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 though 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

Dr. Rajesh Kumar
(Scientist F)

Annexure-A-I

Renewable Energy Research and Development Priorities

Area	Technology Gap	Research Areas
Solar Photovoltaic	• Import dependence for wafers, cells and modules. • Mass manufacturing of cells and modules. • Availability of alternative options in emerging technologies.	i. Indigenous PV cell technology with globally competitive prices and performance; ii. Cutting edge manufacturing techniques for indigenous manufacture; and iii. Next generation PV technologies including Perovskites, Thin films, Multi-Junction Solar Cells, Dye induction photovoltaics, organic/inorganic composites etc. iv. Development of cost competitive packages for applications beyond grid electricity, including cooking, lighting, water pumping, irrigation etc.
Solar Thermal Applications	• Import dependence for solar field components. • Conversion efficiencies derive	i. Improving conversion efficiencies and reducing costs through improved designs, new materials, manufacturing processes, deployment of higher conversion temperatures, alternative heat transfer fluids etc. ii. Thermal storage systems integrated with power, heating or cooling applications iii. Indigenizing Reflector materials with good outdoor durability, high solar reflectivity, good mechanical resistance.
Waste to Energy	• Lack of standardization of process leads to unfavourable economics.	i. Technologies for efficient utilization of urban, farm and industrial waste for power generation at minimum

		economic and environmental costs
Wind Energy	• Import dependence for technologies for offshore wind deployment. • Modelling and simulation to ensure accurate forecasting.	i. Cost reduction and indigenization of wind turbine components and sub-systems; ii. Development of materials, techniques and technologies for offshore wind energy deployment; iii. Modelling and simulation including high-performance computing (HPC) to improve generation forecasting, and performance analysis.
Hydrogen and Fuel Cells	• Availability of hydrogen of desired purity at viable costs. • Import dependence for hydrogen storage materials. • Import dependence for fuel cell components and stacks. • Lack of infrastructure for transportation/distribution of hydrogen to end user locations.	i. Increasing efficiency and indigenous content of electrolyzers; ii. Indigenous development of type III and type IV cylinders, as well as hydride and carbon materials for hydrogen storage; iii. Development of indigenous catalysts, membranes, balance of system components and stack assemblies; iv. Development of Fuel cell based applications for power generation, transportation, logistics etc; and v. Development of hydrogen distribution networks through pipelines, and dispensing stations.
Energy Storage	• Limited experience with new energy storage technologies, like li-ion, sodium ion, sodium sulphur batteries. • Lack of standardized controls and interfaces.	i. Next Generation Energy storage devices for grid-scale storage at economic cost; ii. Standardization of controls and interfaces to allow flexible operation; and iii. Simulation and Modeling for evaluation of storage requirement for different

	• 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.	applications including grid support, ancillary services, e-mobility, peak shifting etc, so that appropriate technology choices could be put implemented for each scenario.
Small hydro	• Indigenously available. However, need to develop modular systems.	i. Modular turbines with reduced weight and higher conversion efficiency at lower cost.