

No. 223/90/2017 - R&D  
Government of India  
Ministry of New and Renewable Energy  
(R&D Coord.)

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Block No.14, CGO Complex,  
Lodhi Road, New Delhi-110003  
Dated: 21<sup>st</sup> February, 2019

**ORDER**

**Subject: Administrative Approval for continuation of the Renewable Energy Research and Technology Development Programme for the period from 2017-18 to 2019-20.**

Sanction of the President of India is hereby accorded for continuation of the **Renewable Energy Research and Technology Development (RETD)** Programme of the Ministry of New and Renewable Energy (MNRE) for implementation during the period 2017-18 to 2019-20 at a total cost of Rs. 175.87 crore. The scheme aims at scaling up R&D effort for “**Renewable Energy Research and Technology Development**” during the said period for promoting indigenous technology development and manufacture for wide spread applications of new and renewable energy in efficient and cost effective manner across the country. The programme will strengthen research and innovation capacity of the country and will be implemented in accordance to policy and guidelines issued from time to time and thrust areas identified by MNRE.

2. The details of the scheme are as follows;

**A. Objectives**

The objective of the scheme is to support the R&D projects for technology development and demonstration in various areas of new and renewable energy such as solar thermal systems, solar photovoltaic systems, biogas systems, waste to energy systems, wind energy systems, hybrid systems, storage systems, hydrogen and fuels cells, geothermal, etc. with the ultimate aim of increasing share of renewables in the energy mix in the country. The R&D efforts are expected to make industry competitive and renewable energy generation supply self-sustainable/ profitable. The technology development and demonstration will be supported for manufacture of new and renewable energy systems/devices/components for different applications including transportation, portable and stationary applications for rural, urban, industrial and commercial sectors through:-

- i. Technology Mapping and Benchmarking;



- ii. Research, Development, Demonstration and Manufacture needs and facilitate implementation of the same;
- iii. Encouraging innovation and start-ups.
- iv. Laying down standards, specifications and performance parameters at par with international levels and facilitate industry in attaining the same;
- v. Testing, standardization and certification and appropriate international level quality assurance accreditation and facilitate industry in obtaining the same;
- vi. Aligning costs of new and renewable energy products and services with international levels and facilitate industry in attaining the same;
- vii. Facilitation of industry in becoming internationally competitive.
- viii. Carrying out Renewable Energy Resource Survey, Assessment and Mapping.
- ix. Providing sustained feed-back to manufacturers on performance parameters of new and renewable energy products and services with the aim of effecting continuous up-gradation so as to attain international levels in the shortest possible time span;
- x. Providing cost-competitive, new and renewable energy supply options.
- xi. International collaboration for joint technology development and demonstration, testing and standardization.

## B. Components

The scheme has been structured to support technology development and demonstration, validation, testing and standardization, innovation start-ups, field evaluation, study, etc. for entire renewable energy sector which includes solar thermal systems, solar photovoltaic systems, biogas systems, waste to energy systems, wind energy systems, hybrid systems, storage systems, control and integration systems, hydrogen and fuel cell systems, geothermal, etc. The details of the components of the scheme are given in table below:

Components	Year 1 (2017-18)	Year 1 (2018-19)	Year 2 (2019-2020)	Total
	Physical	Physical	Physical	Physical
1. Support for R&D for Technology/Process/Development & Demonstration and Performance Testing and Standardization.	(i) 20 Nos. of new projects in thrust	(i) 40 Nos. of new projects in thrust	(i) 40 Nos. of new projects in thrust areas and support	(i) 100 Nos. of New projects. Completion of on-going



	areas and support to on-going projects, including international collaboration.  (ii) Support for test labs/centres.	areas and support to on-going projects, including international collaboration.  (ii) Support for test labs/centres.	to on-going projects, including international collaboration.  (ii) Support for test labs/centres.	(ii) 10 Test labs/Centres.
2. Support for Start- ups	For prototype/ scale ups for entrepreneur development.	For prototype/ scale ups for entrepreneur development	For prototype/ scale ups for entrepreneur development	15 prototypes/ scale-ups
3. Innovation competition/ studies/ meetings/ conclaves/ monitoring	Awards for innovation, studies on policy research and field evaluation, sharing technology development achievements and monitoring.	Awards for innovation, studies on policy and field evaluation, sharing technology development achievements and monitoring.	Awards for innovation, studies on policy and field evaluation, sharing technology development achievements and monitoring.	Prizes for innovation. Reports on policy research and analysis on new and renewable energy.

The annual physical target mentioned above is indicative, and can be rolled over or exceeded in any given year, as long as the financial limits are not breached.

### C. Outcomes:

The scheme will lead to technology/process development in New & Renewable Energy which will be measured in terms of improvement of process/efficiency and cost reduction and technology validation for scaling up for demonstration and commercialization. The outcome for R&D Projects will be measured in terms of product/process/technology development, patents, publications, entrepreneur development, test labs for performance and reliability testing, policy reports, etc.

In addition, the scheme will lead to strengthening expertise of R&D/academic institutions in specific advance areas for technology development and demonstration. The base line will be the achievement made at the end of 12<sup>th</sup> Plan Period as brought out in the appraisal report.



## **D. Implementation.**

The MNRE has been funding R&D projects following a policy and guidelines dated 18.10.2010. It contains procedure for project development, evaluation, appraisal, sanctioning, monitoring, and terms and conditions of grant sanctioned/released for the projects, including IPR sharing and assets acquired under the projects. It has been decided to support R&D based on a policy and ecosystem that promotes technology development integrated with innovation and validation keeping in view applications and commercialization. A policy with a robust ecosystem for supporting innovation and research for promoting technology development and innovation in new and renewable energy sector with guidelines for implementation will be issued separately.

