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SOUTHERN AFRICA ENERGY PROGRAM (SAEP)

ENERGY STORAGE IN THE REGION: TRACKING REGIONAL BESS PROJECTS

RERA CONFERENCE, LUANDA, ANGOLA

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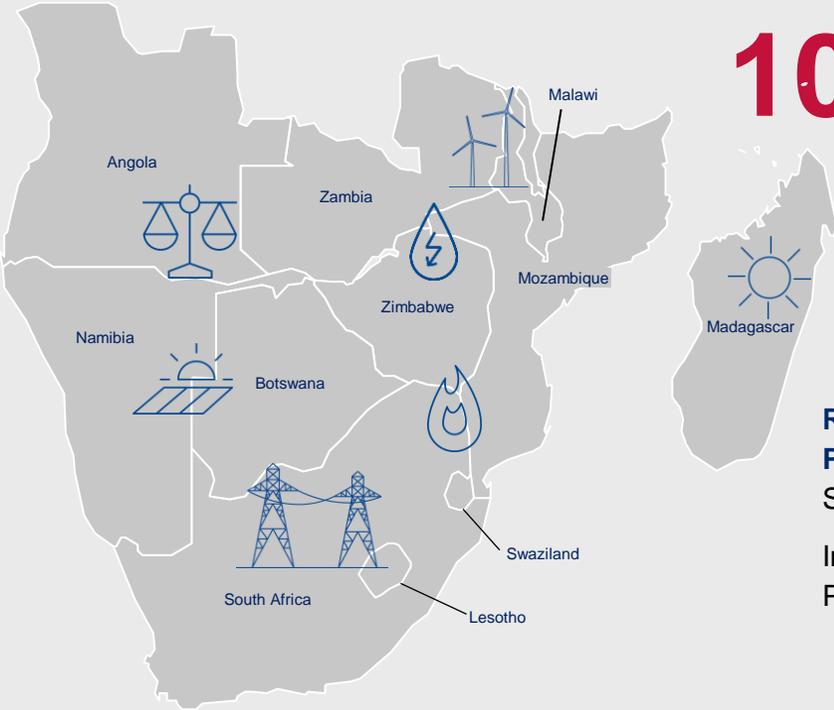
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USAID SOUTHERN AFRICA ENERGY PROGRAM

The USAID Southern Africa Energy Program's assists in the development of generation, transmission and distribution whilst promoting investment in the energy sector for a brighter, more sustainable future.

6 Years
ACTIVITY DURATION
March 2017 – June 2023

IMPLEMENTED BY
Deloitte, *with* McKinsey,
WorleyParsons, CrossBoundary,
and Another Option



10 **TARGET COUNTRIES**
Angola, Botswana, Lesotho,
Madagascar, Malawi,
Mozambique, Namibia, South
Africa, Swaziland, Zambia

**REGIONAL
PARTNERSHIP FOCUS**
SADC, SAPP, RERA, SACREEE
Implementing in collaboration with
Power Africa Partners

Program Funding

The Southern Africa Energy Program is funded by the United States Agency for International Development (USAID), in support of the US Government's Power Africa Initiative. To date, Power Africa's more than 130 private and public sector partners have committed more than \$52 billion to mobilize and organize international efforts to electrify Africa.

USAID supports Power Africa through programs that bring together technical and legal experts, the private sector, and governments from around the world to work in partnership to increase the number of people with access to power.

SAEP OVERVIEW

OBJECTIVE

Increase investment in electricity supply and access in Southern Africa by strengthening the regional enabling environment and facilitating transactions.

