

Experience with Grid-Connected Utility-Scale RE Projects in the ECOWAS Region

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International Workshop on Renewable Energy Development in Macaronesia and West Africa
Praia, 30 May – 01 June 2016



Current Status of Utility Scale RE Capacity

Total installed grid-connected RE capacity stands at only 4,781 MW (as of 2014)

- 4,745 MW of hydro (of which 225 MW is small hydro)
- 27 MW of wind
- 30 MW of solar PV
- 15.275 MW of biomass

The numbers above are due to change soon because of new and larger projects in the pipeline.



EREP Targets for Grid-Connected RE

The ECOWAS Renewable Energy Policy (EREP), adopted by the Heads of State in July 2013, sets the following targets for grid-connected RE:

- Increase the share of grid connected RE in the overall energy mix (including medium and large hydro) **to 35% by 2020 and 48% by 2030**
- Increase the share of grid connected RE, from wind, solar, bioenergy and small scale hydro to **10% by 2020 and 19% by 2030**. This would require the development of **2,424 MW by 2020 and 7,606 MW by 2030**.

ECREEE Activities on Grid-Connected RE

- West Africa Clean Energy Corridors
- Technical assistance for improving the legal and regulatory framework for grid-connected RE in selected ECOWAS member states (upon request from national institutions)
- **Technical assistance for project development**
- **Documentation and analysis of experiences with RE flagship projects**
 - **Dissemination through case studies and other formats**
- Regional knowledge exchange and capacity building

RE Flagship Projects in the ECOWAS Region Covered in this Presentation

- Santiago and Sal solar PV plants in Cabo Verde
- Navrongo Solar PV project in Ghana
- FasoBiogaz project in Burkina Faso

Utility-Scale Solar PV Plants in Cabo Verde – Key Facts

- Two utility-scale solar PV parks on Santiago (4.3 MWp) and Sal (2.2 MWp) constructed and commissioned in 2010
- Both plants developed as public projects financed with a concessional loan from the government of Portugal
- EPC contract with Martifer Solar
- Operation by Electra SARL (national utility) under a concession agreement



Utility-Scale Solar PV Plants in Cabo Verde – Benefits

- Reduction of carbon emissions by displacing thermal electricity generation by Electra – approx. 20,000 t CO₂ savings
- Avoided costs of generation (fuel) to Electra
- Cabo Verde has gained experience with the operation and integration of PV plants into existing power networks.
- Technical staff of Electra has gained considerable knowledge and experience in technical maintenance.

Utility-Scale Solar PV Plants in Cabo Verde – Selected Experiences

- Separation of ownership (MoE) and operation (utility) complicated management of EPC contract
- No retention of final payment – limited incentives for contractor to address outstanding issues (punch list)
- Large impact of soiling on power production especially during dry season
- The plant in Sal is not always used at full capacity
- Variable RE generation (wind + PV) in Sal might often exceed what the utility considers that it can absorb.



Navrongo Solar PV Project in Ghana – Key Facts

- 2.5 MWp solar PV project developed by the state-owned Volta River Authority (VRA) in the Upper East region
- First project under VRA's Renewable Energy Development Programme
- Competitive process for selecting EPC contractor incl. O&M during first 6 months
- International consultancy firm was hired to supervise O&M contractor
- Development in phases:
 - 1.9 MWp commissioned in February 2013
 - Additional 600 kWp commissioned in July 2013
- Operated by VRA

Navrongo Solar PV Project in Ghana – Selected Experiences

- Competitive procurement allowed to minimize CAPEX but issues with the selection of certain components were not identified in time
- Need for timely planning and construction of transmission infrastructure to avoid delayed commissioning
- Need for adequate security during construction and operation to avoid theft of solar modules
- Need to provide job opportunities for local population to avoid conflicts
- “Things can get lost in translation.” (VRA)



Photo: VRA

The FasoBiogaz project in Burkina Faso – Key Facts

- First grid-connected biogaz power plant in West Africa, commissioned in 2015
- Installed capacity of 275 kW, located in Ouagadougou
- Current expansion to 550 kW with final goal of 1,375 MW
- Investment of Euro 1.6 million provided through Equity from parent company and grant from the Dutch government
- Biomass waste from the nearby slaughterhouse and brewery used as main fuel
- Solid and Liquid Organic fertilizer produced as byproduct



Benefits of the Project

- Environmental
 - Reuse of slaughterhouse waste streams for energy and fertilizer production
 - Reduction of methane emissions from open air wastewater disposable lagoons of the slaughterhouse
 - Reduction of carbon emissions by displacing fuel oil electricity generation by SONABEL
 - Production of high grade organic fertilizer to boost agriculture production
- Economic and Social
 - Production of clean electricity in a high demand location (industrial zone)
 - Provision of base load power for up to 20 hours a day
 - Avoided fuel cost to SONABEL
 - Creation of up to 30 permanent jobs in the biogas to energy value chain

Selected Project Experiences

- Project Development phase spanned over 4 years and included:
 - Legal and Financial preparation (land lease, licence, PPA, Waste supply contract)
 - Environmental Impact Assessment
 - Technical studies (logistics of waste collection, grid connection study)
- Partnership with experienced biogas technology provider (Nijhuis)
- Business model based on sale of electricity and fertilizer (potentially heat)

Selected Project Experiences - Challenges

- Challenging PPA negotiation with Off-taker
 - 15 years PPA with fixed priced defined for only 3 years
- Difficulties in predicting waste supply prices with providers
 - Supplier now tend to increase the price of what had no previous value to them
- Currently no market for liquid fertilizer and for industrial heat

Resolving these challenges would help the company in raising finances for the good operation of the plants as well as expansion plans

ECREEE/GIZ Support for Development of Potential RE Flagship Projects

Since April 2015 a team of ECREEE and GIZ staff with assistance from a pool of international short-term experts is providing technical assistance for the development of potential RE flagship projects, e.g.

- Support to national utility in the Gambia for improving draft PPA and network connection agreement for utility-scale PV project
- Support to MoE in Burkina Faso for improving draft legal documents to be signed with winners of restricted solar PV IPP tender
- Support to MoE in Mali in the evaluation of bids for solar PV power plants



Thank You