

Renewable Energy and Poverty Alleviation: Prospects for Rural Electrification

Dr. Hartmut Grewe

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Basic Situation for 1.6 billion people:

Rural Population is lacking access to electricity

- 80% of those who do not have access to electricity live in rural areas. **Poor living conditions and high unemployment are inciting many people to migrate to urban areas.** This migration into cities has been a major problem for most developing countries.
- **This migration can only be overcome by improving living conditions – and particularly by creating jobs – in rural areas.** There is no time to lose, since many many megacities in developing countries are on the brink of collapse.
- **Compared with power supply in urban areas, rural electrification is costly but indispensable.** Bringing power to the rural poor is a great challenge, since they have no lobby support and are hardly politically organised.

Electricity Access in World Regions (2005)

Region	Population	Without	With Access	Urban Rate	Rural Rate
	(million)	(million)	(million)	(%)	(%)
Africa	891	554	337	68	19
- North	153	7	146	99	92
- Sub-Saharan	738	547	191	58	8
Emerging Asia	3418	930	2488	86	65
- China/East	1951	224	1728	95	84
- South Asia	1467	706	760	70	45
LatinAmerica	449	45	404	98	66
Middle East	186	41	145	87	62
Developing Countries	4943	1569	3374	85	56
OECD -Russia	1510	8	1501	100	98
World	6452	1577	4875	90	62

Benefits of electricity in rural areas:

Overcoming poverty by economic action

- **Electricity is not a luxury good reserved only for the rich, but it is an essential precondition for fulfilling basic human needs.** Access to electricity can provide water and irrigation and thus boost agricultural production. Electricity fosters education by providing light and communication tools. It reduces child and maternal mortality as well as disease incidence by enabling refrigeration of medication as well as access to other equipment. And it improves gender equality by relieving women of fuel and water collecting tasks.
- **Overcoming poverty requires self sustained economic growth.** Electricity is essential for setting up small businesses which serve the local market. Jobs are the only sustainable means of lifting people out of poverty. A stable power supply, which can be used for economic activities, can lead to job creation and higher incomes.

Energy choices with global environmental impact: the challenge of climate change

- The environmental dimension of rural electrification is great. The choices developing countries make today for their energy mix will make a big difference for the global environment in the medium and long term.
- Many of today's developing countries and emerging economies will soon become major economic actors and will play a crucial role in shaping the global environment, particularly climate change.
- The transition to renewable energy sources is crucial for both development and environmental goals. Continues reliance on traditional forms of biomass (such as wood and charcoal) is leading to deforestation, increasing CO₂-levels and creating a loss of biodiversity, eroding top soils, suffering from flash floods.

Grid extension or decentralised power generation:

A strategic political choice

- **Some policymakers have a strong preference for the extension of the national grid to rural areas.** But there are limited financial resources and there is a need to bring electricity to the poor in the more immediate future.
- **The cost of grid extension is generally subsidised and not recovered by electricity tariffs.** This distorts the competitiveness of decentralised power generation systems. Besides, long transmission lines often produce technical losses of electric power (6-10% per 100km).
- **Developing countries should take into account that existing grid infrastructures are already very unstable.** Very often, power supply is limited to a few hours a day. Existing grids would need to be reinforced.
- Renewable energy provides an alternative solution which does not require such investment. **Many engineers see decentralised power generation as a promising strategy for the future of energy production** (both in industrialised and in developing countries).

Alternative technologies for rural electrification (1)

Technology	Description	Advantages	Shortcomings
Small PV applications	PV–panel attached to equipment	High flexibility. Easy to move and to share	Limited to specific use. Maintenance, repairs not assured
Energy Home Systems	Each house with a roof mounted PV panel or micro wind turbine and electricity lines.	Flexible to mount. No tariffs/metering needed.	Not suitable for powering business. Easily reaches its capacity limit. Maintenance and theft are problems.
Energy Containers	Powered by RE/hybrid or diesel offers electricity for charging mobile phones and small batteries.	Easy to set up and finance. Easy Maintenance. Additional services can be provided to local needs.	System is not expandable. Limited impact on living conditions at home and business development.

