Rural electrification in Benin by grid extension

I: Presentation of project
II: Socio-economic impacts

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I: Presentation of project
Challenges regarding rural electrification in Benin (1)

- Main production of electrical energy by neighbor countries and strong dependence upon petrol products
- Limited financial resources for required investments
- Supply and demand
  - Strong annual increase of energy demand;
  - Frequent blackouts (30 days/year)
  - Severe loss of electrical energy as a result of informal connections (up to 60%)
- Unsufficient technical service on all levels (organization, equipment, competences)
- Low access-rates
  Urban population (30%): 54% / Rural Pop. (70%): 3.5%
- Migration of (young) rural population to urban areas
Challenges regarding rural electrification in Benin (2)

Localization of demand by spatial analysis (GeoSim/ IED)

3,758 communities in Benin (2009), 2,384 (= 63%) are not electrified.

1,979 non electrified villages within <10 km of MT

⇒ Potential for electrification with low investment.
Challenges regarding rural electrification in Benin (3)

Localisation of demand by spatial analysis (GeoSim/ IED)

3,758 villages in Benin (2009), 2,384 (= 63%) are not electrified

125 non electrified villages at >20 km from existing grid

=> Potential for renewable energy
Project budget: 21,8 Mio €

- **EUROPEAN UNION**: 7,7 Mio
- **Agence Francaise Développement (FRANCE)**: 7,8 Mio
- **SBEE (BENIN)**: 2,4 Mio
- **DGIS (NETHERLANDS)**: 2,4 Mio
- **BMZ (GERMANY)**: 1,5 Mio
Summary of rural electrification project (1)

- **Overall Objectives**
  - Improve living conditions of rural population by implementation of national policy regarding rural electrification
  - Improve economic, social and environmental sustainability of the sector

- **Specific Objectives**
  - Increase sustainable access of rural village population to electrical energy (105 villages) including economic sector and social institutions
  - Strengthen organisational structures and specific competences of SBEE and ABERME
Summary of rural electrification project (2)

- **Partners**
  - Société Béninoise d‘Energie Electrique (SBEE)
  - Agence Béninoise d‘Electrification rural et de Maîtrise d‘Energie (ABERME)
  - Association Nationale des Communes du Bénin (ANCB)

- **Target group**
  - Approx. 220,000 people until 2017 (primary connections)
  - Social institutions (schools, health care centres), local business and handicraft business

- **Timeframe:** 01/2009 – 06/2013
Summary of rural electrification project (3)

- The grid extension
  - Number of villages: 105
  - Medium Voltage (15/20/33 kV): 320 km
  - Low Voltage (230/400 V): 500 km
  - Transformers: 185
  - Electric meters: 16,000
  - Public street lightning: 2,500
  - Power poles (concrete): 5,250
  - Power poles (wood): 8,600
Key results

- Significant increase of access to electrical energy
  - Introduction of more efficient planning methods (105 villages au lieu de 59)
  - Improved living conditions of rural population / social-economic conditions for social institutions, local craftsmen and traders
- Introduction of efficient technical planning tools, leading to a significant reduction of investment costs (optimisation of electrical and mechanic design of grid)
- Introduction of new standards in construction of power lines (Choice of materials; construction standards)
- Improved planning competences of local partners
- Detailed expertise on potential of renewable energy
II Socio-economic impacts
Non-electrified households

- Size of households:
  12 people with 7 children between 0-18 years

- Type of housing:
  Traditional houses
  Modern buildings
Lighting (1)

- 100% households use petrol lanterns
- Around 5 lanterns per household
- Burning 11h (19:00 – 06:00) each night
- 8 l petrol consumed per month
- Costs: 4.000F CFA /month (= 6,20 €)
Light sources (2)

- LED-lantern, type « Yayi Boni » with 3 ou 4 mono-cells (from chinese production)
- 4 lanterns per household
- 4 h per night
- 32 piles/ month*household
- 3,200 F CFA /month*household (4,90 €)
Other costs for electrical and other equipment

- Mobiles: charged 12 times/month: 1,800 F CFA (2,80 €)
- Radio: 12-16 piles/month:1,200/1.600 F CFA (1,8/2,5 €)
- Electrical generators (e.g. local festivities, weddings, initiations, political events)
- Diesel driven engines for generation of electrical energy (par ex. for electrical welding, bars, woodcraft)

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- Corn-mills (run on diesel)
- Air-compressors (for inflating tires)
Economic infrastructure in non electrified villages:

Carpenter  Tailor  Miller
New projects planned by households
24.5% of interviewed households declared that the plan to open a new business

- Café/Bar: 9%
- Restaurant: 9%
- Internet, copy-shop, pc-services: 18%
- Video-Club: 5%
- Woodcraft/Tailor/Welding: 10%
- Fridge for sale of fish: 21%
- Fridge for sale of ice, beverages, milk products: 30%
- Others: 7%
Reasons for access to modern energy
79% of the already existing businesses plan an expansion of their enterprise

- Better Quality: 23%
- Extension of working time: 33%
- Increased number of clients and income: 19%
- Increasing size of business: 6%
- Others: 2%
- Speed of work: 9%
- Reduction of energy costs: 8%
In fact, local workshops, already existing before electrification, seldom make intense use of electricity (apart from bars); however, access to electricity especially leads to creation of new enterprises.
3 Lessons learnt

- We must identify the individual drivers of socio-economic development for each village before electrification (important choice –criteria?). Specific strategies and tools must be available and implemented to support and push those drivers.

- We must not ignore the existence of informal secondary connections, created by villagers shortly after completion of the project. Secondary connection multiply in some cases the access rates by factor **5 to 8**!

- Sustainability of rural electrification demands for a better service quality to be provided by the electricity supplier. Adequate measures must be part of the log-frame.
Challenging and controversial questions

- Which is the decisive forces for the social-economic development of villages after their electrification?
- Which is an appropriate set of SMART-criteria to be used for a balanced choice of villages?
- What is an equal balance between „poverty reduction“ and „economic development of villages“? (measurable?)
- Do all (100%) social-institutions have to be connected to the grid or do we need other solutions?
- Which is the minimum technical standard, that would make secondary connection acceptable?
- How could the service attitude of electricity provider be improved during the project?
Thank you for your attention!
and don‘t forget: