

MI – INDIA

Funding Opportunity Announcement (FOA): Smart Grids

Call for Notification of Intent

(Code: MI-India/IC#1/DST/2017)

June 2017

1. PREAMBLE

There is a worldwide focus on deploying large amount of renewable energy sources, such as wind, solar and biomass, to achieve sustainable growth of electricity sector. The main limitation of renewable sources is their intermittent nature of supply i.e. the energy can only be harness during a particular part of the day, like daytime for solar energy and windy conditions for harnessing wind energy, also these conditions cannot be controlled. With such unpredictable energy sources, it is necessary to have a grid that is highly adaptive (in terms of supply and demand). Hence, the opportunities for building Smart Grids are immense, as reliable electric supply is one of the key infrastructure requirements to support overall development. In order to maximize the amount of energy use from renewable energy, the power grid that today relies pre-dominantly on coal and gas power plants, is transitioning to a future grid that can be largely powered by decentralized renewable energy sources, and which can dynamically adjust supply and demand in order to handle the intermittency of solar and wind power. Innovation in smart grid and storage technologies and the development of community or city scale grids powered largely or solely by renewables that can operate in parallel with, or independently from, the main grid will help accelerate these developments.

2. OBJECTIVES:

The objective of this Call is to undertake Research & Development in the field of Smart Grids to innovate on components /systems / sub-systems / technologies required to address the challenges related to the design, development, integration, operation, management, and optimization of the grids in a way that can allow the use of up to 100% renewable energy.

3. PURPOSE:

The purpose of developing Smart Grids is to seamlessly transition from the existing centralized power network powered with fossil fuels to generation systems powered with renewable energy. Also, conduct research, development and demonstration to foster technology innovations that are technically feasible, robust and cost-effective to facilitate greater share of renewable energy in overall energy mix, and develop research pathways to allow 100% renewable powered grid eventually. It is expected to evolve technologies and develop methodologies and business models tunable to local as well as at global needs.

4. SCOPE:

The funding opportunity will financially support activities towards design, research & development and demonstrations that can address the issue of integration and interoperability of existing centralized power networks (without disturbing the existing power network) with renewable energy based power plants in the short run and also develop R&D pathways for 100% renewable powered grid.

5. IDENTIFIED RESEARCH PRIORITIES:

An indicative list of R&D priority areas identified for the systems / sub-systems / technologies / solutions development under various smart grid theme areas and their relevance at Regional (R), Distribution (D), Micro-grid (M), Cross- Innovation(C) levels are listed below:

A. Operation, Control & Protection

- Operation and control of large, medium and small scale renewable energy sources (R,D,M)
- Protection technologies for AC and DC smart grids (R,D,M)
- Wide area monitoring, protection and control (WAMPC) (R,D,C)
- Energy management techniques(R,D,M)
- Supervisory control of network with multiple micro and nanogrids(R,D,M,C)
- Network analysis and optimal power flow(R,D)
- Modeling and simulation of large power grids (including cyber systems)(R,D,C)
- Seamless Grid operation involving TSO and DSO (R,D,M,C)
- Forecasting of renewable and loads (R,D,M,C)

- RES Generation & storage to address system adequacy & security (D,M,C)

B. ICT & Cyber security

- Reliable wired and wireless communication technologies(R,D,M,C)
- Interoperability and ICT architecture (R,D,M,C)
- Audit and validation tools for cyber security features (D,M)
- HAN, WAN, and Internet of things(R,D,C)
- Threat models and Cyber security (R,D,M,C)
- Information privacy and handling challenges(R,D,M,C)
- Cloud Computing, data storage and big data analytics(R,D,M,C).

