



**Expression of Interest (Eol) for Reversible Pump-Turbine
and/or Generator-Motor for Pump Storage Schemes (PSS)**

Extension of Eol Due Date

Subject: Business Sharing Agreement (BSA) for Reversible Pump-Turbine and/or Generator-Motor for Pump Storage Schemes (PSS)

This has reference to the Expression of Interest (Eol) published on BHEL's website www.bhel.com on **August 31, 2022** for Business Sharing Agreement (BSA) for Reversible Pump-Turbine and/or Generator-Motor for Pump Storage Schemes (PSS). The Expression of Interest (Eol) seeks response from Original Equipment Manufacturers (OEMs) of Reversible Pump-turbine and/or Generator-Motor for Pump Storage Schemes (PSS) from India & Abroad, who are willing to be associated with BHEL through a Business Sharing Agreement (BSA) on medium term (5 years) basis to address PSS opportunity in India. Scope of a typical PSS includes Design, Engineering, Manufacture, Assemble, Test, Supply, Erect, Commission, Guarantee and Warranty Obligations & long term support of the Reversible Pump-Turbine and/or Generator-Motor and/or associated equipment.

The due date for receiving the proposals against the Eol has now been extended upto **October 18, 2022 (Tuesday)**.

The interested prospective Original Equipment Manufacturers (OEMs) shall ensure that their response along with annexures as mentioned in the Eol are received by BHEL on or before **October 18, 2022 (Tuesday)**. The response shall necessarily be accompanied with all the details, as requested in subject Eol.

In case any further information is needed, kindly feel free to contact us.

The respondent shall submit their offer with all annexures duly signed to the following address:

General Manager-Marketing
Power Sector: Hydro Business Group
Bharat Heavy Electricals Limited
9th Floor, Joy Tower, Plot No. C-20/1A/1
Sector-62, Noida-201301 (U.P)
Phone- 0120-6748069
Email id: prastogi@bhel.in



Expression of Interest (EoI) for Reversible Pump-Turbine and/or Generator-Motor for Pump Storage Schemes (PSS)

Subject: Business Sharing Agreement (BSA) for Reversible Pump-Turbine and/or Generator-Motor for Pump Storage Schemes (PSS)

1) Introduction

This Expression of Interest (EoI) seeks response from Original Equipment Manufacturers (OEMs) of Reversible Pump-turbine and/or Generator-Motor for Pump Storage Schemes (PSS) from India & Abroad, who are willing to be associated with BHEL through a Business Sharing Agreement (BSA) on medium term (5 years) basis to address PSS opportunity in India. Scope of a typical PSS includes Design, Engineering, Manufacture, Assemble, Test, Supply, Erect, Commission, Guarantee and Warranty Obligations & long term support of the Reversible Pump-Turbine and/or Generator-Motor and/or associated equipment.

1.1) About Bharat Heavy Electricals Limited (BHEL)

Bharat Heavy Electricals Limited (BHEL) is a Maharatna Public Sector Enterprise under the administrative control of the Ministry of Heavy Industries. It has the distinction of being the India's largest power plant equipment manufacturer. The company has its corporate and registered office in Delhi and has a network of 16 manufacturing units, 2 repair units, 4 regional offices, 8 service centers, 15 regional centers in India. BHEL is supplier of a wide range of products, systems and services for the core sectors of the economy, viz. power, transmission, industry, transportation, renewable energy, oil & gas and defense. Further details about the company and its operations can be obtained from its website www.bhel.com.

1.2) Current Business Scenario and BHEL's experience in Pump Storage Schemes (PSS)

BHEL's Heavy Electrical Plant (HEP), Bhopal is responsible for manufacturing of various rating of Hydro Turbines, Generators, Pumps, Motors and associated equipment and BHEL's Electronics Division, Bengaluru is responsible for manufacturing of various rating of Excitation and Control & Monitoring equipment for Power Projects since past 50 years.

