

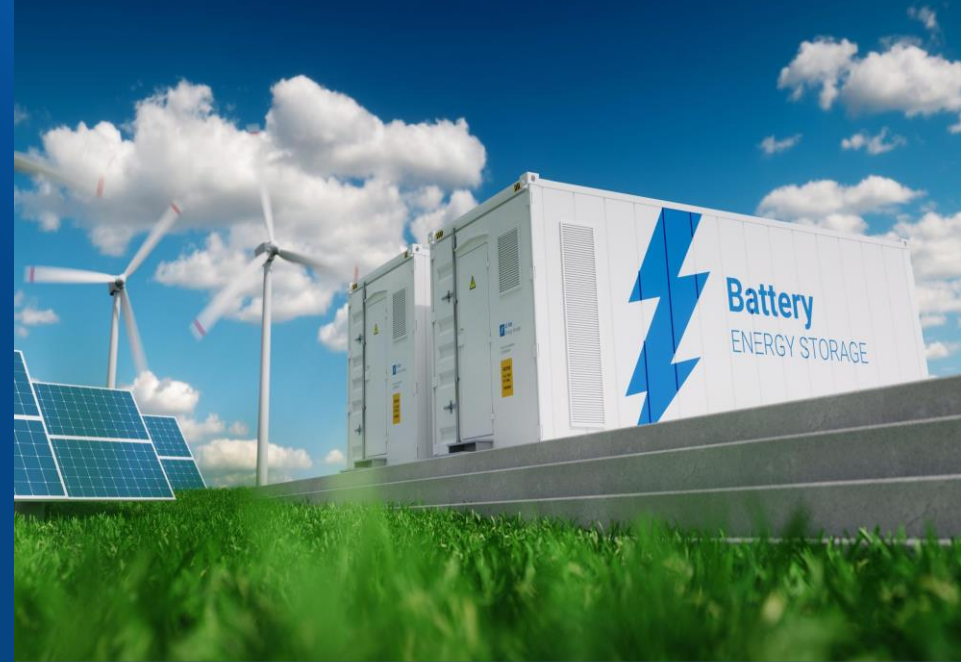
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Mauritania Energy Transition Acceleration

The Critical Role of Battery Energy Storage

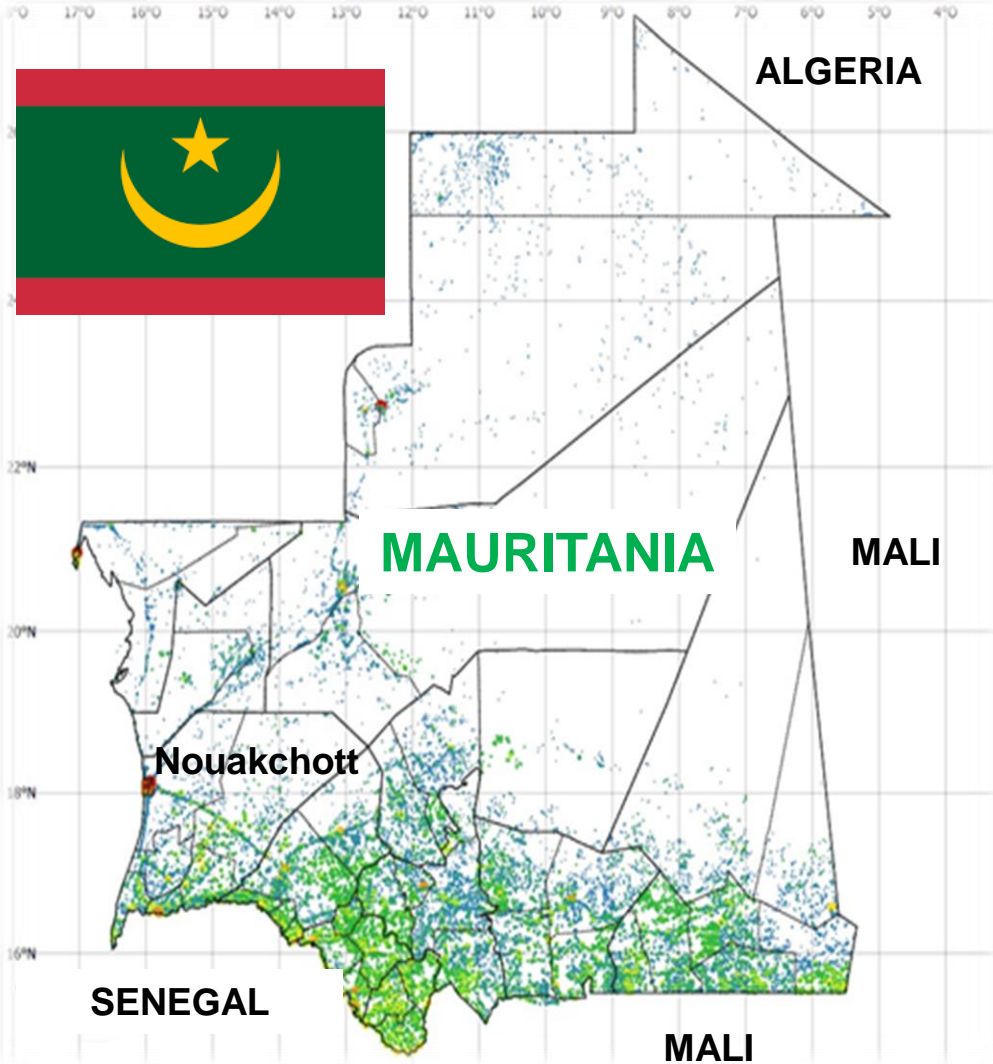
Lafdal Dedi, Director of Strategy, SOMELEC

