

**REQUEST FOR EXPRESSION OF INTEREST
FOR
SELECTION OF BENEFICIARY DESIGNATED CONSUMERS
FOR
DEMONSTRATION
OF ENERGY EFFICIENCY PROJECT (DEEP)**



BUREAU OF ENERGY EFFICIENCY

Government of India, Ministry of Power

June 2022



ENERGY EFFICIENCY SERVICES LIMITED
A JV of PSUs under the Ministry of Power

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1. Project Brief

The Bureau of Energy Efficiency (BEE) is keen to implement innovative energy efficiency technologies and deploy large-scale implementation of energy efficiency measures in the PAT industries i.e., the Designated Consumers (**DCs**). Energy Efficiency Services Limited (EESL) has a vast experience in the implementation of large-scale energy-efficient projects through innovative financial models and demand aggregation. In this context, BEE has entrusted EESL with providing support to PAT industries for the demonstration of innovative energy-efficient technologies & creating an ecosystem to enable market transformation for such innovative technologies. BEE and EESL with their collaborative approach and expertise have prepared this program to implement innovative technologies and deploy a bespoke package of energy efficiency technologies in PAT industries.

The overall objective of this program is to demonstrate emerging/innovative energy-efficient technologies in the identified PAT sectors and to create a self-sustaining mechanism for their upscaling. Key activities of the project are as below

- Identification of Innovative technologies
- Selection of beneficiaries through REoIs (Request for expression of interest)
- Baseline study & DPR preparation
- Procurement, Installation & commissioning of technology
- Measurement & Verification (M&V)
- Training and capacity building

Emerging technologies, which are innovative in nature and have potential to replicate in the notified PAT industries, which has not been commercialized to the large scale and have potential for energy efficiency improvement or generation will be targeted under the scheme. JTWC has identified the following four technologies for demonstration of the project.

1. Microturbine/ Back pressure turbine (HP/MP to LP expansion)
2. VFD enabled Screw Compressor with Permanent Magnet (PM) motor
3. Turbo Blower
4. Low-Grade Waste Heat Recovery System (LGWHRS)

Through this request for expression of interest, we are getting the willingness of beneficiary units and collecting the data to assess the suitability of the technology for a demo project. Beneficiary units will be selected through this EoI on the basis of highest contribution in the terms of technology cost from the DCs as per DC selection criteria given in the Section-3. Technology briefs for demo projects are given below.

Finance for project shall be done through the grant support (partially) by BEE and upfront contribution from DC. DCs has to contribute minimum 30% of total technology cost. The DC, who will contribute more will be prefer for selection. A marking matrix will be prepared on the basis of upfront contribution of the DC towards demonstration project as per clause 3.


2. Technology Information

Technical details of approved innovative energy-efficient technologies are given below:

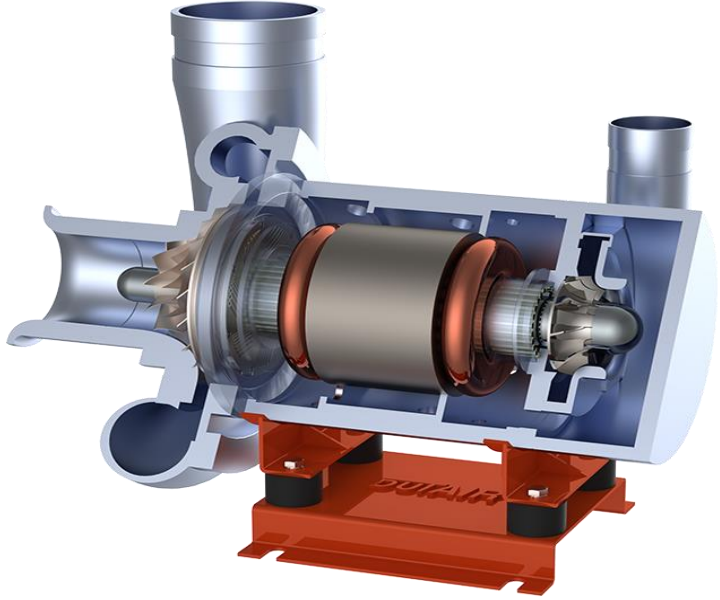
2.1 Microturbine/ Back pressure turbine (HP/MP to LP expansion)

