Hybrid PV+Batteries in The Gambia

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

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)
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.

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

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

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