The implementation mechanism of the programme would be as follows:

### **D.1 R&D, Test Labs, Centres of Excellence and Start Ups:**

- (i) The scheme will be implemented by R&D /academic institutions/ industries, etc. across the country. Research Groups engaged in R&D/academic institutions, engineering colleges (both public and private approved by government accredited body), industries, other organizations, etc. engaged in R&D for promotion of new and renewable energy will be supported for taking up research, development and demonstration projects for technology development integrating innovation for continuous improvement of technologies/systems/process. However, technology demonstration will be taken up either at implementing institutions or in field at utility in the case of project taken up in partnership with institutions/industry/utility.
- (ii) The RETD Programme will be implemented as per policy and thrust areas identified by MNRE.
- (iii) The scheme will be implemented in form of projects with identified deliverables. The project proposals will be invited in thrust areas of MNRE in place of normal submission of project proposals by investigators, which will be done by the Ministry through its website/national dailies from time to time. The proposal will be submitted as per prescribed format. The proposals should be supported with proper appraisal by a Project Appraisal Committee taking into consideration the assessment for scalability with commercial potential.
- (iv) The project's cost will involve project manpower, equipment, instrumentation, fabrication and installation, performance evaluation, improvement in system, design, manpower, travel, contingency, overhead charges for the implementing institutions, etc. as per policy and guidelines of MNRE. Projects in partnership with industry will involve cost sharing with them, up to 50% of the total cost.



- (v) For implementation of the project, the temporary manpower i.e SRF, JRF and RA etc. shall be hired in the R&D project based on their expertise/professional qualification in RE field depending upon availability. The hiring of the manpower will be purely on temporary basis with a condition that there will be no liability of such staff for confirmation by government. The staff services shall discontinue immediately after the project duration expires.
- (vi) The projects as such do not involve hiring of consultants as the projects are implemented by experts in the respective areas, hence hiring of consultants under the project will not be allowed.
- (vii) The project administrative structure comprises of Principal Investigator and Co-Principal Investigators from the Implementing Institutions. In the case of collaborative projects, a Co-PI will be designated by such institutions.
- (viii) Centre of Excellence will be supported/ created in project form for pursuing research in advanced areas with clear-cut goals and deliverables. Centers of Excellence will also be supported in consortia of institutions and industry for advanced research with clear cut long terms goals.
- (ix) Testing and standardization is a key component for the growth of RE sector, and therefore test labs would be strengthened and expanded at par with international practice for quality assurance of renewable energy supply in the country. Test labs will be strengthened with adequate trained manpower including staff for delivering efficient and quality testing services to industry/project developers. New test labs will be set up to meet the demand of deployment. Necessary support will be provided for setting-up Labs. These labs will be supported in partnership and on self-sustaining basis.
- (x) Start-up is a major intervention for promoting setting up small scale industries for indigenous development and manufacture of new and renewable energy systems/components/devices. The start-ups would be supported in transparent manner with proper assessment for their potential for entrepreneurship development. The Innovation Award Scheme would be utilized for supporting start-ups. An ecosystem with proper appraisal and financing mechanism will be evolved for supporting start-ups/scale-ups raised out of innovation for entrepreneur development.
- (xi) In addition, the MNRE will also support projects under MHRD led initiatives, IMPRINT and UAY matching MNRE thrust areas and approved by the Apex Committees of these initiatives.
- (xi) The international cooperation for taking up joint research, design and development activities in advanced areas of new and renewable energy will be supported. Collaboration with institutions of ISA Member countries will also be supported in mutually identified areas. A suitable MoU for implementation will be



signed between the participating organizations/agencies as per requirements of collaboration.

(xii) The projects will be examined by the concerned divisions to decide whether the same covers the thrust areas of MNRE. The division then will seek comments of experts on the projects. The projects qualified will be taken up in the meetings of the R&D Project Appraisal Committee (RDPAC) of the MNRE for appraisal and recommendation. The projects recommended by the committee will be sanctioned as per MNRE Policy & Guidelines.

(xiii) The proposals for test labs will also be evaluated by experts as per policy and guidelines. The proposal shall be submitted in prescribed format. The proposals qualified will be appraised by the Standard, Testing and Quality Control Committee (STQCC) as per Lab Policy. The proposals recommended by the committee will be processed for approval by the Ministry. The projects approved by Ministry will be sanctioned to concerned organizations for implementation.

(xiv) The project review, submission of progress reports, completion, extension will be regulated as per policy and guidelines.

## **D2. Awards for Innovation/start-ups**

The objective of giving awards is to foster innovation by organizing competitions at national level wherein innovators will be given opportunity to present their innovative ideas/innovation/prototypes before a judging committee. Nominations will be invited through MNRE website /national/regional dailies, and also through relevant both state and central government departments/organizations/ institutions. The winners may be given awards in form of cash prize or in form of support mechanism for transforming their ideas/prototypes to commercial products or both. Innovative ideas/innovations awarded will be considered for support for start-ups. The scheme will be implemented following the guidelines for "Awards for Innovative Ideas in New and Renewable Energy-" "Abhinav Soch - Nayee Sambhwanayen" instituted by MNRE in July 2017.

## **D3. Study on Policy Research**

Study on policy research and analysis of implementation of various programmes of MNRE, including impact of technology development support and field implementation of projects/programmes will be supported for drawing conclusion for improvement in technology/systems/components/process/schemes. This may include study on impact of systems design, integration, resource assessment, optimum utilization of resources and systems, quality control, regulatory mechanism and socio economic impact of renewables. The proposals will be approved by the concerned RDPAC.



## **E. Sanction and Release of Funds**

Funds will be sanctioned/ released directly to the institutes/implementing agencies, which will be operated by the administrative set up already existing in those institutes. Funding pattern and central contribution in individual projects, including administrative/overhead charges for implementing agencies will be regulated as per the policy and guidelines of R & D programme. The Pattern of release is as below: -

i. The Pattern of release of CFA will on milestone basis. In order to facilitate procurement of equipment early, upto 50% of the total assistance minus the institutional overheads would be released initially along with the sanction depending on the requirements of equipment in the project. For projects where equipment cost exceeds 50% of the project cost, higher initial release may be considered by the Ministry. The balance assistance minus the institutional overheads would be sanctioned as per the annual allocation based on the progress/milestone achieved in the project. The utilization of the grants released towards purchase of equipment may be within 1 year of date of release, subsequent grant will be released after full utilization of previous release and submission of required documents etc.

ii. The institutional overheads would be released only after successful completion of the project and review by a Project Monitoring Committee and on receipt of the project completion report and financial due diligence as per GFR.

## **F. Monitoring & Evaluation**

(i) The monitoring of the progress of the projects will be done by project monitoring committee (PMC) comprising of the experts identified by MNRE.