Presently, 8 PSS (approx. 4.8 GW) are under operation and 3 PSS (approx. 1.5 GW) are under construction in India. Out of 8 PSS, BHEL was associated in 6 projects (approx. 3.4 GW) viz Kadamparai (4 x 100 MW), Nagarjuna Sagar (4 x 100 MW), Srisailem (6 x 150 MW), Sardar Sarovar (6 x 200 MW), Ghatghar (2 x 125 MW) and Kadana (4x60 MW).

Government of India has set an ambitious program to increase Renewable Energy Generation capacity. During COP26 summit, Government of India committed to install non-fossil fuel electricity capacity of 500 GW & source 50% of energy requirement from renewables, both by 2030.

In view of focus of Government of India on Renewable energy (wind, solar etc.) which are intermittent in nature, grid stability is a concern. The PSS provides a much needed balance to the grid. PSS is the fastest grid scale resource to restore balance. Pumped storage technology is technically proven, highly efficient and flexible way of energy storage on a large scale.

PSS are likely to come up in West Bengal, Tamil Nadu, Odisha, Maharashtra, Karnataka, Andhra Pradesh, Himachal Pradesh and Bihar etc. The Maximum unit size of PSS likely to be upto 400 MW.



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2) Scope of Cooperation:

BHEL intends to have a medium term association (5 years) with the prospective Business partner to address PSS opportunities in India. The proposed association shall include activities viz Design, Engineering, Manufacture, Assemble, Test, Supply, Erect, Commission, Repair, Service, Guarantee and Warranty Obligations & long term support for Reversible Pump-Turbines and/or Generator-Motors for PSS under a BSA, so as to bid against tenders for PSS. Interested OEMs meeting PQR as specified in article 4 below are invited to respond to this Eol.

Modalities of Business Sharing for participation in PSS shall be based on specific provision available in forth coming PSS Tenders.

Upon receipt of responses against this Eol from OEM(s), BHEL will review the responses to ascertain suitability of the offer made and shortlist the OEM(s) for further discussions. Detailed discussions on scope sharing, commercial and other terms and conditions to finalize the BSA shall be held with the shortlisted OEM(s) subsequently. Indicative scope of PSS is given in **Annexure-1** and Sample Division of Work (DOW) to be discussed and mutually agreed with prospective OEM while finalizing BSA is **enclosed**.

3) Working under Business Sharing Agreement (BSA)

- a) In the BSA model, the prospective OEM (Prospective Business Partner) shall offer / develop / customize PSS in association with BHEL to meet Client requirements on mutually agreed terms.
- b) BHEL and the prospective OEM shall mutually agree on work share for each business opportunity / tender / project based on each other's strengths in system design / software / hardware / manufacturing / testing / installation / commissioning/post-sales support etc.
- c) The prospective OEM shall also be responsible to the customer jointly with BHEL for the design, procurement of components and sub systems, overall system integration, testing and also for the successful acceptance, guarantee and warranty obligations and long term support.
- d) The prospective OEM shall have to furnish Deed of Joint Undertaking (DJU), if mandated by end Customer. Executant of the DJU shall be jointly and severally liable for the successful performance of the equipment as per the format (available in respective PSS tender). The DJU shall have to be submitted during tendering/proposal stage.

4) Pre-Qualification Requirement:

The prospective OEM shall meet the following conditions as on the date of submission of Eol:

A. General Experience:

The Prospective Business Partner shall meet the following conditions as on the date of submission of Eol:

- Should be an OEM of reversible pump-turbine and /or Generator-Motor for PSS.
- Prospective OEM should have design, engineering and manufacturing facility with having at least Fifteen (15) years of experience in design, engineering, manufacturing, supply, testing, erected / supervised erection and commissioning/ supervised commissioning of Reversible Pump-Turbines and/or Generator-Motors for PSS.

OEM as a prime contractor, partner in a Joint Venture / Consortium or EPC contractor must have executed one PSS contract valuing at least INR 300 Cr (In case separate pump-turbine and



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Generator-Motor then contract value at least INR 150 Cr *each*) and at least two (2) nos. PSS must have been executed in last Fifteen (15) years (from start to completion) as a Reversible Pump-Turbine and/or Generator-Motor.

