GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF SCIENCE AND TECHNOLOGY
LOK SABHA
UNSTARRED QUESTION NO. 3070
ANSWERED ON 19/03/2025

CARBON CAPTURE, UTILIZATION AND STORAGE (CCUS) PROJECTS

3070. SHRI BASTIPATI NAGARAJU:

Will the Minister of SCIENCE AND TECHNOLOGY be pleased to state:

(a) the details of the total number of Carbon Capture, Utilization and Storage (CCUS) projects supported by the Government till date under Mission Innovation Challenge on CCUS, along with their expected date of completion, location-wise, year-wise, activity and sector-wise;

(b) the details regarding the funds allocated and disbursed by the Government for said projects, project-wise and year-wise;

(c) the amount of carbon captured till date from the supported projects, project-wise and year-wise;

(d) the details of the number of CCUS related Research and Development (R&D) projects undertaken by the Government in collaboration with other countries along with the technologies developed or undergoing development;

(e) whether the Government is accepting proposals for new CCUS projects under the said mission; and

(f) if so, the details thereof?

ANSWER
MINISTER OF STATE (INDEPENDENT CHARGE) OF THE MINISTRY OF SCIENCE AND TECHNOLOGY AND EARTH SCIENCES
(DR. JITENDRA SINGH)

विज्ञान और प्रौद्योगिकी तथा पृथ्वी विज्ञान मंत्रालय के राज्य मंत्री (स्वतंत्र प्रभार)
(डॉ. जितेंद्र सिंह)

(a) to (b): Under Mission Innovation (MI) Challenge on Carbon Capture Utilisation and Storage (CCUS), the two Departments under Ministry of Science and Technology namely Department of Science and Technology (DST) and Department of Biotechnology (DBT) have jointly supported 25 projects for CCUS R&D. The complete details of these 25 projects as supported by DST and DBT till date, project wise and year-wise are given in Annexure-I as (A) and (B) respectively.

(c) Ministry of Science and Technology has supported 14 projects on Carbon Capture focusing on lab level R&D. In addition, National Thermal Power Corporation (NTPC), a Public Sector Undertaking (PSU) under Ministry of Power, has supported commissioning of a CO_2 pilot plant at Vindhyanchal, Madhya Pradesh in the year 2023, which currently captures 3000 tons per annum of CO_2 (Carbon Dioxide).

(d) DST has undertaken 5 projects for support in collaboration with various other countries. Details of these projects are given in Annexure II.

(e) to (f): Yes Sir, DST accepts CCUS proposals under the MI Mission through its periodic thematic calls. In the year 2023, DST launched the call under CDR (Carbon Dioxide Removal) Mission of MI, total number of 3 projects have been supported till date as per the details given in Annexure III.

Annexure-I

Table 1: (A) CCUS Projects supported by Department of Science & Technology (DST) as part of Mission Innovation Challenge including the fund allocated and disbursed

Sr. No.	Project Name/ Activity	Organisation and Location (*Organisation full name mentioned in the table below)	Sector	Year	(in ₹ Lakhs)		Date of Completion
					Fund Allocated	Funds Disbursed	
1	Demonstration of 1000 lit/day Syngas Generation Via Dry Reforming	CSIR- IIP, Dehradun Uttarakhand	Utilisation	2019-20	72.36	48.16	22.03.2021
				2020-21		5.7	
2	Development of hybrid multi electrode plasma reactor for energy efficient dry reforming of greenhouse gases.	Pondicherry University, Puducherry	Utilisation	2019-20	74.5	35.98	29.09.2022
				2021-22		14.48	
				2023-24		6.07	
3	Development of Methods for Utilisation and Conversion of Waste CO_2 to Fuels	CSIR- NCL, Pune, Maharashtra	Utilisation	2019-20	66.37	33.06	27.09.2022
				2021-22		10.84	
4	Study on new green CO_2-capturing solvents	ICT, Mumbai, Maharashtra	Capture	2019-20	43.7	15.14	27.09.2022
				2021-22		12.85	
5	Development of a geomechanical model for cyclic CO_2 injection and methane release through experimental studies of matrix shrinkage/swelling, mechanical properties, and permeability of coals	IIEST, Shibpur, West Bengal	Storage	2019-20	49.11	26.37	17.12.2022
6	Development of Integrated technologies for reduction of anthropogenic / industrial waste CO_2 to value added Chemicals and Fuels.	JNCASR, Bengaluru, Karnataka	Utilisation	2019-20	324.32	275.11	23.09.2022
				2020-21		16.93	

