केंद्रीय विद्युत अनुसंधान संस्थान
(विद्युत मंत्रालय, भारत सरकार के अधीन स्वायत्त सोसाइटी)
Central Power Research Institute
(An Autonomous Society Under Ministry of Power, Govt.Of India)

CALL FOR PROPOSALS FOR FUNDING SUPPORT UNDER THE

"R & D SCHEMES OF MINISTRY OF POWER BEING IMPLEMENTED THROUGH CPRI"

FOR

Indigenization of the products imported for applications in Power Sector and/or developing indigenous substitutes for "Make in India"

Focussing on

the development of sustainable and cost-effective technologies and processes to address key bottlenecks in the indigenous manufacturing of identified power sector equipment/components. Additionally, exploring viable alternatives for these technologies that can be domestically developed, thereby reducing import dependency and strengthening India's self-reliance in the power sector.

Last date of submission:

31st March 2025

Central Power Research Institute
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GENERAL INFORMATION

The Ministry of Power, Govt. of India is promoting Research and Development for the Indian power sector through Central Power Research Institute (CPRI), which promotes applied research leading to technology development in the power sector.

The scheme basically aims to provide funds for carrying out need based research in power sector including solving of operational problems encountered by Indian power system. For these R&D proposal the project shall be pertinent to the electric power sector.

The proposal for the projects may be devised with the involvement of industries /manufacturers/startups or ultimate beneficiary. Organizations proposing the project should ensure that the key investigators indicated in the project proposal are available for the entire duration of the project. Project proposals are to be formulated after a thorough survey of literature in order to ensure that similar work is not undertaken elsewhere. Project should have substantial research content and element of innovation. The outcome of the project should be readily useful for the Power Sector.

The specific objectives of this R&D programme are:

- To develop and integrate technologies in identified Thrust areas
- To develop/demonstrate emerging/ advanced technologies
- To modernize traditional technologies, tools
- To facilitate enhancement of quality and performance of power systems
- To promote activities aimed at improving technology, materials, Processes and other appropriate activities as applicable to the Power sector.
- To develop/demonstrate technologies leading to import substitution

1.0 Brief Background

India's power sector is a cornerstone of the nation's economic and industrial growth. However, a significant portion of the equipment and critical components required for power generation, transmission, and distribution are currently imported, leading to high dependency on foreign supply chains. This reliance creates vulnerabilities, including cost fluctuations, supply chain disruptions, and geopolitical risks, which can impact the efficiency and expansion of the power sector.

To address these challenges, it is essential to advance indigenous manufacturing capabilities and develop viable alternatives technologies for the imported items that can be produced domestically. Strengthening the local manufacturing ecosystem will not only reduce import dependency but also enhance self-reliance, promote industrial growth, and generate employment opportunities. This requires focused research and development (R&D) to overcome technological barriers, optimize manufacturing processes, and explore innovative materials and design alternatives.

2.0 Objectives of Call

This call for research proposals seeks to identify key technological challenges in manufacturing of the identified products domestically, develop cost-effective and sustainable solutions, and foster innovation in design, production techniques, and material efficiency. The objective is to build a robust and globally competitive ecosystem for power sector equipment manufacturing, ensuring long-term resilience, energy security, and economic sustainability. Researchers, industry experts, and academic institutions are encouraged to contribute to this initiative, driving India toward a self-sufficient and technologically advanced power sector.

To achieve this, the Principal Investigator may collaborate and lead a multidisciplinary research team that fosters interdisciplinary, multi-institutional collaboration, leveraging the expertise of various partners to develop efficient, high-impact technologies aligned with national priorities. The initiative encourages strong industry-academia-research institution partnerships, ensuring that industrial collaborators are engaged from an early stage to facilitate technology transfer, commercialization, and long-term industry linkages. Projects under this call should focus on scalable and transformative solutions, with outcomes capable of driving significant advancements in indigenous manufacturing of power sector equipment/components.

3.0 CALL STREAMS

The proposals are invited under the following thrust areas of research. The Principal Investigator can apply in any one of these streams where he/she is best suited to deliver the outcome to the power sector in the country. The topics indicated in call are only illustrative and any other topic addressing call spirit may be considered. The PI is expected to identify the technology gap for indigenous manufacturing of the products for the following identified areas and propose a suitable research project for coming up with an indigenous solution for the same. The following are the Thrust areas identified in the present call where the products are currently reliant on imports and indigenous development of their alternatives is necessary:

1. Transformer Technology & Insulation Materials

- Development of Technology for 765 kV Resin Impregnated Paper (RIP)/Rasin Impregnated Synthetic (RIS)/Oil Impregnated Paper (OIP) Bushing for transformers.
- Development of technology for core of RIP/RIS bushings for all voltage levels.
- Insulation Paper/ Board for transformer.
- Development of Silicone rubber for Insulators used in Power lines and transformers.
- Development of base stock Oil for Transformer ~~(as we have import dependence for base oil)~~.
- Biodegradable oil (like Ester) filled transformer and reactor.
- Disposal/ recycling of transformer oil after useful life of transformers.

