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DST's CCUS Interventions

Dr. Neelima Alam, Associate Head, CEST, DST

Awareness and Capacity Building Workshop on CCUS: Technology Policy and Regulation towards Net zero strategy

11th June 2025

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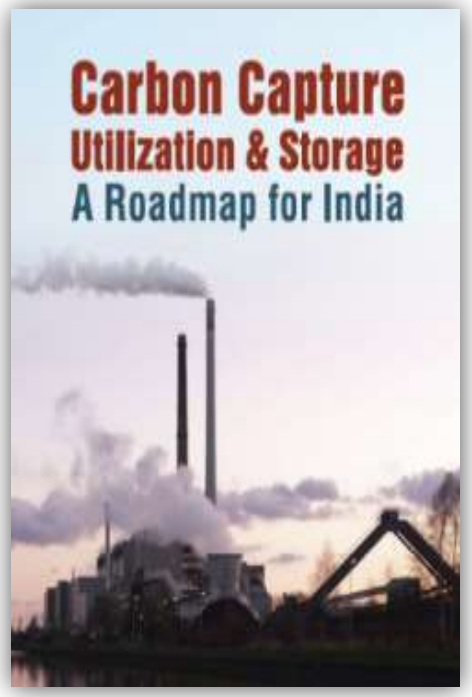
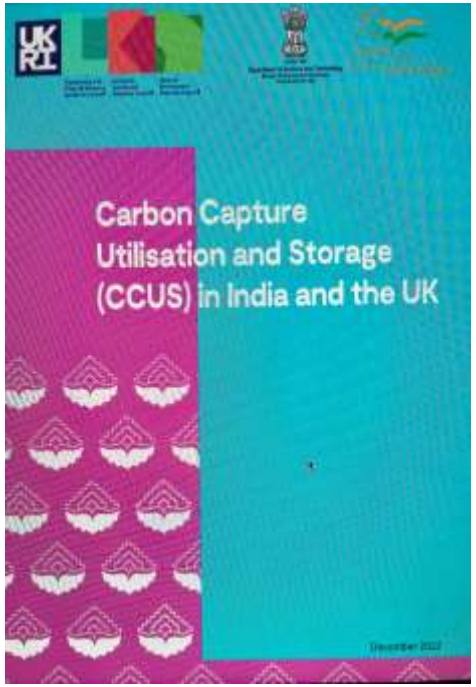
Carbon Capture Utilization and Storage in India

