



Global view on CCUS developments

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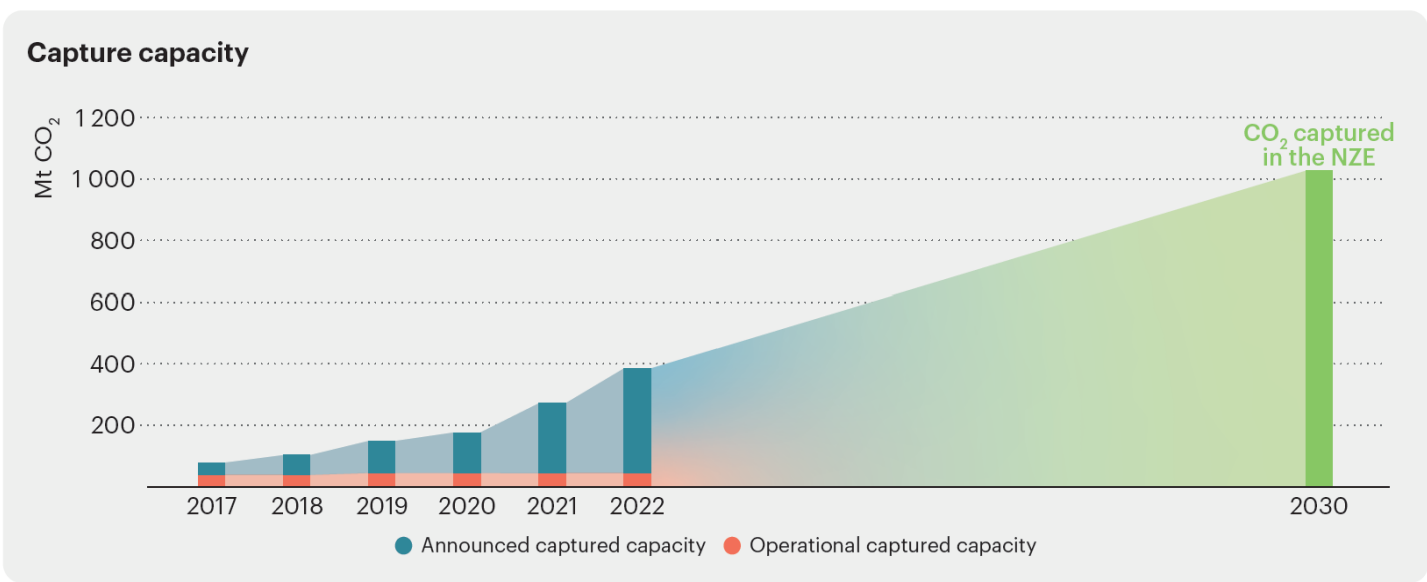
Bio-CO₂ Use and Removal 2024
16 April 2024

Agenda for this intervention

1. 2030 used to be medium term.... but is no longer!
2. Progress in CCUS: “Tailwinds – but rough seas”
3. Collaboration to get over hurdles

1. 2030 has become short-term – and ramp-up is getting urgent

Paris-aligned modelling objective:
1Gt of CO₂ captured and stored per year by 2030



Source:
IEA Net Zero Roadmap 2023

Milestones	2022	2030
Total CO ₂ captured (Mt CO ₂)	45	1 024
CO ₂ capture from fossil fuels and industrial processes	44	759
Power	1	188
Industry	4	247
Merchant hydrogen	0	161
Other fuel transformation	38	163
CO ₂ capture from bioenergy	1	185
Power	0	44
Industry	0	23
Biofuels production	1	114
Other fuel transformation	0	5
Direct air capture	0	80
Total CO ₂ removed (Mt CO ₂)	1	234

2. Progress with CCUS: Tailwinds...

- **Net Zero targets** → a major boost for CCUS
- 25 countries have CCUS/CCS in their **NDCs**
- National and regional specific carbon management **strategies** and **policies** have been (or are being) developed in several countries → sharp contrast compared with 3-4 years ago
- Specific **policy mechanisms** being implemented
 - Capital support: Grants, tax credits etc.
 - Operational support: CfDs, tax credits, direct payments etc.
 - Green procurement pledges, product standards, carbon markets
 - Risk management: Government acting as coordinator
 - Regulatory frameworks: safety and integrity of CO₂ storage
- **Business models** are emerging or being developed
- **Financing** becomes possible (including via green bonds)
- Novel **narrative**: “Carbon management = CCS + CCU + CDR”

