

# NamPower Battery Energy Storage System (BESS) Project

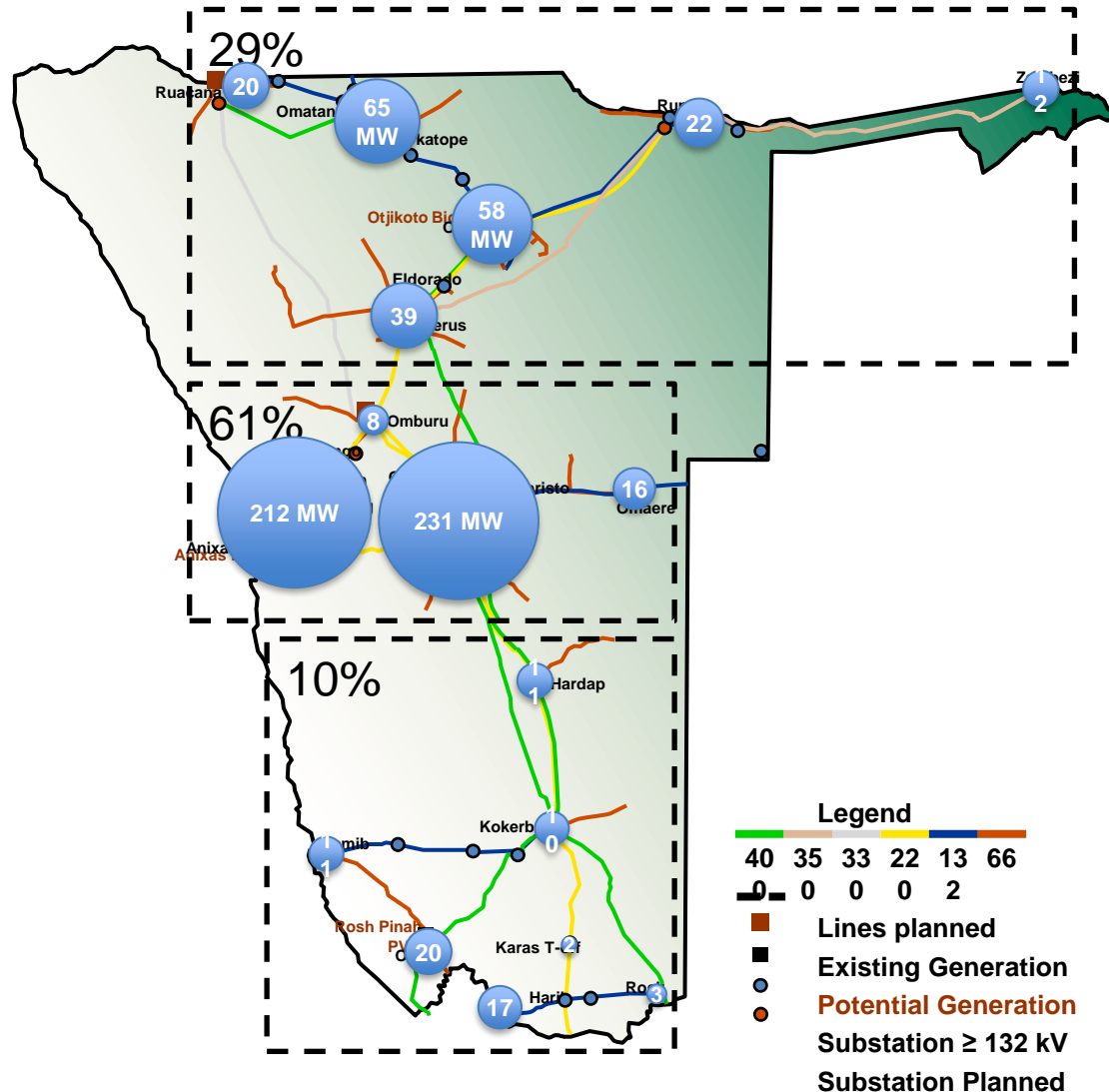
## Challenges and Opportunities for Energy Storage Deployment in Developing Countries