AND

B. Specific Experience:

The Prospective OEM should have successfully:

- I. Designed, engineered, manufactured, supplied, tested, erected / supervised erection and commissioning/ supervised commissioning of at least two (02) nos. Reversible Pump Turbine of 200 MW or above out of which one (01) nos. Reversible Pump Turbines should have been executed in last Fifteen (15) years (from start to completion) and at least one (1) no. Reversible Pump Turbine should be of 250 MW or above. Each of the Reversible Pump Turbines should be in two (02) separate stations and should be in successful operation for a period not less than Two (2) years prior to the date of closing of this Eol.

Relevant proof along with salient project data and reference list is to be submitted **(as per Annexure-2 (a))**.

AND / OR

- II. Designed, engineered, manufactured, supplied, tested, erected / supervised erection and commissioning / supervised commissioning of at least one (01) Fix-Speed Generator-Motor of 200 MW or above (50 Hz / 60 Hz) and at least one (01) Variable-Speed Generator-Motor of 200 MW or above (50 Hz / 60 Hz). Out of which one (01) Generator-Motor should have been executed in last Fifteen (15) years (from start to completion) and at least one (1) no. Generator- Motor should be 250 MW or above and Each of the above Generator-Motor should be in two (02) separate stations and should be in successful operation for a period of not less than Two (2) years prior to the date of closing of this Eol.

Relevant proof along with salient project data and reference list is to be submitted (as per Annexure-2(b)).

5) Brief Description of Eol Process:

The interested Prospective OEM shall forward their response along with requested information and duly filled following annexures to be received by BHEL on or before **21.09.2022**

Annexure 1: Indicative Scope of Pump Storage Schemes (PSS) Project

Annexure 2 (a & b): The Prospective OEM shall furnish a summary of their product reference for major supplies in last 15 years

Annexure 3: Prospective OEM's Experience in the field of Reversible Pump-Turbine and Generator-Motor for PSS

The response shall necessarily be accompanied with details on:

- Company background
- Product profile
- Technical features/ Latest product catalogue
- Reversible Pump-Turbine and Generator-Motor for PSS proposed along with its technical details
- Reference list of Customers for PSS



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- List of approvals / conformance certificates from the customer
- Product data sheet
- Copy of annual audited financial reports for last 5 (five) years including copy of auditor's report etc.

In case any further information is needed, kindly feel free to contact us.

The respondent shall submit their proposal with all annexures duly signed. Your response may be sent to the following address:

General Manager-Marketing
Power Sector: Hydro Business Group
Bharat Heavy Electricals Limited
9th Floor, Joy Tower, Plot No. C-20/1A/1
Sector-62, Noida-201301 (U.P)
Phone- 0120-6748069
Email id: prastogi@bhel.in

6) Key Particulars

Sr. No.	Description of Item(s)	Particulars
1.	Website for downloading of Eol document	https:// www.bhel.com
2.	Date of issuing the Eol document	Date: 31.08.2022
3.	Last date for submission of Eol response	Date: 21.09.2022
In case any amendment / corrigendum to this Eol is issued , it shall be notified only at https:// www.bhel.com.		

7) Miscellaneous:

7.1 Right to accept or reject any or all Applications:

- Notwithstanding anything contained in this Eol, BHEL reserves the right to accept or reject any Application and to annul the Eol Process and reject all Applications, at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons therefore. In the event that BHEL rejects or annuls all the Applications, it may, at its discretion, invite all eligible OEMs/Suppliers to submit fresh Applications.
- BHEL reserves the right to disqualify any Applicant during or after completion of Eol process, if it is found there was a material misrepresentation by any such Applicant or the Applicant fails to provide, within the specified time, supplemental information sought by BHEL.
- BHEL reserves the right to verify all statements, information and documents submitted by the Applicant in response to the Eol. Any such verification or lack of such verification by BHEL shall not relieve the Applicant of his obligations or liabilities hereunder nor will it affect any rights of BHEL.
- BHEL reserves the right to cancel/ withdraw Eol for any reason at any time, without thereby incurring any liability to the affected OEMs.