APPLICABILITY IN SECTORS	<ul style="list-style-type: none"> • Textile • Iron & Steel • Petrochemical • Pulp & Paper • Thermal Power Plants
SUITABILITY	Process plants with PRV/PRDS
BRIEF DESCRIPTION	<p>The unutilized pressure energy in the process plant PRV / PRDS, which is otherwise simply throttled, can be conserved by installation of a micro-turbine in the steam line to generate power/captive power. In the process, the micro turbine is installed parallel to the PRV and the exit line from the turbine is connected to the process line. The micro turbine reduces the steam pressure to the required process (Back) pressure. Micro turbine converts this pressure energy to high velocity that gives an impulse to rotate the turbine wheel at a speed of 12000 RPM. This high speed is reduced through a reduction gear box to 1500/3000 RPM to generate incidental green electric power. Since the system can utilize saturated steam, it becomes highly beneficial for industries using saturated steam.</p> <div style="text-align: center;"> <p>Schematic arrangement</p> </div>
BENEFITS	<ul style="list-style-type: none"> • Captive power generation, Thermal energy savings, CO₂ reduction • System can also use saturated steam • Wasted pressure energy can be conserved and utilized to generate useful electricity

2.2 Screw Compressor with Permanent Magnet (PM) motor

APPLICABILITY IN SECTORS	<ul style="list-style-type: none"> • Aluminium • Cement • Chlor-Alkali • Fertilizers • Iron & Steel • Pulp & Paper • Textile • Thermal Power Plants
SUITABILITY	Process Plant and where old and inefficient air compressors are installed
BRIEF DESCRIPTION	<p>Screw air compressor uses two meshing helical screws, known as rotors for compressing the air. It works on the positive displacement principle, there are three stages involved in the process of air compression namely suction, compression and then ejection, the air is initially sucked from the atmosphere and then compressed and gets stored in the compressed air vessel where it gets distributed for various processes.</p> <ul style="list-style-type: none"> • Compressors driven by PM Motors do not have a rotor winding which cancels out copper and core loss, hence the efficiency is increased. The rotor is made up of a permanent magnet. • Motor is directly connected to the screw arrangement of the compressor which actually nullifies the transmission loss of a belt-driven system (3% to 5%). Such a direct drive system actually enhances the overall efficiency of the system. • 30% of the full load power is consumed when the motor starts running in no-load condition after achieving cut-off pressure. To overcome and adjust this, in-built VFD helps in varying motor rpm as per varying load conditions. <div style="text-align: center;">  </div>
BENEFITS	<ul style="list-style-type: none"> • Reduction in Specific energy consumption from the baseline • Reduction in Maintenance cost • Noise-free operation • lesser breakdowns

