Hybrid PV+Batteries in The Gambia

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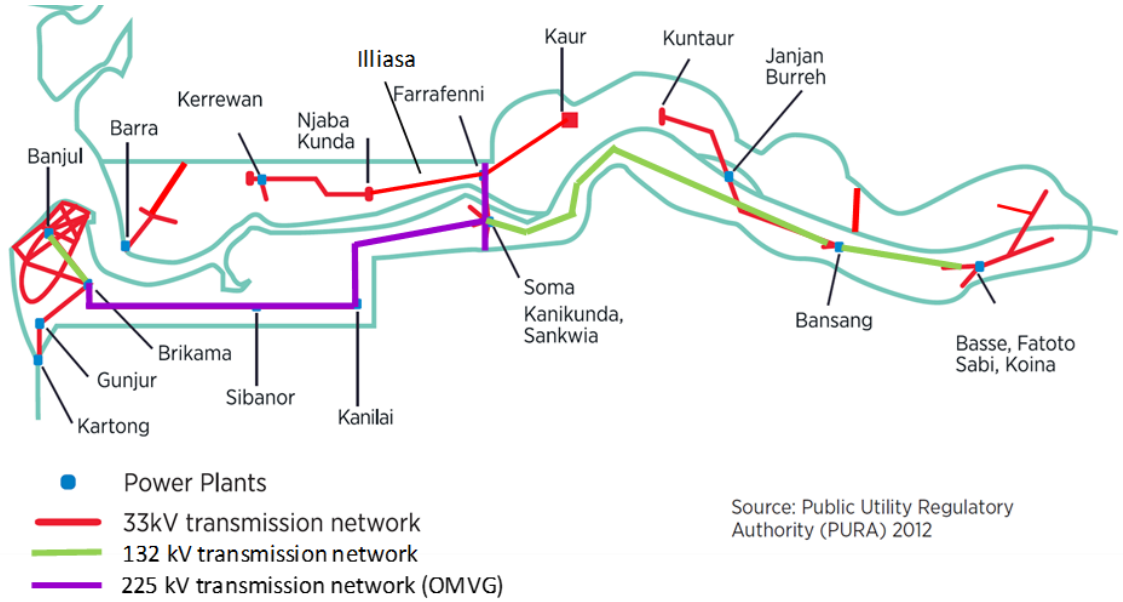
June 7, 2022

Gambia Power Sector Snapshot (challenges)

- National power system is limited to the Great Banjul Area with small local grids in the regions based on diesel generation
- HFO is the only source of generation. Old power plants in Kotu and Brikama, 30 MW of new HFO groups and 30 MW of rental generation (Karpower boat)
- High technical and commercial losses (improving during last 7 years)
- Frequent blackouts due to weak system
- Recent connection with West African Power Pool (WAPP) but still unreliable national system
- Manual dispatching with an ongoing project for a control system (WB/EIB/EU).



Source: Public Utility Regulatory Authority (PURA) 2012

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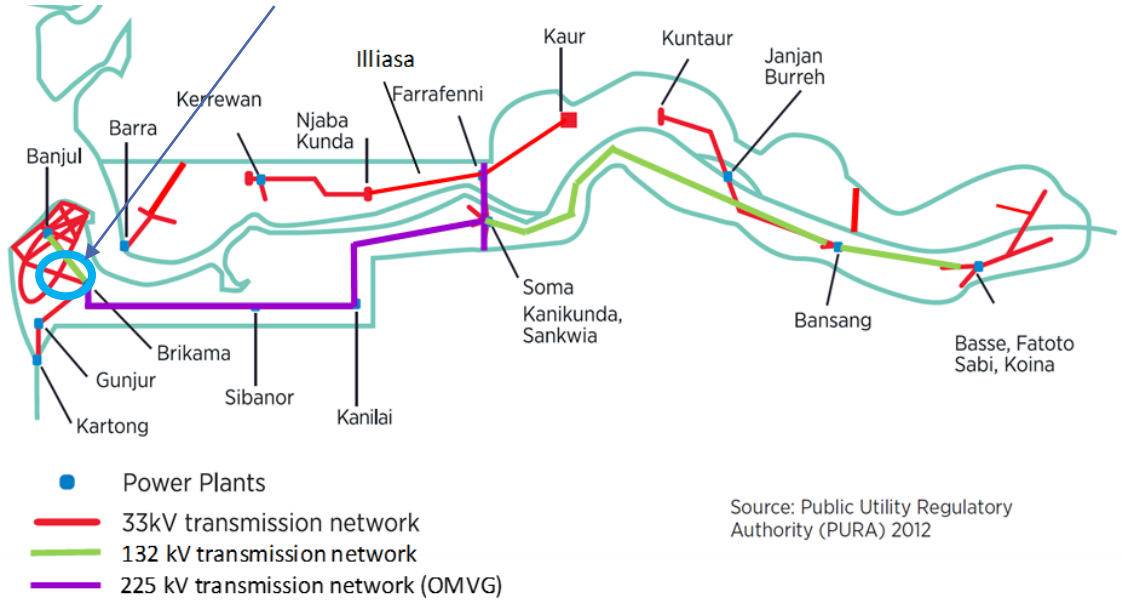
Storage was part of ongoing WB/EIB/EU project (2018-0ngoing)

