BATTERY STORAGE DEVELOPMENT IN SOUTH AFRICA

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Frederic Verdol
Senior Power Engineer
1. World Bank Support to Battery Storage Technology

2. Making The Case for Battery Storage in South Africa

3. Eskom Battery Storage Demonstration Program

4. Conclusion
1. WB SUPPORT TO BATTERY STORAGE TECHNOLOGY
What Happened Since WB Announced US$1bn Support to Battery Storage Technology in 2018?

IDA/IBRD pipeline: Benin, Burkina Faso, Cabo Verde, India, Maldives, Mali, Mongolia, Mexico, Nicaragua, Pacific Islands, Senegal, Sri Lanka, The Gambia, Tunisia, Turkey, Ukraine, Uzbekistan, WAPP, Zanzibar

Grid integration/feasibility studies for optimal placement of batteries and auction preparations for Hybrid Solar Parks (PV+batteries)
WB Energy Storage Partnership (ESP) : A Global Platform to Share Practices

1. Power systems
2. Testbed and testing protocols
3. Training and capacity building
4. Flexible sector coupling
5. Decentralized energy storage solutions
6. Enabling policies and procurement frameworks
7. Reuse and recycling of batteries
Knowledge Sharing will be Key to Advance Battery Deployment

https://www.esmap.org/publications

https://www.linkedin.com/company/energy-storage-partnership
2. BATTERY STORAGE IN SOUTH AFRICA GRIDS: WHY NOW?
Grid Scale Battery Storage Technology Now Beyond Test Phase
7,000+ MW in Operation, 15,000+ MW under Construction, Large Programs in most of Large Utilities

- **National Grid (UK)**
  - Frequency
  - Auctions
  - 201 MW (2019)
  - 8 Sites

- **EDF (World)**
  - Wind/Solar
  - Program
  - 10 GW (2030)
  - 300 MW (2018)

- **PSC (NY)**
  - Re-purposing
  - Program
  - 316 MW (2020)
  - 3000 MW (2030)

- **FP&L (FL)**
  - VRE Solar
  - 409 MW (2021)
  - 1 Site

- **AES (Chile)**
  - 253MW Solar
  - 112 MW (2021)
  - 1 Site

- **Neoen (Australia)**
  - Wind
  - 1 site
  - 100 MW (2017)
  - 50MW (2020)

- **Utilities (CA)**
  - Wind/Solar
  - 360 MW (2018)
  - 195 MW (2020)
  - 182 MW (2020)
  - 100 MW (2021)

- **Huanghe Hydro (Qinghai Province)**
  - 2.2GW Solar
  - 1 Site...
  - 208 MW (2020)
  - 10-month EPC

- **KEPCO (South Korea)**
  - Frequency
  - Program
  - 500 MW (2018)
  - Multi-site
Viable Energy Storage Applications in South Africa Grids

- PV/Wind Integration and management
- Re-purposing of closing coal sites
- Better economic dispatch of thermal assets (CO2 savings)
- Less reliance on peakers (OCGT)
- Imports of cheap Hydropower
- Grid investment deferral (Tx and Dx)
- Grid stability (inertia, voltage and frequency control, local, national)
- Better integration of rooftop PV
- Back-up for Commercial customers
- Management of Prosumers
- Security of Supply for strategic customers
- Universal access to remote communities
South Africa Can Be in All Segments of the Battery Storage Value Chain

Support to battery technology is meeting consensus across all stakeholders in South Africa

Battery Storage Value Chain Scale Up Potential (Global)

- Global Battery Value Chain Scale up by 2030 (Source: WEF / Global Battery Alliance report, Sept. 2019):

  - Raw material mining: 5-40x
  - Raw material refining: 14x
  - Active materials: 15x
  - Cell production: 19x
  - Recycling: 15x

- Battery Storage Global Investments to reach $620 billion by 2040 (Forbes, June 2019)

Support Battery Storage Value Chain Development in South Africa is getting traction

- Preparation of enabling environment for battery storage industrialization (DTI, NT, DEFF, NERSA, IDC)
- Battery Storage targets in the IRP, proposals including storage from the private sector (RMI4P RFI).
- Need to develop strategic cooperation with manufacturing countries but also with mineral rich neighboring countries
3. ESKOM BATTERY STORAGE PROGRAMME
Eskom Battery Storage Program will Enable VRE Integration

**Eskom Sere Wind (Multidonors financed)**
- 100 MW Wind
- 80MW/320MWh Storage equivalent capacity
- Min. 53 ktCO2 offset yearly

**REIPPP Round 3.5 (Private sector)**
- 200 MW Solar CSP
- Min. 212 ktCO2 offset yearly

**New Wind/Solar Capacity (Private sector)**
- 415 MW Solar PV
- 676 MW Wind
- 500MWh/d Storage equivalent on 7-8 sites

**Eskom distributed PV (Eskom financed)**
- 60 MW Solar PV
- Min. 80 ktCO2 offset yearly

**Selected sites for battery storage**
- Min. 133 ktCO2 offset yearly

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**2021**
- Displaced integration
- Curtailment Avoided
- Intermittency Mitigated
- Displaced energy
- Grid investment deferral
- Coal Repurposing Program
- Intermittency Mitigated
- Displaced energy
- Resilience in Remote Area
- Displaced energy

**2022**
- Clean Energy Enabled

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11
**Expected Benefits for SA, beyond The Eskom Program**

*Demonstration Effect, Transformational Potential*

**Utility perspective**

- From a ‘traditional’ electricity producer to a **modern energy manager** function
- With incoming Wind and Solar IPPs by 2021, good timing to acquire ‘plug and play’ tools for Grid stability and re-skilling critical mass of utility staff
- Lessons from large-scale battery program useful to better integrate future decentralized / rooftop solar capacity
- More flexibility and more dispatchable clean energy thanks to the batteries, allowing to decommission old coal plants

**South Africa perspective**

- In a period of economic recovery, **reliability of electricity supply** is critical to attract private investment (industry, manufacturing)
- Scale up of battery technology to complement rapid expansion of **least cost energy**, critical for SA’s Recovery
- South Africa may be the only country in Africa where Integration and industrialization in the entire battery storage value chain (mining, manufacturing, operation) is feasible.

**Africa region and Global perspective**

- Over 6,000MW grid-scale batteries in operation worldwide, But **NO battery connected to a grid in Africa**
- **Demonstration effect** in South Africa will enable battery technology to expand faster in Africa (market pioneer advantage).
4. CONCLUSIONS
1. WBG will invest in 17.5 GWh of Battery Storage by 2025
2. In a polarized SA Energy sector, Battery Storage makes consensus
3. Eskom Battery Storage Program already bearing fruits
4. Need for an Integrated SA Battery Storage Value Chain Strategy
Ngiyabonga! (Thank You!)