2.3 Turbo Blower

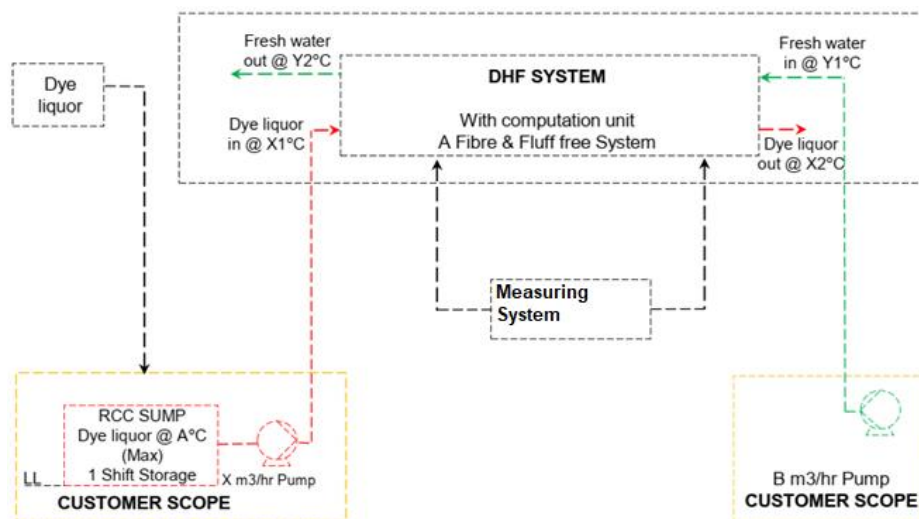
APPLICABILITY IN SECTORS	<ul style="list-style-type: none"> • Aluminium • Cement • Chlor-Alkali • Fertilizers • Iron & Steel • Pulp & Paper • Textile • Thermal Power Plants
SUITABILITY	<p>Turbo blowers are used where there is a requirement of high volume of air flow at low pressure. Turbo blowers achieve higher efficiency in air compression systems up to 1 bar.</p>
BRIEF DESCRIPTION	<p>The anodized aluminum impellers used in the Turbo blower have high corrosion resistance & when combined with air foil bearings due to their low weight, provide excellent control over varying rpm. These bearings are maintenance-free and suitable for high temperatures. Permanent Magnet motors are integrated uncompromisingly into turbo blowers. The speeds between 20,000 and 50,000 rpm provide high energy density. A small turbo compressor in the motor sucks air through the various cooling channels in the motor. A separate outlet expels the cooling air so that its residual heat can also be used in another process.</p> <div style="text-align: center;">  </div>
BENEFITS	<ul style="list-style-type: none"> • Efficiency can be up to 98% • Vibration-free • Up to 30% to 45% savings in energy consumption • Size is 1/3rd of regular blower



2.4 Low-Grade Waste Heat Recovery system

APPLICABILITY IN SECTORS	<ul style="list-style-type: none"> • Aluminium • Cement • Chlor-Alkali • Fertilizers • Iron & Steel • Pulp & Paper • Textile • Thermal Power Plants
SUITABILITY	<p>Industrial processes e.g., drying, waste heat present in the forms of vapors, fume, exhaust, wastewater, and heat; waste heat discharged from furnaces, air compressors, refrigeration systems, boilers etc.</p>
BRIEF DESCRIPTION	<p>Preheating of feed water /air/fuel (DHF-Dip Hydro Formed)-Fiber and Fluff free dye Liquor heat Recovery</p> <p>LGWH is heat below 100°C and there is no cost-effective solution commercially available and, as 63% of waste heat is at a temperature below 100°C, there is a significant untapped resource. During various industrial processes e.g., drying, heating and combustion, waste heat presents in the forms of vapor, fume, exhaust, wastewater, and heat; and is discharged from furnaces, motors, refrigeration systems, boilers etc. on without further utilization. The temperature of waste heat varies with industrial processes. Waste heat is generally distinguished as high-, medium- and low-grade heat. Compared to medium- and high-grade heat, utilizing and recovering low-grade heat is far more challenging, less feasible and not commonly applied in practice.</p> <p>Dip Hydro Formed (fiber and fluff free dye Dip Hydro Formed liquor heat recovery)</p> <p>An effluent heat recovery, which has been carefully designed catering to actual site parameters. This system effectively handles fluff-based dye liquor ensuring no choking and aptly ensures heat gain from waste energy.</p> <p>Design Parameters for Dye Liquor and Fresh water</p> <ul style="list-style-type: none"> • Flow rate in m³/hr • Inlet temperature in °C • Outlet temperature in ° C <p>These heat exchangers are specially designed for low-grade waste heat recovery</p>

and can raise the temperature of the heat sink from ambient temperature to up to 55°C, thus, reducing the heating requirement of the system.



