

GOVERNMENT OF INDIA
MINISTRY OF NEW AND RENEWABLE ENERGY
LOK SABHA
UNSTARRED QUESTION NO. 716
ANSWERED ON 04.02.2026

RESEARCH AND DEVELOPMENT PROJECTS ON RENEWABLE ENERGY

716. SHRI BASTIPATI NAGARAJU

Will the MINISTER OF NEW & RENEWABLE ENERGY be pleased to state:

- (a) the details of the total number of renewable energy related Research and Development (R&D) projects supported by the Government till date, State, year and sector-wise;
- (b) the details of the funds allocated and disbursed for such R&D projects especially in Andhra Pradesh, project-wise;
- (c) the details of technologies developed and indigenous renewable energy systems and devices developed till date, project and State-wise;
- (d) whether the Government has received any proposals from Andhra Pradesh for R&D projects in renewable energy during the last five years; and
- (e) if so, the details of the total number of proposals approved thereof?

ANSWER

THE MINISTER OF STATE FOR NEW & RENEWABLE ENERGY AND POWER

(SHRI SHRIPAD YESSO NAIK)

(a) & (b) As per records available in MNRE, a total number of 42 research and development projects are being supported during the period FY 2021-22 to FY 2025-26. The State, year and sector-wise details for such R&D projects are given in **Annexure-I**. No funds have been allocated or disbursed specifically for Andhra Pradesh.

In addition, Department of Science and Technology (DST) has also supported 16 numbers of R&D projects in the field of renewable energy.

(c) The specific details of technologies developed and indigenous renewable energy systems and devices developed from of R&D projects are placed at **Annexure-II**.

(d) & (e) R&D proposals are received from academic institutions across the country, and after due diligence, proposals have been sanctioned to various institutions such as IIT Bombay, IIT Roorkee, IIT Jodhpur, IIT Madras, National Institute of Solar Energy, National Institute of Wind Energy, and National Institute of Bio-Energy etc., However, none of the institutes are located in Andhra Pradesh.

Annexure-I referred to in reply of parts (a) of the Lok Sabha Unstarred Question No. 716 to be answered on 04.02.2026

1. Under Renewable Energy Research and Technology Development (RE-RTD) Programme

S. No.	Project Title	Year (Date of sanction)	Location	Sector/theme
1.	National Centre for Photovoltaic Research and Education (NCPRE) - Phase III”,	10.11.2022	IIT Bombay Maharashtra	Solar PV
2.	National Primary Standard Facility for Solar Cell Calibration,	27.06.2017	CSIR NPL Delhi	Solar PV
3.	Flexible Perovskite Solar Cells and Intermediate Module”,	28.02.2019	IIT Bombay Maharashtra	Solar PV
4.	Scale-up of Perovskite Tandem Solar Cells (Phase I)”,	18.12.2024	IIT Bombay Maharashtra	Solar PV
5.	Perovskite Solar Modules”,	18.12.2024	IIT Bombay Maharashtra	Solar PV
6.	Centre of Excellence titled “Research and development of Ultra Low head and Hydrokinetic Turbines and performance prediction of small hydro turbine models”,	29.03.2023	IIT Roorkee Uttarakhand	Small Hydro
7.	Biomass Gasification through Plasma Pyrolysis Technology for Chemical Production,	24.03.2022	IIT Roorkee Uttarakhand	Waste to Energy
8.	Densification and co-firing of Agro-waste for power generation through gasification”,	24.03.2022	SSS-NIBE Punjab	Waste to Energy
9.	Green Hydrogen Mobility Projects at Leh”,	01.11.2022	NTPC, Ladakh (UT)	Hydrogen Energy
10.	Design & development of 20kW Low Temperature Polymer Electrolyte Membrane Fuel Cell (LTPEMFC) with high indigenous Content”	25.03.2019	ARCI-CFCT Hyderabad, Telangana	Hydrogen Energy
11.	Setting Up of a Centre of Excellence on Hydrogen Energy at National Institute of Solar Energy”,	28.02.2019	NISE Gurugram Haryana	Hydrogen Energy
12.	Pilot Integrated Commercial Geothermal Energy of 450 kW by retrofitting unproductive oil and gas wells: Raageswari Gas field, Barmer, Rajasthan”,	01.08.2025	IIT Madras Tamandu	Geothermal Energy
13.	Harnessing of geothermal energy from Arunachal Himalaya”,	25.07.2025	CESHs (Govt. of Arunachal Pradesh) Arunachal Pradesh	Geothermal Energy
14.	Demonstration of power generation using integrated Solar-Geothermal energies”,	14.08.2025	PDEU Gandhinagar Gujarat	Geothermal Energy
15.	A Pilot Project on Study and Testing of Shallow Geothermal Energy Potential in India”,	19.08.2025	IIT Delhi Delhi	Geothermal Energy

