

WORLD SMALL HYDROPOWER DEVELOPMENT REPORT 2013

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LIBERIA



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1 Africa

1.5 Western Africa

1.5.6 Liberia

Lara Esser, International Center on Small Hydropower

Key Facts

Population	3,887,886 ¹
Area	111,370 km ²
Climate	West African monsoon climate - tropical; hot and humid. Dry winters with hot days and cool to cold nights; Wet, cloudy summers with frequent heavy showers. Seasons are determined by the prevailing moisture-laden monsoon winds that come from the southwest. November to March, the dust-laden Harmattan wind blows in from the northwest producing a chilly and dry climate ²
Topography	Four distinct relief zones: the coastal belt, rolling hills, plateaus and northern highlands
Rain Pattern	Dry Season: November to March. Rainy season: April to October. Average rainfall ranges between 4,770 mm along the coast and 2,030 mm in the interior. ²

Electricity sector overview

The Liberia Electricity Corporation is the state utility, with the mandate to provide adequate and reliable power to the nation at a reasonable tariff. All of its facilities (both hydropower and thermal plants) were looted and vandalized during the 14-year civil war from 1989 to 2003. Prior to the war, the total installed capacity was 412 MW (of which 200 MW operated by mining companies). A state-owned hydropower plant Mount Coffee (64 MW) was in operation at that time and is now being restored and expanded to 100 MW.

The installed capacity is approximately 24.6 MW and an Emergency Power Programme (EPP) including several diesel power plants is in operation. The estimated total electricity demand for 2010 was 36 - 37 MW.³ More recent electricity production data is not available.

According to the Poverty Reduction Strategy (PRS), about 10 per cent of urban residents and less than 2 per cent of rural residents have electricity access. Liberia's rate of access to publicly provided electricity is close to zero.³ Furthermore, an urban access rate can only be derived for the capital of Monrovia. Some 1,217 of an estimated 210,619 households are supplied with public

electricity (as of late 2010), corresponding to 0.58 per cent of the capital's population. With the exception of a very limited municipal mini-grid in Gbarnga, Bong County, no publicly-supplied electricity service is available outside of the capital.⁴ The remainder of the population depends on costly, inefficient and polluting resources such as small gasoline and diesel generators, firewood, charcoal, candles, kerosene and palm oil.³

In May 2010, the Rural and Renewable Energy Agency (RREA) started a number of pilot activities, including a pilot micro-hydropower project in Lofa county, and swapping kerosene lanterns with solar lanterns under Lighting One Million Lives in Liberia with the help of the Rural Energy Fund.⁵

A World Bank report estimates that by 2015, the electricity demand based on a slow-growth scenario will be 111.84 MW (36 MW on-grid, 75.84 MW off-grid) and by 2020 the demand will be 301.75 MW (103.49 MW on-grid, 198.26 MW off-grid).³

Small hydropower sector overview and potential

Liberia has an assessed hydropower potential of 2,000 MW. Prior to the war, there were 23 small hydropower plants. Now, only one privately-owned small hydropower plant (4 MW) is in operation.⁶ Two small hydropower plants were damaged during the civil war and are in need of repair.^{6,7}

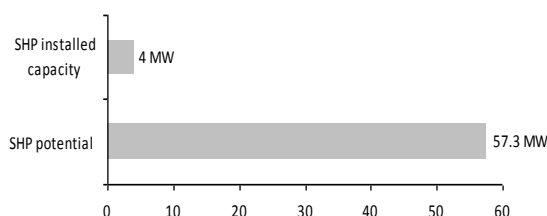


Figure 1 Small hydropower capacities in Liberia

A 30 kW small hydropower plant with an isolated grid was successfully operated and managed by the Yandohun community (Lofa county) in the 1980s. However, it was destroyed during the 14-year civil war. It was redesigned to 60 kW in 2009 through funding from the World Bank's Africa Renewable Energy Access Program. Rehabilitation works started in June 2011.^{3,9}

Proposed small hydropower plants

Proposed plant	Potential capacity (MW)
1 Lofa River Mini Hydro Plant	2.5
2 Zelibia River Mini Hydro Plant	1.5
3 St. John River Mini Hydro	7.5
4 Dougbe River Mini Hydro Plant	0.6
5 St. Paul Mini Hydro Plant	5.5
6 Ya Creek Mini Hydro Plant	1.5
Total	19.1

Sources: Sow⁴, ECREEE⁸

The Baseline Report by the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) indicates total potential of approximately 86 MW in Liberia based on two lists that combine 30 potential small hydro sites up to 30 MW each.⁸ When considering sites up to 10 MW only, the 28 sites identified have a combined potential capacity of 57.31 MW (figure 1).

Renewable energy policy

Liberia has significant renewable energy resources including biomass, hydropower and solar energy. A draft Renewable Energy and Energy Efficiency Policy and Action Plan of the Ministry of Lands, Mines and Energy was published in 2007. Liberia has targeted to raise its share of renewable energy to 30 per cent of electricity production and 10 per cent of overall energy consumption by 2015.¹⁰ A World Bank report *Options for the Development of Liberia's Energy Sector* considers various scenarios including renewable energy options in detail.^{3 10} A draft for the integrated water resource management is in process.⁸

Barriers to small hydropower development

Studies to assess Liberia's hydropower potential were conducted between 1976 and 1983, thus there is a great need to update these findings.³ Higher education institutions do not have a small hydropower curriculum. An energy policy and a legal framework for the promotion of hydropower are not yet established (i.e. no policy, feed-in tariff or standard PPA).⁸

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