(ii) The achievements claimed under the projects will be subjected to validation of the technology/process so that appropriate action is taken on furthering the technology development and demonstration in the area. On completion, the outcome of the project will be screened by expert committee to be constituted with the approval of RDPAC. The achievements will be subjected to measurements in relevant accredited test labs in the country or outside country.

(iii) In addition, interactive meets, R&D Conclave will be organized annually to share the achievements with researchers, experts from R&D/academic institutions/industries, and other related stakeholders for taking corrective steps for improvement in implementation of projects.

(iv) Panel of Experts from lead R&D/academic institutions will be constituted for independent evaluation at the end of the programme period.



## G. Budget

(i) The budget includes funding for R&D projects, test labs, start-ups, innovation prizes, policy research, monitoring, meetings, conclave etc. The R&D project cost would involve project manpower, equipment, instrumentation, fabrication and installation, performance evaluation, improvement in system, design, manpower, travel, contingency, overhead charges for the implementing institutions, etc. as per policy and guidelines of MNRE. Projects in partnership with industry will involve cost sharing with them. The year-wise budget of the programme is given in table below:

Components	2017-18 (Rs. Crore)	2018-19 (Rs. Crore)	2019-20 (Rs. Crore)	Total (Rs. Crore)
1. Support for R&D, Testing & Standardization. (a) Non-recurring (b) Recurring	72.87	43.00	60.00	175.87
2. Start-Ups(Recurring)				
3. Innovation competition/ studies/meetings/conclaves /monitoring(Recurring).				

(ii) The budget will be spent on the basis of projects received in respective subjects/sub-heads and recommended by the respective Appraisal Committees. Accordingly, the budget will be allocated depending on projects.

(iii) The grantee institutions/organizations/industry, etc. will submit the progress report, audited statement of accounts and Utilization Certificate for the grant released/utilized annually. The UC will be furnished as per GFR 12-A (2017) as uploaded on MNRE website.

(iv) The projects are subjected to audit as per GOI policy for audit of projects in Scientific Departments.

(v) The Renewable Energy Research and Technology Development Policy and Guidelines for Implementation of Research and Technology Development Programme are enclosed as **Annexure-A** and **Annexure-B** respectively



3. This issues in exercise of delegated powers of this Ministry and with the concurrence of IFD vide Dy.No. 514 dated 11.2.2019.

Yours Faithfully

Rajesh Kumar

Dr. Rajesh Kumar  
Scientist F

To,

Pay and Accounts Officer  
Ministry of New and Renewable Energy  
Block-14, C. G. O Complex, Lodi Road  
New Delhi-110003.

Copy for information to:

1. Additional Secretary, MNRE
2. AS&FA, MNRE
3. Joint Secretaries/ Advisers/Scientist-G, /Economic Advisers
4. PS to Minister (NRE)
5. Sr. PPS to Secretary (MNRE)
6. All State Nodal Agencies.
7. Additional Secretary (Energy), NITI Aayog, New Delhi.
8. Director (PF-II), Ministry of Finance , Department of Expenditure, North Block, New Delhi -110 001.
9. Director Generals, NISE, Gurgaon, NIBE, Kapurthala, NIWE, Chennai.
10. Managing Director, IREDA, New Delhi.
11. Managing Director, Solar Energy Corporation of India, New Delhi
12. NIC Cell (for publishing on the Ministry's website)

Rajesh Kumar

Dr. Rajesh Kumar  
Scientist F



**Ministry of New and Renewable Energy**

**Renewable Energy Research and Technology Development Policy (RETDP)**

**1.0 Introduction**

1.1 The wide-spread application of renewables is a vital pre-requisite for the transformation of the global energy system towards sustainability. For India, renewable energy sources are strategic national resource and harnessing these sources will put the country on the path to a cleaner environment, energy independence, a stronger economy, and curb global warming. Renewable energy technologies are still evolving in terms of technological maturity and cost competitiveness. Further, emerging technologies such as storage, smart grids, and electric mobility are witnessing disruptive growth phase, these would have a pivotal role in increasing the deployment and utilization of renewables. In this scenario, focused efforts would be required towards research and technology development benchmarked at the global level in terms of efficiency, cost competitiveness and convenience.

1.2 The Ministry of New and Renewable Energy (MNRE), since its inception, has been undertaking research and development activities through budgetary support. This has resulted in achievements in many areas. However, with the disruptive technological changes in renewable energy landscape, the efforts for technology development do not commensurate with the national aim to deploy a cumulative 175 GW renewable power by 2022 and to strive for over 500 GW renewable power by 2030. The continuous evolving technology landscape has necessitated a well-balanced long-term R&D strategy for the country.

**2.0 The Research Policy**

2.1 Generation of innovative ideas that will usher in new technologies as well innovating and improving upon existing ones is key for realizing the full potential of new and renewable energy. In order to meet the challenges of the future, the Renewable Energy Research and Technology Development Policy (hereafter referred to as *Research Policy*) has been developed for promoting research and innovation for technology development and manufacturing in a cost



effective manner. To this end, this Research Policy would strive for seamlessly integrating technological advances to industry on real-time basis and also support to industry to take the technology risk for large scale deployment.

2.2 The policy seeks to set the Research Agenda in renewables and facilitate the same through enabling environment, including support from the government for increasing research output and its linkages with industry for developing their manufacturing capabilities within the country. This policy and its emanating guidelines will replace Ministry's research and development guidelines of October 2010 and remain operational up to the year 2021-22. This policy will be the first building block for the research strategy till the year 2020. This policy will also serve the purpose of sending right signals to the research institutions, universities, academia, industry, innovators, international research and development institutions about Government of India's strong and long-term commitment for incentivising innovation, performance improvement, reliability and cost-competitiveness of renewable energy systems and devices.

### **3.0 Objective**

3.1 The Research Policy aims at achieving the following objectives: -

- i. To foster research and innovation for increasing the share of renewable energy in the national energy mix in most cost competitive manner;
- ii. To support industry for developing internationally competitive renewable energy systems and devices with the ultimate aim of India becoming net foreign exchange earner in renewable energy;
- iii. To strengthen the institutional mechanisms for indigenous development, demonstration, adoption and upgradation of renewable energy technology; and
- iv. To support international cooperation in research and development that is aimed at acquisition, mastery, diffusion, indigenization and absorption of knowledge, technology and skills by local institutions, industry etc. in India.