C. Devices and Technology (converters)

- Fault ride through enhancement of converter interfaced to renewable energy sources (R, M,C)
- Grid interfacing and islanding issues along with seamless transfer technology(D,M,C)
- Ancillary services of converters (R,D,M,C)
- Optimal design of flexible power converters (D,M,C)
- Coordination and control of multiple converters and modular multi-level converters(R,M,C)
- Converter technologies for HVDC and MVDC systems(R,D,C)
- Multi-functional hardware smart grid enablers (D,M,C)
- Smart and unified control of converters (M,C)
- Hot swappable converters for smart grids (R,D,M)
- Standardization of voltage and power levels (R,D,M,C)
- Network voltage regulation and power quality (R,D,M,C)
- Wide band gap devices (GaN, SIC) (R,D,M,C)
- AC and DC technology (R,D,M,C)

D. Distributed Energy Resources, Storage and Deployment Issues

- Policy, regulatory and market design issues (R,D).
- Demand Response and Demand side management with optimization and forecasting techniques for storage and renewable energy source (RES)(R,D,M,C)
- Inertial issues of renewable energy resources with stochastic behavior(R,D,M)

- Optimal mix, siting and sizing of energy storages at various levels of network(R,D, M)

6. ELIGIBILITY:

The proposals have to be led by qualified researchers/ professionals from Science, Technology and Engineering disciplines working in regular position at Indian institutions drawn from Academia and public funded R&D Laboratories. The institutions/industries of Mission Innovation (MI) member countries are welcome to join the partnership with the lead Indian institute / organization to carry out collaborative work. While there is no restriction on upper number of participating MI countries (including European Union), participation of at least one organization (institution/industry/utility) from MI country is mandatory. The participating organizations from MI countries have to be legal entity as per their countrys' statute.

7. FUNDING:

Total size:	US \$ 5 millions
Floor limit:	US \$ 0.2 million
Ceiling limit:	US \$ 1 million
Expected Number of Awards:	10

8. COMPONENTS OF FUNDING

- Research manpower especially hired for the project in India (Existing research manpower will not be eligible for funding).
- Travel (Domestic and international)
- Dissemination activities and stakeholder workshops
- Contingent expenditure such as stationery, incidentals etc.
- Consumables and spares needed for project implementation
- Minor Equipment (not exceeding 10 % of project cost)
- Field/Pilot demonstration in India (upto 50 % of project cost, if proposed).

9. EVALUATION CRITERIA

The integrated proposals can address one or more research challenges right from applied R&D to development and demonstration at lab / field level, wherever feasible. Standalone proposal focusing on pressing challenges/issues with clear path to bring about out affordability, robustness and accessibility are welcome. Besides, fulfillment of minimum eligibility, the following criteria will be used in grant making decisions:

- i) Relevance to objectives MI Innovation Challenge # 1(mission-innovation.net)
- ii) R&D led breakthroughs for smart grids.
- iii) Technical Innovation on improving the viability of smart grid.
- iv) Addressing critical R&D issues requiring early stage grant funding that will allow for the development and testing of innovative technological solutions.
- v) Potential for accelerating the commercialization of innovative Smart Grid solutions.
- vi) Contribution of proposed work to enhance cost effectiveness and robustness of Smart grid applications.

10. PROCESS

The evaluation process will be conducted in two stages:

- Stage-I: All interested applicants are invited to submit a Notification of Intent (NoI) in Consortium mode.
- Stage-II: From these initial submissions, Evaluation Committee (EC)will shortlist the eligible applicants through peer review process.

Applicants found eligible at Stage-I evaluation will be requested to submit detailed proposals for participation in Stage-II. The EC will also provide detailed guidelines for submission of proposal to prospective applicants.

11. TIMELINES

- | | |
|---|----------------------------------|
| • Call for Notification of Intent (NoI) | 6 th June, 2017 |
| • Last date of submission of NoIs Form | 30 th September, 2017 |
| • Invitation for submission of detailed proposals | 31 st December, 2017 |
| • Receipt of detailed proposals | 31 st January, 2017 |
| • Evaluation of proposals and due-diligence | 31 st March, 2018 |
| • Announcement of awards | MI-3 |

12. GENERAL GUIDANCE ON PROPOSAL FORMULATION

The below guidance is not exhaustive, but is designed to help interested organizations to develop proposals.