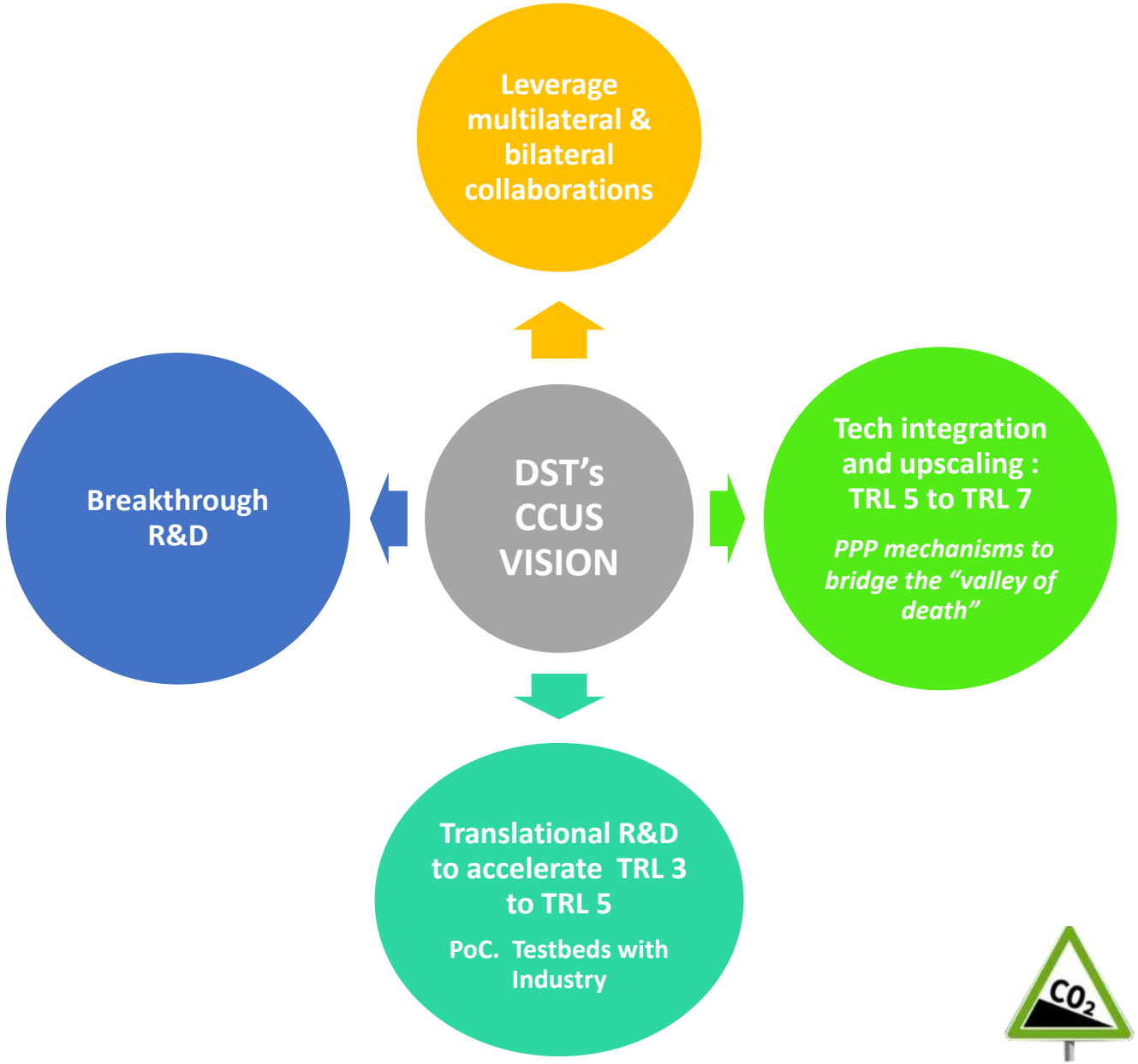
PM MODI INTRODUCES INDIA'S 'PANCHAMRIT' AT COP26 IN GLASGOW



DST-TIFAC CCUS R&D Roadmap 2018



DST's Indo-UK scoping report on CCUS



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DST's CCUS –Journey so far…..

2019

- **19** R&D multilateral projects
- **11** MI member

2020

- **2** multilateral consortia
- **14** ACT member countries

2022

- **2** multilateral consortia with **5** ACT member countries
- **Two** National CoE-CCUS, IITB & JNCSR Bengaluru

2023

- CETP **30** partnering countries & **50** Funding agencies
- **One** National CoE-CCUS, NEERI Nagpur.
- **23** CCUS RD&D projects

2024

- **Two Testbeds** for CCU deployment in **Thermal power** methanol & DME production
- Deployment of CCU in **Cement Sector**

Three National CoEs in CCUS

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R&D to Technology Validation

Funding innovation through Translational R&D

- Public Private Partnership mode
- Technology validation in hard to abate sectors

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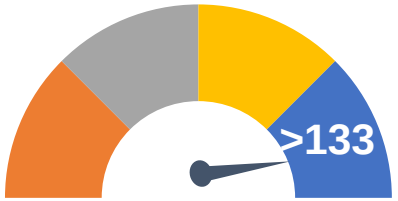
Significant Outcomes & Impacts in last 5 years

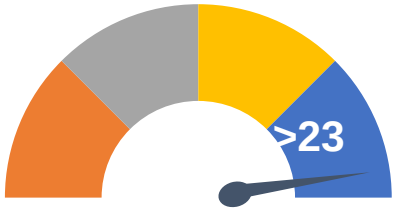
Funds Invested ~120 crores
36 Interventions supported

3 NCoEs | **26 National RD&D projects**

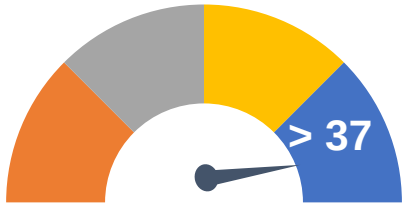
2 CCU Test Beds | **5 Multilateral Consortia**



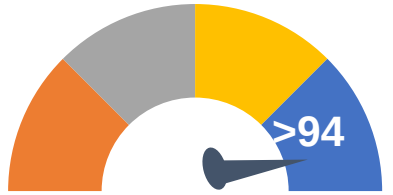
Publications



Patents granted



Technologies developed



Critical Mass : Scientists and Professionals

Tech-Commercialisation

- UrjaNovaC, IIT Bombay
- Breathe India, JNCASR Bengaluru
- Apar Ltd, PDEU, Gandhinagar, Gujarat

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Technical Outcomes……..