### **4.0 Research Priorities**



4.1 In view of the fast changing technology landscape, applied research in renewable energy areas that addresses country's immediate technological requirements, would be undertaken. Accordingly, research and development priorities in the pertinent renewable energy areas have been identified, and are enclosed at ***Annexure –A-I***.

4.2 In addition to the research areas, as detailed at ***Annexure- A-I*** depending upon the emerging trends, the Ministry would undertake research, technology development and demonstration activities in other aspects of new and renewable energy technologies with the approval Secretary MNRE

## **5.0 Strategy**

### *Need based, goal oriented research*

5.1 In order to identify technology gaps and opportunities for innovation, mapping of renewable energy technologies available globally and benchmarking of the same in the Indian context would be undertaken.

5.2 Based on the identified gaps and benchmarking, India specific targets for technical performance and market competitiveness and for various renewable energy technology areas will be defined by MNRE. These targets would serve as guiding challenges for research projects.

5.3 The research and technology development in renewables will be need based that captures the technological gaps in various renewable energy technologies. To this end, activities that support renewable energy technologies becoming cost competitive, efficient, convenient, predictable and more easily integrated into the energy system will be undertaken.

5.4 To the extent possible, research and technology development would be organized on competitive basis within the defined boundary conditions through '*request for proposal*'. Wherever appropriate, a '*Challenge based research programme*' would be undertaken. This would lay down specific challenges in terms of parameters like performance, life, costs etc.



### *Research Framework and Institutional Mechanism*

5.5 The research and development framework for renewable energy will complement the existing research framework in the country and leverage from the international research efforts. Progressively increasing role of the Industry will be ensured for putting in new processes and products in the market. The industry will be supported/ encouraged for absorbing the technological risk and factor in the research and technology development investment over a time-horizon.

5.6 Consortium approach will be encouraged. Academia, research institutions, and industries involved in renewable energy supply chain will be grouped for developing specific renewable energy technologies.

5.7 Centers of Excellence and expert group of scientists with a successful track record on renewable energy related innovations will be encouraged to propose and implement projects. Industries with an interest to demonstrate and build capabilities in renewable energy area will be invited to partner in these projects.

5.8 Autonomous institutions under administrative control of the Ministry will be strengthened for technology development and validation, Testing, Standardization and certification in various aspects of renewable energy.

5.9 Policy research and analysis of renewable energy programmes provides useful feedback for further improving the system performance. Accordingly, studies that contribute in technology validation, improvement and up gradation will be supported and/or undertaken.

### *Capacity Building*

5.10 The policy will seek to build, develop, strengthen, and enhance the capabilities of institutions and individuals engaged in research, technology development and innovation in different aspects of renewable energy. Further, networking of extramural projects, laterally supported projects activities, industry and international institutions will be encouraged for information and knowledge sharing.



### *Product Development*

5.11 The research activities will be supported by techno economic feasibility and policy analyses to evolve a robust 'tech to market' roadmap for each of the identified renewable energy option. This will be aligned with a systematic pilot and deployment roadmap. Innovative start-ups, entrepreneurs, and businesses will also be supported for building cutting edge products and services in renewable energy.

5.12 In order to facilitate indigenous manufacturing of systems and devices, support would also be provided for setting up manufacturing units, including equipments

### *Standards and Testing*

5.13 The formulation of the standards and testing protocols will be carried out in collaboration with premier National / International institutions which perform intensive research on emerging and developed technologies in renewable energy systems. These will be updated periodically as required, especially considering the emergence of various new technologies. Knowledge and experience gained from evaluation of established and new technologies will be disseminated appropriately. A comprehensive test program framework for different aspects of renewable energy systems would be instituted. The tests performed would be related to *inter-alia* application functionality in different climatic condition, safety, performance, and lifecycle. In addition assistance will be given to laboratories to equip them to act as testing laboratories for the provided standard as laid down under relevant laboratory policy of MNRE.

5.14 Study of available standards for mature and developing technologies, and also analysing applications for which presently there are no standards/testing protocols would be undertaken on regular intervals.

### *International Cooperation and Technology acquisition*

5.15 International cooperation in research and development through well-defined projects with proper division of labour and responsibilities for specific tasks with equitable credit sharing arrangements will be pursued. Such projects will be aimed at acquisition, mastery, diffusion and indigenization & absorption of knowledge, technology and skills by local institutions, industry etc. in India.



#### *Project implementation mechanism*

5.16 Selection of projects, their monitoring and evaluation, financial support, IPR etc shall be governed by Guidelines issued by this Ministry for the purpose from time to time.

5.17 The Ministry and/or its designated institutions will financially support research projects based on the merit and relevance of the proposals. Appropriate Committees with representation from the Ministry and subject area experts will be constituted for this purpose.

5.18 Monitoring and evaluation of the research and technology development activities will be undertaken through Project Monitoring Committees (PMCs) of the respective renewable energy technology area. PMCs will continuously monitor project implementation and recommend mid-course corrections, budget revisions, realigning of objectives to enable delivery of the envisaged project outcomes in a timely manner.

#### *Awards for Innovation*

5.19 In order to encourage innovation in new and renewable energy, the Ministry will award prizes to deserving individuals/groups on an annual basis.

### **6.0 The shape of things to come**

6.1 The Research Policy attempts to capture the present research and technology development priorities. However, the policy will continue to be revalidated and modified depending upon the emergent requirements and challenges. In the year 2021, the Ministry plans to bring out modified Research Policy for the period 2021-2030 that will attempt to reflect emergent challenges and suggest a road map for putting the nation into leadership position in new and renewable energy technologies.



7.0 This issues with the approval of Minister of Power and New and Renewable Energy.

Yours Faithfully

*Rajesh Kumar*

Dr. Rajesh Kumar  
(Scientist F)

To

All Officers of MNRE.