Project was designed to modernize the power system in the country and to decrease the unbearable cost of generation and system reliability

- Increase generation (solar + BESS)
- Improve reliability of the network
- Install a control system for generation, transmission and distribution
- Prepare the system for the connection with WAPP line
- Increase collection rate by installing prepayment meters
- Support the reform in the national utility (NAWEC)

Solar plant +BESS



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Why Energy Storage in The Gambia?

- The Government is decided to promote local solar to complement the imports from WAPP and minimize use of HFO
- Solar was a good alternative because the resource is abundant and international prices had declined drastically in the last years
- However, the situation of the power system did not allow variable generation without putting the stability in even a more dire situation, even with the connection with WAPP
- Energy storage was seen as the [only] way forward for:
  - Supporting variable generation integration into a weak system by smoothing the solar generation
  - Reasonably extending daytime generation to peak consumption times (early evening)
  - Providing some stability support to the grid
- Project structure would be an EPC contract with 3 years O&M with capacity training for the national utility. After these 3 years, the utility will take over the plant (or extend the O&M contract)
- Specifically for energy storage, the RFP allows [preferently] the option of proposing a long-term capacity maintenance contract to ensure adequate capacity of the system throughout the lifetime of the project.

Project Description

- **Feasibility study was conducted in advance to define specifications**
- **Energy Storage System:** Li-Ion Battery
- **Technical specifications: 8 MWh/4 MW**.
- **Business model:** EPC + 3 years O&M. Preferred option to propose capacity maintenance agreement for the storage system for 15 years.

Feature	Remarks
Type of technologies for BESS	Li-Ion
PV capacity	20 MWac
Minimum capacity of storage (MWh)	8 MWh
Requirements for BESS technologies	Maturity of the supplier (projects+manufacturing)
Minimum annual net generation	At point of interconnection (including losses)
Production profile	Not defined to Bidders
Island mode	Yes
System stability	Guaranteed PV stability
Storage degradation management	100% during the 3 years O&M

Procurement process

- Relatively new Implementation Unit but well staffed
- Expert consultant support for procurement within the Implementation Unit
- International company supporting technically the procurement process
- Procurement modality: Initial Selection (prequalification) + 1 stage
  - Initial selection of appropriate bidders (6)
  - Request for Proposal was issued in 2020, proposal were received in February 2021
  - Contract signed at mid 2021 but contractor requested price revision end of 2021
  - Request not accepted and retendering in December 2021
  - New evaluation almost completed
- International Owner's Engineer was recruited to supervise the execution and O&M

Main issues and lessons learnt

Main issues → solutions	Lessons learnt

• Technical capability on BESS by the implementation team → International consultants to support
• Definition of the system in advance → Complete Feasibility Study was carried out
• Economic evaluation methodology needs to be carefully gauged → techno-economic based on LCOE
• Reliability of BESS suppliers proposed by Bidders → minimum requirements in the RFP (experience + manufacturing capacity)
• Instability of market during the last two years → …
	• General experts are needed along the process (not many real expert companies)
	  • For Feasibility, Technical specs, Bidding documents, Evaluation
	  • Owner's engineer is needed to supervise (ideally the same expert consultant)
	  • International consultant needs to be carefully selected
	• Economic evaluation should be tested in advance (real economic value for the system vs pure cost)
	• Extra carefully when selecting the preferred Bidder (and associated BESS supplier)
	• Market has been very volatile during the last two years (COVID and war)

Thank you!

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