BREATHE

Development of hierarchical novel Catalyst for one pot Conversion of CO2 rich synthesis gas to Dimethyl ether and scale-up Studies

Integrated CO_2 absorption and conversion to methanol in slurry phase reactors using metal complexes as catalyst.

IIT Delhi
Indian Institute of Technology Delhi

Deployment of 1.4 TPD CO2 to methanol with Thermax Pune

Innovative catalysts :
CO2 to Methanol, DME & Olefins

300kg/day pilot at JNCASR Bengaluru

NCoE – CCU at JNCASR Bengaluru

JNCASR

Start up emerged from JNCASR Bengaluru

Innovative catalyst developed for polycarbonates and olefins

CO_2

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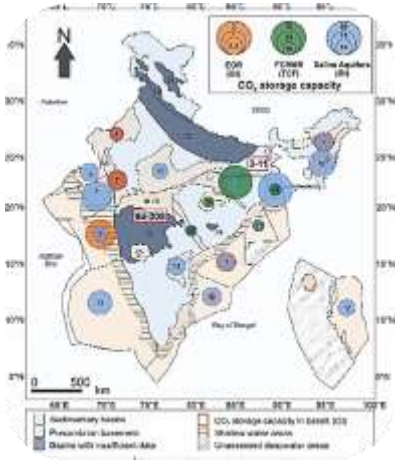
Country-wide assessment :

CO_2 sequestration & enhanced oil and gas recovery



DST-NCoE-CCUS

Startup UrjanovaC

URJANOVAC
Clean Energy & Net Zero Solutions

IIT Bombay

CO2 Mineralisation :

1 tonne/day for capture

CO2 to CO Conversion technology

Application in steel sector

Energy-Efficient CO2 capture Tech:

Ionic Liquids Membranes

PDEU PANDIT DEENDAYAL ENERGY UNIVERSITY
Formerly Pandit Deendayal Petroleum University (PDPU)
UGC RECOGNIZED

Pandit Deen dayal Energy University, Gandhinagar, Gujrat

Technology commercialised & transfer :

APAR Industries

APAR
Tomorrow's solutions today

CO_2

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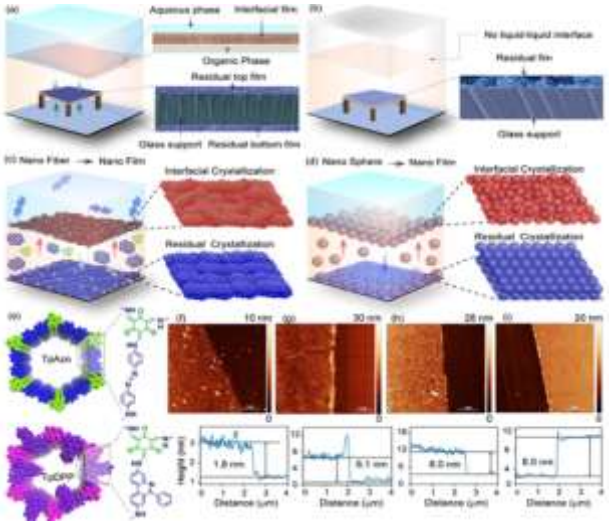

Technologies Developed

CSIR-NGRI, Hyderabad-

Permanent sequestration gigatons of CO2 in basalt deposits

CSIR-IICT Hyderabad

Dual operational FBR system and Sorbent Catalyst Materials

BITS, Goa

Unmixed Combustion (UMC) test rig

IISER, Kolkata

Hierarchical covalent organic nano sheets and hybrid membrane,

IISc , Bengaluru

Carbon sequestration

3D printable material

IIT Gandhinagar-

CaO-based material & silica aerogel materials

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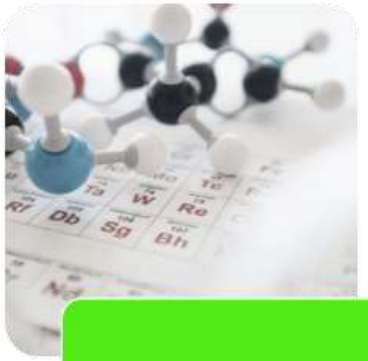
Industry tie ups and Partnerships across the Value Chain

CO_2 Capture

- Microfilt India Pvt Ltd.
- Tuticorin Alkali & Fertilizers ltd. (TFL)
- NTPC
- APAR Industries Pvt. Ltd
- UrjaNovaC Ltd.