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7.2 Governing Laws & Jurisdiction:

- The Eoi process shall be governed by, and construed in accordance with, the laws of India and the Courts at New Delhi (India) shall have exclusive jurisdiction over all disputes arising under, pursuant to and/ or in connection with the Eoi process.



Expression of Interest (Eol) for Reversible Pump-Turbine and/or Generator-Motor for Pump Storage Schemes (PSS)

Annexure-1

Indicative Scope of Pump Storage Schemes Project

a)	<p>Design, Engineering, Manufacturing, Assembly, Testing, Supply, Erection, Commissioning, Repair, Service, guarantee and warranty obligations & long term support Reversible Pump-Turbines and/or Motor-Generators for Pump Storage Schemes (PSS).</p> <p>Indicative scope of Generator – Motor BSA (frame-work):</p> <p>(a) Tendering stage (joint working as per Division of Work (DOW)) (Generator - Motor)</p> <ul style="list-style-type: none"> - Preparation of pre bid queries and attending pre bid meetings. - preparation of tender designs (electrical and mechanical) - preparation of interface data (tender stage) for <ul style="list-style-type: none"> - Excitation system design. (Fix speed / Variable speed as applicable) - SFC design (Motor) - Air and oil cooler design - Power house layout design. - Bus-duct, NG, LAVT design - Control and monitoring system design, <ul style="list-style-type: none"> - PH Crane, Cooling Water, HVAC (Heating, ventilation, and air conditioning) and firefighting system design, - Transportation, storage and erection etc. - Control Monitoring and Protection system design <p>The excitation system for fixed speed PSS will be provided by BHEL with technical inputs from Generator manufacturer. However, in case of Variable speed PSS, the scope of supply for excitation system will be decided during tendering stage. In case for the ease of integration and for ensuring Guaranteed technical particulars it has to be sourced from other than BHEL, then it should be exclusively indicated in the Eol stage itself by the bidder.</p> <p>The feasibility of providing control & monitoring system, SCADA system by BHEL with technical inputs from BSA will be decided during tendering stage. In case for ease of integration and for ensuring Guaranteed Technical Particulars it has to be sourced from other than BHEL, then it should be exclusively indicated in the Eol stage itself by the bidder.</p> <ul style="list-style-type: none"> - Preparation of technical offer, GTP and drawings. (as per DOW) - Preparation of estimates of respective scope as per DOW. <p>(b) Post tendering stage (Joint working as per Division of Work)</p> <ul style="list-style-type: none"> - Preparation of replies to Post bid queries, Post bid meetings etc. <p>(c) Post order Association</p> <ul style="list-style-type: none"> - Finalisation of Generator-Motor design (electrical/mechanical), direct design association is envisaged. - Issue of interface design inputs to other divisions. (as described under clause (a)) - Design inputs to BHEL as per DOW for raw material procurements, applicable standards and equivalent national / international standards. - Manufacturing drawings with BOM in English (First angle projection) for BHEL scope as per DOW - Assembly drawings for BHEL scope assemblies. - Manufacturing Quality Plan (MQP) and quality services. - Preparation and submission of customer approval drawings and documents as per contract. - Preparation of erection drawings and FQP. - Preparation of testing protocols for testing during erection/pre-commissioning/commissioning activities. - FAT (Field Acceptance Test) procedure for customer approval. - Operation and maintenance manual.
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Expression of Interest (Eoi) for Reversible Pump-Turbine and/or Generator-Motor for Pump Storage Schemes (PSS)

- (d) Association during manufacturing
 - Supervision of OEM engineers at BHEL manufacturing shop (at least one unit as per DOW)
- (e) Association during Erection, Testing commissioning and FAT
 - Supervision of OEM engineers at site (at least one unit)
- (f) Support for respective scope during Defect Liability Period.
- (g) Spare support for at least 10 years after hand-over.

