

Addendum 04

Package Name: Design, Supply, and Installation of Flow Battery Energy Storage Systems and Energy Management Systems in 2 islands across Maldives - Rebidding

This Addendum 04 is issued in accordance with Sub-Clause No. 8.1 of Section 1 – Instructions to Bidders. The addendum forms part of the Bidding Document.

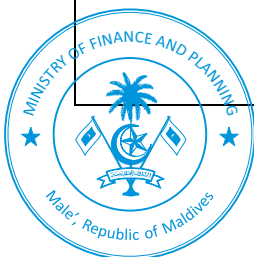
1) Section 6: Employer's Requirements (3.2.1 – Flow battery, Revised as follows)



Flow Battery

Technical requirements of the storage battery:

- The measured DC round trip efficiency: $\geq 80\%$
- The storage battery itself shall then be composed of cell stack, electrolyte tank, auxiliary equipment like heat exchanger, pumps, sensors, and all of these shall be installed inside containers.
- The electrolyte of the storage battery shall be vanadium.
- The storage battery shall be able to deliver the minimum required power as specified in Chapter 2.5 (column “flow battery and battery inverter required minimum power”) and meet the requirements of minimum battery capacity at nominal discharge output (column “Minimum required flow battery capacity”).
- Recycling certificate: when the storage battery has achieved its end of life it must enter in a recycling program from the Manufacturer. The transport and shipment costs will be carried by the Employer. The Bidder shall provide a certificate proving that the Manufacturer agrees to receive and recycle the storage batteries according to international applicable standards.
- If electrolyte of the storage battery needs to be filled into the tank on-site, the necessary tools and equipment shall be transported.
- The cycle life and durability of the storage battery is a major requirement in the system. The Bidder shall provide components that full fill the following points:
 - The lifetime of flow battery applied shall be minimum 15 years, and 20 years as the norm, at DOD (depth of discharge) 100% at nominal output power.
 - Copy of the manufacturer's test report opened to public, submitted to external official agency, or published in reputable international journal shall be submitted in Technical Bid.
 - The Bidder shall submit the capacity calculation sheets with degradation ratio certificate of BESS to achieve requirements of capacities.
- Standards compliance
 - IEC62932-2-1: Performance general requirements and test methods
 - IEC62932-2-2: Safety Requirements



- UL1973: Batteries for Use in Light Electric Rail (LER) and Stationary Applications
- The storage battery shall satisfy the following safety and environmental requirements:
 - Electrolyte tank shall provide a duplicated acid-resistant structure (i.e., having secondary containment), or the bike shall be provided around the electrolyte tank to prevent electrolyte leakage even when the whole amount of the electrolyte flows out of the electrolyte tank.
 - Cell stack of the storage battery shall be UL1973-certified or compliant with UL1973.
 - The storage battery shall be compliant with Annex B (Safety Requirements for Stacks) of IEC62932-2-2 (Flow Battery Energy Systems for Stationary Applications - Part 2-2: Safety Requirements). The bidder shall submit past implementation results as evidence.
 - The bidder shall submit the seismic design document of the electrolyte tank and the battery container.
- Environmental condition shall be as follows:
 - Ambient operating temperature: -5 to +40 degrees Celsius
 - Operating humidity: 0 to 80 % RH
 - Enclosure rating: IP54
 - Maximum elevation: 1,000 m
- Earthquake resistance shall be as follows:
 - **Horizontal: 0.5 G**
 - **Vertical: 0.3 G**