CO_2 Utilization

- Thermax
- BHEL
- Tata Power
- Udaipur Cement Works Ltd
- Breathe India Ltd
- Dalmia
- JK Cement
- Ultratech
- JSW Cement
- Reliance Cement

Storage & Sequestration

- Coal India Ltd.
- Oil India Ltd
- BPCL
- ONGC
- IOCL

EOR , EGR

- ONGC
- Reliance Industries Ltd
- Hindustan Petroleum Corporation Ltd
- ESSAR Oil & Gas Ltd

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DST supports CO2-to-Methanol CCU Test bed in PPP Mode to be set up in Pune

IIT Delhi
Indian Institute of Technology Delhi

THERMAX
THERMAX LIMITED

Public Private Partnership

CO_2

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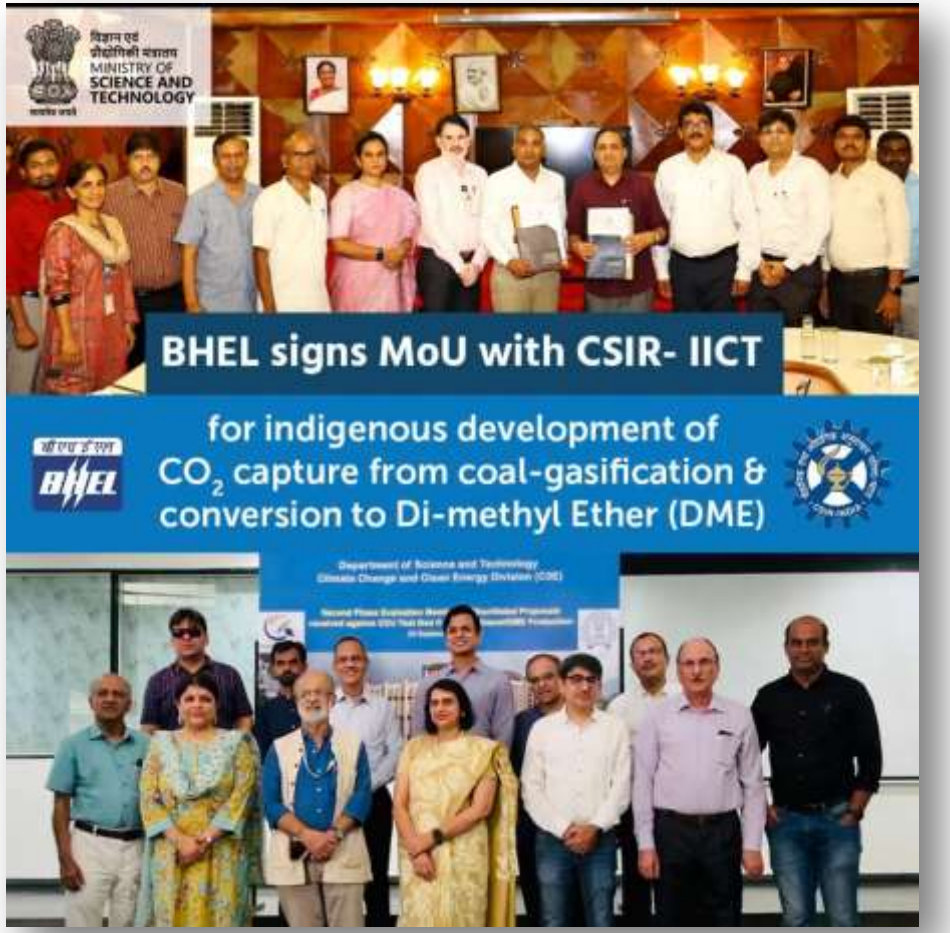
DST supported Testbed for CCU deployment in Coal Gasification for DME Production to be set up in Hyderabad