Indicative scope of Pump – Turbine BSA (frame-work):

- (a) Tendering stage (joint working as per Division of Work) (Pump-Turbine)
 - Preparation of pre bid queries and attending pre bid meetings.
 - Preparation of tender design (including machine sizing, speed selection (if required), hydraulic design, mechanical design, transient analysis etc.)
 - Preparation of interface data (tender stage) for
 - For Generator-Motor
 - For Power house layout design.
 - For Power house auxiliary systems including Compressed air system, Drainage & Dewatering system, draft tube water depression system, cooling water system etc.
 - For governing system
 - For control and monitoring
 - Preparation of preliminary design, technical offer, GTP and drawings
 - Preparation of estimates of respective scope
- (b) Post tendering stage (Joint working as per Division of Work)
 - Preparation of replies to Post bid queries, Post bid meetings etc.
- (c) Post order Association (Joint working as per Division of Work)
 - Review of contract with respect to scope, material selection and GTP
 - Finalization of master drawing list and component-wise project schedule
 - Submission of design memorandum for customer approval as per tender requirements
 - Finalisation of pump-turbine hydraulic design
 - Preparation & submission of Pump-turbine model test procedure, experimental model testing, preparation & submission of model test report
 - Finalisation of pump-turbine mechanical design of main turbine components & Auxiliaries
 - Design of governing system, mechanical & electrical BOP's
 - Issue of interface design inputs to other divisions including Generator-Motor, power house layout, governing system, auxiliary systems, control & monitoring, start-up and shut-down sequencing for Pump and Turbine, Drive logics, protection and tripping logic, operating logics in Pump and Turbine mode etc.
 - Design inputs for raw material procurements, applicable standards and equivalent national / international standards.
 - Manufacturing drawings with BOM in English (First angle projection) & 3D models
 - Pump-Turbine sectional arrangement, Assembly drawings & 3D models
 - Manufacturing Quality Plan (MQP) and quality services.
 - Preparation and submission of customer approval drawings and documents as per contract.
 - Preparation of erection drawings
 - Preparation & submission of Pump-turbine field efficiency test procedure, conductance of field efficiency test, preparation & submission of field efficiency test report
 - Operation and maintenance manual.
- (d) Association during manufacturing
 - Supervision of OEM engineers at BHEL manufacturing shop (at least one unit as per Division of work)
- (e) Association during Erection, commissioning and field efficiency testing
 - Supervision of OEM engineers at site (at least one unit)



**Expression of Interest (Eoi) for Reversible Pump-Turbine
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	(f) Support for respective scope during Defect Liability Period. (g) Spare & Maintenance support for at least 10 years after hand-over
b)	Sharing of all design, design calculations, hydraulic data (calculations & drawings), manufacturing drawings, technical and quality surveillance assistance and supervision during manufacturing, erection, testing, commissioning of equipment's.
c)	Sharing of applicable computer programs / software including Logics, engineering tools, commissioning tools etc.
d)	Training of BHEL Engineers to enable them to design, engineer, manufacture, assemble, quality control, test, supply, install, commission, repair and service Reversible Pump-Turbines and/or Generator-Motors for PSS.
e)	Support through engineering services from prospective OEM's design office / manufacturing facilities for Reversible Pump-Turbines and Generator-Motors for PSS.
f)	Sharing of information to enable BHEL to procure items from other vendors (not being manufactured by the prospective OEM) for use in Reversible Pump-Turbines and Generator-Motors for PSS.

(SIGNATURE)



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Sample Division of Work (DOW)

Sample DOW (Pump-Turbine)				
No.	Item	Design	Manufacturing	
			Unit #	
1	Hydraulic Design and Turbine Model Test	Prospective OEM (Sharing of Hydraulic design by partner with BHEL; BHEL to witness turbine model test)	—	—
2	Turbine Assembly Design	Prospective OEM	—	—
3	Turbine Assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
4	Runner	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
5	Spiral Case/Stay Ring/Penstock Connection	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
6	Head Cover/Bottom Ring	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
7	Upper/Lower Draft Tube Liner	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
8	Guide Vane	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
9	Operating Mechanism	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
10	Operating Ring	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
11	Turbine Shaft	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
12	Shaft Coupling Parts	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
13	Guide Bearing/Shaft Seal	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
14	Turbine Pit Liner	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
15	Guide Vane Servomotor	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
16	Inlet Valve	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
17	Inlet Valve Servomotor	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
18	Bypass valve	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
19	Turbine control water piping system design	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
20	Turbine control oil piping system design	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)