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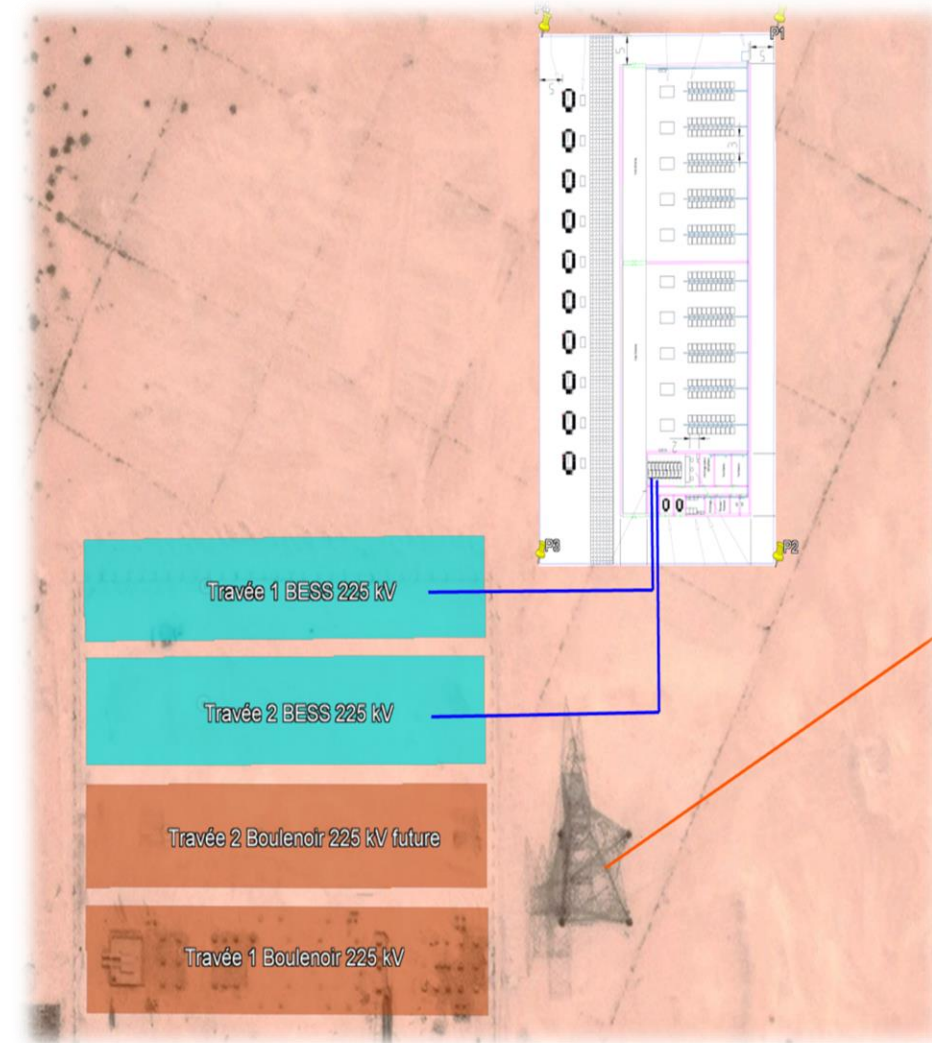
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Introducing Mauritania