07-Nov-2023 | Fred Bailey



# NamPower BESS Project

## About NamPower

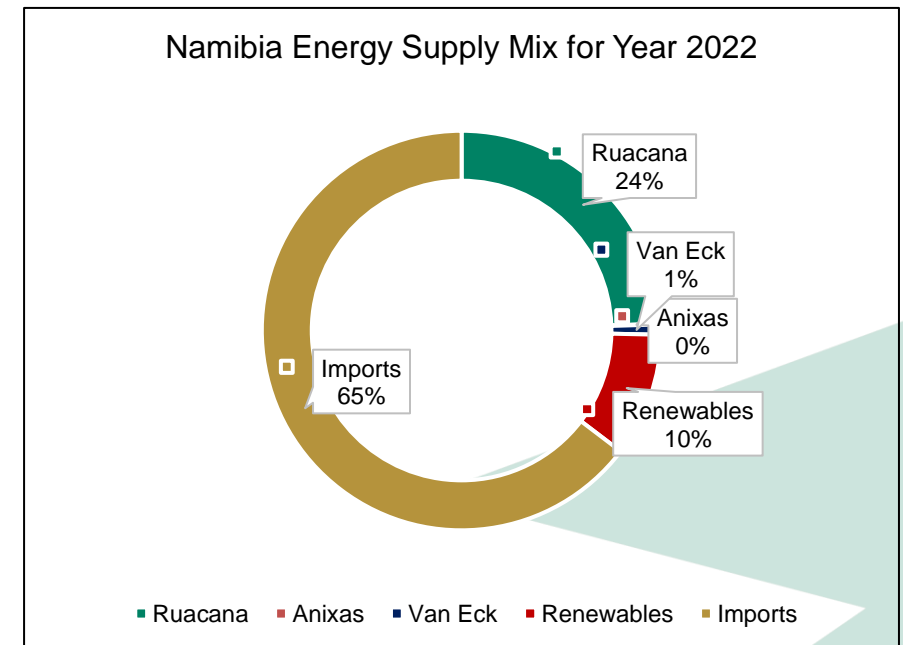


### Installed Capacity: 641 MW

- Ruacana (Hydro): 347 MW
- Van Eck (Coal): 120 MW
- Anixas (Diesel): 22.5 MW
- Renewables: 151.5 MW

### Imports Capacity: 330 MW

- Eskom: 100 MW
- ZESCO: 180 MW
- ZPC: 50 MW



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## Challenges and Opportunities



### Challenges:

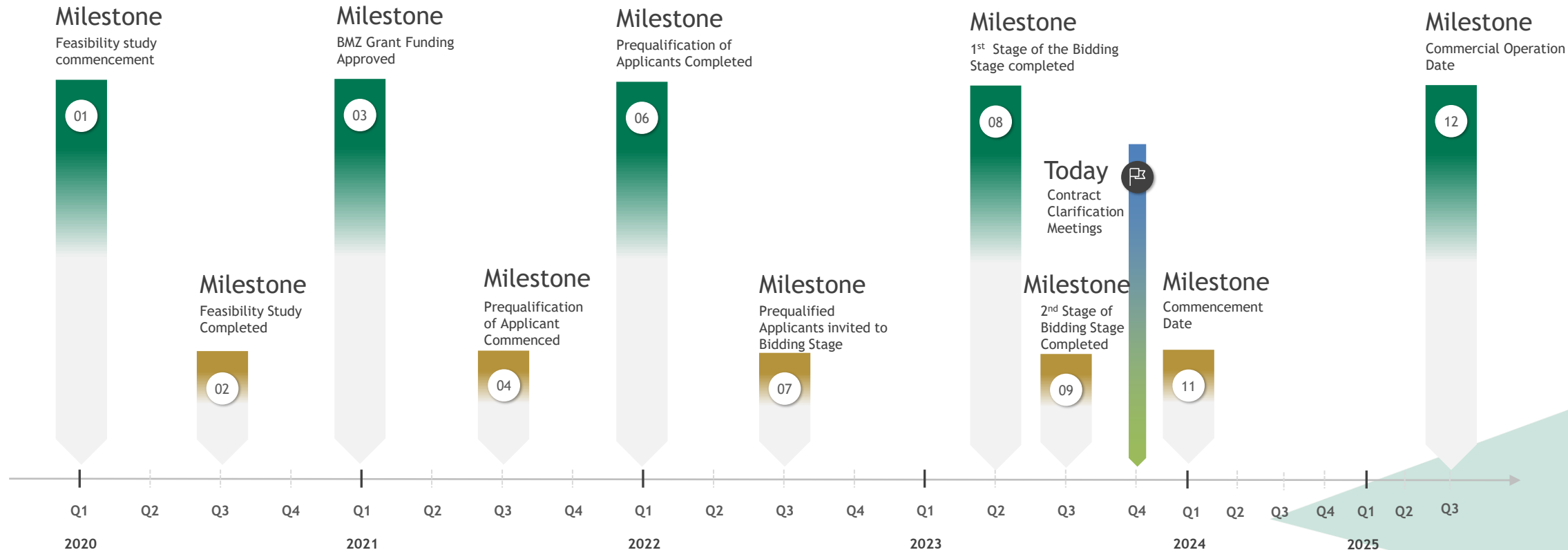
- Lack of Ancillary services market in Namibia / SAPP region.
- No BESS regulations. There is currently draft regulations under consideration
- Lack of familiarity with storage technology between the utility and regulator (e.g., PPA structures, Revenue models etc.).