GOALS

1. Generate 3000 MWs
2. Develop 1000 MW transmission capacity
3. Create 3 million new connections

PROGRAM OUTCOMES / TASK AREAS



Outcome 1: Improved Regulation, Planning and Procurement for Energy



Outcome 2: Improved Commercial Viability of Utilities



Outcome 3: Improved Regional Harmonization and Cross-Border Trade

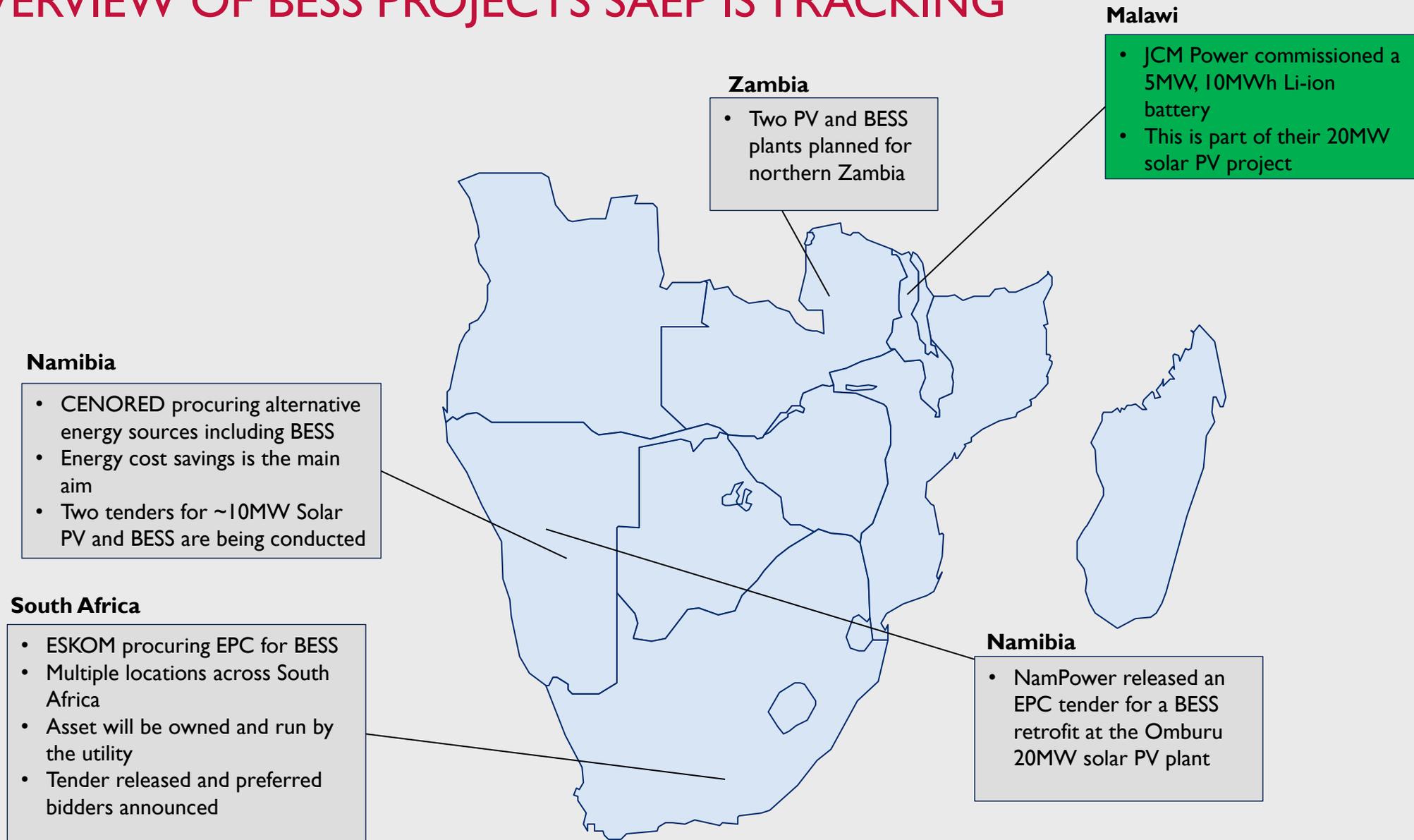


Outcome 4: Scaled Renewable Energy (RE) and Energy Efficiency (EE)



Outcome 5: Increased Human and Institutional Capacity

OVERVIEW OF BESS PROJECTS SAEP IS TRACKING



MALAWI: JCM POWER (5MW, 10MWh) BESS in OPERATION

JCM Power's solar PV plus BESS plant reached COD in the first quarter of the 2022 calendar year



Specifications:

Solar PV: 20MWac
BESS: 5MW, 10MWh
Chemistry: Li-ion

20 year PPA

Plant designed primarily as a PV plant. BESS added afterwards when funds became available

No pre-defined use cases. The asset's participation in frequency response needs serious considering grid stability issues

MALAWI: JCM POWER (5MW, 10MWh) BESS



SOUTH AFRICA: TWO-PHASE BATTERY ENERGY STORAGE SYSTEM PROJECT

South Africa's state-owned utility released a request for bids, in May 2021, for the engineering, procurement and construction of BESS at multiple sites in South Africa



Specifications:

BESS:

Phase 1: 199MW, 833MWh

Phase 2: 144MW, 616MWh

Chemistry: Unknown

Eskom to own and operate plant.