2. Progress with CCUS: Tailwinds...

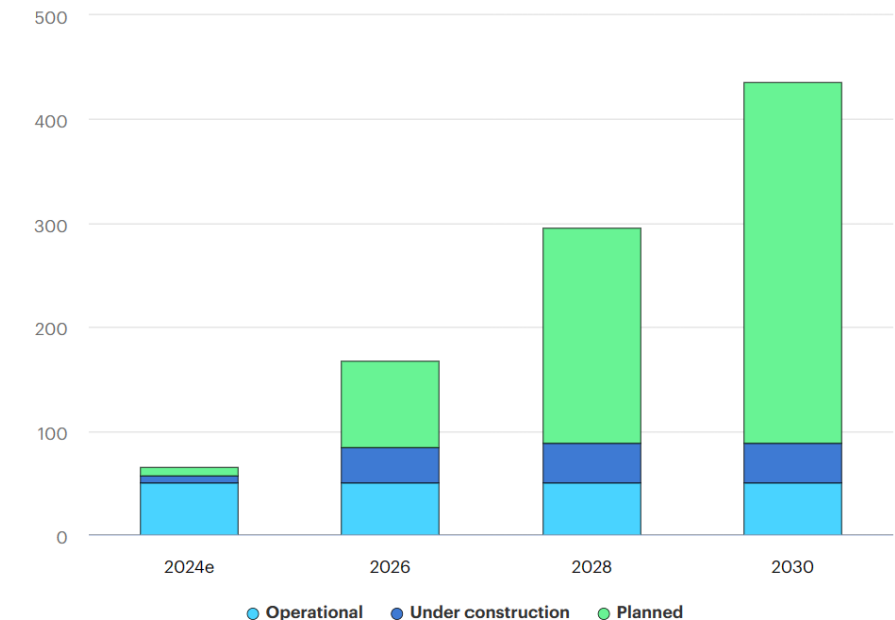
- **Project** announcements have significantly increased
 - 435Mt by 2030
 - (but 500+ MORE needed!)
- Sectors, esp. **cement** have become very active
 - Cement sector counts ~120 CCUS projects globally
 - USER sector requesting carbon management
- **Hubs**
 - Over 290 hubs in 50+ have been identified, worth 7Gt of capacity
 - Several country strategies rely on hubs: UK, NL, FR, DK, CA, US, KSA...

