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Government of India/ Bharat Sarkar
Ministry of Power/ Vidyut Mantralaya
(T&R Section)

2nd Floor, F-Wing, Nirman Bhawan,
New Delhi, Dated the 07th June, 2023

OFFICE MEMORANDUM

Subject: Mission on Advanced and High-Impact Research (MAHIR) on the latest and emerging technologies in energy sector– reg.

Advanced and high-impact research on the latest and emerging technologies related to energy sector are an immediate necessity. In order to stay ahead in the rapidly advancing world of innovation, it is crucial to quickly identify emerging technologies and develop the technologies indigenously, at scale, for deployment within and outside India. Such technologies will serve as the main fuel for the economic growth in future and make India a manufacturing hub of the World. Accordingly, Ministry of Power & Ministry of New and Renewable Energy have planned for end-to-end development of advanced technologies to make the future power system in India robust and advanced so that India takes the lead in the disruptive technologies in the Power Sector, as to ensure self-reliance in meeting our energy needs with wide societal and commercial benefits.

2.1 In order to address the immediate necessity, Ministry of Power and Ministry of New and Renewable Energy have decided to jointly set up a National Mission on advance and high-impact research (MAHIR) on the latest and emerging technologies in energy sector initially for a period of five (5) years from 2023-24 to 2027-28.

2.2 **Objectives of the Mission** - The objectives of the Mission are as under:

- To identify emerging technologies/areas of future relevance for the energy Sector and take up indigenous end-to-end development of the relevant technologies.
- To seed, nurture and scale up scientific, industrial R&D and to create vibrant & innovative ecosystem in the energy Sector of the country.
- To provide a common platform for energy Sector Stakeholders for collective brainstorming, synergistic technology development and devising pathways for smooth transfer of technology.
- To indigenize, develop and demonstrate world-class advanced/disruptive technologies for the energy Sector in a time bound and collaborative manner.

- To support pilot projects of indigenous technologies developed (especially by Indian Start-ups) and also facilitate their commercialization.
- To engineer, industrialize, nurture the high impact technologies so as to create competitive advantage in the global market and make India the manufacturing hub for the technologies facilitating technology led economic growth.
- Leveraging foreign alliances and partnerships to accelerate research & development of advanced technologies. Building competencies-capabilities-access to advanced technologies through bilateral or multilateral collaborations facilitating exchange of knowhow and Technology Transfer.
- To make our Nation among the leading Countries in Power System related energy Technologies & Applications development.

3. Mission structure

3.1 The Mission will follow the technology life cycle approach, i.e. Idea to Product. The Mission will have a two tier structure. The first tier will be an Apex Committee and the second tier will be a separate Technical Scoping Committee. The composition of both the Committees shall be as mentioned in para 3.2 and para 3.4 below, however, both the can also co-opt the Members as per requirements.

3.2 The composition of the **Apex Committee** will be as under:

1	Hon'ble Minister for Power and New & Renewable Energy	Chairman
2	Secretary, MoP	Member
3	Secretary, MNRE	Member
4	Secretary, D/o Science and Technology	Member
5.	Principal Scientific Adviser or his representative	Member
6	Chairperson, CEA	Member
7	Representative of NITI Aayog	Member
8	Joint Secretary/Economic Adviser (T&R), MoP	Member
9	CMDs of NTPC / PGCIL / PFC / REC / NHPC / NEEPCO / THDC / SJVNL / GCIL / IREDA, MD, SECI, Chairpersons BBMB / DVC and DGs of NPTI / BEE / NISE / NIWE / NIBE	Member
10	Directors of IITs, Delhi / Bombay / Chennai / Kanpur	Member(s)
11	Director General, CSIR	Member
12	Director General, CPRI	Member Convener

3.3 The Apex Committee shall approve the research proposals and monitor the progress of research. The technology / product to be developed under the Mission will be deliberated

by the Apex Committee. The final approval of all the research proposals / projects shall be given by the Apex Committee. If the TSC recommends for international collaboration for the development of technology, the same shall also be taken up by the Apex Committee for discussion with the collaborating country. Approval of any collaboration, the technology to be developed and agreement to be entered into with the collaborative country will be decided by the Apex Committee.

3.4 The composition of the **Technical Scoping Committee** will be as under:

1	Chairperson, CEA	Chairman
2	Joint Secretary/Economic Adviser (T&R), MoP	Member
3	Representative of MNRE (Minimum at JS level – to be nominated by Secretary, MNRE)	Member
4	Five Scientists /Experts – to be nominated by Ministry of Power	Member
5	Five Scientists / Experts – to be nominated by MNRE	Member
6	Director General, CPRI	Member convener

3.5 The Technical Scoping Committee (TSC) shall survey and identify the on-going and emerging areas of research globally and will make recommendations to the Apex Committee. The TSC shall identify the potential technologies that can be considered for development under the Mission. The TSC will bring out the relevance of the technology for the future Power Sector and justify the Techno-economic advantage of indigenous development of the Technology and a roadmap for market creation for the Technology. The TSC shall also provide a broad range of specifications desired from the final product. Periodic monitoring of the approved research projects will also be carried out by the TSC.

4. **Scope of the Mission**

4.1 Under the Mission, once research areas are identified and approved by the Apex Committee, the proposals for outcome linked funding will be invited from companies/organizations across the globe. The selection of the proposal shall be done through Quality cum Cost-Based Selection (QCBS) basis. The organizations of the Ministries may also co-develop the technologies with the selected Research Agency. The IPR of the technology developed would be shared with the Government of India and the Research Agency.

