

Electrification Using Renewable Energy: Uganda's Experience

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Outline of the Presentation

- Background
- Electricity Sector
- Rural Electrification Strategy and Plan
- Policy framework
- Financial schemes
- Projects Implemented
- Proposed projects
- Conclusion

Background



- Uganda is located in East Africa
- It has an area of 241,000 sq km of which 43,900 sq km is covered with water bodies.
- 34% of the land is arable.
- Uganda's population is estimated at 34.9 million (2014) of which 82% reside in rural areas.
- The country has good hydro and solar resources

The Electricity Sector

- The national electricity access is 14% while in the rural areas, access is only 7%.
- The electricity sector was unbundled into generation, transmission and distribution following the Electricity Act 1999.
- The generation companies sell electricity in bulk to transmission company which in turn sells it to distribution companies
- The Electricity Act 1999 also provides for the establishment of a Regulator and the Rural Electrification Agency (REA)
 - REA is responsible for promoting, supporting rural electrification programs in addition, RE below 20MW.

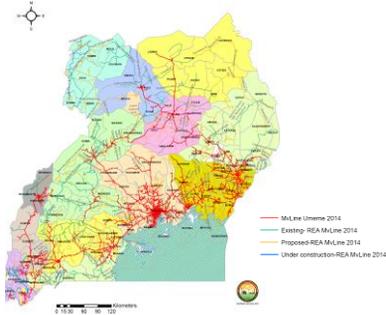
Rural Electrification Strategy & Plan 2013-2022

- In July 2013, the Government published a Rural Electrification Strategy and Plan (RESP) for period 2013-2022.
 - The primary objective of the Strategy is to achieve an accelerated pace of electricity access and service penetration to meet national development goals
 - The target is to achieve a rural electrification access of 26% by 2022, which translates to 1,415,000 new connections on grid and off-grid.
 - The strategy is also aimed at positioning the country to achieve the Government Vision of universal access by 2040
- The country has been divided into 13 service territories

Implementation of RE Strategy & Plan

- The Strategy is being implemented through a combination of approaches:
 - Grid extension in areas where the demand for electricity is high and the demand justifies the cost.
 - Mini-grids where the demand is not so high and the distance from the grid is long but the loads are fairly concentrated with potential for productive use of electricity such as trading centres including islands communities
 - PV standalone systems for isolated and dispersed households, businesses and social services facilities.

The Current Grid Map



Master plan

- REA has embarked on the master planning process to determine areas feasible for grid extension within the 10yr planning period and areas suitable for off-grid solutions
- The process will include development of detail construction plans with timelines.
- The islands on Lake Victoria are being considered for off-grid electrification using mini-grids
 - Survey is being undertaken to identify population centres and collect socio-economic data necessary to undertake pre-feasibility studies.

Policy Framework

- The policy provides for the development of mini-grids by the public, private including communities and through public-private-partnerships
- Some of the policy instruments available include:
 - Tax exemption of renewable energy generation equipment.
 - License exemption for off-grid projects with a capacity not exceeding 2MW.
 - Exemption from complying with all service standards applicable to the main grid
 - Light handed environmental regulation for small renewables energy projects

Financial Schemes

- There are a number of financial instruments available for developers of mini-grids in Uganda
 - Capital subsidies from REA covering the cost of the local distribution grid in order to buy down the end-user tariff
 - The liquidity insurance facility from Uganda Energy Credit Capitalization Company Ltd (UECCC) to enable Participating Financial Institutions (PFIs) extend the tenure of the loans.
 - Partial Risk Guarantee facility from UECCC available during the construction phase to cover for cost overruns of up to 15% of the total project cost. Any addition cost overrun up to 50% is finance 50:50 by both parties.
 - Bridge Financing Facility from UECCC to cover interest payments during the construction stage of a project, before it starts generating cash flows but payable after commissioning.
 - Transaction Advisory Services from UECCC

Projects Implemented

- The 3.5MW Nyagak mini-hydro located in north western Uganda supplies electricity to the district town.
 - Developed and operated by IPS. The project received a concessional loan and subsidy for REA
- The 374kW Kisiizi mini-hydro located in south western Uganda. It was upgraded from 64kW to 374KW. It supplies power to a hospital and the neighboring community.
 - It was developed and is operated by a church funded hospital. The project received a subsidy from REA
- The 64kW Bwindi micro-hydro located in south western Uganda supplies power to hospital and neighboring community.
 - It was developed by GIZ and is operated by the community.
- 40kW Suam Micro-hydro located in eastern Uganda supplies power to a community.
 - The project was developed by GIZ and is operated by the community

Pamoja Energy Ltd has set-up two biomass gasification projects each with a capacity of 32kW
REA Uganda is providing the distribution network and connection



A 600kW PV & 1MW diesel hybrid mini-grid set-up on Bugala Island by Kalangala Infrastructure services commissioned in Jan 2015



5kW PV mini-grid in Kasese set-up by Remergy Energy A/S that supply electricity to 97 households



22.5kW PV System Installed by Kricher Solar in Uganda to supply the village and a telecom tower



Current Proposals

- REA has received proposals for the following off-grid projects:
 - Kirchner Solar Ltd to supply power to 30 villages with about 150 households and businesses using 22kW PV hybrid mini-grid.
 - REMERGY is planning to supply electricity to 3 villages in Kasese district using PV mini-grids.
 - Mandulis Energy Limited is setting two 32kW gasification using rice husks to power rice mills in northern Uganda and the neighboring community
 - Absolute Energy Ltd is plan to set up a 150kW PV mini-grid at Kitobo Island on Lake Victoria to supply over 400 households and businesses.
 - Energy for Development in collaboration with REA is setting a pilot 13kW pilot mini-grid to be operated by the community

13.5 kW at Kanyegaramire Trading centre

The project is being implemented in collaboration with E4D and the local district council

- E4D provide the solar generation equipment (PV module, charge controller and batteries)
- REA provide the distribution network, PV support structure and housing for batteries
- District provided the land and to drill a borehole.

The mini-grid will be managed by the community through a cooperative.

Status of implementation

- Cooperative formed
- Distribution network under construction
- Civil works under implementation



Conclusion

- Due to the scattered nature of settlements in Uganda, mini-grids will play a major role in increasing electricity access in Uganda. Many people are migrating into trading centres which is providing opportunities for decentralized mini-grids.
- However, the potential will not be realized unless constraints are addressed:
 - The mindset of energy planners who view grid as the only approach to providing electricity.
 - Demonstrate that mini-grid can provide reliable electricity cost effectively.
 - Consolidate projects in a geographical area to benefit from economics of scale and reduce operational cost.
 - License projects covering the whole geographical area
 - Address the high upfront capital requirement, the resultant high end-user tariff and the ability of the rural communities to pay.
 - Provide subsidies and concessional financing to lower the end-user tariff.
 - Streamline and shorten the licensing regimes
 - Remove or reduce license fee for very small renewables.
 - Provide predictability of when the grid is likely to be extended to the area.
 - Develop rural electrification master plans that give timelines of when the grid is expected.
 - Improve regulation & incentives for connection of small renewables to the grid
 - Currently Uganda has a single buyer model. A need to allow embedded generation

THANK YOU

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