



International Resources Group

Best Practices in Renewable Energy: Standardized Tools for Accelerating Uptake of Small-Scale Renewable Energy

By Matthew S. Mendis
International Resources Group
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- Principal barriers to accelerating commercialization of RE
- Options for RE overcoming market barriers
- Samples for successful RE market interventions
- Conclusions



Principal Market Barriers to Small-Scale RE

- **Policy** – bias for conventional energy systems
- **Legal/Regulatory** – need for fair treatment of independent and intermittent energy systems
- **Institutional** – entrenched interests in large-scale centralized and conventional energy systems
- **Financial** – high capital costs and perceptions of risk
- **Technical** – perceptions related to performance, reliability, compatibility, safety, etc.



Options for Overcoming RE Market Barriers

- **Policy** – this is perhaps the most difficult to overcome – requires support at the apex levels of government and society.
 - Best policy is to “level the playing field”, but this is easier said than done.
 - In the absence of a “level playing field” RE needs “infant industry” support to compete with entrenched conventional systems
 - Policies must also open market access and monetize social/environmental benefits/costs



Options for Overcoming RE Market Barriers

- **Legal/Regulatory** – must translate policy support to binding, effective and enforced measures – some examples include:
 - Renewable Portfolio Standards (RPS);
 - Non-Fossil Fuel Obligations (NFOs);
 - Electricity Feed Law (EFL);
 - Payment of Avoided Costs / PURPA;
 - Mandated RE Targets

- All of the above are imperfect solutions to a “level playing field” and an open market but do provide incentives for RE.



- **Institutional** – need to transform existing institutions and establish new ones capable of implementing and supporting small-scale, decentralized RE systems:
 - Centralized and vertically integrated utilities are not favorably disposed to small-scale, decentralized RE systems;
 - Need to foster IPPs, RESCOs, RECs, RE Finance Companies/Divisions, Micro-credit Providers, etc.
 - Standardized contracts and PPAs can help stimulate the market and reduce transaction costs.



Options for Overcoming RE Market Barriers

- **Financial** – need innovative, financial engineering and leveraging of RE's social and environmental benefits:
 - Long-term loans with manageable debt service ratios
 - Microcredit financing for decentralized small-scale RE (SHS, household biogas, pico-hydro, etc.)
 - Monetized environmental benefits/carbon credits
 - Supporting risk guarantees
 - Vendor credits