CSIR - IICT
Touching Lives

बी एच ई एल
BHEL



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Translational R&D for CCU deployment in Cement Sector

5 Academia-Industry consortia Test beds Approved by DST in PPP mode :

Premier Cement Industries and Knowledge Partners

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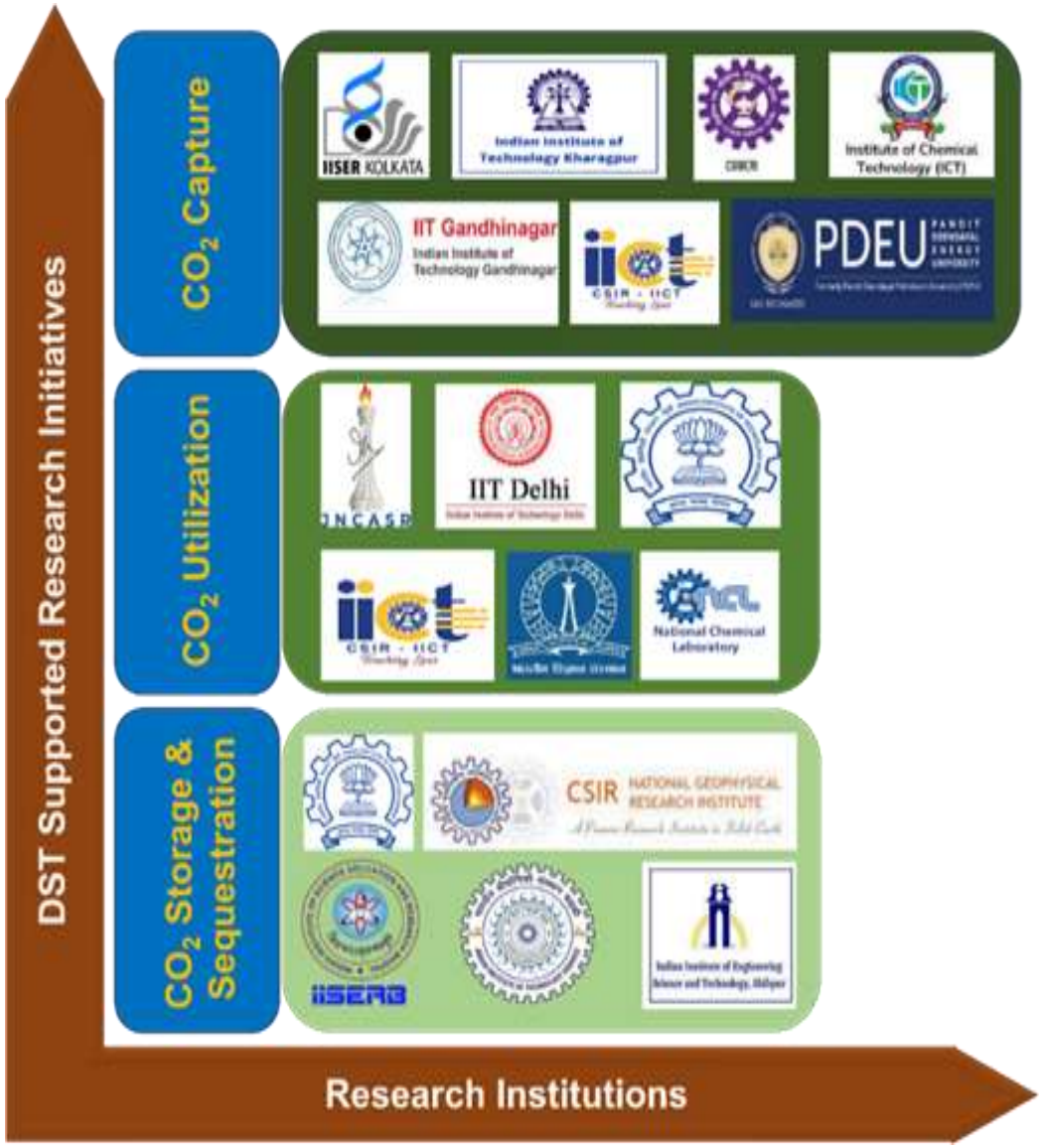
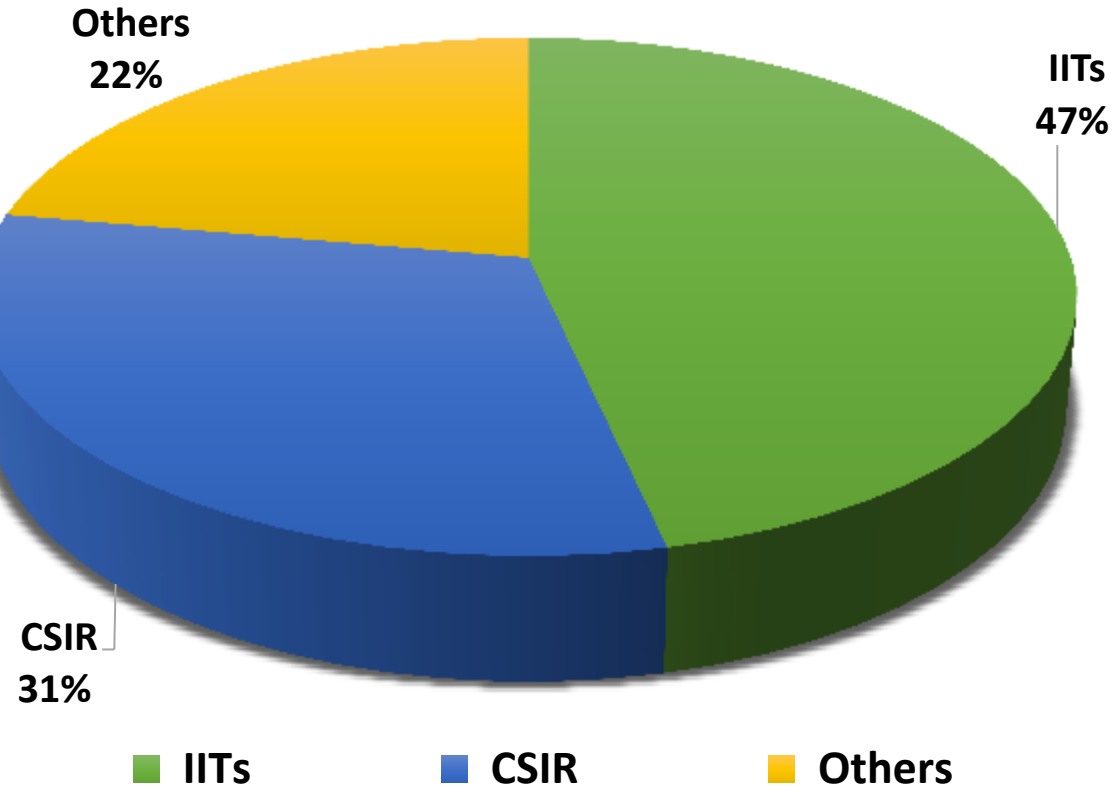
Key organizations involved in accelerating CCUS technologies



