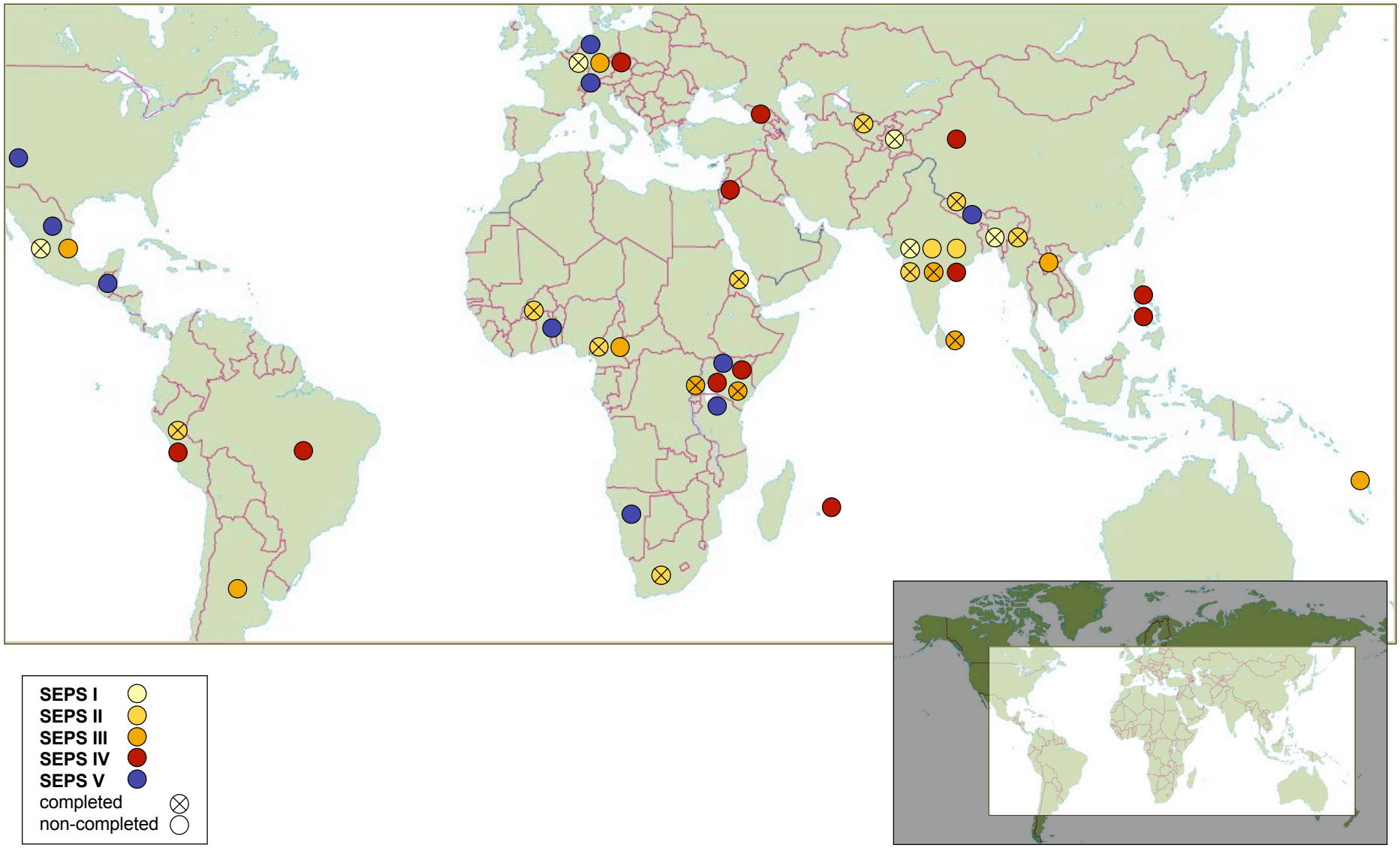
SEPS Project Map

Sustainable Energy Project Support



Update: December 2008

SEPS projects examples

- Most of the applications submitted to SEPS calls dealt with energy access in rural areas and hardly any in informal urban settlements
- Urban projects focussed on energy efficiency
  - e.g. in street lighting systems in India or
  - Efficient lighting in public buildings in Mexico, Mauritius and India
- Following examples show an excerpt of supported projects that can give hints for options to improved energy access/electrification
  - Small Wind Power Generation Systems in Peru (recently finished)
  - Energy Shops in Unelectrified Areas of Namibia (newly started)
  - Introducing solar lamps for night fishing at Lake Victoria (currently running)