Copy to:-

1. PS to Minister for New and Renewable Energy & Power
2. Secretary, Department of Science & Technology
3. Secretary, Department of Scientific and Industrial Research and Director General, Council of Scientific and Industrial Research
4. Secretary, Department of Bio-technology
5. Secretary, Ministry of Environment Forests & Climate Change
6. Secretary, Ministry of Earth Sciences
7. Secretary, Department of Atomic Energy
8. Secretary, Department of Space and Chairman, ISRO
9. Secretary, Department of Information Technology
10. Secretary, Department of Agriculture Research.
11. Secretary, Defence Research and Development Organization
12. Chief Executive Officer, NITI Aayog, New Delhi.
13. Chairman & Managing Director, National Research & Development Corporation (NRDC)
14. Chairman, University Grants Commission
15. Director (PF-II), Ministry of Finance , Department of Expenditure
16. Director General, National Institute of Solar Energy
17. Director General, National Institute of Wind Energy
18. Director General, SSS - National Institute of Renewable Energy
19. Managing Director, IREDA, New Delhi.
20. Managing Director, Solar Energy Corporation of India, New Delhi.
21. Indian Council for Agricultural Research (ICAR), New Delhi
22. All State Nodal Agencies implementing MNRE's Programme
23. Chairman, National Innovation Foundation, Ahmedabad, Gujarat
24. NIC Cell (for publishing on the Ministry's website)

*Rajesh Kumar*

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**Renewable Energy Research and Development Priorities**

Area	Technology Gap	Research Areas
Solar Photovoltaic	<ul style="list-style-type: none"> <li>• Import dependence for wafers, cells and modules.</li> <li>• Mass manufacturing of cells and modules.</li> <li>• Availability of alternative options in emerging technologies.</li> </ul>	<ul style="list-style-type: none"> <li>i. Indigenous PV cell technology with globally competitive prices and performance;</li> <li>ii. Cutting edge manufacturing techniques for indigenous manufacture; and</li> <li>iii. Next generation PV technologies including Perovskites, Thin films, Multi-Junction Solar Cells, Dye induction photovoltaics, organic/inorganic composites etc.</li> <li>iv. Development of cost competitive packages for applications beyond grid electricity, including cooking, lighting, water pumping, irrigation etc.</li> </ul>
Solar Thermal Applications	<ul style="list-style-type: none"> <li>• Import dependence for solar field components.</li> <li>• Conversion efficiencies derive</li> </ul>	<ul style="list-style-type: none"> <li>i. Improving conversion efficiencies and reducing costs through improved designs, new materials, manufacturing processes, deployment of higher conversion temperatures, alternative heat transfer fluids etc.</li> <li>ii. Thermal storage systems integrated with power, heating or cooling applications</li> <li>iii. Indigenizing Reflector materials with good outdoor durability, high solar reflectivity, good mechanical resistance.</li> </ul>
Waste to Energy	<ul style="list-style-type: none"> <li>• Lack of standardization of process leads to unfavourable economics.</li> </ul>	<ul style="list-style-type: none"> <li>i. Technologies for efficient utilization of urban, farm and industrial waste for power generation at minimum</li> </ul>



		economic and environmental costs
Wind Energy	<ul style="list-style-type: none"> <li>• Import dependence for technologies for offshore wind deployment.</li> <li>• Modelling and simulation to ensure accurate forecasting.</li> </ul>	<ol style="list-style-type: none"> <li>i. Cost reduction and indigenization of wind turbine components and sub-systems;</li> <li>ii. Development of materials, techniques and technologies for offshore wind energy deployment;</li> <li>iii. Modelling and simulation including high-performance computing (HPC) to improve generation forecasting, and performance analysis.</li> </ol>
Hydrogen and Fuel Cells	<ul style="list-style-type: none"> <li>• Availability of hydrogen of desired purity at viable costs.</li> <li>• Import dependence for hydrogen storage materials.</li> <li>• Import dependence for fuel cell components and stacks.</li> <li>• Lack of infrastructure for transportation/distribution of hydrogen to end user locations.</li> </ul>	<ol style="list-style-type: none"> <li>i. Increasing efficiency and indigenous content of electrolyzers;</li> <li>ii. Indigenous development of type III and type IV cylinders, as well as hydride and carbon materials for hydrogen storage;</li> <li>iii. Development of indigenous catalysts, membranes, balance of system components and stack assemblies;</li> <li>iv. Development of Fuel cell based applications for power generation, transportation, logistics etc; and</li> <li>v. Development of hydrogen distribution networks through pipelines, and dispensing stations.</li> </ol>
Energy Storage	<ul style="list-style-type: none"> <li>• Limited experience with new energy storage technologies, like li-ion, sodium ion, sodium sulphur batteries.</li> <li>• Lack of standardized controls and interfaces.</li> </ul>	<ol style="list-style-type: none"> <li>i. Next Generation Energy storage devices for grid-scale storage at economic cost;</li> <li>ii. Standardization of controls and interfaces to allow flexible operation; and</li> <li>iii. Simulation and Modeling for evaluation of storage requirement for different</li> </ol>



	<ul style="list-style-type: none"> <li>• Energy storage can provide multiple services and multiple technology choices are available, there is a need to benchmark performance and economic viability of various options in different application scenarios.</li> </ul>	<p>applications including grid support, ancillary services, e-mobility, peak shifting etc, so that appropriate technology choices could be put implemented for each scenario.</p>
Small hydro	<ul style="list-style-type: none"> <li>• Indigenously available. However, need to develop modular systems.</li> </ul>	<p>i. Modular turbines with reduced weight and higher conversion efficiency at lower cost.</p>



**Ministry of New and Renewable Energy**

**Subject: Guidelines for Implementation of Research and Technology Development Programme**

In pursuant to the Renewable Energy Research and Technology Development Policy notified by the Ministry of New and Renewable Energy on 21.02.2019 vide F. No. : 223/90/2017-R and D COORD, this document elucidates the guidelines for implementation of the MNRE's Research and Technology Development Programme.

