



Success Factors for the Implementation of Mini Grids

Michael Franz, Project Manager, GIZ

Berlin, 26 February 2013



giz Service Portfolio for the Energy Sector

■ Capacity development

- Technical and management expertise
- Strengthening of sector institutions and key actors

■ Building enabling environments

- Support for attractive policy and regulatory frameworks
- Support for formulating and implementing national energy strategies
- Promotion of private sector participation

■ Technical advisory

- Technology transfer for RE/EE
- Planning and implementation of demonstration projects

■ Multi-stakeholder dialogue in the energy sector

- „honest broker“ between political actors, society, research, private sector
- Support of national and regional political processes





Definitions and applications

Definition: As a minimum a mini-grid consists of an electricity generator interconnected to a distribution network that supplies electricity to a localized group of customers. Energy storage can be included and several several generation technologies can be combined.

Applications:

- Electrification of remote areas (1kW – 1 MW)
- Electricity supply of islands as well as commercial or public facilities (100kW – multiple MW systems)

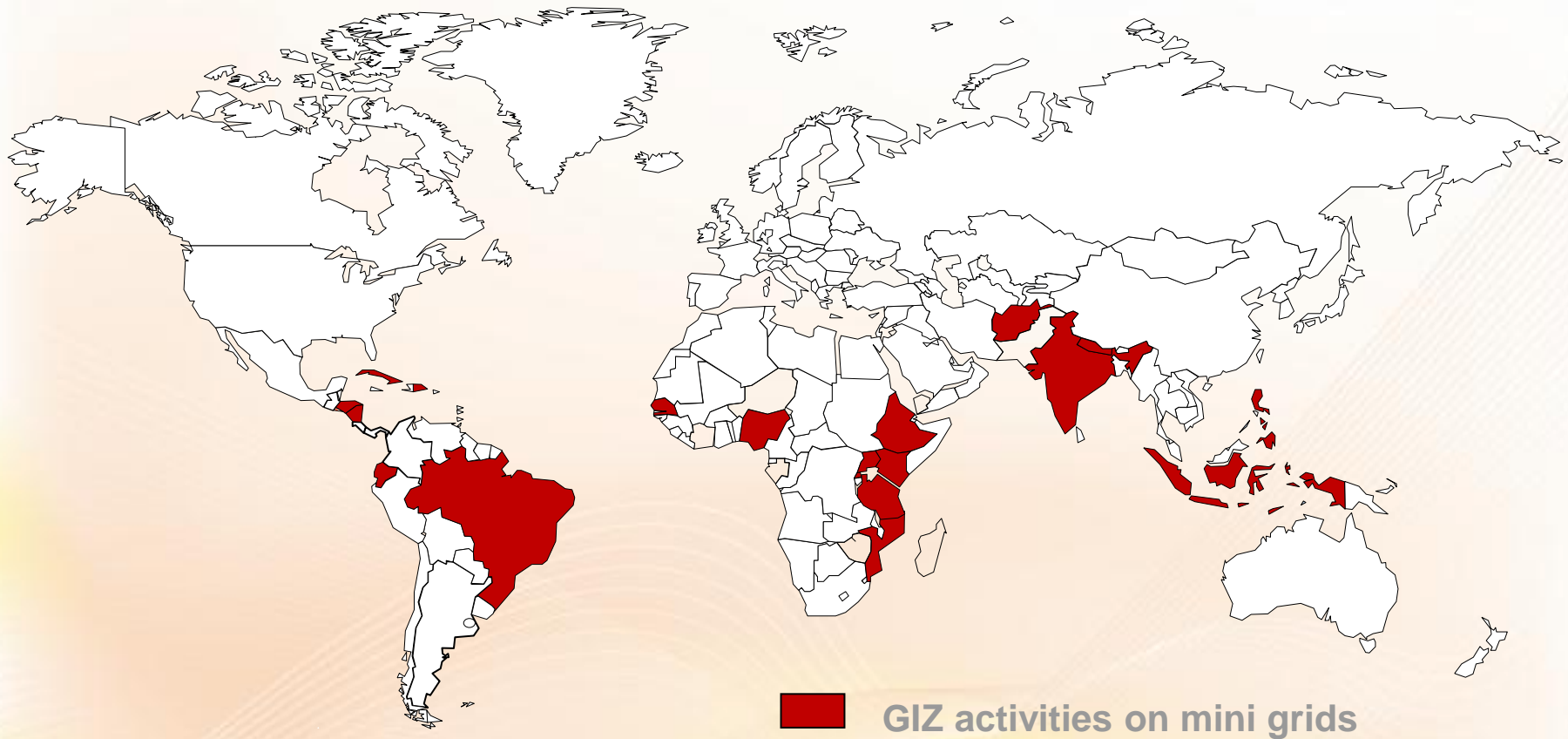


Why mini-grids? Why now?

- **Technologies have matured** (some only recently, i.e. solar PV)
- **Paradigm change:** grid-based rural electrification is not enough
- Strong and increasing **interest / push from private sector**
- **Benefits of renewable energy / hybrid mini-grids**
 - Economic viability (where grid connection is unviable)
 - Improved living conditions
 - Productive use, local value addition and job creation
 - Improved social services (in particular health and education)
 - Environmental benefits (micro and macro)
 - Opportunity for leveraging investment, incl. from foreign sources
 - Future possible grid connection, then contribution to grid stabilization



GIZ Experience in promoting mini-grids





Example I: German-Senegalese program *PERACOD*

- **Objective:** 80% of the SN population have no access to electricity → improve access, involve private sector
- **Financing:** BMZ
- **Partner:** Senegalese Rural Electrification Agency (ASER), Electricity Regulatory Commission (CRSE), private operators (INENSUS West Africa, EnergieER, etc.)
- **Achievements**
 - 18 mini-grids operational; Further 50 in implementation