Sr. No.	Project Name/ Activity	Organisation and Location (*Organisation full name mentioned in the table below)	Sector	Year	(in ₹ Lakhs)		Date of Completion
					Fund Allocated	Funds Disbursed	
7	Nano-Encapsulation Driven Synergistic Activation of Carbon Dioxide into Fuel	NIT, Tiruchirappalli, Tamil Nadu	Utilisation	2019-20	69.42	45.56	10.12.2022
8	Development of low cost, efficient and scalable materials for CO_2 captures using naturally available nontoxic stable materials and industrial solid wastes	IIT, Gandhinagar, Gujarat	Capture	2019-20	60.09	34.05	18.11.2022
				2020-21		10.53	
9	Hierarchical Porous Covalent Organic Nanosheets and Nanosheets Based Hybrid Membranes for Carbon Capture and Separation of CO_2	IISER, Kolkata, West Bengal	Capture	2019-20	56.32	43.36	26.09.2022
				2021-22		4.48	
10	Development of catalysts and a prototype device for conversion of CO_2 to fuels / Chemicals	IIT Bombay. Mumbai, Maharashtra, IIT Guwahati Assam	Utilisation	2019-20	49.06	21.18	7.11.2019
				2021-22		7.81	
11	Development of hierarchical novel Catalyst for one pot Conversion of CO_2 rich synthesis gas to Dimethyl ether and scale-up Studies	IIT, Delhi, New Delhi	Utilisation	2019-20	169.21	143.51	
				2021-22		14.09	23.09.2021

Sr. No.	Project Name/ Activity	Organisation and Location (*Organisation full name mentioned in the table below)	Sector	Year	(in ₹ Lakhs)		Date of Completion
					Fund Allocated	Funds Disbursed	
12	Studies on CO fueled self-sustaining Unmixed Combustion (UMC) reactor for integrated CO_2 capture and power/steam generation	BITS, Goa	Capture	2019-20	78.62	49.14	16.01.2023
				2022-23		12.05	
13	Adsorption and separation of CO_2 by porous carbon obtained from agro-residues through cost-effective, clean energy methodology	CSIR –CSMCRI, Bhavnagar, Gujarat	Capture	2019-20	129.95	66.46	23.09.2022
				2020-21		13.02	
						10.03	
14	A systematic large-scale assessment for potential of CO_2 enhanced oil and natural gas recovery in key sedimentary basins in India	IIT, Bombay, Maharashtra	Storage	2019-20	199.29	94.01	22.09.2022
				2020-21		27.1	
				2022-23		21.01	
15	Bench scale design and development: Investigation of high frequency, high intensity ultrasonics for carbon rich solvent regeneration in solvent-based post combustion CO_2 capture process PCCC for reducing CO_2 capture energy demand	SSN College of Engineering, Chennai, Tamil Nadu	Capture	2019-20	186.77	91.15	19.01.2023
				2022-23		50.55	
16	Model Based Design, Synthesis and Evaluation of Combined sorbent catalyst Material (CSCM) for CO_2 Capture.	CSIR-IICT, Hyderabad, Telangana	Capture	2019-20	106.85	86.19	17.10.2022
				2021-22		8.59	
				2022-23		8.55	

Sr. No.	Project Name/ Activity	Organisation and Location (*Organisation full name mentioned in the table below)	Sector	Year	(in ₹ Lakhs)		Date of Completion
					Fund Allocated	Funds Disbursed	
17	Nanoengineered Inorganic Halide Perovskites for Solar Based CO_2 Reduction: Novel Artificial Photosynthesis Implementation for Clean Energy Generation	G S Mandal's Marathwada Institute of Technology, Aurangabad, Maharashtra	Utilisation	2019-20	20.55	15.05	10.12.2021
				2021-22		2.00	
18	Integrated CO_2 absorption and conversion to methanol in slurry phase reactors using metal complexes as catalyst.	IIT Delhi	Utilisation	2019-20	90.24	65.52	27.09.2022
				2020-21		5.5	
19	Structure, Interaction and Process for Energy Efficient CO_2 Separations Using Novel Ionic Liquids Supported Membranes	PDPU, Gandhinagar, Gujarat	Utilisation	2019-20	28.01	10.57	27.09.2022
				2021-22		7.17	
				2022-23		6.03	
Grand Total					1874.74	1474.95	

(B) Details of CCUS Projects supported by Department of Biotechnology (DBT) as part of Mission Innovation Challenge including the fund allocated and disbursed

Sr. No.	Project Name/Activity	Institute Name	Sector	Funds* (in ₹ Lakhs)			Date of Completion
				Year	Allocated	Disbursed	
1.	Bioconversion of CO2 to Biofuels through Microbial Catalyzed Systems	VIT University, Vellore Campus, Vellore	Biological Carbon Capture	2019-2020	49.97	36.11	11/02/2023
2.	Sequestration of CO2 with Simultaneous Production of Succinic Acid by metabolically engineering.	The Energy And Resources Institute, New Delhi		2019-2020	58.97	31.06	29/12/2022
				2020-2021			
				2022-2023		18.94	