BENEFITS

- Waste heat is recovered and can be used in the low temperature applications
- No strainer is needed for heat exchanger, choking is less frequent.
- Less cleaning times

3. Designated Consumer Selection Criteria

S. No.	Criteria	Sub Criteria	Qualifying Criteria	Weightage for selection
1.	Percentage Upfront contribution by DC	% of estimated project cost*	Min. 30%	50%
2	Overall contribution	Total contribution (In INR)	INR	50%
If the sum of score of 1 and 2 is same, following marking will adopted for the selection of beneficiary units.				
I	Specific energy saving	Cost basis (toe/Lakh Rs.)	Energy saved per INR lakh of investment	50%
II	Specific emission saving	Cost basis (tCO2/Lakh Rs.)	GHG mitigated per INR lakh of investment	50%

*Estimated project cost includes the cost of equipment and associated accessories, freight, and insurance, unloading, installation and commissioning, etc.



- Maximum number of technologies that shall be demonstrated in a single DC/group of DC be limited to maximum 2 technologies and project cost not more than INR 200 Lakhs in one single DC/group of DC.
- **The beneficiary industry will be selected through competitive bidding offer whoever get highest marking in evaluation of Expression of Interest.**

4. Objective of the REoI

Objective of REOI is to adopt a transparent mechanism for the selection of beneficiary units for demonstration. As a government organization, BEE and EESL follows norms of transparency in all its engagements.

For the finalization of REoIs EESL will adopt a cafeteria approach to assess the willingness of DCs to implement these energy-saving technologies. REoIs will also include the information to assess the capacity, saving potential, investment and payback period, organization/sectoral representation etc. Annexures are attached for technical information to evaluate the above parameters.

5. Evaluation of the REoI

Units will be selected in a transparent manner by a committee comprising members from BEE & EESL. Evaluation of REoIs will be carried out in 2 stages as detailed below.

Stage-1

Information will be collected from the designated consumers through an online webpage. PMU will compile and analyze the information to evaluate the techno-commercial feasibility of the demonstration. Techno-commercial feasibility report will be shared with DCs to move on to stage 2.

Stage-2

Cost Contribution has to be declared by each DCs based on the techno-commercial feasibility report shared. DC will be mapped in the DC selection matrix and ranking will be assessed. the selection matrix will be put up to the JTWC for approval.

If the multiple units have the same ranking for the beneficiary selection for a particular technology, priority may be accorded as mentioned above in clause 3.



6. Commercial terms

6.1 Contribution of the technology cost sharing

Contribution of the technology cost sharing by DCs **(To be filled during second stage REoI after sharing the techno commercial feasibility report)** in

- a. INR _____ (in figures)
- b. INR _____ (in words)
- c. In percentage (_____ %) of estimated technology cost

6.2 Payment milestones towards upfront contribution

Payment milestones for cost shared by DCs as agreed in clause 6.1

- a) DC has to submit advance Bank Guarantee (ABG) equivalent of 10% of estimated technology cost at the time of signing of the agreement. ABG should be valid for duration till 100% receipt of DC's cost contribution.
- b) 50% of DC's contribution within 10 days from the date of the delivery of equipment at site
- c) Balance 50% of DC's contribution within 10 days from the date of successful commissioning of equipment
- d) ABG will be returned on receipt of 100% amount of DC's cost contribution
- e) All statutory taxes/duties including GST or any indirect taxes or any duties / levies / CESS (including but not limited to labor CESS, construction CESS, workmen compensation CESS) as applicable shall be reimbursed by DC to EESL on actual basis.
- f) In case of delay in payment to EESL, a "Delayed Payment Surcharge" shall be applicable on the outstanding amount due to EESL for the period beyond the "Due Date" to the actual date of credit of such dues into EESL bank account. The Delayed Payment Surcharge shall be applicable at the rate of 2% over and above annual SBI MCLR rate on the outstanding amount due to EESL on day-to-day basis (and compounded monthly) for the duration starting from the Due Date to the actual date of receipt of payment against EESL's invoices.