**I. Project Proposals**

Research and Technology Development project proposals could be submitted for financial support by scientists / engineers / technologists working in industry / academic institutions / registered societies / R&D institutions / laboratories having adequate infrastructure/facilities to carry out the proposed activities. The proposals may be submitted through any of the following three routes for consideration by the Ministry:

- i. MNRE will, on a periodic basis, notify "Call for Proposals" for Research and Technology Development projects through advertisement in scientific / technological journals and the MNRE website. Proposals will be invited against proactively identified challenges, research problems / topics in new and renewable energy;
- ii. Interested institutions/ individuals may also submit proposals in relevant areas of research aside from the Calls for Proposals at any time to this Ministry. Such proposals will be evaluated for financial support on a case to case basis according to their relevance to the Ministry's research priorities and suitability for financial support;
- iii. Based on the need, Ministry may also consider soliciting proposals from identified experts, institutions and industry capable of implementing technology development activities in relevant areas; and
- iv. In addition, eligible laboratories may also send proposals for financial support as laid down under National Laboratory policy on Testing, Standardisation and Certification for RE sector 2017



## II. **Proposal Appraisal**

The Research and Development Coordination Division, MNRE will serve as Secretariat and concerned group will be responsible for appraisal of the proposals for support. The steps followed for appraisal of proposals would be:

- i. Initial Screening by the concerned group to assess the relevance of proposal and suitability as per mandate;
- ii. Evaluation of eligible proposals shall be carried out by subject experts to facilitate broad based consultation. The concerned Group would seek comments/recommendations on the eligible proposals from at least three experts in the case of projects with budget up to Rs.1.0 crore and five experts in the case of projects with budget more than Rs.1.0 crore. Projects supported by at least two experts in the first case and three experts in the second case with a score of 60% or higher will be considered. The minimum qualifying rating of each attribute should not be less than 50% of the rating earmarked for each aspect of project evaluation;
- iii. Proposal recommended by at least three experts will be put up for approval of the R&D project appraisal committee (RDPAC). The RDPAC will be chaired by Secretary, MNRE, co-chaired by an eminent scientist and comprise of experts from various new and renewable energy areas and other relevant S&T departments. Group Head, research coordination will be convener of the Committee; and
- iv. The Evaluation criteria to be considered by experts and the RDPAC would include: i) Relevance and the scientific quality of the proposal; ii) Availability of clear statement of quantified objectives and deliverables; and iii) Technical feasibility and economic viability in view of available options at the end of development.

## III. **Project Approval**

Proposals recommended by the RDPAC will be put up for the standard financial approval process as per Government of India's General Financial Rules (GFR).

- i. Upon obtaining Financial concurrence and Administrative approvals as per procedure, the project will be sanctioned;



- ii. The sanction letter will contain clearly approved objectives, head-wise budget with yearly break-up, duration, terms and conditions, deliverables/output and other condition of Grant as per GFR; and
- iii. The project grant shall be utilized as per the “General Terms & Conditions of the grant for Research and Technology Development projects” as enclosed at *Annexure-B-I*

#### IV. **Financial Support**

The extent of financial support would depend upon the appropriateness, relevance and strategic importance of the project. The following general principles will be followed: -

- i. Proposal from academic institutions, universities, research institutes, government/non-profit research organisations etc. would be eligible for financial support up to 100% of the total project cost. The financial support to the private institutes/ research organization would be restricted up to 50% of the project cost;
- ii. However, having focus on applied research, the Ministry will encourage research and technology development proposals in collaboration with the industry. The proposals from industry will have a component of co-financing the research proposal. Generally financial support for such proposals will be limited to 50% of the project cost;
- iii. Start-ups, entrepreneurs etc. will also be eligible for financial support up to 50% cost of the project for technology development;
- iv. Manufacturing units will be eligible for financial support up to 50 % of the equipment cost required for carrying out research resulting to development of indigenous product;
- v. Proposals which are being funded by any other arm of the Government of India or have received grants from any other national/international body will have to submit a strong case to demonstrate why they need additional financial support from the Ministry;
- vi. The project proponents of the approved projects will receive financial support as per the standard financial norms and upon submitting necessary documentation as per GFR-2017;
- vii. In a collaborative project, only one entity can apply for funding and the eligibility criteria will only apply to the applicant entity, i.e. the lead applicant. If the application is successful, only the applicant will enter into a funding agreement. The lead applicant will be responsible for the performance of the project;



- viii. Emoluments of manpower recruited for the project will be in accordance with the rules of the Institute and guidelines of the Government of India. However, the emoluments of personnel on the regular roles of the institutes would not be borne in the project.
- ix. The Pattern of release of CFA will on milestone basis. In order to facilitate procurement of equipment early, upto 50% of the total assistance minus the institutional overheads would be released initially along with the sanction depending on the requirements of equipment in the project. For projects where equipment cost exceeds 50% of the project cost, higher initial release may be considered by the Ministry. The balance assistance minus the institutional overheads would be sanctioned as per the annual allocation based on the progress/milestone achieved in the project. The utilization of the grants released towards purchase of equipment may be within 1 year of date of release, subsequent grant will be released after full utilization of previous release and submission of required documents etc and;
- x. The institutional overheads would be released only after successful completion of the project and review by a Project Monitoring Committee and on receipt of the project completion report and financial due diligence as per GFR.
- xi. The overhead charges will be restricted up to 8% of the project cost for the projects costing up to Rs. 1 crore. In case of the projects costing Rs. 1-5 crores the overhead charges will be 8 % of the project cost or Rs. 15 lacs whichever is less. In case of the projects costing more than 5 crores the quantum will be decided on a case to case basis.
- xii. Contingencies and Consumables amount are based on the recommendations of the Expert Committee, to be provided where the research work involves field work or/and project has many investigators/institutions and larger manpower.

V. **Intellectual Property Rights (IPR)**

Matters pertaining to IPR shall be dealt in accordance with the guidelines contained in the DST circular issued with the concurrence of Ministry of Finance, Department of Expenditure *vide* their O.M. No.33(5)PF-II99, dated 22nd February, 2000 or subsequent circulars which may be issued by DST/ MOF on the subject.



## VI. **Monitoring, Reporting and Validation**

Monitoring and evaluation of the research and technology development activities will be undertaken through Project Monitoring Committees (PMCs) of the respective renewable energy technology area. PMCs will comprise of subject area experts and will be chaired by an eminent Scientist in the relevant area. The PMCs will be responsible for: -

- i. Continuously monitoring project implementation;
- ii. Recommending mid-course corrections, budget revisions, realigning of objectives to enable delivery of the envisaged project outcomes in a timely manner;
- iii. Assessing the performance of the supported projects, and appraising the annual work plan for the current year on the basis of the deliverables/outcomes; and
- iv. Evaluate the achievements of completed projects and give recommendations for corrections and further work, if any.

## VII. **Project Completion Process**

All efforts to be made to complete the projects in time through rigorous monitoring and feedback.