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21	Water Supply System with piping	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
22	Cooling System for TGB/Shaft Seal	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
23	Speed Governor	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
24	Compressed Air Supply System	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
25	Pressure Oil System for Governor/Inlet Valve	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
26	Operation Control System	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
27	Water Drainage System	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
28	Oil Treatment System	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
29	Misc items/BOPs	Prospective OEM /BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)

Sample DOW (Generator-Motor : Fix speed)				
No.	Item	Design	Manufacturing	
			Unit #	
1	Electrical and Mechanical Design	Prospective OEM (Design association with BHEL envisaged)	—	—
2	Interface inputs related to Generator-Motor	Prospective OEM		
3	Installation and assembly drawings	Prospective OEM		
4	Installation manual and Field quality plan	Prospective OEM		
5	Customer approval drawings & quality plan	Prospective OEM and BHEL		
6	Stator Frame assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
7	Stator frame and core assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
8	Stator winding bars and connectors	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
9	Stator winding assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
10	Stator air coolers	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
11	Rotor assembly including current carrying leads & slip ring	Prospective OEM	Prospective OEM	BHEL (atleast one unit)



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12	Rotor coil and pole assembly	Prospective OEM	Prospective OEM	BHEL (fabricated type) (atleast one unit)
13	Top and Bottom shafts including shaft current carrying leads.	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
14	Thrust bearing assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
15	Upper guide bearing assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
16	Lower guide bearing assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
17	Upper guide bearing coolers	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
18	Lower guide bearing coolers	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
19	Top bracket assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
20	Bottom bracket assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
21	Brush gear and DC connection	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
22	Stator Instruments	BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
23	Top bearing Instruments	BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
24	Bottom bearing instruments	BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
25	Other Instruments	BHEL	BHEL	BHEL
26	Generator-motor Auxiliaries	BHEL	BHEL	BHEL (atleast one unit)
27	Completing Items	BHEL	BHEL	BHEL (atleast one unit)
28	Erection & Lifting Tools	BSA	BHEL	BHEL (Common for all units)
29	Spare parts	Prospective OEM /BHEL	Prospective OEM /BHEL	
30	Field acceptance test	Prospective OEM	Prospective OEM	
31	EXCITATION SYSTEM	BHEL	BHEL	BHEL
32	SFC	BHEL	BHEL	BHEL
33	PROTECTION SYSTEM	BHEL	BHEL	BHEL
34	BUSDUCT , LAVT, NG CUBICLE	BHEL	BHEL	BHEL
35	CONTROL AND MONITORING SYSTEM	BHEL	BHEL	BHEL



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Sample DOW (Generator-Motor : Variable speed)				
No.	Item	Design	Manufacturing	
			Unit #	
1	Electrical and Mechanical Design	Prospective OEM (Design association with BHEL envisaged)	—	—
2	Interface inputs related to Generator-Motor	Prospective OEM		
3	Installation and assembly drawings	Prospective OEM		
4	Installation manual and Field quality plan	Prospective OEM		
5	Customer approval drawings & quality plan	Prospective OEM and BHEL		
6	Stator Frame assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
7	Stator frame and core assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
8	Stator winding bars and connectors	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
9	Stator winding assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
10	Stator air coolers	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
11	Rotor assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
12	Slip ring	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
13	Rotor winding assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
14	Top and Bottom shafts including shaft current carrying leads.	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
15	Thrust bearing assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
16	Upper guide bearing assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
17	Lower guide bearing assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
18	Upper guide bearing coolers	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
19	Lower guide bearing coolers	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
20	Top bracket assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
21	Bottom bracket assembly	Prospective OEM	Prospective OEM	BHEL (atleast one unit)