Project Overview

- **The Project aims to revolutionize the energy landscape in Mauritania by integrating BESS into the power grid**
- **Expected to facilitate imminent increase of VRE in the national system**
- **For maximal value, to be accompanied with**
 - Gas-to-Power
 - HV grid reinforcement
 - VRE Dispatch Center



Project Objectives

- **Secondary control: Ensuring supply-demand balance across Mauritania** in order to limit the impact of VRE on transits with neighboring countries. The secondary adjustment should represent a use of approximately **315** equivalent complete cycles per year (22,000 MWh/y)
- **Reduce use of thermal plants: (Manual Dispatch)** In the event of strong VRE penetration presenting an excess of production, SOMELEC will be able to use the battery to charge part of this energy, in order to reinject it into the network at the peak. This reinjection will reduce the use of thermal power plants, or even in certain situations may reduce the lack of available capacity to cover the peak. This use should represent **50** complete equivalent cycles per year (3500 MWh/y)
- **Voltage regulation: Stabilize the voltage level in Nouakchott.** Control the injection or withdrawal of reactive power in order to stabilize the voltage at the level of the 225 kV network in Nouakchott. Indeed, the dual adjustment capabilities are currently insufficient to stabilize this voltage. This application does not cause battery cycling per se, the functionality being provided by the inverters.