Funds allocated across CSIR Labs, IITs and Other Institutions



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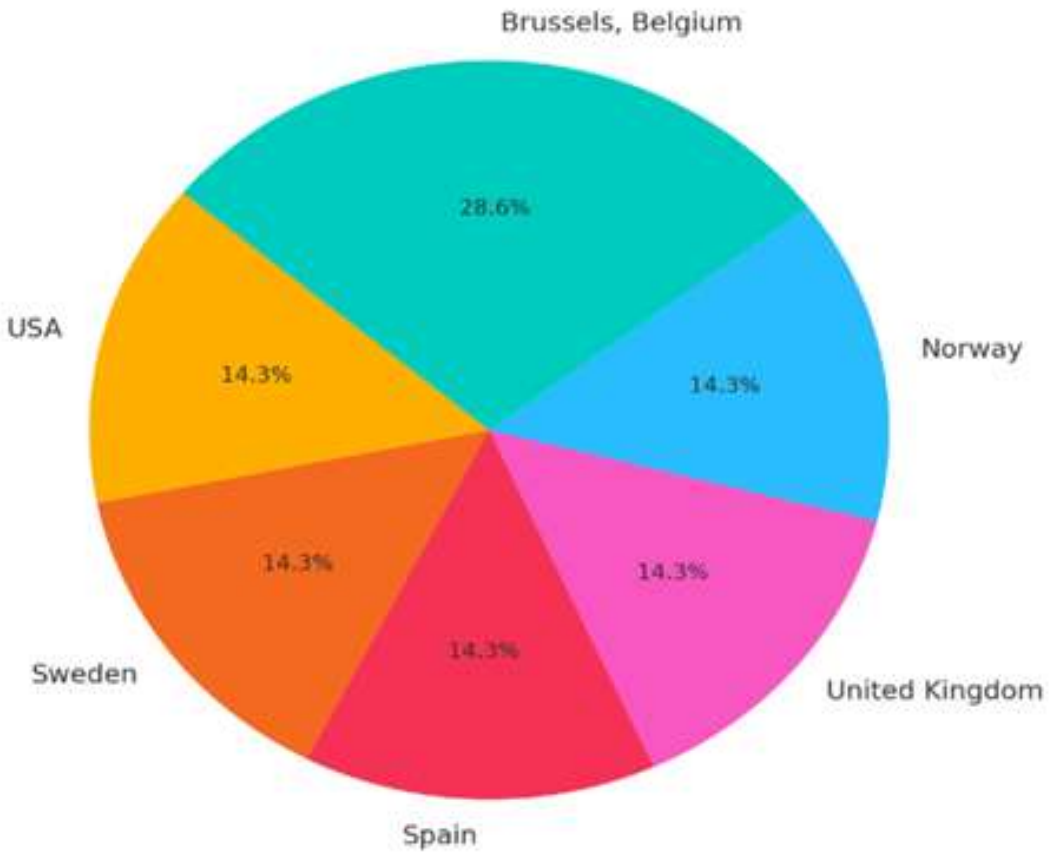
International Linkages