- Proposed projects should necessary be based on clean energy and should be truly innovative and transformational. Proposals should make clear how they are adding value and not duplicating an existing solution; multiple forms of innovation are eligible and will be considered. Proposals should also clearly illustrate how the work proposes to overcome technical barriers of interoperability, integration of existing centralized power network with renewable energy based power plants and standalone functioning of renewable grids.
- Proposed projects should be for applied research, establish proof-of-concept in the early stages of development, defined broadly as the critical transition phase of idea/ concept to development into a viable proposition and demonstration to establish viability of proposition, thus making support from this grant would be most impactful.
- Proposals envisaging development and demonstration of integrated solution need to demonstrate how they would be replicated and scaled up to have wider impact, if successful. Such proposals should also demonstrate that they have considered the long-term sustainability of their proposed intervention. Similarly, R&D proposals aimed at developing components/sub-system need to highlight how the development would be commercialized cost effectively.
- The maximum duration of the project should not be more than 36 months. Each project is subject to review at key milestones to continue funding.
- The project administrative costs should be kept to a minimum. The permanent equipment maximum upto 10 % of the cost of project may be provided to the organization to develop the solution. The cost of system deployed in the field shall be indicated separately as the cost of Field Model in financial requirement, if any.

- In case, the partner is an institute/organization in MI member countries, a supporting document from them is needed regarding their support to the project. The participating MI entity(ies) needed to provide supporting document from relevant authority in the country justifying its legal status as per country's statute.
- The grant places strong emphasis on evidence-based results. Proposals must clearly define the indicators of success in the application form to show quantified tangible gain during the project lifecycle.
- The grant also places a strong emphasis on sharing the results more widely. Project implementing organizations will be required to maintain a website of the project and submit progress reports on regular intervals or on the achievement of key milestones for the duration of the project, and submit a project completion report within three months of the project conclusion along with the audited fund utilization certificate. The grantee institution(s) have to comply with the Open Access Policy of DST (www.dst.gov.in).

12. SUBMISSION GUIDELINES

- Please submit documents in an Envelope marked: **MI / IC#1 / : Name of Principal Investigator**:
- 4 copies of complete NoI in prescribed format with enclosures (1 marked original + 2 hard copies) and 1 Soft copy in CD.
- The complete set of documents are to be addressed to: Dr. J.B.V.Reddy, Scientist 'D', Room no.20, Hall-C, S&T Block II, Technology Mission Division, Department of Science & Technology (DST), Technology Bhavan, New Mehrauli Road, New Delhi-110016 and should reach latest **by 31stAugust,2017**. Soft copy of NoI (MS word) is also to be e-mailed (**Email Subject:MI-IC#1 : Name of Principal Investigator/ Name of Institute**) to jbvreddy@nic.in.

Notification of Intent Form

All applicants MUST use this form to apply

Instructions

1. Please review the Call for NoI carefully before completing this form.
2. Do not exceed the word limit where specified.
3. Use 11 point Arial font to fill the information.
4. All questions should be answered clearly. Incomplete applications will be disqualified.
5. Submit the completed NoI to DST.
6. By submitting this NoI, you are certifying that the answers to the questions are accurate to the full extent of your knowledge.
7. Enclosure (letter of intent from partners / beneficiary)

Section A: General Information

Ref Number (do not fill this field)	
Project Title	
Project Type <i>Research/Design & Demonstration of innovative Smart grid/ Deployment / Delivery of Technology or product development/ energy services / Other</i>	
Project Location/s <i>(District/State)(Must be in India)</i>	
Stage of development <i>(initial concept/ proof of concept/ lab scale / demonstration/scale-up)</i>	

(I) Total Funding Request (INR)	
Lead Implementing Organization and its Status (Must be an Indian organisation)	
Partnering Organizations In MI Countries	
In INDIA	
(II) Contribution in Cash /kind from lead/partnering institutions, if any	
Total cost (I + II) =	