Region
World

Operational and planned capture capacity

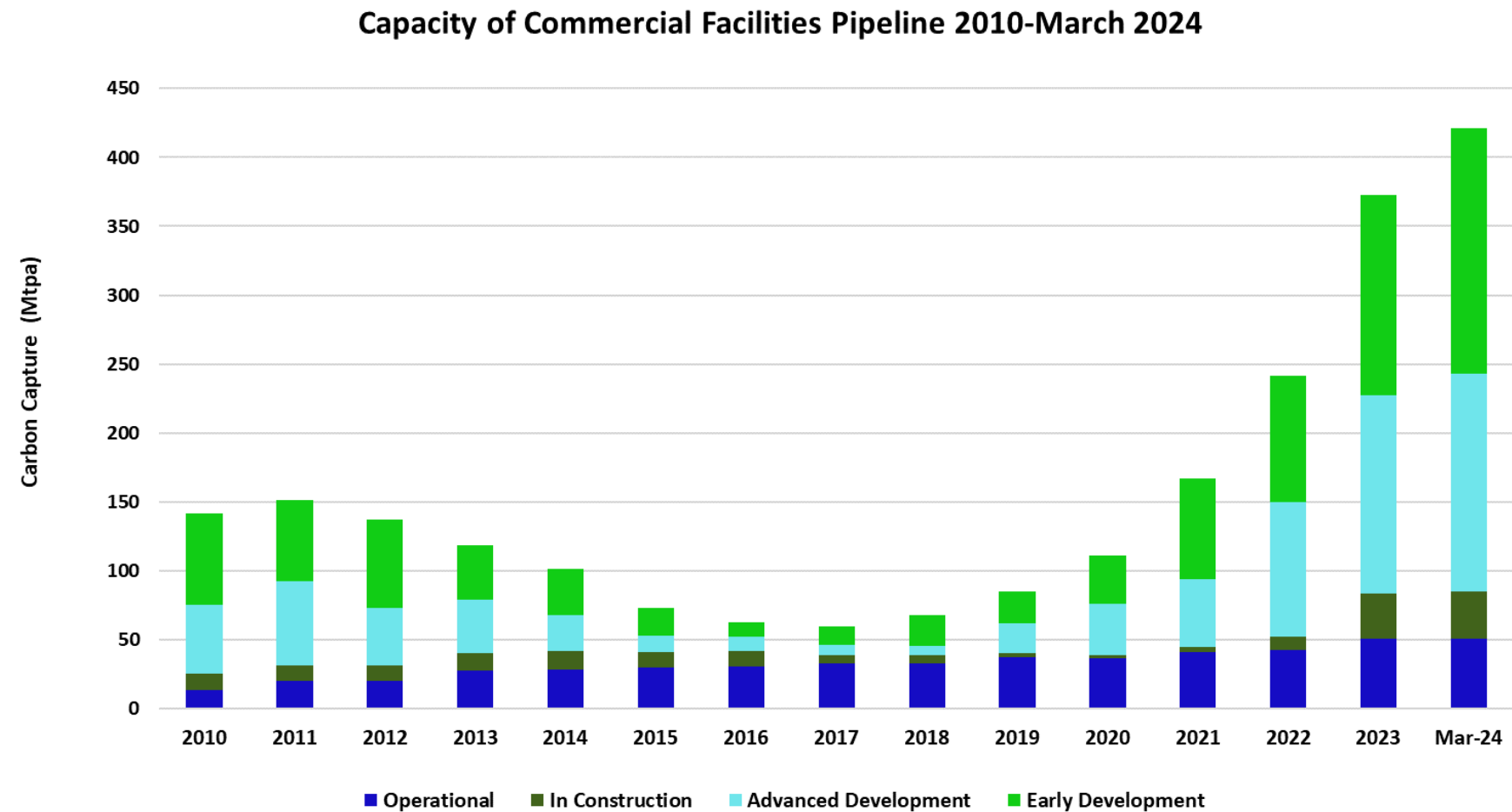
By status By project type

Mt CO₂ per year



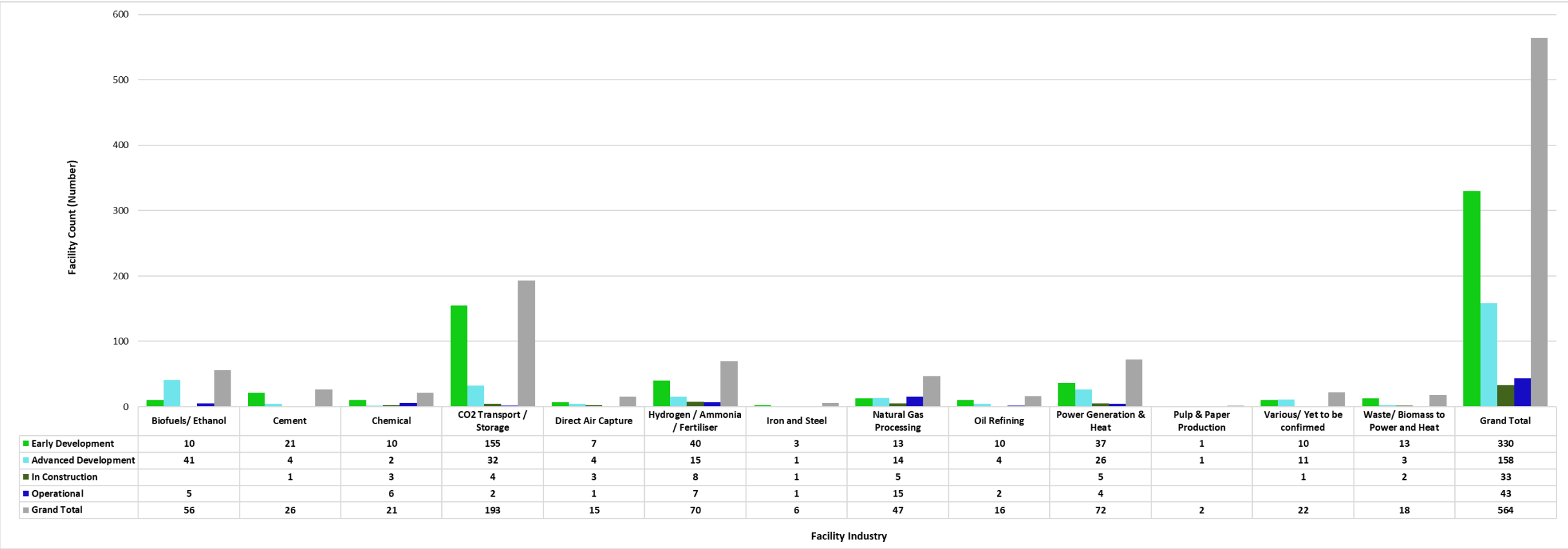
Source:
IEA CCUS Database

CAPACITY OF COMMERCIAL FACILITY PIPELINE 2010-MARCH 2024