16.	Design and Development of Geothermal Cooling for Air Conditioning System in 20x20x10 ft Room”,	19.08.2025	OTBI-Osmania University Hyderabad, Telangana	Geothermal Energy
17.	Demonstrating Innovative, Reliable, Efficient and Cost competitive 500 kW Tidal Power Plant in Arunachal Pradesh,	17.12.2025	CESHs and Tidal Sail Arunachal Pradesh	Tidal Energy
18.	Design and Development of Power Back up of 1kWh based on Sodium ion Cell operable at sub-Zero temperature for Solar street/home UPS,	31.12.2025	IIT Roorkee Uttarakhand	Energy Storage
19.	Next Generation Energy Storage: Industrial scale manufacturing of Low-Cost High Temperature Latent Heat Storage Using Chloride Salts as the Storage medium,	19.12.2025	IIT Jodhpur Rajasthan	Solar Thermal Energy Storage

2. Under National Green Hydrogen Mission

A list of the 23 projects sanctioned in FY 2024-25, along with their sector/theme, is placed below for information:

Sl. No.	Project Title	Location	Sector / Theme
1	Development and Demonstration of Direct Injection Hydrogen Fuelled Internal Combustion Engines (H2ICE) for Heavy Duty Commercial Vehicles	Pune, Maharashtra	Applications
2	Development of retrofitted kit for H2ICE Application	Gurugram, Haryana	Applications
3	Development and Demonstration of Hydrogen-fuelled Internal Combustion Engine for Agricultural Tractor	Chennai, Tamil Nadu	Applications
4	Prototype Development of a Highly Efficient Compression Ignition Hydrogen Engine for Agriculture Sector	Kanpur, Uttar Pradesh	Applications
5	Development of hydrogen-powered high-power-density fuel cell drone for oil & gas applications	Guwahati, Assam	Applications
6	Development of Fuel-cell powered high-endurance UAVs	Coimbatore, Tamil Nadu	Applications
7	Design, Development and Manufacturing of Indigenous Solid Oxide System for Electrolyser and Fuel Cell	Bengaluru, Karnataka	Applications
8	Green Hydrogen Generation via Direct Seawater Electrolysis	Karaikudi, Tamil Nadu	Production (Non-Biomass)
9	Supramolecular Approach to Improve Stability of Alkaline Electrolyser Membranes	Chennai, Tamil Nadu	Production (Non-Biomass)
10	Integrated Heat Management for Energy-Efficient Direct Seawater Desalination	Pune, Maharashtra	Production (Non-Biomass)
11	Development of High-Performance PEM Membranes	Vadodara, Gujarat	Production (Non-Biomass)
12	Clean Hydrogen: Enhancing Biohydrogen Purity	Sekkalakottai, Tamil Nadu	Production (Biomass)
13	Synergistic Biohythane Production	Pune, Maharashtra	Production (Biomass)
14	Technology Demonstration Plant for Green Hydrogen from Biomass Pyrolysis + Gasification	Mumbai, Maharashtra	Production (Biomass)

Sl. No.	Project Title	Location	Sector / Theme
15	Biomass to Green Hydrogen: 100 kg/day Demonstration	Pilani, Rajasthan	Production (Biomass)
16	Pilot Plant for Hydrogen Production from Agricultural Waste	Bara Phool, Punjab	Production (Biomass)
17	AI-based Smart Sensors for Real-time Hydrogen Leak Detection	Thiruvananthapuram, Kerala	Safety
18	AI-Driven Insights into Global Hydrogen Incidents	Patiala, Punjab	Safety
19	Spontaneous Combustion Behaviour of Pressurised Hydrogen Leaks	Varanasi, Uttar Pradesh	Safety
20	Causal Analysis and Machine Learning for Risk Prediction in Hydrogen Facilities	Delhi	Safety
21	Electronic Hydrogen Leak Detector using MEMS Nanofibres	Thiruvananthapuram, Kerala	Safety
22	CFD Modelling in FLACS-Hydrogen for Safety Assessment	Gurugram, Haryana	Safety
23	Hydrogen Explosions – Developing Phenomenological Models	Varanasi, Uttar Pradesh	Safety

All the above projects were sanctioned in FY 2024-25 and are currently at the initial stages of development. As such, no project outcomes or technology developments have been reported so far.