 - Improvement of the regulatory framework for private operators
 - PPP with Inensus West Africa piloting Micro Power Economy Model with smart pre-paid meters





Example II: RE / EE in rural Afghanistan

- **Objective:** low electrification rate, insufficient and unstable supply → improve access in 4 provinces
- **Financing:** Alternative Energy Promotion Centre (AEPC); commercial banks
- **Partner:** Ministry of Energy and Water, Provincial governments
- **Achievements**
 - Six small-scale hydropower schemes completed providing electricity to 63,000 people
 - Two mini-grids powered by solar PV systems installed
 - 150 businesses using electricity for productively
 - Regional working groups established to develop and implement provincial electrification plans





Example III: Hydro debt fund Nepal (EnDev Nepal)

- **Objective:** establish a professionally managed fund for the financing of MHP based mini-grids
- **Financing:** Energising Development (EnDev)
- **Partner:** Ministry of Energy and Water, Provincial governments
- **Achievements**
 - 2 commercial banks (Himalayan Bank and Clean Energy Development Bank) actively involved in
 - 10 loan agreements for micro hydropower based mini-grids signed
 - 4 Micro Hydropower schemes operational
 - 7500 persons (1374 HH) electrified





Operation Models for Mini Grids

Model	Abstract	Opportunities	Challenges	Prevalence in Africa
Utility	Planning, implemen. and operation by government entity (e.g. / or utility)	Easy to support (for donors!), easy to realize uniform tariffs	Requires capable utility, quality and sustainability, corruption, can attract only public financing	High
Private	... by private entity	Private investment, incentives on sustainability	Policy framework, cost-covering tariffs, maintenance, community „buy-in“	Low
Community	... by a community	Community buy-in, appropriateness	Financing, management and sustainability	Low
Hybrid	„Outsourcing“ of key functions, e.g. generation	Requires a strong framework, and capable partners, but may otherwise mitigate many challenges while realizing opportunities(?)		None (?)



Project development process (here: mini-grids)





Project development process (here: mini-grids)



Which step is the most critical one?



Project development process (here: mini-grids)



Which step is the most critical one?

Hypothesis:

All of them, since they all feature critical success factors!