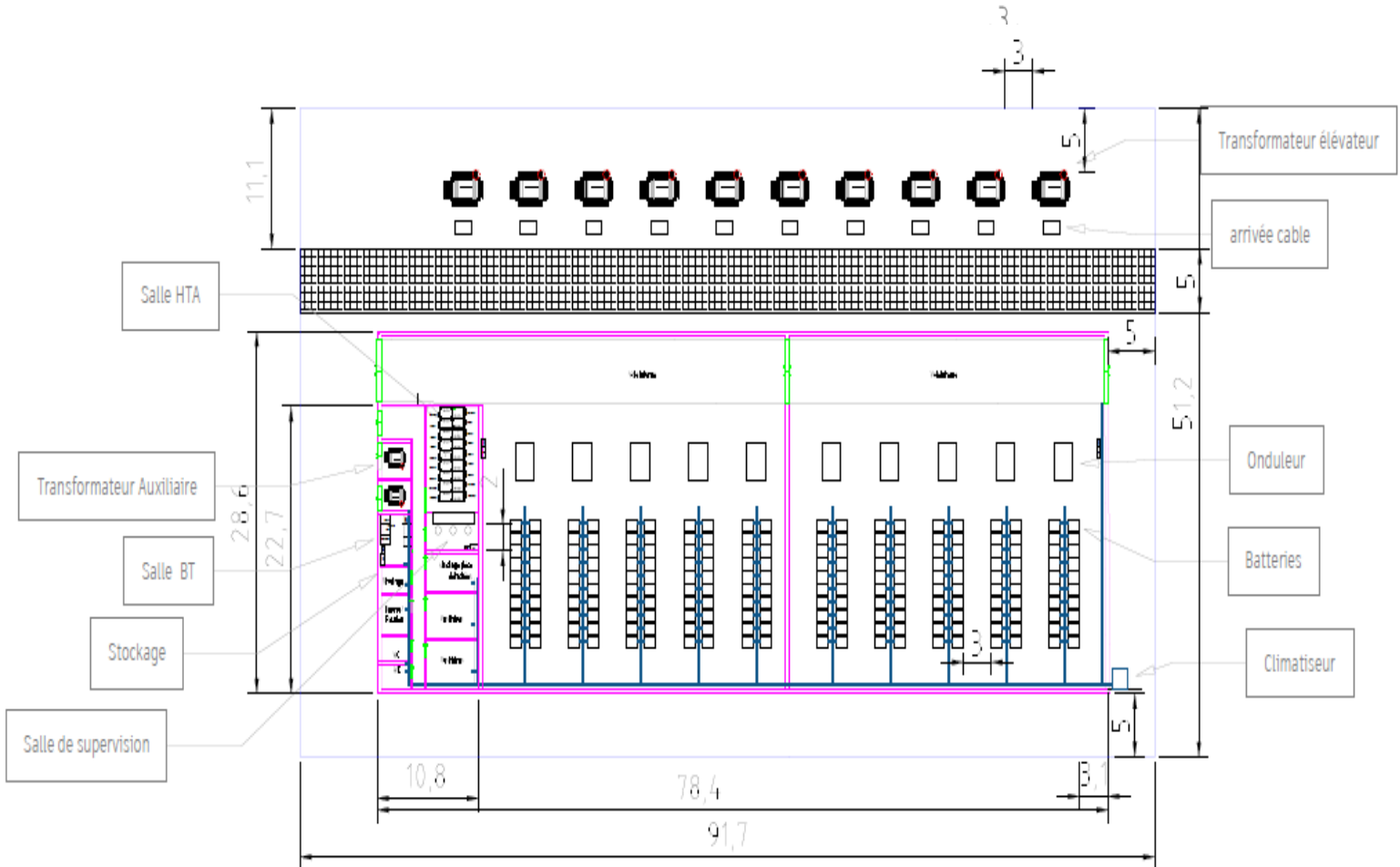
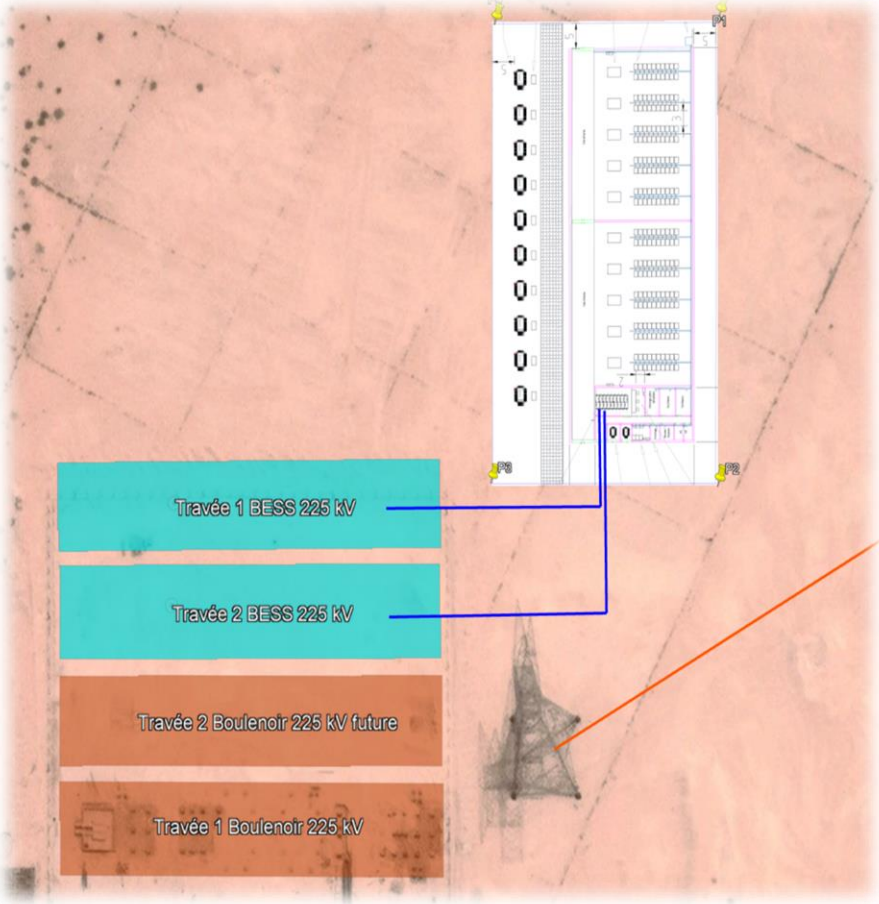
BESS Specs