6 International Funding Agencies



- **33 International Universities**
- **17 International Laboratories**
- **14 International Industries**

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International Cooperations

Multilateral collaborations

UNIDO Delegation : *Brevik CCS Cement Plant & Norwegian Energy Ministry*

Indo –US Cooperation

Indo-Sweden ITP

Potential Bilateral collaborations in CCUS

	DST, India and DOE, USA Scoping for CCUS cooperation
	India and UK Joint Indo-UK Scoping report on CCUS Techs.
	Indo-US Human Resource Capacity building programme on CCUS

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PM-STIAC

Stakeholder Consultations

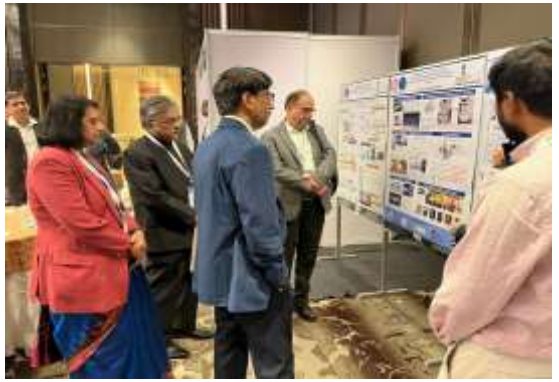
Office of Principal Scientific Advisor to GoI

Azadi Ka Amrit Mahotsav

25th Prime Minister's Science, Technology & Innovation Advisory Council (PM-STIAC) Meeting Discusses Carbon Capture Utilisation & Storage (CCUS) and Carbon Credit in India

Posted On: 09 JUL 2024 9:29PM by PIB Delhi

The 25th Prime Minister's Science, Technology & Innovation Advisory Council (PM-STIAC) meeting was chaired by Professor Ajay Kumar Sood today (July 9, 2024) at Vigyan Bhawan Annexe in New Delhi.