- i. Extension of the duration without increase in outlay can be granted with the approval of Secretary, MNRE;
- ii. Extension of the duration with additional financial assistance will be considered on recommendation of PMC. In both the cases, the approval will be granted subject to justification for the same;
- iii. All projects on completion will be presented by the respective PIs before the PMC; and
- iv. Completed project reports after satisfactory review by the PMC shall be posted on MNRE website.

## VIII. **Awards for Innovation**

In order to encourage innovation in new and renewable energy, the Ministry will award prizes on annual basis. The award will consist of a citation and cash prize of Rs. 5,00,000/- (Rupees Five Lakh); Rs. 3,00,000/- (Rupees Three Lakh) and Rs 2,00,000/- (Rupees Two Lakh). A committee will be constituted under the Chairmanship of Secretary, MNRE to formulate guidelines for awards and act as jury for selection of candidates for the award.



**IX. Financial Outlay**

The budget provision for the Research and Technology Development programme for the control period shall be as under:

Financial Year	Budget Provision (in Rs. Crore)
2018-19	43.00
2019-20	60.00
Total (For 2 years)	105.00

**X. Control Period**

The Guidelines shall come into effect from the date of notification and shall remain effective till 31<sup>st</sup> March 2022 unless notified otherwise.

**XI. Review and Amendment**

The guidelines will be reviewed, as and when required and any modification to these guidelines, if necessary, shall be carried out with the approval of the Secretary, MNRE.

2. This issues with the approval of Minister of Power and New and Renewable Energy.

Yours Faithfully

*Rajesh Kumar*

Dr. Rajesh Kumar  
(Scientist F)

To

All Officers of MNRE.

Copy to:

1. PS to Minister for New and Renewable Energy & Power
2. Secretary, Department of Science & Technology
3. Secretary, Department of Scientific and Industrial Research and Director General, Council of Scientific and Industrial Research



4. Secretary, Department of Bio-technology
5. Secretary, Ministry of Environment Forests & Climate Change
6. Secretary, Ministry of Earth Sciences
7. Secretary, Department of Atomic Energy
8. Secretary, Department of Space and Chairman, ISRO
9. Secretary, Department of Information Technology
10. Secretary, Department of Agriculture Research.
11. Secretary, Defence Research and Development Organization
12. Chief Executive Officer, NITI Aayog, New Delhi.
13. Chairman & Managing Director, National Research & Development Corporation (NRDC)
14. Chairman, University Grants Commission
15. Director (PF-II), Ministry of Finance , Department of Expenditure
16. Director General, National Institute of Solar Energy
17. Director General, National Institute of Wind Energy
18. Director General, SSS - National Institute of Renewable Energy
19. Managing Director, IREDA, New Delhi.
20. Managing Director, Solar Energy Corporation of India, New Delhi.
21. Indian Council for Agricultural Research (ICAR), New Delhi
22. All State Nodal Agencies implementing MNRE's Programme
23. Chairman, National Innovation Foundation, Ahmedabad, Gujarat
24. NIC Cell (for publishing on the Ministry's website)

*Rajesh Kumar*

Dr. Rajesh Kumar  
(Scientist F)



**GENERAL TERMS & CONDITIONS OF THE GRANT FOR R&D  
TECHNOLOGY DEVELOPMENT PROJECT**

1. Approval of the R&D/ technology development project and the grant being released is for the specific project sanctioned and should be exclusively spent on the project within the approved time duration. The grantee organization is not permitted to seek or utilize funds from any other organization (government, semi-government, autonomous and private bodies) for this research project, unless specifically approved for joint funding. Any unspent balance out of the amount sanctioned must be surrendered to the Government of India through an ECS/ crossed Demand Draft drawn in favour of Drawing & Disbursing Officer, MNRE payable at New Delhi.
2. Full infrastructure facilities by way of accommodation, water, electricity, communication etc. for smooth implementation of the project shall be given by the grantee organization(s) at their cost.
3. For permanent, semi-permanent assets acquired solely or mainly out of the project grants, an audited record in the form of a register in the prescribed format (Annexure-XIII of 'R&D Formats' on home page of [www.mnre.gov.in](http://www.mnre.gov.in)) shall be maintained by the grantee organization. The term "Assets" include (a) the immovable property acquired out of the grant; and (b) movable property of capital nature where the value exceeds Rs. 50,000/-. The grantee organization is required to send to the MNRE a list of assets acquired from the grant. The grant shall not be utilized for construction of any building unless specific provision is made for that purpose.
4. Assets acquired in the project shall be shared proportionately between Government of India and grantee organization(s) in accordance with the cost sharing pattern of the project. The assets should not be disposed off or encumbered or utilized for purpose other than those for which the grant had been sanctioned, without the prior permission of this Ministry.
5. On conclusion/ termination of a project, the Government of India will be free to sell or otherwise dispose off its share of the assets, which are the property of the government. The grantee organization shall render to the Government of India necessary facilities for arranging the sale of these assets. The Government of India has the discretion to gift its share of assets to the grantee organization or transfer them to any other organization if it is considered appropriate.
6. The grantee organization/ PI will furnish Progress Report of the work carried out under the project on six monthly basis in the months of April and October during the project implementation period in a prescribed format given at Annexure-VIII of 'R&D Formats' on home page of [www.mnre.gov.in](http://www.mnre.gov.in).
7. Officer(s) of MNRE and MNRE designated Scientist/ Specialist/ Expert Panel/Committee may visit the organization periodically to review the progress of the work being carried out and to suggest suitable measures to ensure realization of the objectives of the project. During implementation of the project, the grantee organization will provide facilities to such visitors in the form of accommodation, site visits, etc.
8. On completion of the project, final consolidated 'Project Completion Report' on the work done on the project will be prepared after incorporating suggestions, if any, from the reviewers of the project and 10 copies of the same will be submitted to the MNRE in the



prescribed format given at Annexure-XVII of 'R&D Formats' on home page of [www.mnre.gov.in](http://www.mnre.gov.in), in physical as well as electronic forms.

