



Renewable Energy and Poverty Reduction, Tanzania Case

Kick-Off Workshop on Low Carbon Development, 100%
Renewable Energy and Poverty Reduction
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Presentation outline

- Introduction
- Energy situation in Tanzania
- RE potential in Tanzania
- Contribution of RE in energy mix
- Case of solar and ICS technologies
- Challenges facing RE
- Conclusion

Introduction

- 2012 Census, Tanzania had estimated population of 43.6 m, 70.9% was considered rural population.
- By 2012, Tanzania had 12.3 million (28.2%) below the poverty line - Poverty is higher in rural areas, 33.3%, than in urban areas.
- Tanzania's registered GDP per capita in 2012 was US\$ 652.
- Tanzanian economy depends heavily on agriculture, in 2012, accounted for 27% of GDP, employed 62% of the population

Energy situation in Tanzania

- Energy is central to human life and the socio-economic development of a country.
- At the present, affordable, reliable and accessible energy is a major constraint
- The energy sector in Tanzania is largely dominated by biomass (charcoal and firewood), accounting for 90% total primary energy consumed in 2012.
- Electricity represents 1.5% and petroleum products represent 8% of the energy consumption in the country.

Energy situation.....

- Solar, coal, wind and other sources represent around 0.5% of the total energy consumed in the country.
- Energy consumption in rural areas accounts for about 85% of total national energy consumption
- In 2012, only about 20.7% of the country's populations were connected to grid electricity, 7% in rural.

RE potential in Tanzania

- Tanzania has abundant, diverse and high-quality green energy resources largely untapped.
- The assessed potential of small hydropower resources (up to 10 MW) is 480 MW. Installed, grid connected, small-hydro projects contribute only about 15 MW.
- Tanzania has significant geothermal potential that has not yet been fully quantified.
- Estimates indicate a potential exceeding 650 MW.

RE potential.....

- Several areas of Tanzania are known to have promising wind resources.
- At Kititimo wind speeds average 9.9 miles per second and at Makambako they averaged 8.9 miles per second at a height of 30 m.
- Tanzania has high levels of solar energy, ranging between 2,800-3,500 hours of sunshine per year, and a global horizontal radiation of 4–7 kWh per m² per day.

RE potential.....

- The potential for modern biomass uses is high, sugar bagasse (1.5 million MTPY), sisal (0.2 MTPY), coffee husk (0.1 MTPY), rice husk (0.2 MTPY), municipal solid waste (4.7 MTPY) and forest residue (1.1 MTPY).
- Currently renewable energy (excluding large hydro) accounts for only about 4.9% of generation capacity.
- According to the Tanzania Power System Master Plan (PSMP, 2013), future energy needs will be met by coal (41%), large hydro (35%), oil and gas (21%) and others (3%).

Contribution of RE in national energy mix

Source	TANESCO	IPP	EPP	SPP	Total	%
Hydropower	553.0	-	-	-	553.0	35
Small hydro (< 10 MW)	8.8	-	-	4.0	12.8	0.8
Oil (Jet-A1 and diesel)	88.3	163.0	205.0	-	456.3	29
Gas	252.0	249.0	-	-	501.0	32
Biomass	-	-	-	27.0	27.0	1.7
Imports ^a	14.0	-	-	-	14.0	0.9
Total	916	412	205	31	1,564.1	100
%	59	26	13	2	100	

Power Generation Capacity - March 2013 *Source: TANESCO 2013.*

Note: IPP = Independent Power Producer, EPP = Emergency Power Producer, SPP = Small Power Producer.

TaTEDO on going initiatives on RE promotion

- Campaigning for Pro-poor Low carbon Development strategies (2014-2016) – SE
- Construction of 30 kW gasification mini-grid in Biro village, Malinyi District to connect 106 HHs, 11 enterprises, 7 inst. – Finland (EEP)
- 20kW gasifier /25kW solar hybrid mini-grid under construction in Kibindu village, Chalinze Dist. to connect 156 HH and enterp. – through support of USADF.
- Institutional biogas plant 200m³ constructed at Manzese sec. school – UN-Habitat

TaTEDO on going initiatives ...

- Study on mini-grid development in Tanzania - WRI
- Training on ICS to refugee in Nyarubusu, Kigoma - OXFARM
- Sustainable Energy Project for Improving Education, Health and Business Services in off grid areas
- Up-scaling access to integrated modern energy services for poverty reduction programme

Case of Solar and ICS technologies

- **Project area:** Tanga, Kilimanjaro, Arusha, Shinyanga, Simiyu, Coast region

Identified problems :

- Inadequate quality social services in off-grid areas
 - Health centre – light for maternity wards, powering microscopes, vaccine storage, etc.
 - Schools – light for studying in the evening, energy to power laboratories, computers, energy for cooking
 - Business – energy for lighting, heating water, cellphone charging, etc.

75 solar PV systems of capacity 600 W each
Total installed capacity 45,000W equiv. to 45kW





Solar PV

- For a dispensary; 250mls to 300mls of kerosene was used per day equiv. to 7 to 8.5 liters per month.
- About 100ltrs annually in one dispensary or 2000ltrs in all 20 dispensaries
- Watchmen were using 8-10 dry batteries monthly in their torches for security; with security lights in place at schools and health centers, an average of 108 batteries are saved annually.

Solar water Heater

- Fifteen (15) solar water heaters were installed in individual HH, rest house and hostels.
- Total installed capacity for 15 solar water heaters is 2,400litres
- Heating 30 lts of water to 60°C , take 20 minutes, equiv. to 0.696 Kw



Improved Cook stove

- 43 improved fuel wood stoves were constructed in boarding and day schools
- In boarding school firewood use declined from 4000kg to 1,600kg equiv. to 2,400kg or 2.4 t/wk or 105.6 t/yr. and in day school from 3500kg to 1400kg
- Total of 4,257t or 4,257,000kg of firewood will be saved annually; which is about 60% saving



Improved Cook stove



Business centers powered by Solar PV

one phone charged – 300Tsh.
Per day average of 20 phones are charged



Benefits from the intervention

- More time to students for reading in the evening hours
- More conducive and hygienic medical environment
- Well cooked food
- Less fuel wood vs. three stone fireplace
- Reduced in-door air pollution
- Saved time and money
- Income generation

Challenges facing RE

- Lack of long-term financing
 - High upfront costs have also been acting as a major deterrent.
 - Private sector faces difficulties in securing long-term financing due to business risks.
 - Projects operate in rural settings with poor consumer load profiles.
- Political interference in implementation of national electrification plan.
- Lack of technical expertise lead to higher project costs.
 - Technology
 - Human Resource
- The absence of clear Government policy/strategies on the development of RE power projects

Conclusion

- High demand for energy of which conventional way alone can not meet.
- Low carbon energy - Environmental benefits versus climate change impacts
- Grid extension is expensive given the vastness of the country coupled with low population densities in a majority of regions.
- RE systems provide reliable energy services
- RE can create opportunity for income generation, improved livelihood and poverty reduction

Our Contacts



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