DST 's High-Level Task Force for Evolving Roadmap on CCUS RDD&D

Task Force Structure and Domain Experts

Prof. Abhay Karandikar
Secretary, DST

Dr. Ashish Lele, Chairperson
Director, CSIR-NCL, Pune

Dr. Anita Gupta
Head, CEST, DST

Dr. Neelima Alam,
Member Secretary
Associate head, CEST. DST

Dr. RR Sonde
Former CTO, Thermax, Former ED, NTPC

Dr. N Gopala Krishnan
Former Director, CSIR-CBRI, Roorkee

Dr. Sebastian Peter
Professor, JNCASR, Bengaluru

Ms Sushma Rawat
Director – Exploration,ONGC, Delhi NCR

Dr. Vivek Polshettiwar
Professor, TIFR, Mumbai

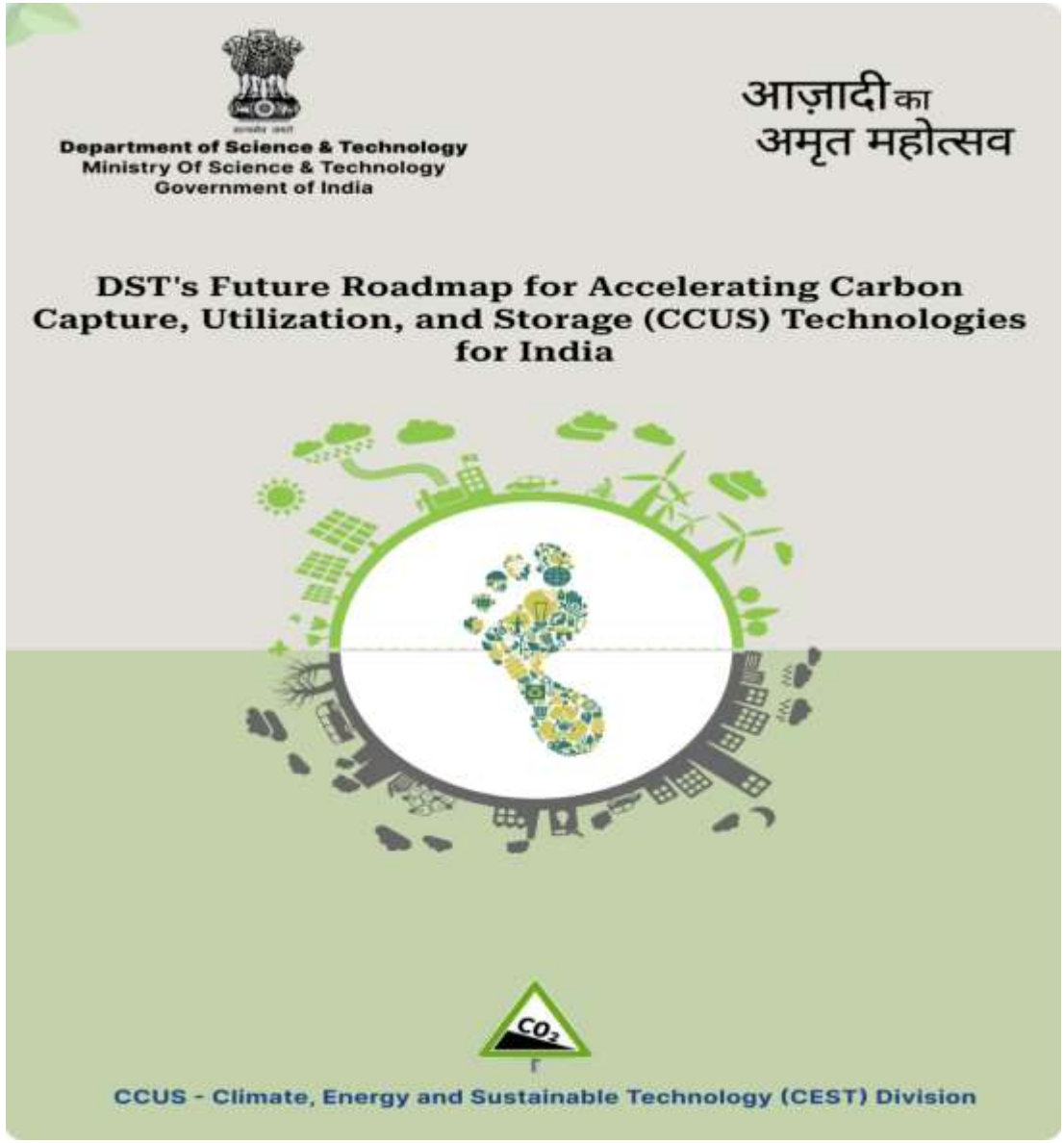
Dr. Rajnish Kumar
Professor, IIT Madras

Dr. Vikram Vishal
Professor, IIT Bombay

Dr. Pratik Swarup Dash
Chief Coal, Coke & Environment Research, R&D, Tata Steel

Dr. Aparna Dutt Sharma
Secretary General,CMA, Delhi NCR

DST's Future Roadmap for CCUS R&D is underway……..



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- Fundamental R&D
- Translational R&D, PoC & Test Bed
- Tech-upscaling and Integration
- Immersive Enablers
- Collaborative linkages

Thank You