Section B: Project Information

Project Description (<i>max 500 words</i>)	
Expected Outcomes (<i>max 200 words</i>) <i>Describe the short and long-term outcomes and impacts of the project</i>	

Expected duration of project activities	<p style="text-align: center;"><i>Years Months</i></p>
The novelty and relationship to the context of MI # 1 <i>(max 250 words)</i>	
Results Indicators <i>List specific results and indicators you will use to measure success of this project towards achievement of impacts and outcomes. Examples are given here: you may develop additional indicators as needed that best reflect project goals and performance. Contribution to Cost effectiveness and access are of paramount importance</i>	<ul style="list-style-type: none"> • <i>What percent integration of renewable with the existing power grids can be achieved?</i> • <i>Increase in proliferation with development of Standards and best practices</i> • <i>Interoperability with existing fossil fuel based power systems</i>
Monitoring and Evaluation approach <i>(max 150 words)</i>	
Project sustainability and long-term viability <i>What steps shall be taken to make the project scalable and sustainable in the long-term? (max 200 words)</i>	

Project Risks (<i>maximum 200 words</i>) <i>What are the main risks and challenges in the execution of the project (technical risks, market risks, regulatory risks, financial risks, business model risks, etc.)?</i>	
How complete and realistic are the impacts identified for this work <i>(max 150 words)</i>	

Section C: Financial requirement (all figure must be INR in lakhs)

Examples of budget heads are given here; you may develop additional budget head as needed that best reflect the proposed activity

S. No	Item Head	1 st Year	2 nd Year	Total (Rs.in lakh)
1	Permanent Equipment <i>(located in lab/ implementing organization)</i>			
2.	Fabricated systems/ Plant /demonstration models			
A'	<i>Subtotal (capital items)</i>			
1.	Manpower			
2.	Consumables			
3.	Contingencies			
4.	Domestic Travel			
5.	International travel to participate MI countries.			

6.	Other Cost ,if any			
7.	Overhead			
B'	Subtotal (General)			
C	Total cost of the project (A'+B')			

I. DST Contribution to Project costs:

II. Contribution of consortium (if any):

Total Budget (I +II) :Rs. _____ Lakhs

Total Budget (INR)	
Budget Details <i>Describe specific activities if any to be supported under this grant, by collaborator share</i>	
<i>Has the applicant received Government of India funding in the past for this or a similar project? (if yes please specify the name of supporting organization, amount and year)</i>	Yes/No
<i>Other sources of funding for the project, if applicable</i>	

Section D: Applicant Details

Name of the Lead Organization	
Address <i>Please include phone numbers, fax, emails and website</i>	

<p>Applicant Type</p> <p><i>Broad: Government /Non-Government</i></p> <p><i>Sub entity : Academic or research institution or DSIR recognized Centre or any other</i></p>		
<p>Primary Point of Contact</p> <p>Lead Principal investigator (PI)</p>	Name:	
	Designation	
	Email	
	Telephone:	
	Mobile	
<p>Secondary Point of Contacts</p>	Name:	
	Designation	
	Email	
	Telephone:	
	Mobile	
<p>Information on Lead PI (<i>maximum 250 words</i>)</p> <ul style="list-style-type: none"> • <i>Relevant experience and track record</i> • <i>Project team (key personnel, skills & experience)</i> • <i>Provide up to 3 past performance references that can speak to ability of applicant to achieve results, successfully implement a project of similar magnitude and complexity</i> 		

<p>Partner institution (in India) * <i>if applicable, and what skills and experience they will contribute to the implementation and scale of the project:</i></p>	
<p>Partner Institutions (in Mission Innovation countries) * <i>if applicable, and what skills and experience they will contribute to the implementation and scale of the project</i></p>	

* The same information as required for lead PI may also be provided for partner organization.

**Section E: Enclosure details, if any
(Letter of intent from partnering institutions)**