

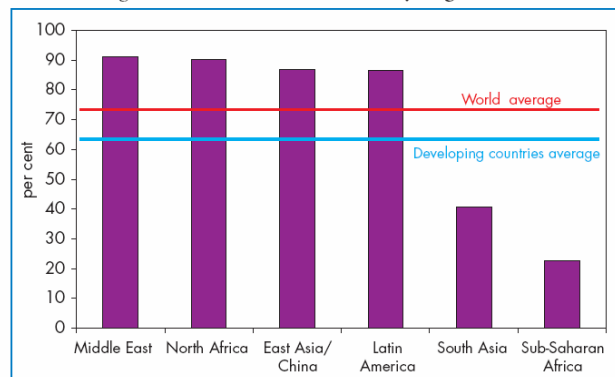
Off grid Regulation and Rural Photovoltaic Energy Concessions in Zambia and South Africa

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Rural electrification lagging...

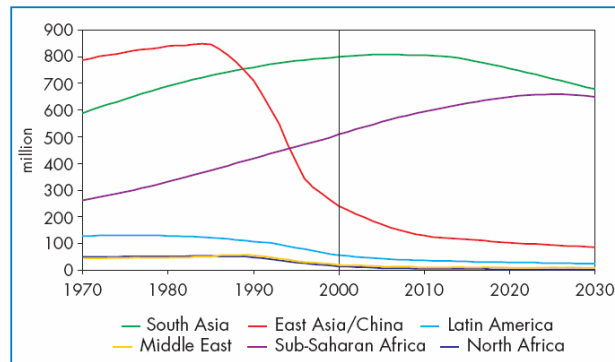
Figure 13.4: Electrification Rates by Region, 2000



Source: IEA analysis.

Impact of demography

Figure 13.8: Number of People without Electricity, 1970-2030



Source: IEA analysis.

Interest of solar photovoltaic energy in developing countries

- Length of sunlight
- Low density of population in some areas
- Flexibility of the investment
- 50Wp Solar home systems in remote areas for basic needs
- Light, radio, TV, mobile phone

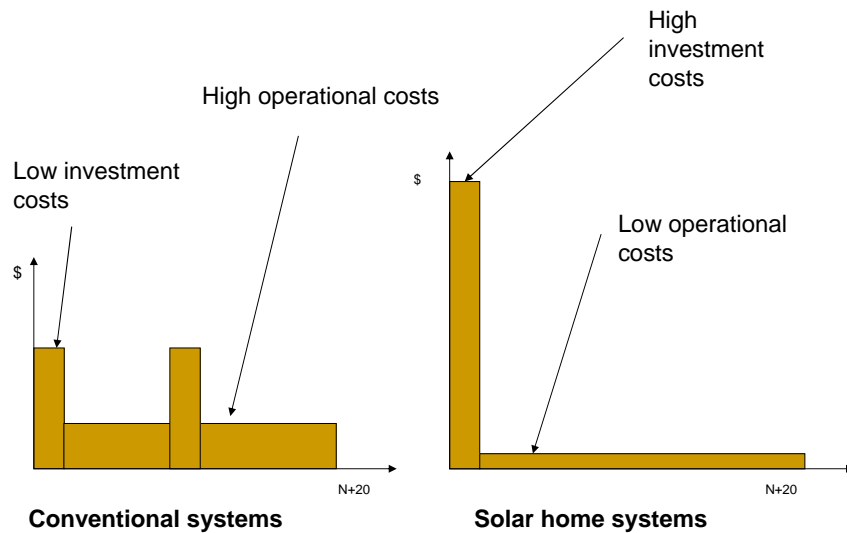
1. The question of the up-front costs

- Reduction of the cost / W_p of more than 80% since the 1980s of the solar panels from the manufacturers
- Still high initial investment (300-1000 US \$ for a 50 W_p)
- Even in wealthiest part of Africa: farmers and civil servants cannot afford such an investment

2. “Experimental technology” and the question of maintenance

- International aid programs
 - Solar systems were given and not maintained by local beneficiaries of aid
- Maintenance of solar systems even if the cost is low has to be borne by the end-users
- Energy just a technical problem?
 - Social needs (not just kWh)
 - To provide a service (not just a product)

Structure of costs



How to solve the questions of up-front costs? and maintenance?