6.3 In Case of Non submission of document by DC

If the selected DC is not able to submit documents along with ABG at the time of signing of agreement, offer will be given to next shortlisted DC. Contribution amount from DC shall be based on actual discovered price of the technology through competitive bidding.

6.4 Exclusion

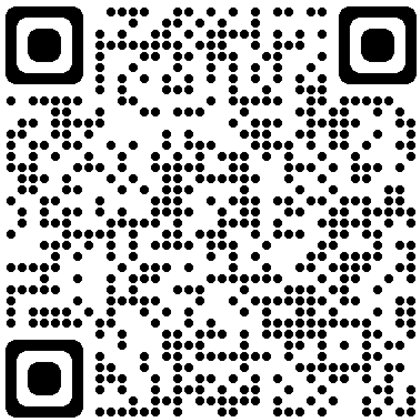
Minor works not related to energy saving and necessary for the implementation of the Energy Efficiency technology will be under the scope of DC (like civil works, integration with existing system, electrical lining / cabling, earthing, etc.)

7. REoI Format

Interested DC(s) have to fill the EOI form stage 1, Select the list of technologies you are interested to implement. Download the sample file and fill it. Convert the Excel file into PDF and upload the same and submit form. You may also send your Excel File and your Queries to deep@eesl.co.in.

You may also download technology excel sheet from the EESL website deep page link [REQUEST FOR EXPRESSION OF INTEREST FOR DEEP](#) fill it, convert to pdf and upload at the EOI form stage 1,

Scan the QR code to reach to the EESL website or click on the link [Corporate Driven – Energy Efficiency Services Limited \(eeslindia.org\)](#) to reach at DEEP page



Click on [EOI FORM-Stage 1](#) to fill and submit your EOI.

Link for downloading the technology excel sheets

Technology No 1: Micro turbine <https://eeslindia.org/wp-content/uploads/2022/06/Technology-1 -Micro-turbine.xlsx>

Technology No 2: Screw Compressor with PM motor <https://eeslindia.org/wp-content/uploads/2022/06/Technology-2- -Screw-Compressor-with-PM-motor.xlsx>

Technology No 3: Turbo Blower <https://eeslindia.org/wp-content/uploads/2022/06/Technology-3 Turbo-blower.xlsx>

Technology No 4: Low-Grade Waste Heat Recovery System <https://eeslindia.org/wp-content/uploads/2022/06/Technology-4 -Low-Grade-Waste-Heat-Recovery-System.xlsx>



Email Technology filled form at below email ID

deep@eesl.co.in

In email, the subject shall mention name of the company along with DC registration number_Tech-1/2/3/4

For any further queries, the DC may reach at email: - deep@eesl.co.in and Mr. Mangesh Potdar (Mobile no. 9650603458)

8. Important dates

- A. Downloading of EOI formats will be available – 27th June 2022
- B. Submission of EOI – From – 27th June 2022 to – 23rd July 2022
Revised Date - 27th June 2022 to 07th August 2022
- C. Technology Workshop with DCs and Industrial associations –

Location	Mode	Date
Ahmedabad	Physical	July 12, 2022
Hyderabad	online	July 15, 2022
New Delhi	Physical	July 20, 2022

- D. 2nd stage REOI Release for cost contribution – 28th July 2022 (through emails to the interested DCs)
Revised Date - 17th August 2022 (through emails to the interested DCs)
- E. Window for submission of 2nd stage REOI – 28th July 2022 to 8th August 2022
Revised Date - 17th August 2022 to 26th August 2022
- F. Approval from JTWC committee – 12th August 2022
Revised Date – 1st September 2022
- G. Signing of agreement with selected DCs – 18th August 2022 onward
Revised Date - 7th September 2022 onward