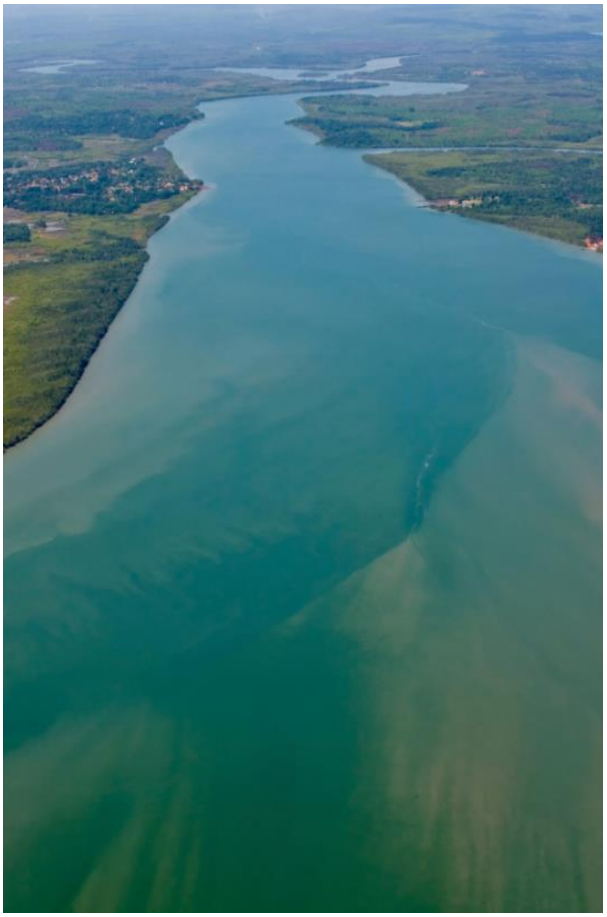
ENERGY SECTOR

2025

Bumbuna I

Existing and expanded generation

Primary energy input	Renewable
Technology	Hydropower
Installed capacity	Existing 50 MW; expansion 60 MW
Location of project:	
■ Town	Bumbuna
■ District	Tonkolili District
■ Province	Northern Province
Project status	Feasibility
Estimated cost (US$)	60 to 67 million
Coordinating ministry	Ministry of Energy
Construction time	33 months



The lowest cost generation in the Sierra Leone system is the existing 50 MW run of river hydro at Bumbuna I, which is owned and operated by the public sector Electrical Generation and Transmission Company (EGTC). Expansion of this plant by a further 60 MW is the lowest cost option for increasing energy provision in the country according to the Millenium Challenge Corporation feasibility study in 2023.

Investment proposition

The existing and expanded capacity will need to be operated jointly. EGTC is not in a position to finance the expansion, therefore the Government of Sierra Leone is looking at a transaction to combine privatisation of the existing 50 MW plant alongside an agreement for the new owner to undertake the 60 MW expansion. The transaction will be underpinned by a power purchase agreement with the Electricity Distribution and Supply Authority, supported by appropriate guarantees, with a starting price based on the existing output and then increased as the expanded capacity comes online.

The expansion cost is estimated in the feasibility study at between US$60 million and US$67 million depending on the turbine configuration selected, with a construction period of 33 months from contract signature.

