

CARBON CAPTURE AND STORAGE: GLOBAL STATUS UPDATE – PROGRESS AND CHALLENGES

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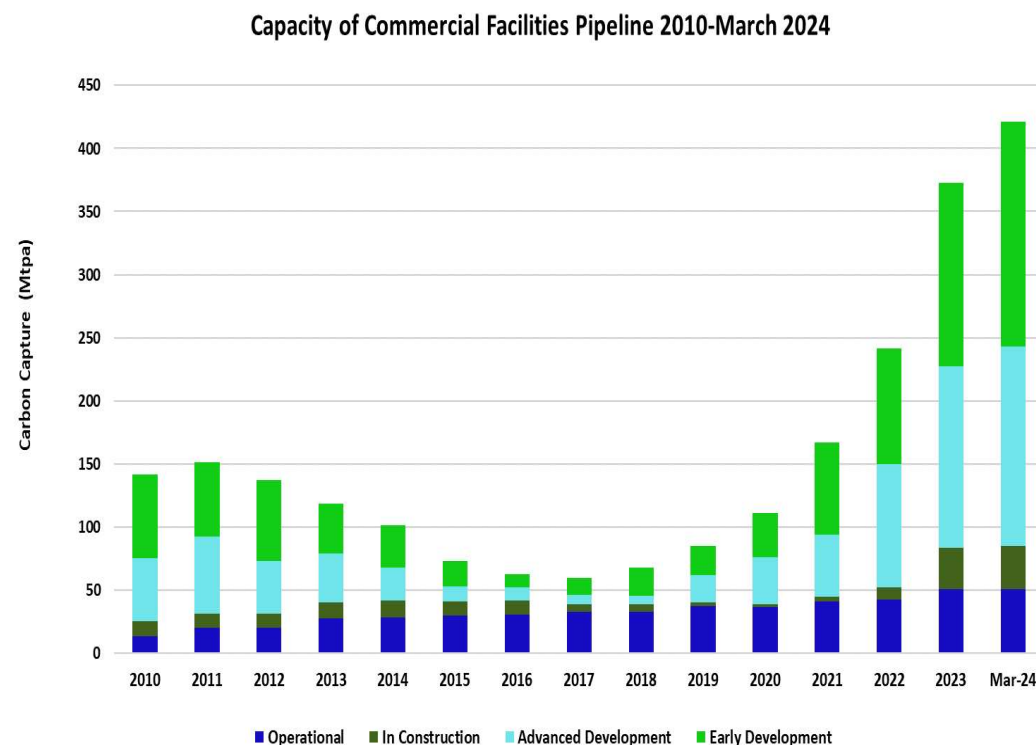


GLOBAL CCS
INSTITUTE

THE GLOBAL CCS PROJECT PIPELINE

- **521** facilities in various stages of development and construction
- **43** facilities in operation, with a capture capacity of **~ 50 Mtpa**
- **5** projects have entered construction just this year
- **421 Mtpa** capture capacity of project pipeline across all projects (*development through operational)
- In Q1 2024, the Institute added **188** CCS facilities to our database

As of March 2024



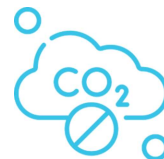
Source: GCCSI CO2RE Database CCS Facilities through March 2024.



POLICIES DRIVING GROWTH



Greater recognition of role of CCS
in NDCs, National Roadmaps



Creation of International CCS ambition:
Carbon Management Challenge



Strengthening general climate policy



Strengthening fiscal incentives –
capital and operating support



Establishment of national CCS targets



Development of CCS regulations



CCS DEVELOPMENTS: USA

- US leads the facility scoreboard, enabled by strong policy support including the **Inflation Reduction Act** (2022), **CHIPS & Science Act** (2022) and **Bipartisan Infrastructure Law** (2021).
 - BIL includes over US\$12 billion in investments in carbon management
 - IRA increases the dollar value of tax credits, lowers carbon capture thresholds, and adds provisions for direct pay and tax credit transferability. Credit level: US\$85 per tonne of CO₂ captured and stored in dedicated reservoirs, US\$180 per tonne of CO₂ removed through (DACCS)
- In April 2024, US EPA issued New Source Performance Standards for GHG emissions from fossil fuel power plants, identifying CCS as the Best System of Emissions Reduction.
- The Department of Interior is developing regulations for offshore storage and the Pipeline & Hazardous Material Safety Administration is updating CO₂ pipeline standards.
- The US EPA has received an unprecedented number of Class VI permit applications. **North Dakota** and **Wyoming** issued new Class VI permits, **Louisiana** received primacy, and the EPA awarded the first draft Class VI permit in **California**.