9. The 'Project Completion Report' must include all relevant technical details/specifications, working drawings for designing of the systems/equipment, and an inventory of materials required, etc.
10. At the time of seeking further installment of grant and closure/ termination of the project, the grantee organization / PI has to furnish the following documents:
  - a. Utilization Certificate (U.C) for MNRE grant and 'Statement of Expenditure' (S.O.E.) for the total expenditure for the previous financial year (in original or copy if sent earlier) in enclosed formats given at Annexure-IX, X and XI (of 'R&D Formats' on home page of [www.mnre.gov.in](http://www.mnre.gov.in)).
  - b. Latest authenticated 'Statement of Expenditure' including Committed Expenditure, for the expenditure on the project including cost shared by any other organization since 1<sup>st</sup> April of that financial year till the previous month; and
  - c. Technical Progress Report, if not sent earlier.
11. The Comptroller & Auditor General of India, at his discretion, shall have the right of access to the books and accounts of the grantee organization maintained in respect of the grant received from the Government of India.
12. The grantee organization will maintain separate accounts for the project in a Bank. If it is found expedient to keep a part or whole of the grant in a bank account earning interest, the interest thus earned should be reported to the MNRE and should be reflected in the 'Statement of Expenditure'. The interest thus earned will be treated as a credit to the Institute to be adjusted towards further installment of grant.
13. The grantee organization will neither entrust the implementation of the work for which the grant is sanctioned to another institution nor will it divert the grant receipts to other institute as assistance. In case the grantee organization is not in a position to implement or complete the project, it should, forthwith, refund to this Ministry the entire grant or the balance received by it at the earliest.
14. All the personnel including Research personnel appointed under the project, for the full/ part duration of the project, are to be treated as project personnel on contract to the organization and will be governed by the Administrative rules/ service conditions (for leave, TA/DA etc.) of the implementing Institute. They are not to be treated as employees of the Government of India under any circumstances and the MNRE will have no liability, whatsoever, for the project personnel after completion of the project duration.
15. For the expeditious implementation of the research project, the PI will take the assistance of the grantee organization in the process of selection and appointment of staff and payment to them in accordance with the guidelines given at Annexure-VII of 'R&D Formats' on home page of [www.mnre.gov.in](http://www.mnre.gov.in). Scale and emoluments for the posts not covered in the said guidelines are to be governed by the norms prevalent in the grantee organization or as decided in consultation with MNRE. Deviations from these guidelines, generally, shall be considered only in consortium projects or projects taken up by an industry on 50:50 cost sharing basis.
16. The Ministry reserves the right to terminate the project at any stage if it is convinced that the grant has not been properly utilized or sufficient progress has not been reported under the project or sufficient efforts have not been devoted.



17. The project becomes operative with immediate effect or within a maximum of one month from the date on which the ECS/ Draft/ Cheque is received by the implementing Institution. This date should be intimated by the grantee authorities/ Principal Investigator to this Ministry.
18. The grantee organization shall associate a co-PI with the project, if not already part of the project team. The co-PI shall function as PI in the absence of PI and should be totally in knowledge of the activities of the project to avoid loss to the project in case PI leaves the project / organization.
19. If the PI to whom a grant for a project has been sanctioned wishes to leave the grantee organization where the project is sanctioned, the grantee organization/ PI will inform the same to the Ministry and in consultation with MNRE, evolve steps to ensure successful completion of the project through co-PI, before relieving the PI or appoint another Scientist as PI.
20. If the results of research are to be legally protected under IPR, the results should not be published without action being taken to secure legal protection for the research results.
21. Investigator(s) wishing to publish technical/ scientific papers based on the research work done under the project should acknowledge the assistance received from MNRE, indicating the project sanction no. under which grant has been given to the grantee organization. The PI will submit a copy of the paper to the Ministry as soon as it is published.
22. If the results of the work carried out under the grant require preparation of a technical booklet/ guides/ software/ CD etc. in such cases the grantee organization will publish/ prepare sufficient copies (number of copies to be decided in consultation with MNRE) and keep a portion for their use/ dissemination and submit the remaining copies to the Ministry for their use and distribution.
23. If the result is in the form of a survey report / product performance evaluation or other such activities which have commercial implications, the grantee organization will not publish the results without specific written approval of this Ministry.
24. The grantee institution/ PI should provide a copy of the 'Full Text Document' of the Patent/ PI within one month of its publication.
25. The grantee organization(s)/ Inventor(s) are required to seek protection of Intellectual Property Rights for the results/ output of the sanctioned RD&D projects and shall share royalty/ proceeds of sale of IPR in accordance with the guidelines given below:
  - i. The Government shall have a royalty-free license/ marching right for the use of the Intellectual Property for the purposes of the Government of India and this Ministry reserves the right to require the institution and the industry to license others and that anyone exclusively licensed to market the innovation in India, must manufacture the product in India.
  - ii. In case MNRE files patents (when grantee organization is unable to file a patent) any earnings accruing from transfer and commercialization shall be shared equally by this Ministry with the Institution and the generator of the Intellectual Property. However, wherever the expected earnings are above Rs.10 lakh, the proportion of sharing can be 40% for the institution, 40% for this Ministry and 20% to the generator of Intellectual Property.
  - iii. The grantee organization(s) is permitted to retain the benefits arising out of the IPR. In case of more than one institution, IPR generated through joint research can be owned jointly by them as may be mutually agreed to by them through a written agreement.



- iv. The institution and industry may transfer the technology to another industry for commercialization, on terms and conditions as may be mutually agreed upon, on non-exclusive basis under intimation to MNRE. Any earnings accruing from such a transfer and commercialization shall be shared between the institution and the industry as may be mutually agreed to. The details of the agreement, amounts-received, annual sales turnover of the product shall be intimated periodically to this Ministry.
- v. In case of projects supported solely to industry, any earnings arising out of sale/transfer of IPR generated through the MNRE supported project shall be shared between the MNRE and the industry in the ratio of their individual shares of the project cost.
- vi. Other terms and conditions regarding IPR issues shall be in accordance with the guidelines contained in the DST circular issued with the concurrence of Ministry of Finance, Department of Expenditure vide their O.M. No.33 (5)PF- II99, dated 22nd February, 2000 or subsequent circulars which may be issued by DST/ MOF on the subject (Annexure-XV of 'R&D Formats' on home page of the Ministry ([www.mnre.gov.in](http://www.mnre.gov.in))).

26. In case of any dispute the decision of Secretary, Ministry of New and Renewable Energy shall be final.

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