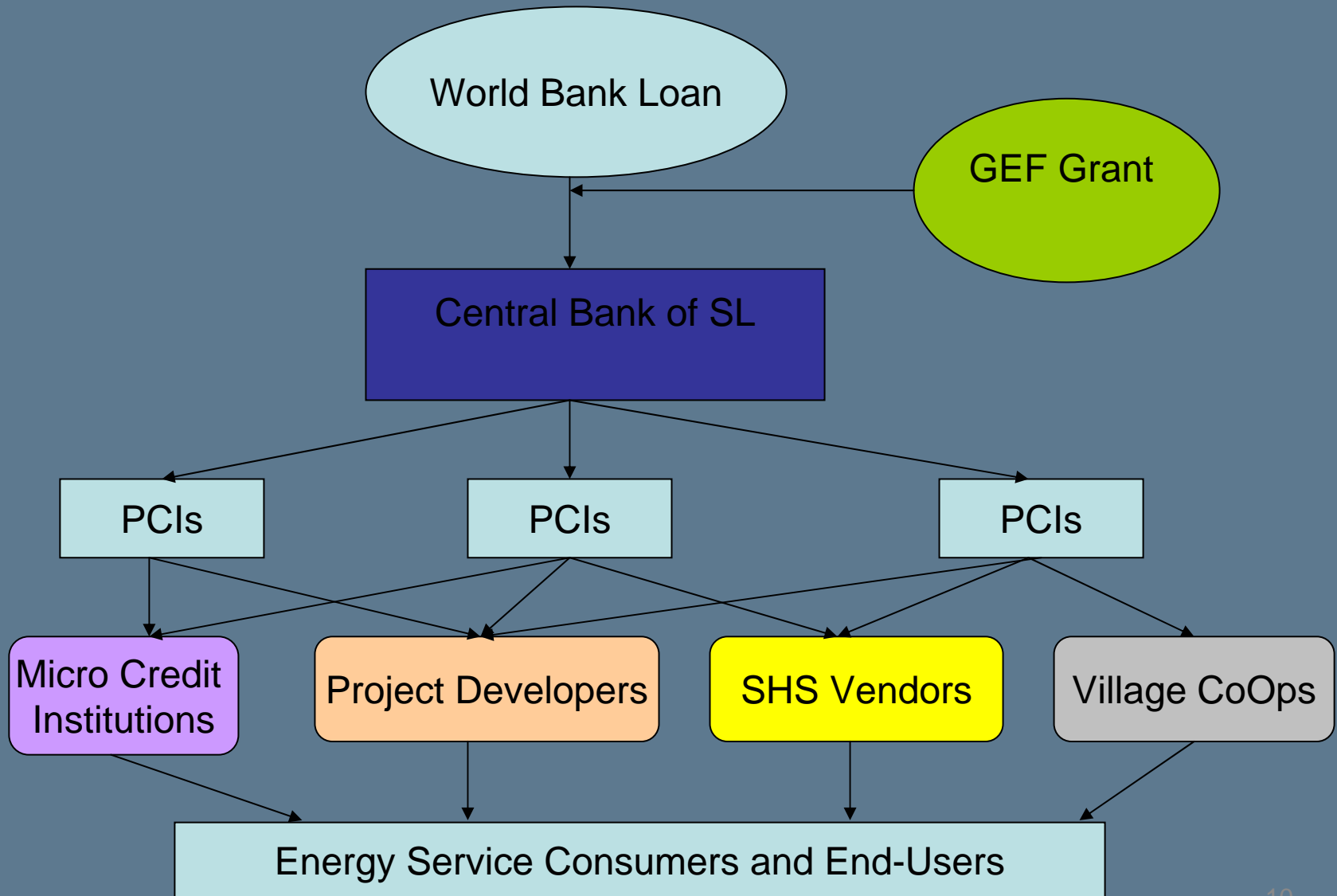


- **Technical** – establish standards for RE technology performance, reliability, safety and work to demonstrate compatibility.
 - Product certifications and standards are especially important for small-scale PV, SHW, pico-hydro, biogas systems to ensure that consumers are not stuck with bad products.
 - Larger RE systems like wind, mini-hydro, biomass combustion/gasification should be subject to similar commercial standards as conventional energy systems.



➤ **Energy Services Delivery Project - \$55.3M**

- Supported by a World Bank loan (\$24.2M) and GEF grant (\$5.9M);
- Leveraged additional capital from local banks (\$13.7M), entrepreneurs (\$9.6M) and government (\$1.9M);
- Executed by the Ministry of Finance and Planning and the Ceylon Electricity Board (CEB);
- The project was targeted to develop 26MW of grid and off-grid renewable energy capacity including providing service to 32,000 off-grid rural customers through solar home systems and village hydro schemes;
- In addition the project supported a 3MW pilot wind farm and supported the CEB in the development of small-scale grid-connected renewable projects and a DSM program.





- From inception of the ESD Project, sales of SHS have grown from less than 30/month to over 1000/month.
- A number of serious private sector companies entered the SHS market in Sri Lanka including the likes of Shell Solar, BP Solar, SELCO and others.
- There are over 1000 persons directly employed by the SHS industry in Sri Lanka.



Keys to the Success of the SHS Component

- Establishing and implementing minimum quality and performance standards for SHS sold in Sri Lanka under the project.
- Providing consumer finance through community based micro-credit institutions.
- Reducing the first-cost barrier for SHS with the GEF grant.
- Promotional and educational campaigns for the use of SHS.
- Monitoring and improving product delivery and maintenance systems.
- Competition among multiple solar vendors.



- By 2002 the ESD Project had implemented 28 OGVH systems with a total capacity of 287kW and serving 1400 households;
- An additional 30 + projects were in the pipeline for financing under a follow-up project;
- As a result, the technical capacity to implement OGVH and the capability to locally manufacture key components for the OGVH projects is now well established.



Keys to Success of the OGVH Component

- Assistance for the high development costs associated with village hydro systems.
- Organization of rural customers into village hydro cooperatives which are responsible for repayment of the project loans and operation and maintenance of micro-hydro power plants.
- Maximum use of local labor and domestic equipment.



- The mini-hydro capacity grew from 1MW prior to the ESD Project to over 30MW under the ESD Project.
- By 2002 an additional 60+MW were currently under development.
- The private sector is aggressively pursuing additional mini-hydro development.
- Policy and institutional reform, undertaken by the ESD Project helped set the stage for this rapid increase



- The ESD Project assisted the Ceylon Electricity Board in the building and testing of a pilot 3MW grid-connected wind farm.
- The pilot was completed in February 1999, certified in May 2000 and has been operating successfully.
- The CEB gained valuable information and experience in integrating wind energy into its system.
- The CEB is now actively seeking tenders for grid-connected wind power.
- The ESD Project helped remove perception and institutional barriers to wind energy in Sri Lanka.

- **The ESD Project undertook to build up the capacity of the Ceylon Electricity Board in dealing with:**
 - Grid-connected renewable energy projects (mini-hydro and wind farms);
 - Off-grid rural energy options;
 - Demand side management measures including:
 - Energy efficient building energy codes;
 - Appliance labeling;
 - DSM strategy and load research.



- Capital availability is a necessary but not sufficient condition for increasing investments in sustainable renewable energy options.
- Policy and institutional reform are necessary to attract and support private sector investors.
- Experience with grid-connected renewable energy options is necessary for utility acceptance.
- Standardized power purchase agreements with tariffs based on avoided cost principles are important elements for private power developers.



- Local community participation is essential for successful implementation of off-grid projects.
- Establishing and implementing performance and quality standards for off-grid renewable energy options is important for building up consumer confidence.
- Innovative financing/subsidy schemes are important in reducing the high initial cost barrier of off-grid systems.

- International financial institutions can and must play an important role in helping establish the foundations for adoption of sustainable renewable energy options.
- Renewable energy options are capital intensive and therefore require external investment capital so as to not drain the capital resources of developing countries.
- Significant support to remove the first-cost barriers of renewable energy options is necessary especially if these options are targeted for the 2 billion un-served rural poor that everyone refers to.