2. High Voltage & Power Transmission Systems

- Development of 765 KV; 63 kA breakers.
- Development of 1200 kV Power Transmission System and its equipment.
- AC Optical Voltage Transformers.
- Flexible Alternating Current Transmission System (FACTS) devices - Static Synchronous Compensator (STATCOM), Synchronous Condenser, Static VAR compensator.
- High Voltage Direct Current (HVDC) – Insulated-gate Bipolar Transistor (IGBT), Thyristor, etc. Insulated Gate Bipolar Transistor (IGBT) based module for Voltage Source Converter (VSC) HVDC technology, power flow controlling devices (like UPFC) and dynamic reactive compensation devices (like STATCOM).
- HVDC convertor for high altitude (4800m), low ambient temperature (-35ºC), impacted by cosmic / UV rays as well as having interaction of multiple inverters of Solar/Wind/Battery storage system.
- Smoothing reactor.

3. Smart Grid & SCADA Systems

- Smart Grid (SG)/ Advance Metering Infrastructure (AMI) - Technology for domestic manufacturing of latching relay, Battery, Liquid-crystal display (LCD), printed circuit board (PCB), Modem, Antenna, and Polycarbonate for the Smart Meters.

- Remote terminal units (RTUs) - Technology for domestic manufacturing of Relays, PCB, Controllers, and Integrated Chips (ICs).
- Software and hardware for Supervisory Control And Data Acquisition (SCADA).

- Phasor Measurement Unit (PMU).
- Synchronous Condensers.

4. Renewable Energy & Energy Storage

- Development of Software based Algorithm and its subsequent deployment on a Website, which can determine the techno-economical feasibility of deployment of BESS at Generation, Transmission or Distribution end.
- Inverters/Grid Tied Inverters used in Renewable Energy.
- Design and development of 5 MW grid-tied inverter for utility-scale solar and wind energy systems.
- Charging Infrastructure for Electric Vehicles (EVs) and their interoperability.
- Technology for Recycling of Solar Panels.

5. Gas Insulated Systems & Alternatives to SF_6

- Gases as alternatives/substitutes for SF_6 gas used in GIS/Sub-stations.
- Re-conditioning of used SF_6 Gas.
- Gas Insulated Switchgear (GIS)/ Gas insulated Sub-station.

6. Power Cables & Transmission Lines

- Development of XLPE Compound or alternatives for Power Cables.
- Development of subsea cables.
- Development of Robotics technology for inspection, monitoring and maintenance of Transmission Lines.

7. Hydro Power Technologies

- Indigenous development of variable speed turbine and drives (DFIM/Cyclo-converter) for Pumped Storage Projects.
- Development of compact generators and generator transformers for the existing capacities as there is always space constraints in underground powerhouse.

8. Power Generation Plants / Technologies

- Generator Circuit Breaker (GCB).
- Terminal Bushings for Turbo-Generators (27.8 kV, 21 kA)
- Blending of Green Ammonia/ Green Hydrogen in coal based thermal power plants
- Monitoring and Control Equipment for Thermal Power Generation
    - C276-Solid/clad plate for absorber & Outlet duct lining
    - Titanium clad plates for outlet duct lining
    - Borosilicate for chimney lining
    - Gypsum de-watering system

- Agitators for absorber & tanks
- Air Cooled Condenser

4.0 CALL DATES

OPENING DATE: **21st February 2025**

CALL CLOSING DATE: **31st March 2025**

5.0 PROJECT FORMULATION GUIDELINES

5.1 GENERAL

The proposals should clearly define the objectives and list the deliverables. For system / component / consumables related proposals, the deliverable should include a target performance and establish it in the proposal. How proposed process/ product/system stands in comparison to comparable national and international ones in terms of performance and projected cost. The proposal should clearly define the present challenge for indigenization of the technology and how the present solution will aid to the same. The CV of the project investigators should be brief and highlight their competence and experience related to the proposed project area. Consortia may be formed wherever required by clearly explaining the need for forming the consortia and the roles and responsibilities of each partner. The Industry partner (if present) should have proven standing and R&D capability in the area related to the call and should exhibit the potential to commercialize/ scale up the products / systems developed under the proposal. The extent of participation and contribution of the industry partner should be clearly defined. Participating Industry would be required to invest within its own system i.e. production/ test lines and/or develop required infrastructure to adopt research leads and is expected to bring design and engineering capability for the benefit of the project. The industry should not include their salary of the permanent employees in the project.

5.2 COMPONENTS OF FINANCIAL OUTLAY OF THE PROJECT

The expenditure pertaining to the project proposal such as Equipment, Instruments, Travel, Consultancy, Hiring charges for temporary research staff, overheads and miscellaneous & incidentals can be built into the cost of the project. Generally, overhead charges @10% is allowed to be built into the cost of the project. Projects with the objective of only carrying out only simulation studies and purchase of expensive software packages is not encouraged under this scheme.

