



KERALA STATE ELECTRICITY BOARD LIMITED

(Incorporated under the Companies Act, 1956)

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Abstract

Battery Energy Storage System (BESS) implementation in KSEBL – Inviting Expression of Interest (EOI)- sanctioned-Orders issued

CORPORATE OFFICE (Renewable Energy & Energy Savings)

B.O (FTD) No. 698 /2021/CE(REES)/INNOV/T4/BSS/2021-22/ Thiruvananthapuram dated 24-09-2021

- Ref:-
1. BO (FTD) No 2699/2017(CE(REES)/Projects/Misc/2017-18/1779 Dated 30.10.2017
 2. Letter NI.CEG/AE-II/BESS-Proposal/2021-22/918 dated 27.8.2021 of the Chief Engineer (Generation & PED) Moolamattom.
 3. Note No DGE/G3/BSS/2021-22 dated 31.08.2021 of the Director (Generation-Electrical & SCM) submitted to the Full Time Directors (Agenda 35/9/21)

ORDER

The Electricity is one of the key enablers for achieving socio-economic development of the State. The economic growth shall lead to growth in demand of power. The Generation Capacity augmentation coupled with reliability is vital for meeting the future market demands. The idea of growing sustainable has grown to be of prime importance and has moved towards a minimal carbon future. In realizing the objective of carbon free energy and to address the environmental issues arising from obnoxious emissions, efficient power plants are being commissioned and more renewable energy sources are being promoted. The capital cost of renewable technologies for power generation is becoming competitive day by day and shall promote sustainable development. However, the intermittency associated with the RE technologies is a limitation, which needs to be addressed in the power system. The adoption of grid scale energy storage system shall be a key component for large scale grid integration of renewable energy sources and shall aid in improving the power system reliability.

The present installed generation capacity of KSEBL is 2224.49 MW including renewable energy power plants (Solar & Wind energy projects). In addition, 627.819 MW is being contributed by the Captive Power Plants (CPPs) and the Independent Power Producers (IPPs) to the State's generation Capacity. The emerging power plants in the state are predominantly of Variable

Renewable Energy (VRE) which is widely distributed across the State. The generation capacity mix has undergone significant changes in the near decade and RE penetration and Electric Mobility is expected to impound drastic changes to the energy grid in the State. The Optimum generation mix of capacities shall be a need of the hour to be implemented to suit the emerging future load profiles.

As per order read as 1st above, the KSEBL had accorded sanction for appointing Project Consultant for implementation of Bulk Energy Storage system, through e-tender. The initiative was under the Administrative Sanction ordered vide G.O(Rt) No.319/2017/Power/11-09-2017, which was envisaged to promote grid integration of RE power. Subsequently, tender was invited for the same and the proceedings were closed due to unavailability of qualified bidders.

The Grid Scale Energy Storage are technological systems in which electrical energy can be stored and later discharged to grid based on system operation requirements. The storage solution shall cater to a wide variety of challenges that are experienced in diversifying the energy system requirements and in transitioning to cleaner energy alternatives. The energy storage system shall act as a one stop solution for system improvement applications and as a reliable power storage potentially improving the performance of the Utility. The Battery Energy Storage System (BESS) shall also enhance the electric mobility requirements harnessing the energy from Solar PV installations for use of mobility applications. The commercial viability of the BESS has been improved by the technological maturity, reduction in battery costs, energy density, improved round-trip efficiency and constructional easiness.

Grid-scale BESS have been the subject of intensive research in the recent times in India, owing primarily to the emerging challenge of integrating large amounts of Variable Renewable Energy (VRE) in the power grid. The Central Electricity Authority's Optimal Generation mix report outlines the need for a 27 GW of grid-scale battery energy storage systems by 2030 with four hours of storage. The Ministry of Power (Government of India), vide order dated 21.06.2021 has announced waiver of Inter State Transmission Charges on energy supplied to/from BESS projects commissioned before June 2025, if at least 70% of charging requirement is met through renewable sources. Amongst the most promising business models of BESS that's likely to emerge in the future is its integration with the grid which is to be flexibly operated to provide either firm, schedulable power or reliable and balancing support to the grid. M/s NTPC has invited EoI for setting up a 1000 MWh of Grid-scale Battery Energy Storage System at single/split across multiple NTPC Power Plants in India on 26.06.2021.

The role of BESS is critical in long-range resource planning under high variable renewable energy scenarios, its role in providing fast responding, high quality energy services for ancillary operations is already proven across large power systems. Hence a Grid-scale BESS, is proposed to be implemented in KSEBL for evolving the prospects of transformational grid analysis and future deployments to enhance the availability and quality of reserves in the grid.

The Grid-scale Battery Energy Storage System is pursued to be implemented on pilot basis with a flexible storage system, to test the ability of KSEBL to integrate BESS into its future operational regime and enhance the reliability of the grid. In order to explore the adaptive technologies of Grid Scale BESS, a total capacity to meet a demand of 10 MW (3 application use case models) are proposed to operate at four hours on 2 cycles per day. The total anticipated

capital outlay shall be Rs. 105 crore (Rupees One Hundred and Five Crore Only) including the infrastructure development costs and project management for the targeted capacity of 10 MW. The pilot scheme is envisaged as follows;

