Bumbuna Hydropower Dam

HYDROPOWER DEVELOPMENT IN SIERRA LEONE

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1. Map and population of Sierra Leone
2. Status Quo of Hydropower Development
3. General Policy Framework
4. Specific Case Study – Bumbuna Hydro Power Scheme
5. Expectations from The ECOWAS Small Scale Hydropower Program (SHP)
MAP OF SIERRA LEONE
Freetown, Capital City of Sierra Leone
Over the years, Sierra Leone, with a total land of 72,000 sq. km area with a population of about 5.5 million has achieved reasonable development in the hydropower industry and there are still vast potentials to be exploited. Several studies have been carried out to ascertain the different levels of hydro power capacities at different land systems and water catchment areas. A summary of these studies has identified in excess of 30 locations suitable for hydro power development.

a) Micro Hydro (<100kW) – currently not operational in Sierra Leone
b) Mini Hydro(100 – 1000kW) – Yele/Makali with a total capacity of 250KW are operational in the Northern Part of Sierra Leone
c) Small Hydro (1 -30MW) - Charlotte – 2MW work is yet to commence situated near Freetown

Bankasoka – 2MW construction is yet to commence situated in the Port Loko District
Moyamba – 10MW contract is yet to be signed situated in the Southern part of Sierra Leone
Goma – 6MW operational supplying power in the south east. Situated in the eastern part of sierra Leone in Dodo chiefdom
2. STATUS QUO OF HYDROPOWER DEVELOPMENT CONT.

d) Large Hydro (>30MW)
Bumbuna – 50MW operational situated in the northern part of Sierra Leone constructed in the Seli river.

Bumbuna Phase II – 350MW contract modalities in progress (upstream and downstream)

Benkongor Phase I – 34.5MW situated in the south in Kono district
Phase II – 80MW situated in the south in Kono district
Phase III – 85.5MW situated in the south in Kono district

Benkongor projects is yet to be exploited.
• Present Electricity Supply from Hydro – 56.25MW (Bumbuna 50MW, Goma 6MW & Yeli 250KW)

• Rough Estimate of Hydro Potentials untapped – 1,150MW

• Possible contribution of SHP for rural electrification – Yeli mini hydro has improve significantly on the livelihood of that settlement, on agriculture, education and socio-economic development

• Government of Sierra Leone at the moment owns almost all the hydropower plants in the country. The largest hydropower plant, Bumbuna is operated by a private Italian company known as Salini Construction. Goma Hydropower plant is operated by Sierra Leoneans in the east.
• Existence of local production of turbines or spare parts – Not Available (N/A). Existence of local consultancy capacity – N/A.
• Existence of hydrology departments at university/training institutes in the country – N/A
• Existence of a network of gauging stations for regular water level and runoff measurements and hydrological data collection – Available at the hydropower stations

3b. What is the normal consumer tariff for electricity? New tariff is 1,224 Leones/kWh (40.8 US cents/kWh) on average. Industries/Large Customers is 47.1 US cents/kWh.

3c. What are the legal requirements for the development, implementation and operation of a hydropower system? Licences, quality standards, permits, water rights, land right, environmental and social impact assessment.
3d. If feeding electricity to the national grid is allowed, how is the feed-in tariff defined? Standard power purchase agreements, but tariff figures are not yet available to the public for ADAX BIOENERGY power purchase agreement contract recently signed by Government.

3e. Does the existing legal framework make a difference between micro, small and large hydro? Certainly yes.
4. Specific Case Study of Hydropower.

Bumbuna Hydroelectric Power Plant (50MW)
Bumbuna Area View in 2005 during Construction
Map showing dam location and details
Dam layout and intake schematic
Operations of the radial & intake gates, tunnel and schematic layout of the power house with transmission lines
Operations of the radial gates during peak flow
Bumbuna Hydroelectric Power Plant

4b. Capacity – First Phase 50MW
   Year of Construction – Started 1991
   Commissioned – 2009 Nov. 6th

4c. Who owns the system? – Government of Sierra Leone (GoSL)

4d. Who operates the system? – An Italian Firm by the name of Salini Constructori

4e. Does it connect to the national grid? - Sierra Leone does not have any national grid, but Bumbuna transmission line, 161kV will form the basis.
4f. Who benefits? - Freetown the capital city is benefiting most from the generation followed by Makeni where a shield wire was dropped to supply about 3MW.

4g. What were the main barriers? – finances and during construction the war

Factors for success ? – Bilateral relationship with the government of Italy, cooperation of several funding agencies WB, Kuwait fund, ADB, EU, DFID etc
5. Expectation from ECOWAS small scale Hydropower program (SHP)

Expectation is high and this will assist developing countries like Sierra Leone to have more access to energy, hence improving its socio economic livelihood, improve agricultural sector, education, mining etc