FACILITY COUNT: INDUSTRY BREAKDOWN

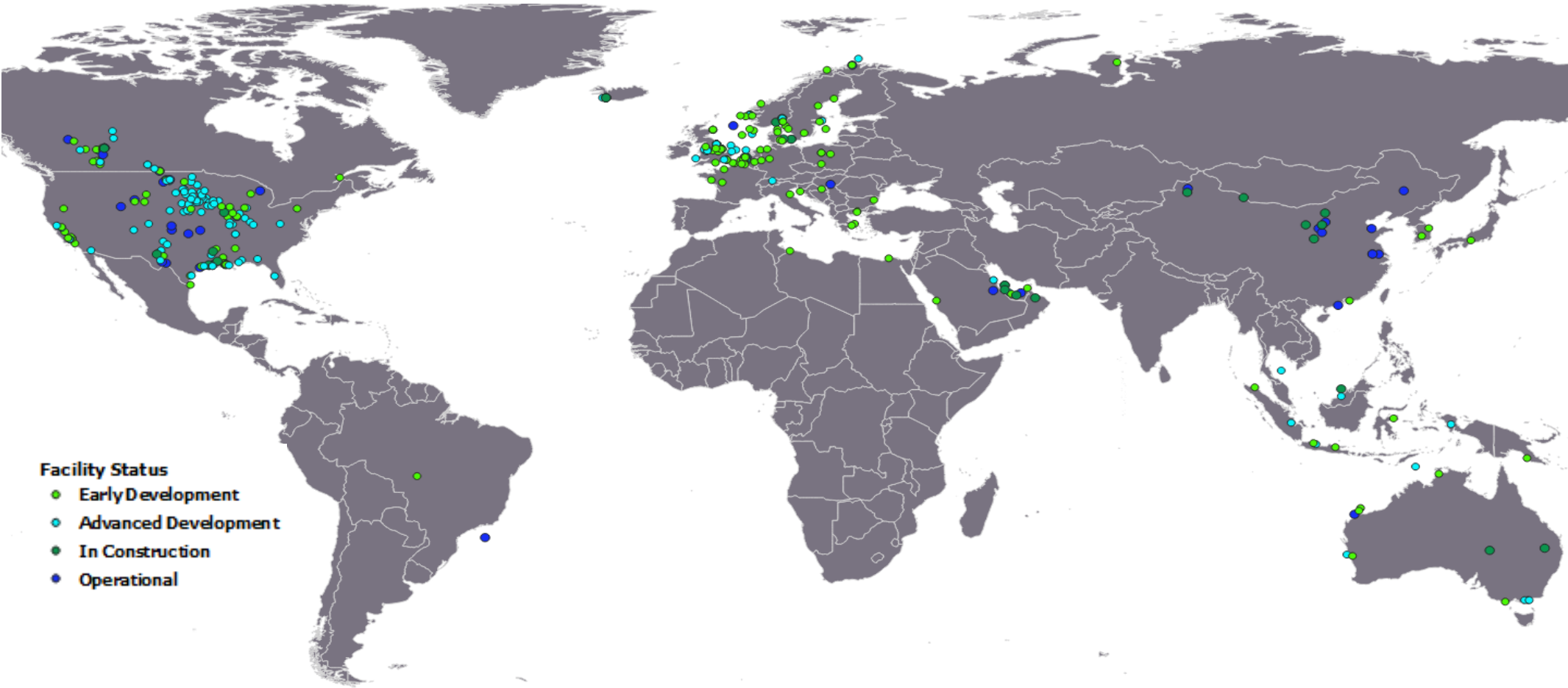
CO2 Transport/ Storage, Ethanol, Power Generation and Heat, Hydrogen, Ammonia, and Fertiliser production, as well as Natural Gas Processing are the top industries for carbon capture.



