

	The Energy and Resources Institute	ISSUE NO.	01	DATED	01-09-2023
	Tender	REVISION NO.	00	DATED	01-09-2023
		DOC. NO.	F/Mat/14		

Request for Proposal

**Design, Supply, Testing, Installation, Commissioning,
Operation and Maintenance of 20 MW/ 40 MWh
Battery Energy Storage Systems (BESS) in Delhi
under Tariff-Based Competitive Bidding**

Ref:TERI/MAT/2023-24/014

Tender publishing date: 01 Sep 2023


Last Date for Submission of Bids: 22 Sep 2023

Vol I: Scope of Work and Technical specifications

 The Energy and Resources Institute	ISSUE NO.	01	DATED	01-09-2023
	REVISION NO.	00	DATED	01-09-2023
	DOC. NO.	F/Mat/14		
Tender				

Contents

Introduction and Background of the project	3
Definitions of Terms.....	5
Project Context	11
Scope of Work:.....	12
1. Erection and Commissioning.....	12
2. Operation and Maintenance.....	15
3. Equity investment	16
Technical Parameters of BESS, BESS Characterization and Performance Parameters.....	18
1. Technical Parameters of BESS.....	18
1.1 Battery Sub System.....	18
1.2 Battery Sub System.....	19
1.3 Battery Energy Management System (EMS)	19
1.4 Battery Management System (BMS) & Power Conversion System (PCS)	23
2. Design and Construction Requirements	24
3. General specifications.....	26
4. BESS Safety Standards.....	27
4.1 National/ International Standards for Battery Energy Storage System	27
4.2 National/ International Standards for Power Conditioning System / Power Conditioning Unit * 29	
*Certification/test reports required for abovementioned standards for PCS/PCU	30
4.3 Protection System.....	30
4.4 Transportation and Storage at site.....	33
4.5 Civil and Structural Works	33
5. System Testing, Commissioning, and Operations.....	33
5.1 Factory Acceptance Test.....	33
5.2 Site Acceptance Test.....	34
5.3 Training	35
5.4 Documentation.....	35
6. Performance monitoring.....	36
7. Service Level Agreement (SLA)	37

	The Energy and Resources Institute	ISSUE NO.	01	DATED	01-09-2023	
		Tender		REVISION NO.	00	DATED
	DOC. NO.			F/Mat/14		

Introduction and Background of the project

The power sector in India today is experiencing major technological disruptions, with the biggest being addition of RE generation alongside the thermal based generation. India's National Electricity Plan has projected nearly 600 GW of renewable electricity capacity by 2031-32, including 365 GW solar and 122 GW of wind energy¹. Renewable Energy (RE) has also become the most affordable and cheapest source for meeting the energy requirements. India had a total renewable energy capacity of 169 GW as on 28th February 2023. While initial RE capacities have been successfully integrated to the grids so far, further capacity addition is expected to face integration challenges due to variability and supply-demand mismatch. As of March 2023, India's modern renewable energy share (solar and wind) of gross generation stood at ~12%, which is expected to increase to ~35% by 2031-32¹.

The increasing share of renewable energy generations in the grid has impacted the traditional approach of grid balancing. The renewable energy sources are intermittent in nature due to dependence on external climactic conditions, such as sunshine or wind. Therefore, the variability of renewable generation must be considered while adjusting output of load following generating stations for the purpose of balancing.

Large penetration of Renewable energy sources and Distributed Energy Resources (DERs), such as rooftop solar into the Distribution Network (DN), fast changing demand patterns and the electrification of transportation through electric vehicles pose technical challenges to existing power distribution networks. Technical/operational challenges in terms of loss of load, deviations in power flow, fault/congestion in electricity distribution network and power quality distortions are expected to affect the performance of distribution utilities. This will impact the overall power system stability and dynamic behaviour of the system.

The National Electricity Plan (NEP)¹ identifies Pumped Hydro Storage System (PSP) and Battery Energy Storage Systems (BESS) as the commercially deployable solutions for providing requisite storage capacity. CEA's modelling for the NEP projects BESS requirement of 8.68 GW/ 34.72 GWh by the year 2027-28 and 47.24 GW/ 236.22 GWh by 2031-32. BESS can thus be an effective solution to address issues of RE integration; it provides capabilities for shifting generation, regulating dispatch of electricity, maintaining flow control in transmission system, and strengthening reliability of the power system without adding new capacity.

Therefore, **BSES Rajdhani Power Limited (BRPL)** has envisaged to deploy a **20 MW/ 40 MWh BESS** within their licensed area, which is a timely and much needed step toward mitigating challenges arising from RE integration. BRPL has appointed **The Energy and Resources Institute (TERI)** to invite

¹ National Electricity Plan 2022-32 ([Access here](#))

 The Energy and Resources Institute	ISSUE NO.	01	DATED	01-09-2023
	REVISION NO.	00	DATED	01-09-2023
	DOC. NO.	F/Mat/14		
Tender				

bids from prospective bidders through tendering for **site survey, planning, design, engineering, and transportation to site, insurance, supply at site, un-loading, handling, installation, integration, testing, commissioning & demonstration, operation, and maintenance of BESS**, as per the details given in these tender documents. The Delhi Electricity Regulatory Commission (DERC) has provided an in-principal approval for the project.

This Request for Proposal is meant to invite applications from interested Bidder(s) capable of delivering the BESS described herein. The content of this RFP has been documented as a set of three volumes explained below:

Volume I: Scope of Work and Technical Specifications

Volume I of this RFP contains details regarding the scope of work and technical specifications of the BESS that Buying Utility deems necessary. The information set out in this volume includes the detailed technical specifications of the BESS which is to be installed and operated.

