Opportunities and Implementation Issues of Community PV Applications

ICRA - IEA PVSDC Joint Workshop

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4. Sahel : RSP Programme

1. IEA - PVSDC Programme

- New programme of Task 9 includes :
  - Activity 42 : PV for Water services
  - Activity 43 : PV for Health, Education and ICT
- Objective:
  - To provide guidance on the use of PV for water services (pumping, desalination and water purification), and in social applications for health, education and ICT.
- Leader : IT Power (UK)

1. IEA - PVSDC Programme

- Work description & Deliverables:
  - Case studies : information on design, performance and reliability, and financing
  - Guideline : to identify when and where PV is most appropriate (cost-effectiveness)
  - Major issue : strategy for long term sustainability (provision for long term operation and maintenance (O&M) strategies is often a recurrent problem)
- Target audiance :
  - Sectoral Ministries and Utilities.

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2. Community PV Applications

- Various PV system sizes for various rural applications in various countries …
  i. PV systems from 100 to 1000 Wp
  ii. School & Health infrastructures
  iii. Rural telecommunication
  iv. Administration
  v. Community centres (including ITC)
  vi. Public lighting
  vii. Water supply

3. Technological Issues

- PV system quality (component and service)
- PV system design :
  i. Car batteries vs. deep cycle batteries
  ii. AC vs. DC supply
  iii. Centralised or individual system
  iv. Battery charging station
  v. Hybrid systems vs. pure PV systems
  vi. Prepayment technology
  vii. Anti-theft devices
  viii. Various technologies for pumping and water treatment
  ix. Etc.

3. Technological Issues (next)

- Final choice depends from many parameters! Technology maturity, performance, reliability, cost, flexibility, local needs, local management capabilities, social-economical parameters, …)
- In pure telecom business, all those PV design issues have been considered and solved because the profitable business generate enough cash to select high quality components, efficient management and long-term planification.

4. Non-technological Issues

i. Commercial service or not?
ii. Pre-electrification or real electrification?
iii. Initial investment : credit schemes, …
iv. O&M : management models, costs
v. Tariffs and subsidies – financial viability
vi. Ownership
vii. Key actor selection for implementation
viii. Capacity building and local training
ix. Etc.

4. Non-technological Issues (next)

- Evaluation of the real impact on the local development dynamism (and on Poverty Alleviation)

5. Experience Sharing

- Experience sharing between developing countries is one of the major objectives of the IEA PVSDC activities.
  - i. In Africa and South America many bilateral projects have promote community applications
  - ii. In ASEAN, new interest for community applications
- i. Project evaluations are rare because very few feedback from experiences, especially in Asia.

Part II : Case Studies

1. Philippines : SPOTS project
2. Uganda : ERT Programme
3. Mozambique : PV for Rural Health Facilities
4. Sahel : RSP project

1. Philippines : SPOTS project

a) Country Data

i. About 5 million rural households have no access to electrical power; dispersed small communities => PV very promizing. Commercial potential=500.000

ii. PV experience : more than 4000 SHS systems since 1980's; 25 years of experience.

iii. SHS dissemination has been dominated by Government and donor projects (many different models of implementation).

iv. Active private sector involvment (at all steps) but also local cooperatives

v. Major past experiences in SHS, telecom and water pumping

vi. Today, innovative approaches.

1. Philippines : SPOTS project

b) SPOTS Project

i. Objectives : provide electricity to 40 ARC in 15 provinces in Mindanao

ii. Characteristics : multiagency undertaking DAR (leader) + DOE + NEA + Rural Electr. Coop., ANEC's, NGO's, LGU's, People Organ. Coop.

iii. Financing : by Spain (50 millions USD)

1. Philippines : SPOTS project

iv. Project components and Solar Packages :

- Agribusiness development : water pumping systems and AC Power Bloc
- Community facilities & Social infrastructures : Health Centre, School, Barangay Hall, Community Lighting systems and Potable Water supply. (Additional SHLS)
- Institutional Development : community support and training on technical, credit management, agribusiness development.

1. Philippines : SPOTS project

v. Phase I implementation status (in 10/2004):

- 160/5553 SHLS; 85Wp + prepayement
- 31/68 BH; 85Wp
- 30/35 HC; 425Wp + refrigerator + lantern
- 37/68 SCH; 255Wp + colour TV + DVD (educ prog)
- 48/100 CL; 170Wp; only 1 or 2 per village
- 9/97 PW; ?
- 0/35 PB; 10 kW AC Power for productive use.

1. Philippines : SPOTS project

vi. Main observations (positive) :

- \+ High quality of design; high quality of products
- \+ Effective local technician training and capacity building (need strict supervision!)
- \+ High quality installations by local technicians
- \+ Orientation courses on O&M for users & operators
- \+ Monthly collective information meeting for users
- \+ Reproducibility of the O&M scheme (modular approach with individual operator (teacher, clinic staff) for each solar package)
- \+ No tariff for community packages but O&M in charge of LGU's (MOA).