Sr. No.	Project Name/Activity	Institute Name	Sector	Funds* (in ₹ Lakhs)			Date of Completion
				Year	Allocated	Disbursed	
3.	Integrated Design and Demonstration of Intensified CO2 Capture with cost effective advanced Process. (INDIA-CO2)	PDPU Gandhinagar - Gujarat,		2020-2021	62.77	46.66	19/11/2023
				2023-2024		5.91	
4.	Solar assisted hydroformylation/ carboxylation of olefins containing natural products with CO2	Indian Institute of Petroleum, Mohkampur Haridwar Road, Dehradun - Uttarakhand,		2019-2020	57.26	17.734	22/06/2023
				2023-2024		24.26	
5.	Metabolic engineering of cyanobacteria for photosynthetic conversion of carbon dioxide into storable fuels	IIT Bombay		2019-2020	89.99	43.85	29/03/2023
				2022-2023		16.43	
6.	Impact of Carbon Nanomaterial based Photocatalyst on Micr oalgae Growth and Lipid for Improved Biodiesel	Motilal Nehru National Institute of Technology		2019-2020	51.25	26.43	04/08/2023
				2021-2022		10.90	
				2022-2023		9.68	
Grand Total					370.21	287.96	

Full forms for Table no. 1(A) & 1 (B) from the Annexure – I

Sr. No	Institute Short Name	Institute Full Form
1	CSIR-IIP, Dehradun	Council of Scientific & Industrial Research - Indian Institute of Petroleum, Dehradun
2	CSIR-NCL, Pune	Council of Scientific & Industrial Research - National Chemical Laboratory, Pune
3	ICT, Mumbai	Institute of Chemical Technology, Mumbai
4	IIEST, Shibpur	Indian Institute of Engineering Science and Technology, Shibpur
5	JNCASR, Bengaluru, Karnataka	Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, Karnataka
6	NIT, Tiruchirappalli	National Institute of Technology, Tiruchirappalli
7	IIT, Gandhinagar	Indian Institute of Technology, Gandhinagar
8	IISER, Kolkata	Indian Institute of Science Education and Research, Kolkata
9	IIT, Delhi	Indian Institute of Technology, Delhi
10	BITS, Goa	Birla Institute of Technology and Science, Goa

Sr. No	Institute Short Name	Institute Full Form
11	IIT Bombay	Indian Institute of Technology, Bombay
12	PDPU	Pandit Deendayal Petroleum University, Gandhinagar, Gujarat
13	CSIR-CSMCRI, Bhavnagar, Gujarat	Council of Scientific & Industrial Research - Central Salt and Marine Chemicals Research Institute, Bhavnagar, Gujarat
14	SSN College of Engineering, Chennai, Tamil Nadu	Sri Sivasubramaniya Nadar College of Engineering, Chennai, Tamil Nadu
15	CSIR-IICT, Hyderabad, Telangana	Council of Scientific & Industrial Research - Indian Institute of Chemical Technology, Hyderabad, Telangana
16	VIT University, Vellore Campus, Vellore	Vellore Institute of Technology, Vellore

Annexure-II

Table 2: Details of CCUS R&D projects supported by DST in Collaboration with other countries

Sr. No.	Project Title	Financial Year	Lead Institute from India	ACT/CETP Member country Partners
1.	Stress history and reservoir pressure for improved quantification of CO2 storage containment risks SHARP Storage	2021-22/ Ongoing Project Development	IIT Bombay, Mumbai	Norway, United Kingdom, Denmark, Netherlands
2.	Sustainable Operation of post-combustion Capture plants	2021-22/ Ongoing Project Development	Guru Gobind Singh Indraprastha (GGSIP) University, New Delhi	Netherlands, UK, Germany, and USA
3.	Permanent sequestration of gigatons of CO2 in continental margin basalt deposits	2022-23/ Ongoing Project Development	CSIR – National Geophysical Research Institute-Hyderabad	Germany, Norway, and USA
4.	Maximizing Carbon Sequestration in Cement-Based Construction through Material Innovation and Additive Manufacturing	2022-23/ Ongoing Project Development	Indian Institute of Science (IISc), Bengaluru	USA
5.	Mineral Optimization driving Renewable Energy applications in Low Energy CO2 Capture and Utilization in Copper Processing	2024-25/ Ongoing Project Development	Birla Institute of Technology and Science (BITS), Goa	Sweden, Spain & Romania

ACT: Accelerating CCUS Technologies

CETP: Clean Energy Transition Partnership

Annexure-III

Table 3: Details of CCUS Projects supported by DST under CDR Mission of MI including the fund allocated and disbursed

S. No.	Project Name/ Activity	Organisation and Location	Sector	Year	(in ₹ Lakhs)		Date of Completion
					Fund Allocated	Funds Disbursed	
1	Constructing Chemically Robust Covalent Organic Nanotubes (CONTs) Coated Zeolites for Metal Free CO2 Capture and Photocatalytic CO2 Conversion in Water	Indian Institutes of Science Education and Research (IISER) Kolkata	Capture	2024-25	90.44	27.27	25.09.2027
2	CO2 Capture and Conversion to Jet Fuel via Alcohol to Jet Process	IIT Delhi	Utilisation	2024-25	176.30	97.20	24.10.2027
3	Quantification of detection threshold and sensitivity of seismic techniques for monitoring of CO2 storage sites in India	CSIR-NGRI, Hyderabad	Storage	2024-25	97.72	42.80	09.12.2027
Grand Total					364.46	167.27	

*MI: Mission Innovation

*CDR: Carbon Dioxide Removal

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