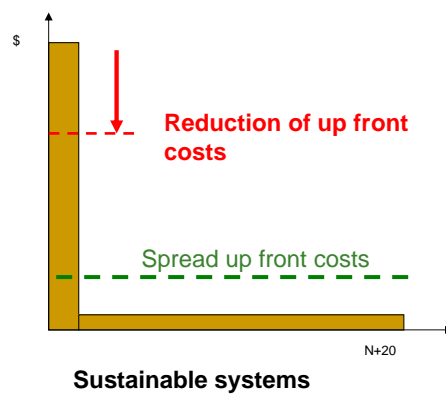
Support mechanisms (feed-in,...) to reduce the up-front costs

+ creation of rural funding agencies (subsidies)

Creation of organisations to spread the up-front costs

-Micro-credit/ revolving credit/loan

-Fee for service (ESCOs,...)



Photovoltaic ESCOs in Zambia



Photovoltaic ESCOs in Zambia (1)

1. Energy Service Companies are small local enterprises
2. Government gives a loan to the ESCOs
3. ESCOs buy PV solar systems & install them in the houses of their clients
4. ESCOs maintain the PV solar systems
5. Clients pay a monthly fee of 8-13 US dollars
6. ESCOs reimburse progressively the loan
7. ESCOs solve the question of up-front cost and maintenance at once

Photovoltaic ESCOs in Zambia (2)

- Concept of ESCO – Energy Service Company - tested in the Eastern Province started in 1998
- Multiple actors
 - Funded by the Swedish International Development Agency
 - Stockholm Environment Institute and University of Zambia involved in monitoring/training
 - Dpt. of Energy involved in monitoring
 - Regulator ERB regulates through the issues of licences and definition of codes of practice and standards
- Now 3 ESCOs, more than 400 clients + waiting list of several hundred clients
 - Fully operational
 - Good record of payment
 - Few thefts
- Good social impact
 - Extended hours of business for small shops
 - Improved results for pupils in schools with solar systems
- **BUT** ESCOs implemented in the wealthiest part of Zambia. In rural areas of Zambia, only 2% of the population has access to electricity: replication of small-scale companies in other parts of Zambia?

Rural Concessions in South Africa



Rural electrification in South Africa

- Massive rural electrification effort since 1994
- More than 2.5 million households connected to the grid
- Still more than 1.5 million households in remote areas unlikely to be connected
- Concessionaire fee for service with solar photovoltaic has been adopted in 1999 to install more than 300,000 Solar Home Systems
- Currently 5 concessions
- Project initially monitored by the national regulator

Energy stores in Kwazulu Natal



Nura Concession in Kwazulu Natal

- Very large concessions of 10.000 Km² with 11.000 solar home systems
- Multi energy stores
 - LPG
 - Solar electricity
- Economies of scale

- **BUT** less proximity with clients and delay in maintenance
 - good human resource management
 - Software + system of reporting
 - Global Position Systems

- Complaints mainly linked
 - to small size of the systems (no colour TV! no cooking!)
 - Cost of the fee (4-8 US dollars) even subsidised remain very high for rural people
 - Understanding of the contract? Problem of ownership of the systems

Regulation for off-grid energy?

- Public-private partnership
 - Long-term policy/commitment of the government
 - Market-driven (and not just donor-driven)
 - Training is crucial (technicians and end-users)

- (Multi) energy regulators
 - Standards and codes of practices “light handed approach”
 - Importance of correct tariff setting (but inflation)
 - Long-term integrated socio-economic comparisons and technological neutral planning
 - Lifetime: 20 years (solar systems compared to hybrid solutions or connection to the network)
 - Rising operational costs of conventional energies
 - Consumer awareness