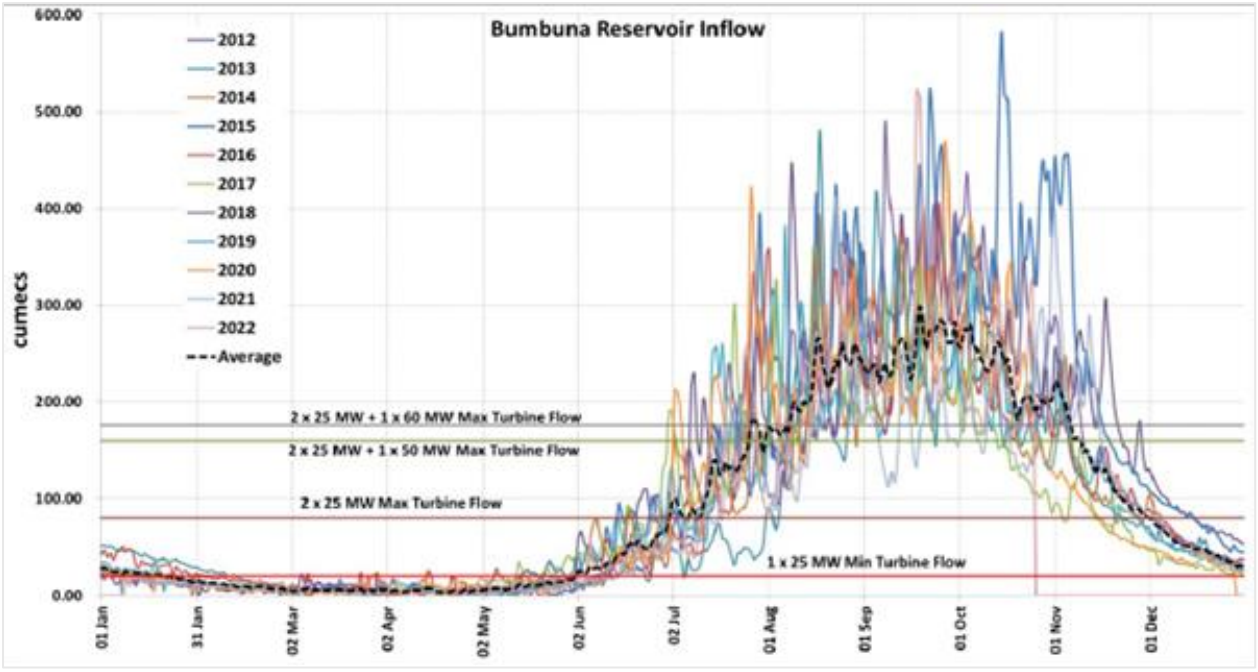
Key facts

- The 50 MW Bumbuna hydroelectric power plant is located on the Seli river in the Tonkolili district of Sierra Leone. The plant was built with an investment of US$327 million and was intended to provide a consistent, inexpensive and clean source of energy for the country.
- Construction of the first phase of the plant was started in 1975. By May 1997, about 85% of the project had been completed; however, work had to be suspended by the outbreak of civil war.
- Construction was restarted in 2005, and the plant was completed and commissioned in November 2009.

- The assets include the Bumbuna dam, a surface powerhouse, a 50 MW powerhouse at the foot of the dam (2x25 MW). A 200km 161kV transmission line transmits electricity from the plant to Freetown.
- The Bumbuna dam is 88 m high and 400 m long with a head of 70.8 m. Two tunnels run on the right and left side of the dam. The left tunnel is used as the primary spillway while the right tunnel functions as the power tunnel and auxiliary spillway. The intake for the right tunnel is a 93 m concrete tower with a diameter of 7.5 m. Nominal flow per turbine is 40m^3/second.
- The surface power station contains the machine hall which houses all the equipment including the draft tubes, penstocks and inlet valves. The powerhouse consists of two Francis turbines rated at 25 MW each. The turbines are connected to vertical shaft synchronous generators.
- Performance over the five-year period from 2018 to 2022 was an average output of 222.5 GWh with an average capacity factor of 51%. The minimum average load was 6 MW in May 2022[1].

Annual inflow for the Bumbuna reservoir 2009 to 2022 as per data supplied[2] is set out below:

Figure 1. Annual inflow for the Bumbuna reservoir 2009 to 2022



- The proposed expansion is a low-cost option for power supply because the offtake, intake, main inlet valve, power tunnel, screens, etc. are already designed for an additional 60 MW (80 m^3/s additional flow). There is the option of a single 60 MW turbine or 2x30 MW turbines. The powerhouse will need to be expanded to install the additional turbine(s). Output of the expanded station is expected to be 371 GWh.
- No resettlement related costs are anticipated for construction. With appropriate mitigation, low to no environmental impacts are expected, including no detrimental effect on the local chimpanzee population.
- The stability and integrity of the Bumbuna I dam is not likely to be compromised: the powerhouse extensions will be founded in hard rock, which requires specialist blasting to avoid damaging the instrumentation in the existing powerhouse, adjacent to the site.

[1] Appendix K Feasibility Report prepared by Tetra Tech for MCC: September 2023
[2] Appendix K Feasibility Report prepared by Tetra Tech for MCC: September 2023