5 year O&M contract

Various use cases. As part of the utility's suite of assets, the BESS will be deployed according to a regime determined by the system operator and distribution system operators in line with the operational requirements

PHASING AND USE CASES

BESS Phase 1						
Name	Distribution Operating Unit (OU)	BESS MW Output	Daily MWh Capacity	Total Annual Energy (MWh)	PV(MWp)	Use Case
Skaapvlei	Western Cape	80	320	116 800		AS & ES
Melkhout	Eastern Cape	35	140	51 100		AS & ES, Load Shaving
Elandskop	Kwa Zulu Natal	8	32	11 680		Load Shaving
Pongola	Kwa Zulu Natal	40	160	58 400		AS & ES
Hex	Western Cape	20	100	36 500		AS & ES, Load Shaving
Graafwater	Western Cape	5	30	10 950		ES & Load Shaving
Paleisheuvel 11kV	Western Cape	6	24	8 760		AS & ES
Paleisheuvel 22kV	Western Cape	3.5	21	7 665		ES & Load Shaving
Rietfontein	Northern Cape	1.54	6.16	2248.4	2.04	Load Shaving
TOTAL Ph1		199.04	833.16	304 103	2.04	

BESS Phase 2						
Project Name	Distribution Operating Unit (OU)	BESS MW Output	Daily MWh Capacity	Total Annual Energy (MWh)	PV (MWp)	Use Case
Witzenberg	Western Cape	17	68	24 820		Reactive Power, ES
Ashton	Western Cape	17	68	24 820		Reactive Power, Load Shaving, ES
Cuprum	Northern Cape	70	280	102 200		AS & ES
Kiwano	Northern Cape	40	200	73 000	58	AS & ES
Total Ph 2		144	616	224 840		

NAMIBIA: CENORED ISSUES EOI AND RFP FOR PV PLUS BESS WITHIN EXCLUSIVE JURISDICTION (1/2)

CENORED, a regional electricity distributor in Namibia, issued an EOI and prequalification in May 2021 and a subsequent RFP for energy from solar PV and BESS plants. This is enabled by the modified single buyer model (MSB)



Possible specifications:

Solar PV: 10MWac

BESS: 4MW, 20MWh

Chemistry: Unspecified

IPP-owned and operated
20 year PPA

Main use case is arbitrage. This is based on the support that SAEP provided to CENORED previously and their interest in reducing their bulk electricity costs in the face of tariff increases

NAMIBIA: CENORED ISSUES EOI FOR PV PLUS BESS WITHIN SHARED JURISDICTION (2/2)

CENORED, is also preparing to issue an EOI and prequalification for energy from solar PV and BESS plants for a shared service area. This is enabled by the modified single buyer model (MSB) and SAEP support



Possible specifications:

Unclear.

Specifications expected to be similar to the one that they released in May 2021

Main use case is arbitrage. This is based on the support that SAEP provided to CENORED previously and their interest in reducing their bulk electricity costs in the face of tariff increases

NAMIBIA: NAMPOWER ISSUED AN EPC TENDER FOR A BESS

NAMPOWER issued a tender during quarter three of the 2021 calendar year for a BESS to be retrofitted to the Omburu solar PV plant



Specifications:

Solar PV: 20MW

BESS: 58MW/75MWh¹

Chemistry: Li-ion

Utility-owned

Main intention is to minimize grid impact and to extend plant availability (especially in support of peak demand)

ZAMBIA: TWO PV AND BESS PLANTS UNDER DEVELOPMENT IN ZAMBIA

An IPP in Zambia is developing solar PV plus BESS plants in Chipili and Mansa, north of Zambia. The projects' scheduled construction and commissioning dates are unclear



Specifications:

Solar PV: 50MW

BESS: 20MW

Chemistry: Unknown

IPP-owned and operated
25 year PPA

Use cases have not yet been declared. Early indications are that the BESS will provide some capacity firming and time-shifting, with the IPP looking to support the evening peak. It is also reasonable to assume that ZESCO will want the battery to provide some grid support services

WHAT UTILITIES AND RURAL ELECTRIFICATION AUTHORITIES ARE LOOKING FOR

- Grid support (esp. in the context of increasing variable renewable energy penetration)
 - Optimal location and sizing of BESS for grid support
 - Pairing of solar PV with BESS to minimize grid impacts
- Peaking capacity
 - Using BESS to supplement or replace more expensive peaking capacity
- Energy cost savings
 - Electricity resellers are looking at the arbitrage use case to protect themselves from rising TOU tariffs
- Minimizing mini-grid back-up generator use/specification
- Chemistry
 - Move away from lead-acid to Li-ion

EMERGING PRACTICES (1/2)

- Updating of grid codes or the development of battery energy storage system (BESS) codes
 - Grid connection code for Battery Energy Storage Facilities [...] (South Africa)
- Integrating BESS in capacity planning processes – IRPs or short-term generation expansion plans
- Making decisions on licensing requirements and tariffs
 - Licensing required or not for existing operators?
 - Generation licenses or other special category?
 - How will the different services be priced?

EMERGING PRACTICES (2/2)

- Addressing environmental and safety concerns
 - Fire hazards
 - Transportation of hazardous material
 - Studies and permitting
 - End of life considerations
- Considering value chains
 - E.g. Sources of vanadium and lithium
 - Local manufacturing of components and assembly
 - Research capacity and skills

— Obrigado, Thank you!

