

India launches first cluster of CCU testbeds in academia-industry collaboration for cement industry

Posted On: 14 MAY 2025 3:37PM by PIB Delhi

The Department of Science and Technology (DST) recently unveiled a pioneering national initiative: **five Carbon Capture and Utilisation (CCU) testbeds** in the **cement sector**, forming a first-of-its-kind research and innovation cluster to combat industrial carbon emissions.

This is a significant step towards India's Climate Action for fostering National Determined Contributions (NDCs) targets and to achieve net zero decarbonisation pathways for Industry Transition., towards the Government's goal to achieve a carbon-neutral economy by 2070.

Carbon Capture Utilisation (CCU) holds significant importance in hard-to-abate sectors like Cement, Steel, Power, Oil & Natural Gas, Chemicals & Fertilizers in reducing emissions by capturing carbon dioxide from industrial processes and converting it to value add products such as synthetic fuels, Urea, Soda, Ash, chemicals, food grade CO₂ or concrete aggregates. CCU provides a feasible pathway for these tough to decarbonise industries to lower their carbon footprint and move towards achieving Net Zero Goals while continuing their operations efficiently. DST has taken major strides in fostering R&D in the CCUS domain.

Concrete is vital for India's economy and the Cement industry being one of the main hard-to-abate sectors, is committed to align with the national decarbonisation commitments. New technologies to decarbonise emission intensity of the cement sector would play a key role in achieving of national net zero targets.

Recognizing the critical need for decarbonising the Cement sector, the Energy and Sustainable Technology (CEST) Division of Department launched a unique call for mobilising Academia-Industry Consortia proposals for deployment of Carbon Capture Utilisation (CCU) in Cement Sector. This Special call envisaged to develop and deploy innovative CCU Test bed in Cement Sector with thrust on Developing CO₂ capture + CO₂ Utilization integrated unit in an Industrial set up through an innovative Public Private Partnership (PPP) funding model.

As a unique initiative and one of its first kind in India, DST has approved setting up of five CCU testbeds for translational R&D, to be set up in Academia-Industry collaboration under this significant initiative of DST in PPP mode, engaging with premier research laboratories as knowledge partners and top Cement companies as the industry partner.

On the occasion of National Technology Day celebrations, on 11th May 2025 the 5 CCU Cement Test beds were announced and grants had been handed over to the Test bed teams by the Chief Guest, Union Minister of State (Independent Charge) for Science and Technology; Earth Sciences and Minister of State for PMO, Department of Atomic Energy, Department of Space, Personnel, Public Grievances and Pensions, Dr. Jitendra Singh in the presence of Secretary DST Prof. Abhay Karandikar.

The five testbeds are not just academic experiments — they are collaborative industrial pilot projects bringing together India's top research institutions and leading cement manufacturers under a unique Public-Private Partnership (PPP) model. Each testbed addresses a different facet of CCU, from cutting-edge catalysis to vacuum-based gas separation.

The outcomes of this innovative initiative will not only showcase the pathways of decarbonisation towards Net zero goals through CCU route in cement sector, but should also be a critical confidence building measure for potential stakeholders to uptake the deployed CCU technology for further scale up and commercialisation.

It is envisioned that through continuous research and innovation under these test beds in developing

innovative catalysts, materials, electrolyser technology, reactors, and electronics, the cost of Green Cement via the deployed CCU technology in Cement Sector may considerably be made more sustainable.

Secretary DBT Dr Rajesh Gokhale, Dr Ajai Choudhary, Co-Founder HCL, Dr. Rajesh Pathak, Secretary, TDB, Dr Anita Gupta Head CEST, DST and Dr Neelima Alam, Associate Head, DST were also present at the programme organized at Dr Ambedkar International Centre, New Delhi.

A snapshot of the five testbeds:



Testbed-1: Ballabhgarh, Haryana: At the National Council for Cement and Building Materials, a pilot plant aims to capture 2 tonnes per day of CO₂ using oxygen-enhanced calcination and transform it into lightweight concrete blocks and olefins. *Partner: JK Cement Ltd.*



Testbed-2: IIT Kanpur + JSW Cement: This testbed will showcase **carbon-negative mineralization**, a method that locks CO₂ into solid minerals — literally turning pollution into rock.



Testbed-3: IIT Bombay + Dalmia Cement: Developing a **catalyst-driven CO₂ capture process**, this project will be installed at an actual cement plant — a bold move toward scaling indigenous clean tech.



Testbed-4: CSIR-IIP, IIT Tirupati, IISc + JSW Cement: Using a **Vacuum Swing Adsorption process**, this testbed will separate CO₂ from cement kiln gases and integrate it back into construction materials — closing the loop.



Testbed-5: IIT Madras & BITS Pilani, Goa + Ultratech Cement: Focused on **innovative carbon-lowering interventions**, this initiative pushes the envelope in blending research with real-world impact.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2128151>.

NKR/PSM

(Release ID: 2128620)