CCS DEVELOPMENTS: CANADA AND BRAZIL

Canada

- Federal Government released its carbon management strategy and announced investment tax credit covering up to 50% of the capital cost of CO₂ capture projects (60% for DAC) until 2030.
- Canada Growth Fund (CGF) established as the principal federal entity to issue carbon contracts for difference (CCfDs), reducing economic uncertainty for projects.
 - CGF has awarded two carbon credit offtake agreements (a form of CCfD) to Entropy and Varme Energy
 - Strathcona established an agreement for investment of up to CA\$1B towards CCS infrastructure with CGF
- Alberta awarded 19 additional CCS hubs under the Technology Innovation & Emissions Reduction Regulations

Brazil

- Petrobras CCS project in the Santos Basin injected 10.6 Mt CO₂ in 2022 and aims to inject cumulative total of 80 Mt CO₂ (since start of operations) by 2025.
- CCS legal and regulatory bill passed by the Brazilian Senate – yet to pass the Chamber of Deputies.



CCS DEVELOPMENTS: ASIA PACIFIC

- In **China**, 3 projects became operational in 2023 – Asia's largest coal-power plant CCS facility, China's first offshore CO₂ storage facility, and carbon capture at an oil refinery. China now hosts 11 operating facilities, including its first commercial-scale, 109 km long CO₂ transport pipeline.
- **Japan** has passed the CCS Business Act and is exploring 9 candidate CCS networks that will capture CO₂ in Japan for storage in the offshore waters off Japan and in the wider Asia-Pacific region.
- **Indonesia** released a presidential regulation in January 2024, providing a comprehensive framework for CCS. It also provides 30% of project storage capacity to be used for imported CO₂.
- **Republic of Korea** announced its CCUS Act – to be fully enacted by February 2025.
- In **Australia**, the Federal Government passed a bill to incorporate the 2009 and 2013 amendments to the London Protocol into domestic legislation, to allow transboundary transport of CO₂ for geological storage. The Government has released a National Action List for offshore CO₂ storage to meet its obligations under the London Protocol.



CCS DEVELOPMENTS: EUROPE

- There are now more than **150 facilities** in development in Europe.
- The Net-Zero Industry Act (entered into force in June 2024) aims to have 50 Mtpa injection capacity developed in the EU by 2030 and seeks to shorten regulatory timelines.
- EU Industrial Carbon Management Strategy foresees 280 Mtpa capture capacity by 2040 and 450 Mtpa by 2050. It sets out a comprehensive policy approach to deliver on these targets and establish an EU wide single market for carbon management.
- The EU through the Innovation Fund, is to invest in 22 CCS and CCU projects (and counting).
- A number of bilateral agreements and declarations are being signed across Europe to facilitate cross-border collaboration and transportation of CO₂.
- North Sea sites dominate for CO₂ storage in Europe, but other offshore storage opportunities are also emerging. **Poland** and **Denmark** are considering onshore storage, with Denmark recently awarding the first onshore exploration licences.
- **Austria** and **France** released national strategies outlining plans to advance deployment of carbon management technologies at the national level. **Germany** also unveiled the key points of its national carbon management strategy.



CCS DEVELOPMENTS: MIDDLE EAST & AFRICA

- Regional operational CCS capacity currently accounts for 8% of global total capacity.
- Net-zero targets and a strong emphasis on industrial diversification in the region are driving CCS deployment.
- In November 2023, **Oman's** Ministry of Energy and Minerals launched an initiative to establish a CCUS and blue hydrogen regulatory framework.
- The Institute supports Oman's work programme on CO₂ storage.
- In the **UAE**, ADNOC took FID on the 1.5 Mtpa Habshan gas processing facility.
- The Al Jubail CCUS industrial hub in **Saudi Arabia** targets capturing 9 Mtpa by 2027 and 44 Mtpa by 2035.
- Hosting COP28 turned the spotlight on the region's commitment to sustainability – making adoption of CCS even more pressing and attractive.



IMPORTANCE OF CCS IN ASIA

CCS will be critical in balancing -



Demand for economic prosperity and a just transition



Demand for energy, cement, steel and chemicals



Demand for new markets like low-carbon hydrogen and ammonia for fertiliser



Demand for greenhouse gas emissions reduction



TRANSNATIONAL CCS VALUE CHAIN

THE OPPORTUNITY



Create international trade
in CO₂ transport / storage



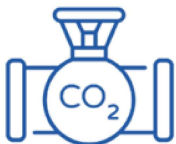
Reduce the cost of
achieving net zero



Create low emissions hubs
and industries



Protect and create jobs



Provide CO₂ management
infrastructure to industry



Provide a just transition for
communities



TRANSNATIONAL CCS VALUE CHAIN

THE REQUIREMENTS

- Sufficient geological storage resources
- Policy and investment
- Government-to-government agreements
- Clear and predictable regulation of the entire value chain
- Commercially available technology
- Strong and skilled workforce
- Social license to operate from community

Government-to-government agreements **ABSOLUTELY ESSENTIAL**

- Ensure the integrity of carbon accounting for national inventories
- Clearly define how liabilities for CO₂ are managed and transferred as it crosses international borders
- Provide project investors with confidence that all parties are committed to supporting CO₂ trade and the conditions attached to that support
- Comply with London Protocol or UN Convention on the Law of the Sea



THANK YOU

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