Sl. No	Target Capacity of BESS	Target Location	Key Benefits Envisaged
1.	5 MW	At Renewable Energy Integrated location 220 kV Substation Kanjikkode/110 kV Substation Kollangode 110 kV Substation, Moovattupuzha / 110 kV Substation Edayar. (Location shall be based on load flow analysis by Power System Engineering Wing of KSEBL)	Power Storage Load Management Energy Arbitrage
2.	3 MW	Government Medical College, Kottayam. 66 kV Gandhi Nagar Substation, Kottayam. (Proposal of up gradation to 110 kV in Progress)	Blackout Mitigation Reliability Improvements
3.	2 MW	At Idukki Hydro Electric Power Project	Emergency Power backup Black Start Operations Power Storage

Total Project capacity envisaged under the pilot Project – 10 MW

Energy Storage capacity envisaged (4 hours X 2 Cycles Per day) – 50 MWh

The Pilot project at each location shall be a complete end to end solution of BESS facility including storage plant, power conversion system, balance of plant, battery management system including software solution for optimized operation of BESS. To ensure the adoption of the best technological solution and envisaging the optimal investment plan beforehand is essential. Hence the proposal shall be rolled out through an Expression of Interest (EOI) investigating different technological solutions and business models for development of BESS for different applications with Load Management and RE Power Generation. The proposed business models shall explore the implementation of BESS either as a Utility Owned Grid Asset (Design, Build, Operate & Transfer) or on co-investment basis on Legalized Cost of Energy (LCOE) for storage.

The brief indent of Invitation of Expression of Interest (EOI) for implementation of Grid Scale Battery Energy Storage in KSEBL shall be as follows:

- › The Expression of Interest (EOI) shall be floated by KSEBL for response from Indian/Global Company/their Consortium/Affiliates/Representatives for setting up of Grid-scale Battery Energy Storage System (BESS) at single/split across multiple locations under KSEBL.
- › The call for EOI for BESS shall be for a complete end to end solution of BESS facility including storage plant, power conversion system, balance of plant equipment, battery management system including software solution for optimized operation of BESS for a minimum period of 3 years on project delivery as Utility Asset. Whereas the LCOE for 15

years shall be adopted on co-investment / investment mode of implementation.

- › This Expression of Interest shall target to engage with prospective companies who have supplied or have comparable potential options available for BESS that can confirm the viability of its capital and operational costs over the lifetime with several selected services, operational profiles and dispatch schedules.
- › The EOI respondents shall also be permitted to suggest an optimal location for BESS viz a viz the locations identified by KSEBL and be admitted as per the merit order of the options based on their experience.
- › The tender documents shall be prepared by adopting the same followed by M/s NTPC Ltd., for setting up of a 1000 MWh of Grid-scale Battery Energy Storage System across multiple NTPC Power Plants in India and customising the same for KSEBL.
- › Participants of the EOI could be energy storage manufacturer or an integrator facilitating KSEBL, in venturing into implementation of BESS for grid services. Applicants of EOI should meet any of the following criteria:
 - › The battery energy storage manufacturer should have manufactured and supplied batteries for grid interactive BESS of cumulative installed capacity of 3 MW/ 3MWh or higher.
 - › The Integrator should be the agency/entity, which has carried out the integration work(s) of grid interactive BESS of cumulative installed capacity of 3 MW/3MWh or as suggested by the successful bidder.
 - › Financial Credentials shall be construed to meet up to the experience in the above project Capacity.

The prospects for Viability Gap Funding / State's budgetary support shall be explored under system reliability improvement funds for infrastructure in Public Health Care Institutions. Capital Aid/ Power System Development Funds / Renewable Energy Integration funds etc. as applicable to the project shall be explored for pilot project implementation.

The invitation of EOI shall assess the commercialization prospects of Setting up Grid scale Battery Energy Storage System in KSEBL. After identifying the prospective stakeholders through EOI who are interested in setting up of Grid-scale Battery Energy Storage System, the Request for Proposals (RFP) for undertaking project(s) at single/split across multiple locations shall be invited subsequently for setting up the facilities and scalable model for further additional requirements. The project cost / LCOE shall be realized in the Request for Proposals (RFP) and the installation of BESS facility in KSEBL shall be carried out after obtaining requisite approvals from State Statutory and Regulatory Agencies based on the responses to the project.

The matter was placed before the Full Time Directors as per note read as 3rd above. Having considered the matter in detail, the Full Time Directors in its meeting held on 10.9.2021 resolved to accord Sanction for inviting Expression of Interest (EOI), for setting up of Grid-scale Battery Energy Storage System (BESS), either at those locations specified above or any other technically feasible locations, as suggested by the successful bidder . Further resolved to authorise the Chief Engineer (REES) & Chief Safety Commissioner to prepare the tender documents for inviting the EOI, in line with the tender documents and the procedure adopted by M/s NTPC Ltd. for setting up of a 1000 MWh of Grid-scale Battery Energy Storage System across multiple NTPC Power

Plants in India in two weeks.

Orders are issued accordingly.

By Order of the Full Time Directors

sd/-

LEKHA.G.

COMPANY SECRETARY-in-charge

To: The Chief Engineer (REES) and Chief Safety Commissioner.

Copy to:-

TA to Chairman & Managing Director/ TA to Director(Planning, Safety &SCM)/ TA to Director(REES,SOURA, Sports & welfare) / TA to Director(Gen-Ele) /TA to Director(Dist & IT)/TA to Director (T&SO)/TA to Director (Gen-Civil)/PA to Director(Finance)/Sr.CA to Secretary(Admn.)/Company secretary/ Fair Copy Superintendent/ Library/ Stock file.

Forwarded / By Order

Assistant Executive Engineer