While preparing the budgetary estimates for the research proposal, the PI shall have to adhere to the Guidelines for cost estimates (enclosed) indicated at point 10 of the Format for the Proposals by the PI.

Inclusion of salary component of permanent research staff is not encouraged. However cost towards hiring temporary research staff for the duration of the project is acceptable.

5.3 EXPERT REVIEW

The proposals as and when received by CPRI are sent to external domain experts from various eminent Institutions and put up for techno-economic evaluation by a Technical Committee appointed by Director General, CPRI. Presently there are four technical committees pertaining to a specific domain viz. 1) Transmission 2) Generation-Thermal 3) Generation-Hydro 4) Grid, Distribution, and Energy Conservation.

In respect of the budget estimates, the Expert shall be also guided by the Guidelines for preparation of the cost estimates.

5.4 TECHNO-ECONOMIC EVALUATION

The project proposals reviewed by experts will be evaluated by Technical Committee which is chaired by Professors from IITs and has participation from Utilities and Industry. The principal investigators will be normally required to defend their project at the Technical Committee meetings. The Committee while undertaking techno-economical evaluation specifically examines aspects of deliverables of the project and their impact on the Utility/Power Sector at large before recommending the proposal to the Competent Authority for approval.

While evaluating the proposals, the Technical Committees shall also be guided by the Guidelines for preparation of the cost estimates.

5.5 PROJECT APPROVAL AND COMMENCEMENT:

Proposals recommended by Technical Committee after Techno-Economic evaluations are put up to the Competent Authority for according approval. Director General of CPRI is the approving authority for proposals having outlay upto 50 lakhs. Other projects are vetted by the Standing Committee on R&D (SCRD) chaired by Chairperson, CEA. The SCRD after thorough evaluation of the merit of the proposal grants approval for the project.

Once approved, the formal sanction and release of grant will be sought from the Ministry of Power. Communication of the approval and release of first installment of the grant will immediately be done after signing of MoU between CPRI and Project Implementing Organization.

5.6 QUARTERLY PROGRESS REPORTS (QPR):

It is the responsibility of Principal Investigator to furnish the progress (Technical and Financial) of the project for each quarter within a month after completion of the quarter. For the purpose of furnishing quarterly reports, the 1st quarter starts in April of every financial year. The QPRs are to be furnished in the prescribed formats for reporting technical & financial progress respectively.

5.7 FUND UTILIZATION CERTIFICATE (UC):

Principal Investigator shall submit the Fund Utilization Certificate for the released amount immediately after exhaustion of funds. Satisfactory technical progress and submission of progress reports and utilization Certificates as per the specified format are pre-requisites for release of further tranche for the project.

5.8 PROJECT MONITORING:

The R&D Management department monitors the projects by analysing the data submitted through QPR and UC. Progress of the projects is reviewed by the Technical Committee at Bengaluru or in some cases at respective investigating organizations.

5.9 PROJECT COMPLETION & TECHNICAL REPORT:

The investigating agency shall make a presentation to the Technical Committee once the project is completed. Prior to this, CPRI will scrutinize & analyze the final results of the project and give a report to the Technical Committee.

The Technical Committee finally declares that the project is completed with the deliverables as stipulated in the original project proposal.

5.10 DISSEMINATION:

The information on technologies / products developed as part of research scheme is currently available on CPRI website. The Project Investigators are encouraged to conduct workshops and seminars for dissemination of the knowledge.

5.11 WHO CAN SUBMIT THE PROPOSAL?

- Power Utilities
- Academic Institutes
- R&D Institutes
- Manufacturers (50% contribution is mandatory)

Collaborative proposals are also encouraged under this scheme.

5.12 WHEN AND HOW TO SUBMIT A PROPOSAL?

1. Research proposals can be sent within the specified timeline to CPRI.
2. The formats for submission of proposal and other details are available on the CPRI Web site under the respective call for proposal or can be obtained by writing to Head, R&D Management Division. The format for submission of the proposal is also enclosed as **Annexure I.**
3. Proposals prepared in the format should be submitted through the head of the respective institution to Head, R&D Management Division CPRI. Proposals in the prescribed format (available in the CPRI website) may be sent to the following address:

Additional Director & HoD
R&D Management Division
Central Power Research Institute,
Prof. Sir.C.V.Raman Road,
Sadashivanagar P.B.No.8066,
Bangalore -560 080

4. The Principal Investigator is normally required to make presentation on the proposal to the Technical Committee.
5. Technical Committee meets only 2-3 times in a year for techno-economic evaluation and recommendation of projects to the Competent Authority for according approval.
6. Recommendations of the Technical Committee will be communicated to the Principal Investigator through e-mail.