### Opportunities:

- Modified Single Buyer - opportunity for both utility and private sector to participate in the Namibia electricity market.
- Improve grid resilience through ancillary services by mitigating adverse fluctuations of the power output, voltage and frequency from renewable generation sources.
- High cost difference between Peak and Off-Peak prices (especially in SAPP)

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## Decision Steps



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## Project Description

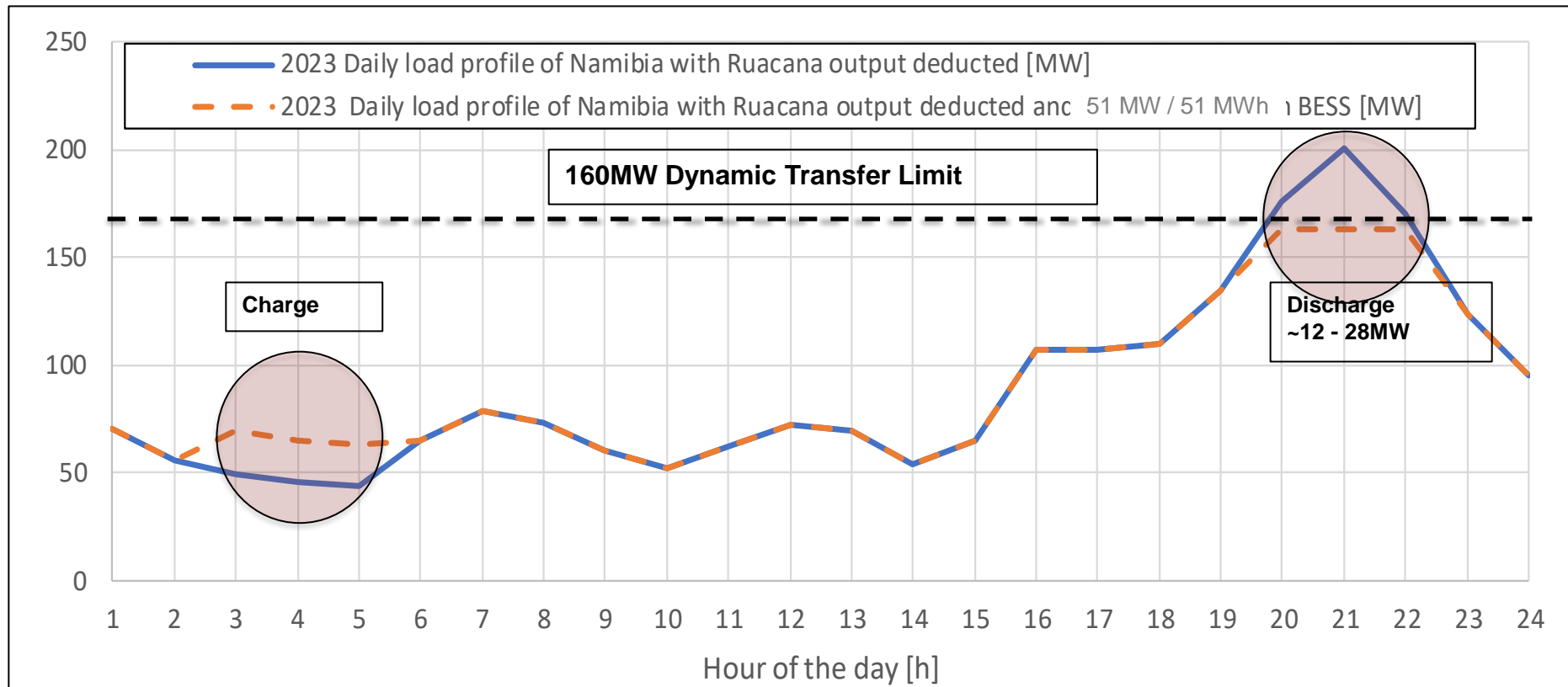


Description	Value
Power Capacity	51 MW
Energy Capacity	51 MWh
Cycles	365 cycles/ year
Calendaric lifetime	15 years
Round-trip efficiency	82.60% (Including Auxiliary consumption)