Rated active power (MW)	35 MW
Rated apparent power (MVA)	70 MVA
Useful storage capacity at the connection point at the start of life (MWh)	70 MWh
Battery Technology	Li-ion
Applications	Secondary control Reduce use of thermal plants Voltage regulation
Annual number of complete cycles	365
Intermediate Voltage	33 kV
Connection Voltage	225 kV
Power Factor	0.95/0.95

BESS Specs – Lithium Ion

- **Technology Selection:** Li-ion technology allows to reach a 20y lifetime at a cost around 200 USD/kWh, while ensuring good efficiency (85%). Other technologies were considered in the feasibility study (Lead Acid, Sodium Sulfur, Zebra, Vanadium Redox Flow, and ZbBr Hybrid Flow) and Li-ion was considered most efficient for Mauritania's needs.
- **Chemical Choice:** To be left open in the upcoming tender, as long as specs on lifetime, security and performances are respected.
- **Environmental Risk Mitigation:** Considering environmental conditions in Nouakchott (dust, heat and salinity), it is proposed to integrate LV and MV components in a building to offer the best protection against climate conditions. The site will be separated in two identical parts to increase system redundancy and availability. Each part will be independent in its operations but also in its ancillary services, cooling and fire safety respective managements.

BESS Specs - Visualization



Financing + Knowledge



- **Pre-FS Study** : Finalized in June 2022. Financed by PPIAF (WB)
- **FS Study** : Finalized in May 2023 and presented to Government of Mauritania on June 22th, 2023. Financed by PPIAF and ESMAP (WB)
- **RFP Study** : Bidding documents to be developed by the same Consultant (contract amendment) and to be financed by ESMAP as part of META Phase II
- **Investment Project**: World Bank financing as key activity of the new META IPF (IDA Credit) to be delivered in end FY24. **RETF Grants would be welcomed to increase concessionality on this pilot project.**

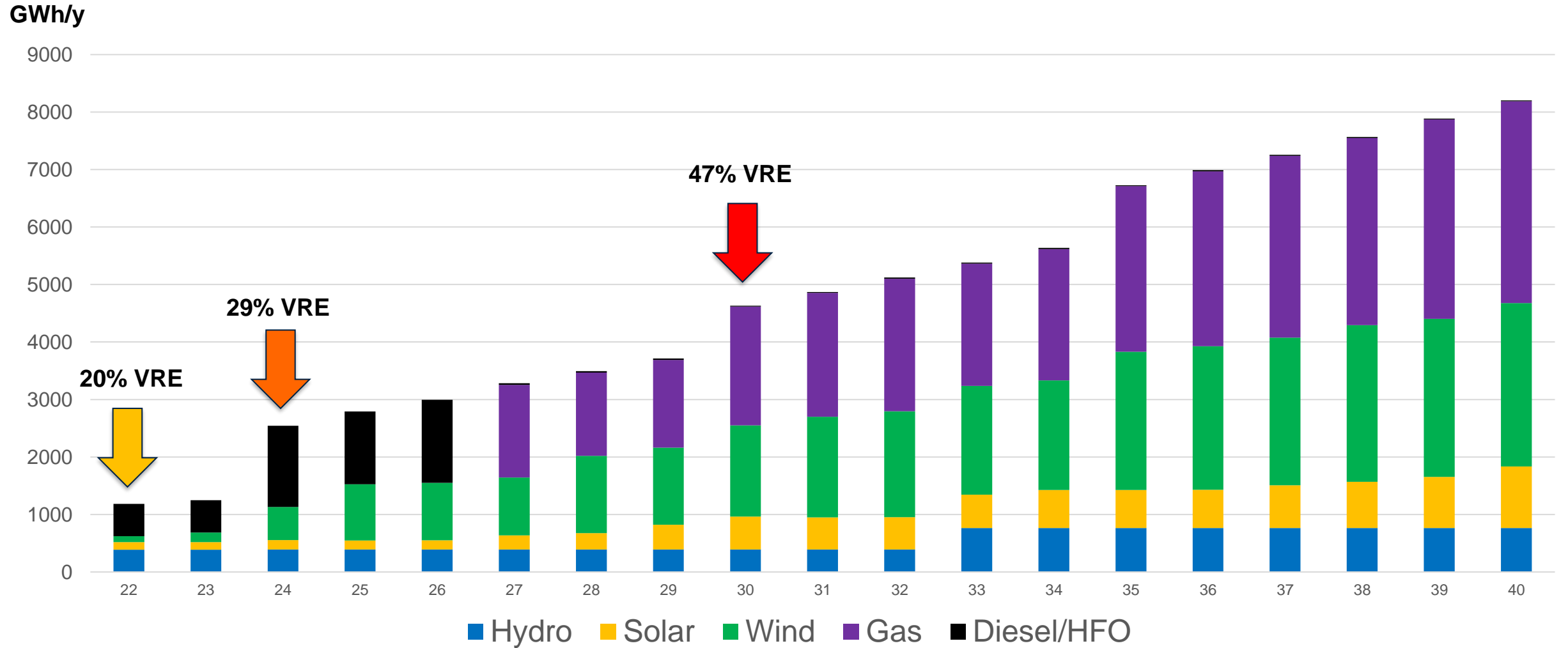
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BESS Scale Up Options