Mini-grid success factors at micro-/project level I

Decision / Identification

▪ **Information**

- User / consumer information: socio-economic data (ability to pay)
- Geographical conditions

▪ **Policy & Regulation**

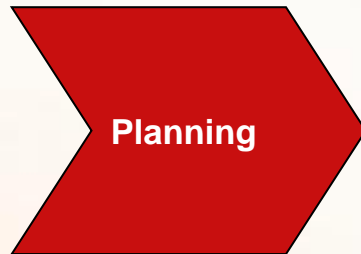
- Regulatory framework must be a) in place, b) clear & coherent, c) attractive
- Policy / regulatory vision, appropriate integration in medium-/long-term sector planning

▪ **Community participation / sensitization**

- Proper and thorough information (“both ways”!), verification “on the ground”



Mini-grid success factors at micro-/project level II



- **Technical design / feasibility**
 - Right choice of technology in view of needs, business case, geography etc.
 - Technically sound design
- **Socio-economic viability**
 - Responsive to user needs and expectations
 - Cost-covering tariffs (incl. subsidies), sound revenue base (incl. “productive use”)
 - Long-term project management vision, incl. O&M (!)
- **Regulatory setup , economic and legal design**
 - Proper consultation with regulators, adherence to all regulations



Mini-grid success factors at micro-/project level III



- **Financing**
 - Proper structuring (equity / debt) and risk management
 - Reliable financing partners (who don't bail out last minute)
- **Bankability**
 - Project documentation must be sound and complete at this stage (!)
 - All regulatory aspects must be addressed (e.g. PPA, permits, concessions, etc.)
- **Procurement (for utility model; partly also for “donor projects”)**
 - Technically sound tender documentation
 - Transparent and integer tender process (!)



Mini-grid success factors at micro-/project level IV



- **Sound project execution**

- Sound project execution: local conditions addressed, all materials available, thorough and correct construction etc.
- Flexibility/experience to do last-minute adaptations on site, if necessary

- **Local technical capacity**

- Availability of capable partners (local technicians?)
- Think ahead: involve future stakeholders and participants, i.e. community, utility (if involved) as well as and in particular technical personnel



Mini-grid success factors at micro-/project level V

Implementation

Operation

Note: this step is often overlooked or underestimated!

- **Local capacity**
 - Technical: ensure availability of qualified staff for O&M
 - Business: ensure availability of reliable and qualified project managers
- **Operation model**
 - All previous framework conditions and all other parameters culminate here!
- **Community involvement**
 - Need to keep community informed and involved, need to be responsive



GIZ – What can we do?

***Philosophy:** ideally support & facilitation to develop markets*

- **Policy & regulation**
 - Macro-level / multi-stakeholder dialogue, sensitization of policymakers
 - Support to formulation and implementation of the p&r-framework
- **Information & contacts**
 - Provision & compilation of information, facilitation of contacts
- **Project preparation / implementation & financing**
 - Support to project participants (project preparation and management)
 - Support to stakeholders in implementation, e.g. regulators, utilities, communities
 - Facilitation of financing, incl. Development of incentive schemes
- **Capacity Development**
 - Training and know-how transfer for all stakeholders



Quo Vadis Mini-Grid Market?

- **Is there already a market? – Yes; potentially large, actually small**
 - Rural electrification:
 - Public procurement: new electrification projects, fuel saver / rehab.
 - Few rural electrification schemes with private involvement (e.g. Senegal)
 - Supply to private, commercial clients (possibly with electrification „spin-off“: e.g. tourism, telecoms)

- **Where are the future markets – how long will it take?**
 - Rural electrification: hybrid operator models (short-/medium-term; +++) – public procurement continued (now, ++) – fully private schemes (medium-term; +??)
 - Private consumers: perhaps the biggest opportunities (falling prices meet rising tariffs and unstable supply); realizing them requires strong sales presence, but most importantly: the right offer (i.e. energy product vs. energy service)



Thank you for your attention!

Contact

Michael Franz
michael.franz@giz.de