Technology	Lithium-ion (LFP)
Location	Omburu Substation, Omaruru, Erongo Region, Namibia
Capex	EUR 24 million
Funding Agency	KfW (EUR 20 million grant)
Commercial Operation Date	July 2025

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## Use Cases: Peak Shaving/Energy Shift

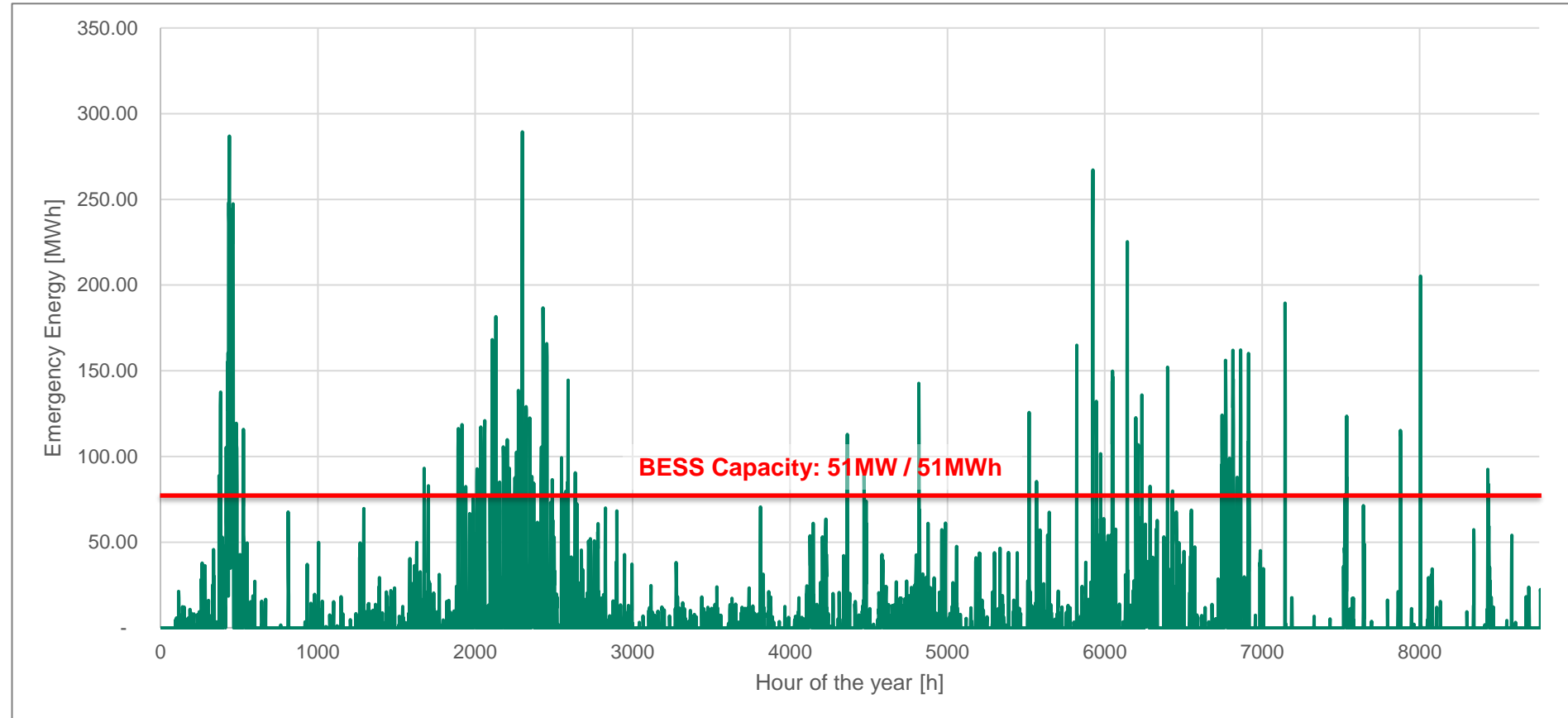
- Reduce loading on the 400kV Kokerboom-Auas transmission line beyond its dynamic transfer limit of 160MW
- 2nd parallel 400kV transmission line only planned for 2028/2029
- Peak shaving considers with Arbitrage.
- BESS can charge during off-peak when energy prices are low and discharge at peak times when energy prices are high.
- Arbitrage only makes sense when the price difference between off-peak and peak times offsets efficiency losses



