

## **CALL FOR PROPOSALS**

### **FOR**

#### **CLEAN ENERGY DEVICES, SUB-SYSTEMS AND SYSTEMS (DSS): DSS-2015**

**OBJECTIVE OF CALL:** The objective of the call is to foster interdisciplinary multi-institutional networked research projects synergising strengths of respective partners to deliver efficient devices/systems meeting global benchmarks. The call envisages close interaction between industry, academia and research institutions. Participation of industrial collaborator from early stage is desirable to build long term linkage and take up leads to develop technologies which could find a space in market place eventually. The outcome of the scientific endeavor under the call should be scalable and deliverables of the projects should have the potentials to change business as usual scenarios. The focus of this call is on developing systems/ sub-systems and devices meeting the priorities and requirements of the country. The need of scientific work and demand for deliverables emanating from the project need to be firmly established in the proposal. The call would support:

- ❖ Pre-competitive technology development.
- ❖ Translational research utilising already available know-how to consolidate research outputs and advance current technologies.
- ❖ Thematic projects on specific technical issues identified by the industry.

**WHO CAN APPLY:** Faculties of recognized universities and academic institutions, scientists working in National Laboratories, R&D institutions and Research organizations recognized by DSIR individually or in consortium. Genuine and meaningful participation of industry having capability in the area and potential to commercialise the developed technology is desirable.

**PROJECT SIZE:** Not exceeding Rs. 3 crore

**PROJECT DURATION:** 3 years maximum

**INDUSTRIAL CONTRIBUTION:** 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. Contribution in cash is not mandatory for the projects submitted under this call.

**CALL OPENING DATE:** 1<sup>st</sup> May, 2015

**CALL CLOSING DATE:** 30<sup>th</sup> June 2015

### **SPECTRUM OF ACTIVITIES SUPPORTED:**

The spectrum of activities include translational research to convert available know how to useful product /process etc as well as applied research aimed at performance enhancement of existing devices and systems. This would also include Development and Engineering (D&E), Prototype Development of Product/ System, Process Development and equipment up gradation but not restricted to them.

### **ASSESSMENT CRITERIA:**

The relevance proposal to call objectives need to be conclusively established. The proposal relevant to call objectives will be evaluated based on following criteria:

- a. Need assessment and demand for proposed work,
- b. Scientific appropriateness of deliverable of proposed approaches and technical merit
- c. Expertise, facilities and track record of team. Appropriateness of industrial partner competence of each member facilities available to conduct research
- d. Proposal formulation. Literature/patent review, qualified objectives, methodology and work plan, clear and well defined deliverable.
- e. Potential to proliferate clean energy deployment, competitiveness of performance and cost goals.

### **INDICATIVE PROJECT AREAS:**

The following research emanating from several scientific discussion and consultation with stakeholders has been identified as focus of this call. However any other topic which could lower the cost of solar energy through technological innovations can also be proposed. In all cases, the proposal should be developed based on clearly felt a need and demand for the research endeavor. Proposal falling in either segment of Clean Energy viz. photovoltaics, thermal, storage, grid integration, building energy efficiency or cross cutting across them would be eligible for support. The identified thematic research topics are:

#### **Thermal**

- ❖ High Efficiency Power blocks and related components (heat exchangers, compressors, expanders, etc) with targeted capacities and efficiencies:-
  - Medium (150°C) to high temperature (300 °C) CSP technology based ORC systems.
  - Supercritical/ultra supercritical steam power cycles based systems
  - Supercritical CO<sub>2</sub> based Brayton cycle based systems.

- Low capacity Stirling and alternate Engines.
- ❖ Heliostats, Dishes and Parabolic troughs: Materials, Designs and layouts; Reducing shading and blocking, Improving intercept factors, Reducing of Tracking Power and Costs, Optimization of reflector size, Ganging of reflectors, Cleaning systems.
- ❖ Receiver related issues: Maximization of efficiency & Minimisation of Optical & Thermal Losses: Optimization of receiver geometry, Radiation shields and windows, etc., Coatings, Integral Receivers, Heat transfer fluid specific (air, CO<sub>2</sub>, direct steam, etc.) designs.
- ❖ Indigenization of Key CSP System Components taking in to account material availability and manufacturing capability; Development of medium capacity prime movers and components.
- ❖ Support Structure related studies including new low cost materials, Material compatibility, Protective coatings, design optimization for cost, stability under wind and thermal loads.
- ❖ Characterization and performance testing standards and facilities for components of CSP technologies such as Reflectors (including materials and coatings), Receivers (including selective coatings for high temperature applications, intensity profiling, etc) Prime movers, Heat exchangers and Heat transfer fluids.
- ❖ Materials for different power cycles such as ORC, Rankine, Brayton Cycles and also for poly-generation
- ❖ Benchmarking of optical and thermal design codes/methodologies and layouts for Dish, Heliostat and Parabolic trough/ Linear Fresnel fields
- ❖ Dust mitigation for thermal systems in India context.
- ❖ Thermal desalination of brackish sea water to produce potable water; material related issues and novel cost effective technologies.
- ❖ Integration of poly-generation (multi input and multi-output) technologies/novel thermodynamic cycles and configurations.