3. Under the Department of Science and Technology (DST)

The Call for proposal solicited proposals across India including Andhra Pradesh with thrust R&D area focus on solar energy and blending of biomass for FY 2020-21 to 2024-25 are as follows: -

State	FY 2020-21	2021-22	2022-23	2023-24	2024-25
Karnataka	1	4		1	1
Tamil Nadu	3	7		2	3
Delhi	1	3	1	1	1
Haryana	1				1
Kerala	1		1		
Rajasthan		2			
UP		2			2
Punjab		2			1
Odisha		2			
Maharashtra		5			
Telangana		1		2	
Uttarakhand		2			
West Bengal		5			1
Assam		2			2
MP		1			
Gujrat		1			1
Chhattisgarh					1
Mizoram					1
Arunachal Pradesh					1
Total	7	39	2	6	16

Annexure-referred to in reply of parts (c) of the Lok Sabha Unstarred Question No. 716 to be answered on 04.02.2026

S. NO.	Name of project/Institutions	State	Technology Developed
1.	National Centre for Photovoltaic Research and Education (NCPRE) - Phase III”, IIT Bombay (IITB)	Maharashtra	<p>The National Centre for Photovoltaics Research & Education (NCPRE), a centre of Excellence in solar energy has made significant achievements in the area of solar research and development. The following technologies developed</p> <ul style="list-style-type: none"> • Advanced PV testing, reliability, and material technologies, • developed an IoT-based I–V tracer, fast QE setup, • low-cost albedometer, and non-destructive EQE system. • Developed perovskite–silicon tandem cells with 29.14% efficiency and CdTe tandems with 24.2% power conversion efficiency and 3,000-hour stability • Developed SiC-based inverters and reliability algorithms. <p>Following instruments are developed and then commercialized by the instrument makers,</p> <ul style="list-style-type: none"> • Thermal Atomic Layer Deposition (ALD), costing ~INR 50Lacs which can replace the imported ones (~INR 1.5-2 Crore) • Ozone cleaner - commercialized by Indian manufacturer and exporting even to the USA. • Laser Scriber - commercialized by an Indian manufacturer and then sold globally, including Singapore, and ISRO. Imported INR 2 Crore and our product sold in ~INR 50Lacs. • Laser Beam Induced Current (LBIC) - Currently developed and is in the marketing stage
2.	National Primary Standard Facility for Solar Cell Calibration, CSIR NPL	Delhi	<p>National Primary Standard facility for cell calibration by NPLCSIR-NPL has established India’s first National Primary Standard Facility for Solar Cell Calibration, making India the fifth country with a World Photovoltaic Scale (WPVS)-recognized setup. The Laser-based Differential Spectral Responsivity (L-DSR) system, developed with PTB Germany, achieves a world-leading 0.35% uncertainty (highest accuracy), enhancing precision and self-reliance in solar metrology.</p>
3.	Flexible Perovskite Solar Cells and Intermediate Module”, IIT Bombay	Maharashtra	<p>In the area of perovskite solar cell, IIT Bombay has developed world second highest efficiency cell with 26% against world efficiency of 27%. The institute is now working on establishing a production line to scale up this technology. Additionally, IITB has achieved 30.2% power conversion efficiency for four-terminal Perovskites Silicon tandem cell.</p>

4.	Green Hydrogen Mobility Projects at Leh”, NTPC	Ladakh (UT)	The NTPC Green Hydrogen Mobility Project in Leh, India’s first fully operational green hydrogen-based mobility initiative, integrates a 1.70 MW solar plant with a system producing 80 kg of hydrogen per day. Five hydrogen fuel cell buses with 200 km range operate successfully in high-altitude conditions, demonstrating the technology’s reliability. Commissioned in November 2024, the project marks a major achievement in renewable energy and sustainable transport integration.
5.	Design & development of 20kW Low Temperature Polymer Electrolyte Membrane Fuel Cell (LTPEMFC) with high indigenous Content”, ARCI-CFCT	ARCI, IIT Madras Research Park, Tamil Nadu	The project achieved the design of a 20 kW LT-PEM fuel cell stack with 95% indigenous components and demonstrated a scalable 100 kW system. It established India’s first automated PEM fuel cell pilot line (100 kW/year capacity), achieved 5000 hours durability with over 45% efficiency, and reduced costs to ₹2 lakh/kW. Two patents have been filed, and the project has laid a strong foundation for the indigenous commercialization of fuel cell technologies
Under the Department of Science and Technology (DST) R&D projects, Micro solar domes, Solar panel cleaning systems and lab scale high efficiency solar devices have been developed from the supported projects.			