Alternative Technologies for Rural Electrification (2)

Technology	Description	Advantages	Shortcomings
RE mini-grid	Centralised power generation based on RE and distribution across the community.	Can provide power for economic activities. Efficient maintenance and protection against theft are possible.	Battery storage needed. Power shortages in cases of unfavorable weather conditions.
Hybrid mini-grid	Multiple RE sources are combined or one RE source combined with a diesel generator.	Smaller battery storage needed. Stable power supply at day/night and during bad weather conditions	If diesel is added, functioning depends on availability of fuel. Emissions and noise result.

Alternative Technologies for Rural Electrification (3)

Technology	Description	Advantages	Shortcomings
Diesel generators	Generator powers a mini grid or single user facility.	Easy maintenance. Spare parts readily available. Steady, reliable power source.	Noise, emissions, and local environmental/health damage. Dependence on external supplies. Rising fuel prices.
Grid extension	Extension of the national grid through high-voltage transmission lines. Local distribution station.	Energy for productive use. Maintenance is generally safeguarded.	Risk of electricity theft. Limited willingness to pay. High price of connection for remote areas. Risks of black-outs.

Necessary steps (1): Recommendations by Alliance for Rural Electrification (ARE)

A. Technology choices:

- **Renewable Energy systems, particularly hybrid systems, are a cost-effective and sustainable technological solution for rural electrification.**
- **Mini-grids have sufficient capacity to power small businesses** which can spur the development of local activities and enable communities to improve their living conditions.
- **The life-cycle approach and an analysis of local conditions are essential tools for determining the right technological solution.** Low upfront investments can result in more expensive outcomes in the medium and long run.

Necessary steps (2): Recommendations by Alliance for Rural Electrification (ARE)

B. Political Challenges:

- **Access to electricity must rank high on the development agenda and should follow a reliable long term strategy.**
- **Policymakers should develop the right economic incentives for rural electrification which spur local initiative and private investment.**
- **A close dialogue between policymakers, the private sector and representatives of rural communities is indispensable for sustainable policies.**

Necessary steps (3): Recommendations by Alliance for Rural Electrification (ARE)

C. Legal Framework :

- **The legal framework must allow for private and local initiatives.** Monopolised power generation and distribution can act as a hindrance to accelerated rural electrification.
- **Subsidies for fossil fuels must be contained.** They should not hinder the deployment of renewable energy technologies.
- **Whenever the ability to pay does not cover the operation costs of rural electrification systems, subsidies are legitimate.** Through the development of the rural economy, and the local job market, these subsidies can be phased out in the long run.

Necessary steps (4): Recommendations by Alliance for Rural Electrification (ARE)

D. Financing and local commitment:

- **Financing schemes should spur private and local initiatives and generate enough cash for operation and maintenance.**
- **The embedding of the power supply within the local community practices is of key importance.** Trained technicians must be available, electricity users must understand the possibilities and limitations of the system, and peers must assume responsibility for the functioning of payment schemes.
- **Local ownership determines whether rural electrification is successful, especially in the long run.** All stake holders, community leaders, companies, aid organisations and public authorities are called upon to work together for capacity development and sustainable solutions.

Conclusion: Positive Impacts of Rural Electrification

- **Electrification is a major economic step ahead for any rural community. It brings about new opportunities and poses many challenges.** Power systems which are only designed from a technological point of view and not adapted to the local community, are doomed to fail. Their embedding within the local context determines whether the system will be operational in the long run and whether it will power social and economic development. **There is no substitute for local ownership and responsibility.**
- Schemes to collect tariffs can only work when people put money aside for covering their monthly fees. A social network, similar to those set up for **micro-financing schemes**, would be appropriate for supporting community payments – both in terms of their willingness and their ability to pay.
- **As for ownership and maintenance, safeguarding local training and capacity building are indispensable.** Such aspects should be assured by the private sector in collaboration with a reliable local authority.

Thank you for your Attention!

KONTAKT: DR. HARTMUT GREWE, ROTDORNSTR. 8, 12161 BERLIN

EMAIL: HARTMUT.GREWE@GMX.DE