## **Storage**

- ❖ Matching up intermittent solar energy with development of appropriate storage system
- ❖ Material Compatibility issues such as corrosion, erosion, thermal stability and volume expansion
- ❖ Life cycle stability and thermal cycling fatigue issues.
- ❖ Matching up overall system dynamics with designed storage (Charging, discharging, cost effective heat transfer enhancement techniques, heat transfer issues)
- ❖ System hybridization / integration, packing arrangement, heat transfer fluid compatibility, size-to-capacity ratio
- ❖ Design of systems based on fast charging and controlled discharging, especially for Electro chemical /Thermo-chemical Systems

## **Photovoltaic**

- ❖ Fabrication of Silicon based devices, non-silicon devices, organic solar cell, dye sensitised solar cell, hybrid solar cell
  - Lab scale devices with target efficiency equal or greater than current international benchmarks (based on the emerging fields of optical metamaterials, plasmonics,

- quantum technology, nanotechnology, new materials like perovskites and polymer semiconductor science etc)
- Pre-commercial scale devices encompassing novel processes of high throughput, better power conversion efficiency, stability, reliability etc with commensurate reduction in cost
- Fabrication of devices on substrate; glass, plastic, steel, cloth, paper etc. for targeted application.
- ❖ Import substitute of cost effective precursors/components/ systems/dyes/ inks/ jigs/ high purity material etc.
  - Development of energy harvesting modules
  - Development of efficient metalisation paste/ encapsulation and supportive materials
  - Dust repellent/self cleaning coatings/systems.

### **Grid Integration**

- ❖ Advance PV panel failure detection systems
- ❖ Smart networks for renewable integrated sources both for stand alone and grid interactive.
- ❖ Augmentation of distribution network with frugal control system to couple renewable power in rural areas.
- ❖ Cost effective smart system for Roof top SPV
- ❖ Development and field performance of smart grid systems for islanded and re-synchronizable systems

### **PROJECT FORMULATION GUIDELINES:**

The proposals should clearly define the objectives and list the deliverables. The Methodology should be given in detail. For any material, system and/or component development proposed, the deliverable should include a target performance, and establish in the proposal how their proposed process/ product/material/system stands in comparison to comparable national and international ones in terms of performance and projected cost. The CV of the project investigators should be brief and highlight their competence and experience related to the proposed project. Consortia may be formed wherever necessary by clearly explaining the need for forming the consortia and the roles and responsibilities of each partner. The industry partner should have proven standing and R&D capability in the area related to Renewable Energy Technologies and should exhibit the potential to commercialize the products / systems developed under the proposal. The extent of participation and contribution of the industry partner should be clearly defined.

### **PROPOSAL SUBMISSION:**

Submit following documents in an Envelope marked “**DSS Call 2015: Name of Principal Investigator**”:

- A. 3 copies of complete project proposal in prescribed format (DSS) with all enclosures (1 marked original + 2 hard copies )
- B. Soft copy in CD:

- i. Complete proposal (MS word / PDF)
- ii. Executive Summary of the proposal as given in Project Proposal format (in MS word document only)

The complete set of documents are to be addresses to: Mr. Vineet Saini, Scientist 'D', Room no 5, Hall- J, Technology Mission Cell, Department of Science &Technology (DST), Technology Bhavan, New Mehrauli Road, New Delhi- 110016 before the closing date of the call. Soft copy of Project Proposal and the Executive Summary (MS word documents) is also to be e-mailed (*Subject Captioned: DSS Call 2015/ Name of the Principal Investigator*) to [dstcericall@gmail.com](mailto:dstcericall@gmail.com).