Small Wind Power Generation Systems to Provide Clean Energy in Poor Rural Areas of Peru

(Soluciones Practicas - ITDG)

Background

- Grid-connection in rural Peru is around 30%, five Mio. people / 40,000 villages are without grid
- ITDG has been working since 25 years in Peru
- Providing isolated communities with electricity in a sustainable manner through renewable energy
- Despite high wind potential, only a few wind mills had been installed
- ITDG developed a small-scale wind mill

Project Aim

- Showcase in a demonstration-project the first wind energy community of Peru

Selection process:

- Identification of region with high wind potential
- Willingness of Local Authorities and Population to work in the project - Community “El Alumbre” in Cajamarca
- Project was funded by several organizations

Small Wind Power Generation Systems in Peru

Activities carried out in the community

- **Socio-economic survey**
  - Family structure and rate of illiteracy; level of organization, skills
  - Energy demand; money spent for energy (∅5.5 US$; income 28-142$)
- **Trainings for users, technicians and administration**
  - Training of users is most important for long-term sustainability; next to training, a user-friendly manual was prepared
  - Technician-administrator were trained to install, operate and maintain
  - Responsible person + assistant were chosen for 3 years to run the single firm "El Alumbre Rural Electricity Service Company"
- **Design + implementation of wind power generating system**
  - Check which type of energy is needed (AC, easiest to use)
  - Wind generator were produced in Lima; other components in Cajamarca; Efforts to incorporate local metal workshops were unsuccessful
  - Population was very motivated and supportive; users had to assemble their wind generator and build their control panel

Small Wind Power Generation Systems in Peru

Results and impacts

- Installation of a 100 Watt wind mill in every household in the community of El Alumbre (33 in total; monthly rate 3 US$)
- Local management model was implemented
- Five local technicians have been trained
- For implementation phase a committee was implemented to link beneficiaries and funding organizations, now control unit

Impacts

- Population use the energy for:
  - Lighting (100%)
  - Charging mobile phones (93%); former only 2% had mobile phones
  - Lighting for night knitting (57%)
  - 2 rural radio stations broadcast for 4-6 h/day
- Two 500 W wind generator (school, medical post), completed by a wind controller and inverter
  - 4 computers in the school and DVD player
  - 1 refrigerator to preserve vaccines
- Dissemination:
  - 300 people visited the project (authorities, university groups etc.)
  - Publishing of the results in media (Radio, TV, Newspaper etc.)

Costs:

Equipment: 50,000 US $

Total costs: 93,000 US $

Funding organizations:

ISF, Green Empowerment, ITDG, WISIONS (1/3)

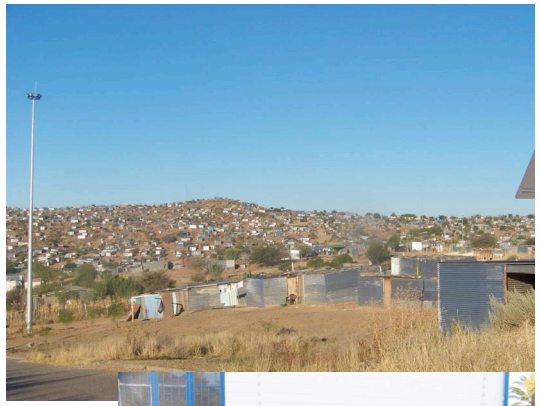
Business Opportunities With Solar Energy in Unelectrified Areas (Namibia; DRFN)

Background:

- In Namibia are 5,858 unelectrified settlements (2005) and only 1,500 are scheduled for grid-connection in next 20 years.
- Meanwhile the number of mobile phones is rapidly increasing
- The Desert Research Foundation of Namibia (DRFN) did survey on the options for “Energy Shop”
- Findings of a former project and developed guidelines
- Energy shops are a core element of the Off-grid Master Plan, but none have been implemented yet; missing demonstration

Project Aim:

- The objective of the project is to provide basic energy services and promote business opportunities in the off-grid region of Namibia (informal settlements and rural regions).
- Ten suitable entrepreneurs shall be identified
- „Energy Shops” will give access to modern energy
  - solar home systems that offer electricity for cell phone charging, hair cutting, battery charging and lighting; provided with solar stoves
- Showcase of pilot projects



Energy Shops in Namibia

Activities and current state

- (1) Procure ten Solar Business Systems from local suppliers as per DRFN specifications
  - Two bids were accepted
- (2) Identify ten entrepreneurs in unelectrified rural and informal settlement areas
  - 24 Potential entrepreneurs were identified in ten appropriate regions and ten selected through interviews, field visits, specific criteria
- (3) Conduct basic technical training, business management and record keeping procedures
  - Currently running
- (4) Monthly monitoring and evaluation of business performance
  - Monitoring guidelines to be prepared
- (5) Final recommendations and draft national of roll-out plan

Promoting sustainable livelihoods at Lake Victoria by introducing solar lamps for night fishing (Osienala/GNF)

- 60,000 fishermen catch the Lake Victoria Sardine, which are caught at night with kerosene lamps (to attract zooplankton)
- Each lamp consumes about 1.5 l, around 6-8 l kerosene/boat
  - Costs half of fishermen's income
  - Environmental risk (2% of kerosene spill to the water of Lake Victoria
  - ➔ Alternative lamps are needed
- A consortium of GNF (German NGO), Osienala (local NGO) and Osram (lighting producer) started in 2004 to work on an alternative
- Idea to use energy saving-bulbs (CF-lamps) with battery was tested as well as acceptance by fishermen ➔ positive outcomes
- Four Solar-Hubs for recharging of batteries (12V) installed that are managed by skilled hub managers (Kenya + Uganda)

➔ WISIONS supported the workshop for their training

  - Training on electronics, business administration, marketing
  - Dissemination of solar hub information to raise awareness
- Fishermen pay a deposit for lamp/battery (possible through micro credit) and 0.3 €/charge (saving of 200 €/a)
- Energy hubs in Kenya (for fishermen and households) are running

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29/07/2008


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OSRAM
UMEME
K W A
WOTE

Conclusions
for electrification of informal urban settlements

- Most of SEPS applications did not focus on urban settlements...Why?
- Variety of small-scale RE technology options can not only be used for electrification of rural areas, but also for informal settlements (e.g. small-scale wind energy);
- Experiences of a lot of rural projects should be shared

Some lessons learned

- Models with active participation of the users are more promising
- Critical selection of partners, people and producers involved before implementation starts
- Training of technicians as well as users is crucial
- Contribution of beneficiaries (monthly rate/fee) is a basic requirement for long-term economic sustainability and to be replicable

Thanks…

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General Background II

Why do we need a Technology Radar?

- Since beginning of new century, there's been an impressive **growth of RET**
  - Some grew 15 – 30% per year; Grid-connected PV solar increased even 60% annually
- However, **global energy demand rises**; and share of **RE showed stagnancy ≈ 13%** of global primary energy demand (IEA conservative figures)
- Experiences show **the need for improving the knowledge and information transfer** among different actors

- Several **studies on potential of RE** technologies exist, **BUT**
  - **comprehensive overviews are few**
  - It's important to illustrate the **linkage** between **energy-related human needs** and **available technological solutions**
- A **wider pool of criteria** beyond technical ones is necessary to evaluate **suitability and sustainability of technologies in the future**

➔ **Technology Radar aims at offering an information tool that analyses not only technical issues, but also illustrates social and economic aspects as well as future perspectives**