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## Use Cases: Provision of emergency energy

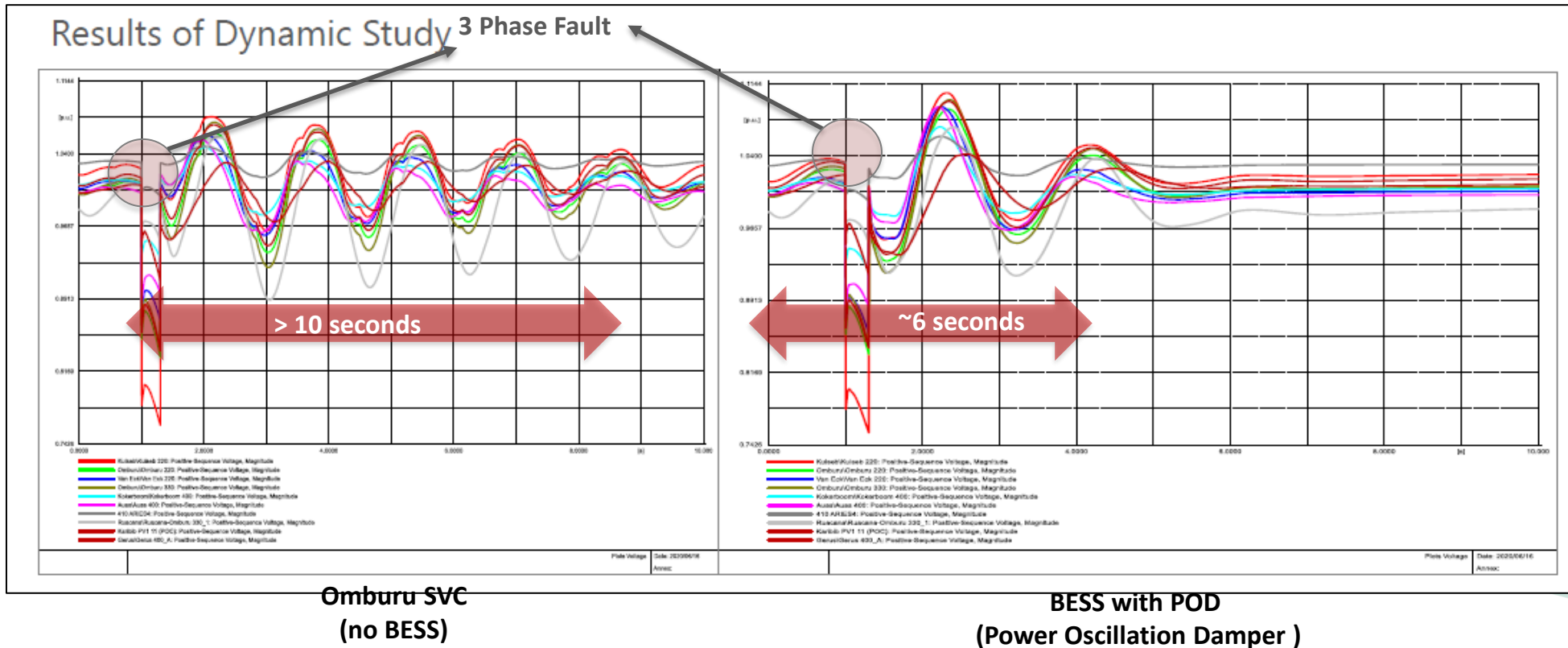
- Unscheduled imported energy
- Emergency energy charges: ~4.85 ZAR/kWh
- Total of 30.8 GWh emergency energy procured between 01-Jul-21 – 30-Jun-22
- The Omburu BESS would have saved 6.5 GWh of the Emergency energy



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## Use Cases: Voltage and Reactive Power Control

- The Omburu BESS will be able to assist the grid stabilize voltage by injecting or absorbing reactive power with power electronics.
- The Omburu BESS to potentially replace the SVC at the Omburu Substation when it reaches its end of life.