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Least Cost Generation Plan (June 2023)



BESS Scale Up Rationale

Rationale for BESS Scale Up

- **Short Term: 100 MW wind plant to boost VRE penetration by early 2024**
- **Medium Term: 500 MW new VRE by 2030 to meet racing demand**
- **Medium/Long Term: Potentially massive VRE from private Green Hydrogen developers (80 GW of MoUs).**

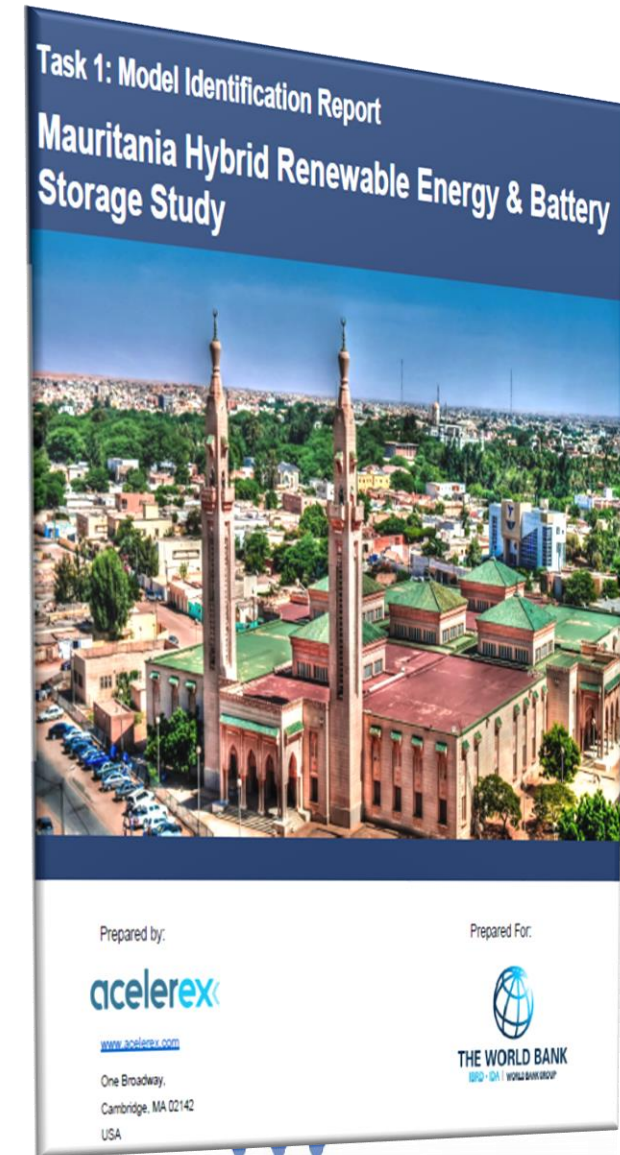
Free surplus (5% of generation) could be tapped for national and regional demand with BESS Scale Up

Private Sector Leapfrogging

- **Opportunity to leapfrog from a classical EPC model directly to 2nd generation IPPs with Hybrid PPAs**
- **Objective: (i) maximize country's world class RE potential in a dispatchable manner and (ii) promote productive sectors such as energy**

Upcoming Business Model

- **To be tailormade to meet Mauritania's specific needs and challenges**
- **Hybrid RE & BESS Study underway with Acelerex (launched in May 2023).**



Thank You !

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