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22	Brush gear and excitation connection	Prospective OEM	Prospective OEM	BHEL (atleast one unit)
23	Stator Instruments	BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
24	Top bearing Instruments	BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
25	Bottom bearing instruments	BHEL	Prospective OEM /BHEL	BHEL (atleast one unit)
26	Other Instruments	BHEL	BHEL	BHEL
27	Generator-motor Auxiliaries	BHEL	BHEL	BHEL (atleast one unit)
28	Completing Items	BHEL	BHEL	BHEL (atleast one unit)
29	Erection & Lifting Tools	Prospective OEM	BHEL	BHEL (Common for all units)
30	Spare parts	Prospective OEM /BHEL	Prospective OEM /BHEL	
31	Field acceptance test	Prospective OEM	Prospective OEM and BHEL	
32	EXCITATION SYSTEM	Prospective OEM	Prospective OEM	Prospective OEM
33	SFC	BHEL	BHEL	BHEL
34	PROTECTION SYSTEM	BHEL	BHEL	BHEL
35	BUSDUCT , LAVT, NG CUBICLE	BHEL	BHEL	BHEL
36	CONTROL AND MONITORING SYSTEM	BHEL	BHEL	BHEL



Expression of Interest (Eoi) for Reversible Pump-Turbine
and/or Generator-Motor for Pump Storage Schemes (PSS)

Reference List: The Prospective OEM shall furnish a summary of their product reference as detailed below for major supplies in last 15 years

Annexure -2:(a)

Sl. No.	Project Name/ Location	Rated Power Output(MW)	Rated Head (turbine)(M)	Rated Head (pump)(M)	Rated Discharge (turbine)(M3/Sec)	Rated Discharge (pump)(M3/Sec)	Max Head (pump) (M)	Speed (RPM)	SFC Rating (MW)	Max Efficiency Pump/Turbine (%)	Year of Commissioning

Annexure -2: (b)

Sl No.	Project Name/ Location	Plant Rating	GEN / MOTOR KW RATING	GEN / MOTOR KV RATING	RATED SPEED / SPEED RANGE	FREQUENCY	Bearing Material	Variable speed YES / NO	SFC SUPPLIER NAME / RATING	EXCITATION SUPPLIER NAME / RATING	Year of Supply	Year of Commissioning

(SIGNATURE)



Expression of Interest (EoI) for Reversible Pump-Turbine
and/or Generator-Motor for Pump Storage Schemes (PSS)

Annexure -3

Prospective OEM's Experience in the field of Reversible Pump-turbine and Generator-Motor for PSS

Sl. No.	Requirement	Prospective Collaborator's response YES/NO and remarks if any
a)	Whether Prospective OEM has at least Fifteen (15) years of experience in Reversible Pump-Turbines and/or Generator-Motors for Pump-Storage System.	
b)	Whether the Prospective OEM is an Original Equipment Manufacturer (OEM) of the proposed Reversible Pump-Turbines and/or Generator-Motors for Pump-Storage System.	
c)	Whether the Prospective OEM meet the PQR as per clause 4: A-General Experience	
d)	Whether the Prospective OEM meet the PQR as per clause B-I (4: B-Specific Experience)	
e)	Whether the Prospective OEM meet the PQR as per clause B-II (4: B-Specific Experience)	
f)	Whether Product data sheet enclosed.	
g)	Whether information on market share enclosed.	
h)	Whether Prospective OEM's detailed reference list enclosed.	
i)	Whether Prospective OEM's annual audited financial reports including auditor's report for last 5 years enclosed.	
j)	Whether the Reversible Pump-Turbines and/or Generator-Motors for Pump-Storage System offered for BSA is the latest being marketed by the Prospective OEM.	
k)	Whether customers (end users) letters / documentary evidence for satisfactory operation of Reversible Pump-Turbines and/or Motor-Generators for Pump-Storage System, which is being offered to BHEL under this EoI enclosed.	
l)	Whether list of approvals / conformance certificates from the customer enclosed.	

(SIGNATURE)