1. Philippines : SPOTS project

vii. Main observations (negative) :

- Large range of components (different batteries, BCR, inverters, …)
- Many actors involved generating inter-relation problems (public/private, central/regional)
- Lack of experience of DAR (lead implementer)
- Complicated and costly organisation of O&M
- RESCO's are not involved
- High investment cost (high quality and sophist.)
- Strong government involvement for long-term sustainability.

1. Philippines : SPOTS project

viii. Conclusions :

- Globally too early to evaluate the PV component of SPOTS.
- Project has paid attention to many critical issues to avoid failures.
- Short-term consequences are :
  - Project management & organisation seem tricky and fragile;
  - Project cost is pretty high with unclear financial setup.
- Project formulation allows regular adaptation.

2. Uganda : ERT Programme

a) Energy for Rural Transformation project

i. ERT is a 10 years programme prepared by the GoU with the Ministry of Energy MoE and Uganda Communication Commission

ii. 2 components will be implemented : **Education** and **Health**

More info on www.education.go.ug

2. Uganda : ERT Programme

b) General Objectives

i. to increase access to electricity services in rural areas both directly, through household connections, and indirectly, through connections to health, education and other institutions;

ii. The program is technology neutral (grid extension, independent power producers, PV energy) but will promote renewable energy. Solar PV technology will be deployed whenever appropriate and least cost based on a lifecycle cost analysis.

2. Uganda : ERT Programme

c) Specific objectives

i. Education Component : to improve the quality of education in 10 districts by providing access to energy and ICT to post-primary education institutions including staff houses.

- This will assist MoES to reach its goals of expanding opportunities for and access to post-primary education.
- Furthermore, policy guidelines for energy/ICT in post-primary education will be developed.

ii. Health Component : (not presented here)

2. Uganda : ERT Programme

d) Education component characteristics

- Cross-sectoral approach, under which an explicit effort has been made to ensure that health, agriculture, education and water sectors benefit from the expansion of rural energy access.
- All rural people will gain benefit from the new services.
- Several capacity and market building interventions to remove barriers to the sustainable use of PV technologies in Uganda.
- Outline of the key financial assumptions, options for sustainability, cost sharing
- Implication and commitment from the district institution is needed to pay the recurrent costs of the energy/ICT packages on a continued basis (agreement before tendering!).
- Feasibility study recommends “supplier led credit scheme” for education package

2. Uganda : ERT Programme

e) Procurement and Energy Packages

- WB loan of US$ 2,600,000 to GoU for the Education component; part for good payments (**Energy & ICT packages)**
- **Design** of the energy packages includes equipment specifications, installation and maintenance arrangements.
- **Procurement** by Ministry of Education and Sports (MoES) of PV and ICT Packages (equipments, installation and maintenance) (bidding will be launched soon).
- **Procurement** by Ministry of Health (MoH) of solar PV energy packages for 376 rural health centres.

2. Uganda : ERT Programme

f) Specific issues (tech / non tech)

- External evaluation of cost effectiveness and sustainability of the proposed packages in the Uganda context before bidding.
- To debate whether to use AC or DC systems, or some combination, and whether, in the case of AC systems, whether to use centralized or decentralized ones
- To selectively build and exploit synergies between cross-sectoral assets in energy and ICT but avoiding unnecessary inter-sectoral linkages that may spread implementation difficulties.
- Impact evaluation of linkages between Energy, ICT and Education (or Health).

3. Mozambique : PV for Rural Health Facilities

a) Project objectives

i. To increase the **coverage** of health services in rural areas where there is no grid

ii. To improve the **quality** of health services

iii. To motivate the health care **staff** work in rural areas

iv. To provide **power** vaccine refrigeration, illumination of clinics, and electrification of staff houses

3. Mozambique (next)

b) Project implementation

i. By Ministry of Health (Maintenance Department); with grant from Norway; completion in 02/2002.

ii. Totally 250 rural health facilities in 3 phases

iii. Modular system approach :

- Health Centre lighting system (Fluo + adapted Halo + Na)
- Vaccine refrigeration system
- Staff house system (fluo & halo lighting + refrigeration) => to attract qualified staff!

3. Mozambique (next)

b) Project implementation (next)

iv. Local installation courses and Specific training of clinic maintenance staff (=> every 2-3 years).

v. Extra training needed to avoid regular overuses

vi. High protective design (lighting, BCR, battery box)

vii. Adapted organisation to handle spare parts (lamps, fuses, distilled water)

viii. Energy meter for monitoring

ix. Installation monitoring survey

4. Sahel : RSP project