Volume II: Instructions to Bidders and Evaluation Criteria

Volume II contains instructions for bidders when responding to this RFP. It also contains the eligibility conditions and the evaluation criteria for selecting of successful bidder.

Volume III: General Conditions of contract

Volume III explains the draft contractual terms that Buying Utility wishes to specify at this stage. Prospective bidders must follow the respective terms and conditions in each agreement.

It is envisioned that the following agreement will be signed with the selected bidder.

Type of agreement and Scope	Involved parties	Estimated Period of Performance
Battery Energy Storage Service Agreement (BESSA)	Buying Utility and Winning Bidder (BESS Developer (BESSD))	From signing of BESSA until 12 years post Commercial Operation Date (COD) of BESS


This document is Volume I.

	The Energy and Resources Institute	ISSUE NO.	01	DATED	01-09-2023
	Tender	REVISION NO.	00	DATED	01-09-2023
		DOC. NO.	F/Mat/14		

Definitions of Terms

Following terms used in the documents will carry the meaning and interpretations as described below:

1. **"ACT" or "ELECTRICITY ACT, 2003"** shall mean the Electricity Act, 2003 and include any modifications, amendments, and substitution from time to time.
2. **"ADJUSTED EQUITY"** of a company shall mean the capital, surplus and retained earnings accounts less all intangible assets
3. **"AFFILIATE"** in relation to a Company shall mean a person who controls, is controlled by, or is under the common control with such Company.
4. **"APPROPRIATE COMMISSION" or "DERC"** shall refer to the Honourable Delhi Electricity Regulatory Commission.
5. **"AVAILABILITY"** shall be as defined in the RFP.
6. **"BATTERY ENERGY STORAGE SYSTEMS" or "BESS"** shall mean the system(s)/ projects utilizing methods and technologies such as electrochemical batteries (Li-ion, solid state batteries, flow batteries, etc.) or others, providing a facility that can store chemical energy and deliver the stored energy in the form of electricity, including ancillary facilities.
7. **"BATTERY ENERGY STORAGE SYSTEM DEVELOPER" or "BESSD" or "DEVELOPER"** shall mean the entity owning/operating the BESS facility for supply of power
8. **"BATTERY ENERGY STORAGE SERVICE AGREEMENT" or "BESSA"** shall mean the agreement signed between the Selected Bidder/ BESSD and Buying Utility according for procurement of capacity from the BESS. A draft for the BESSA is enclosed with Volume 3 this RFP.
9. **"BID" or "PROPOSAL"** shall mean the documents submitted by the Bidder towards meeting the techno-commercial and financial qualifying requirements, along with the price bid submitted by the Bidder as part of its response to the RFP issued by Bid Manager.
10. **"BIDDER"** shall mean Bidding Company (including a foreign company) or a Bidding Consortium submitting the Bid. Any reference to the Bidder includes Bidding Company/ Bidding Consortium, Member of a Bidding Consortium including its successors, executors and permitted assigns and Lead Member of the Bidding Consortium jointly and severally, as the context may require; foreign companies participating in the bidding process shall be registered as companies as per the rules of their country of origin.

	The Energy and Resources Institute	ISSUE NO.	01	DATED	01-09-2023
	Tender	REVISION NO.	00	DATED	01-09-2023
		DOC. NO.	F/Mat/14		

11. **“BIDDING CONSORTIUM”** or **“CONSORTIUM”** shall refer to a group of Companies that collectively submit the response in accordance with the provisions of this RFP under a Consortium Agreement.
12. **“BID CAPACITY”** shall mean aggregate project capacity of the Battery Energy Storage System(s) as proposed by the Bidder.
13. **“BRPL”** or **“BUYING UTILITY”** shall mean BSES Rajdhani Power Limited, which utilizes the BESS for meeting its power on demand requirements.

14. **“CERC”** shall mean Central Electricity Regulatory Commission

15. **“CHARTERED ACCOUNTANT”** shall mean a person practicing in India or a firm whereof all the partners practicing in India as a Chartered Accountant(s) within the meaning of the Chartered Accountants Act, 1949.

For bidders incorporated in countries other than India, “Chartered Accountant” shall mean a person or a firm practicing in the respective country and designated/ registered under the corresponding Statutes/ laws of the respective country.

16. **“COMPANY”** shall mean a body corporate incorporated in India under the Companies Act, 2013 or any law in India prior thereto relating to Companies, as applicable.

17. **“COMMERCIAL OPERATION DATE (COD)”** shall be the date on which the commissioning certificate is issued by the Commissioning Committee upon successful commissioning of project. The Commissioning Committee shall include members from Buying Utility and third-parties nominated by the Buying Utility. The conditions for commissioning are defined in Volume 3 of this RFP

18. **“CONTRACTED CAPACITY”** shall mean the capacity of 20 MW for 2 hours (40 MWh) contracted with Buying Utility for providing Energy storage facility for charging and discharging the system on “on-demand” basis, based on which the BESSA is executed between BESSD and Buying Utility.

19. **“CONTRACT YEAR”** shall mean the period beginning from the Effective Date of the BESSA and ending on the immediately succeeding 31st March and thereafter each period of 12 months beginning on 1st April and ending on 31st March provided that:

- a. in the financial year in which the Scheduled Commissioning Date would occur, the Contract Year shall end on the date immediately before the Scheduled Commissioning Date and a new Contract Year shall commence once again from the Scheduled Commissioning Date and end on the immediately succeeding 31st March, and thereafter each period of 12 (Twelve) Months commencing on 1st April and ending on 31st March, and