4.2 The Mission shall also fund pilot projects of technologies developed by Indian Start-ups and also facilitate its commercialization through the CPSEs under both the Ministries. The start-ups will have to share the IPR with the Government of India/ CPRI.

4.3 The Mission will also facilitate international collaboration for smooth exchange of know-how and Technology Transfer. The Mission will also seek collaboration with the best laboratories of the world for joint development of technologies.

5. Key modalities of the Mission

5.1 After approval of the Apex Committee, the Technology will be taken up for further processing, viz. preparation of the final specifications of technology development, preparation of RFPs. The RFPs will outline the expectations and the terms of reference. The proposals will be invited from companies/educational institutes/ reputed Universities/ research laboratories/ research organisations/ Industries/ Start-ups/ other reputed agencies across the globe. The research project/proposal shall cover the scheme, methodology and second level of bar-chart of the project execution. The selection of proposals shall be done through Quality cum Cost-Based Selection (QCBS) basis or as decided by the Apex Committee. The major participants for submission of research proposals are expected to be Research Organizations, Industry, Start-ups, Utilities and Academia. The initial scrutiny of the proposals will be carried out by the Mission Secretariat and subsequently screened by the Technical Scoping Committee. Based on the recommendation of the TSC, projects will be placed before the Apex Committee for final consideration.

5.2 The modalities for implementation of the research project including key milestones with time-frame and proportionate financial expenditure will be defined in an Agreement with the Project Implementing Organization(s). Projects will be executed by the project implementing organizations in their respective project locations or as desired by the Apex Committee. The funds will be released in installments based on the pre-defined milestones in the agreement, detailed schedule for funds requirement provided by the Project Implementing Agency and the progress report submitted by the Project Investigator clearly mentioning the physical and financial progress of the research.

5.3 For effective implementation of the Mission, cloud based technology platform will be sourced from Govt/Govt empaneled cloud service providers. This will have both computational and storage facility, accessible to all Mission activities/projects. A centralized Web Portal for Mission will be created on the cloud which will provide collective information of running status of all the activities under the Mission. Such portal will be a dynamic repository of information on all activities/components, resources and outputs, associated with the Mission. This will be maintained and continuously updated for monitoring the progress of the Mission by the Mission Secretariat. The expenditure to set up and maintain the Web portal will be funded by the Mission.

6. **Funding:** The research projects approved by the Apex Committee as well as all expenditure in respect of effective implementation of the Mission shall be funded by the Mission for which financial resources of both Ministry of Power and MNRE and their CPSEs shall be pooled. Any funding component from GoI budgetary resources shall be in accordance with relevant approved scheme and with laid down competent level approval. The tentative cost of the Mission shall be derived by the Mission Secretariat and shall be divided year wise for the duration of the mission. The funding contributions to the Mission from the stakeholders viz. CPSEs under MoP and MNRE will be decided by the Apex Committee and

accordingly, the funds will be disbursed on approval of Mission Secretariat based on achievement of approved milestone.

7. **Areas Identified For Research:** To begin with, the following eight areas are identified for research:

- (i) Alternatives to Lithium-Ion storage batteries
- (ii) Modifying electric cookers/ pans to suit Indian cooking methods.
- (iii) Green hydrogen for mobility (High Efficiency Fuel Cell)
- (iv) Carbon capture
- (iv) Geo-thermal energy
- (v) Solid state refrigeration.
- (vi) Nano technology for EV battery
- (vii) Indigenous CRGO technology


8. **Secretariat**

The Secretariat for the Mission will be at Central Power Research Institute (CPRI), Bengaluru. CPRI will provide all necessary secretarial assistance to Apex Committee and Technical Scoping Committee. CPRI will assist the Mission in all activities like organising meetings of the Apex Committee and Technical Scoping Committee, preparation of guidelines, release of RFP, selection of Implementing Institutes, signing of MoUs / Agreements on behalf of Mission, award of research projects, preparation of budget, management of funds of the Mission, release of funds for the research projects, monitoring the progress of research projects etc. CPRI will ensure effective execution of the Mission.

9. **Evaluation**

Evaluation of the mission will be taken up through a credible Third Party at the end of the initial period of the Mission.

10. This issues with the approval of Hon'ble Minister for Power & New and Renewable Energy.


(Arun Kumar Garg)
Director
Tel: 23063497

To

1. Secretary, MNRE
2. Secretary, DST
3. Chairperson, CEA
4. Heads of all Organisations under MoP and MNRE
5. Directors of IITs, Delhi /Bombay /Chennai /Kanpur /Kharagpur /Guwahati /Roorkee
6. DG, CSIR
7. CEO, NITI Aayog

Copy for information to:

1. PS to Hon'ble Minister for Power and New & Renewable Energy
2. APS to Hon'ble Minister of State for Power and Heavy Industries
3. PS to Hon'ble Minister of State for New and Renewable Energy and Chemicals & Fertiliser
4. PS to Secretary (Power)
5. PSO to SS&FA / Sr.PPS to AS(AT)
6. All Joint Secretaries / Economic Adviser / Chief Engineer, MoP
7. All Directors / Deputy Secretaries / Under Secretaries / Sections / Desks, MoP