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## Lesson Learnt

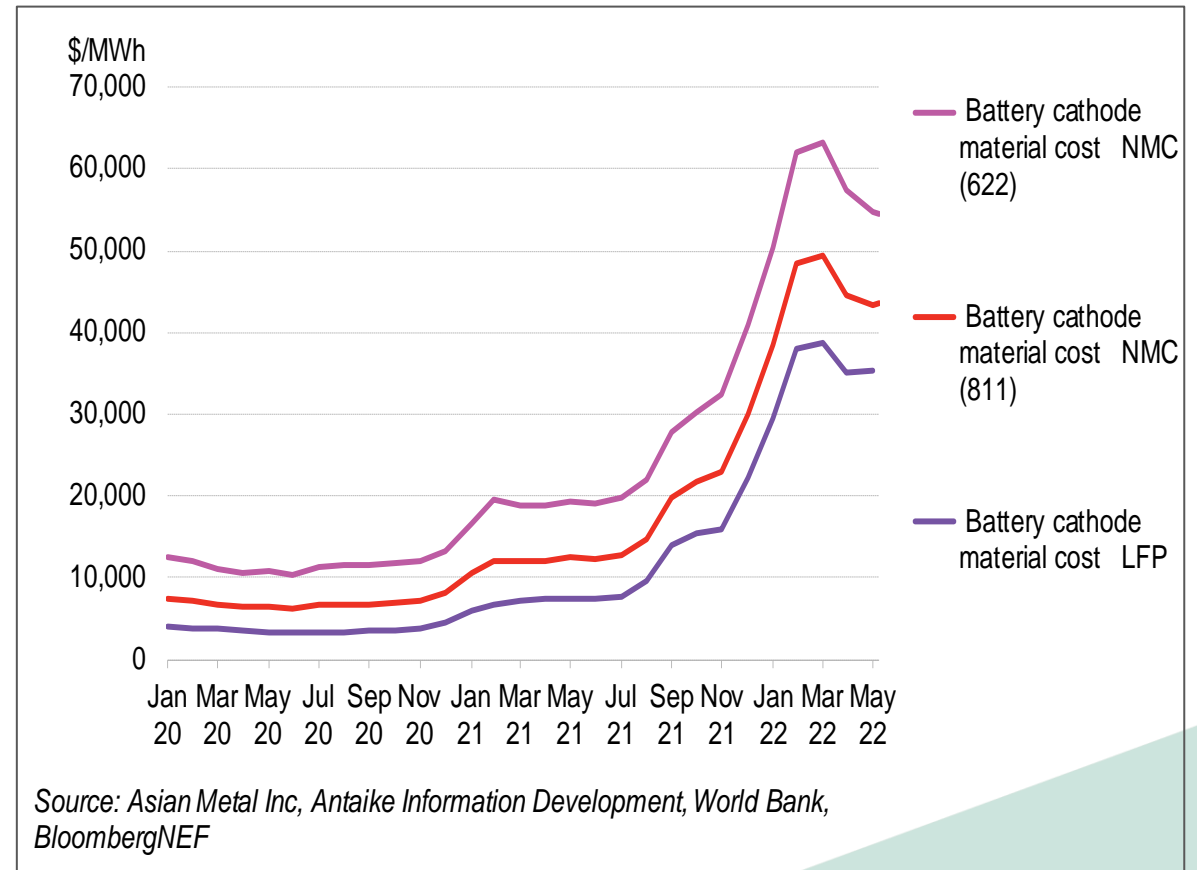


### Shift from One-Stage to Two-Stage Bidding:

- Increase of costs for the battery cells of around 10 - 30% compared to 2021.
- Long lead times with up to 1.5 years of delivery after contract signature.
- Binding price proposals only valid for several days to a maximum of a few weeks.

### Value in a Two-Stage Bidding process:

- Helps the procuring agency/Employer understand the recent market trends and aligns/streamline the technical/commercial requirements to fit the prospective Bidders.
- The preferred Bidder is more likely to have a good understanding of the requirement, which potentially reduces risks in the implementation of the contract.



# Thank you