This chart does not include the following:

- Announced or Operation Suspended Facilities.

COMMERCIAL CCS FACILITIES WORLD MAP



- Facility Status**
- Early Development
 - Advanced Development
 - In Construction
 - Operational

This map does not include the following:

- Pilot and Demonstration Facilities
- Announced Facilities
- Approximately 150 facilities where precise location is yet to be confirmed

Source: GCCSI CO2RE Database CCS Facilities through March 2024.

2. Progress with CCUS: ... but rough seas

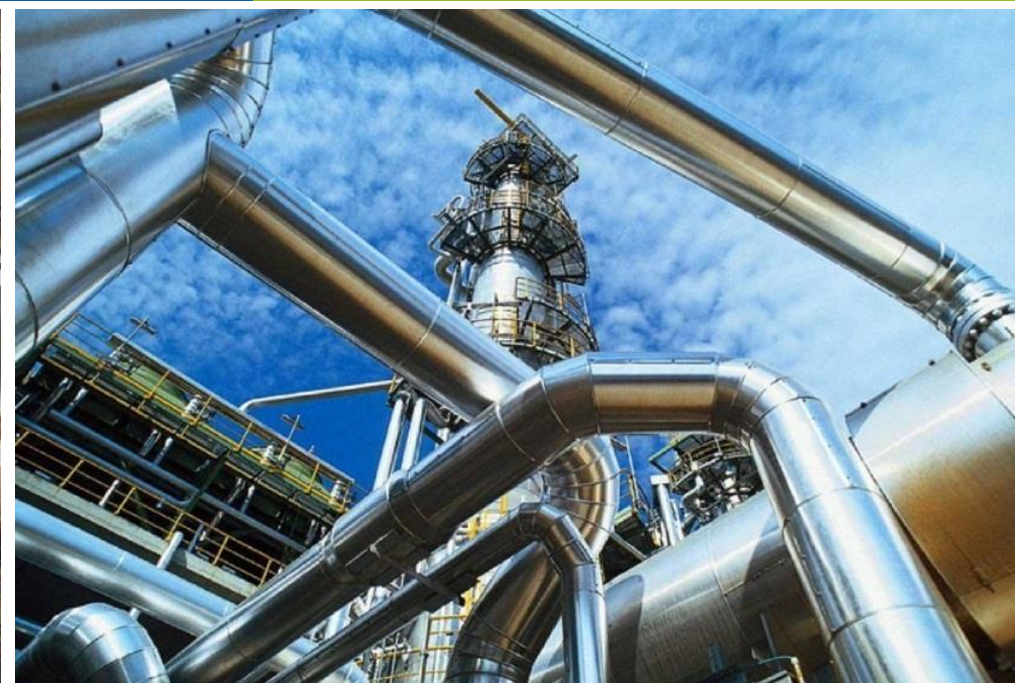
→ SUCCESSFUL DEPLOYMENT WILL DEPEND ON SEVERAL FURTHER FACTORS

- **Acceptance** & public image of CCUS: improving but you'll never please everybody
- Policy **longevity**: untested in many (=most) countries
- Legal, regulatory and **permitting** development: esp. emerging economies
- Role, quantification and certification of **removals**: avoiding “mitigation deterrence”, ensuring quality
- **Long-term** policy drivers → what comes after the current publicly funded programmes?
- **Infrastructure** buildout: public good vs private investment, role of government
- Technology **costs**: must be reduced, but costs compared to WHAT?
- **Resources and leadership**: do governments and regulators have the willingness and the means to both
1) provide incentives and 2) permit and regulate the activity?
- Project **lead times**: currently too long to reach 2030 targets (IEA: from 6-7 down to 3-4 years)

3. Collaboration to get over investment hurdles

- **Bridge gap** between OECD vs. emerging economies
 - Knowledge and capacity to implement carbon management
 - Access to finance
- Importance of **global forums**: G20, CEM-MI, UNFCCC
 - Raising ambition and sharing knowledge
- **Carbon Management Challenge**: first ever “Paris-aligned” global objective
 - 21 countries across the globe, incl. from emerging economies
 - Ramp up to Gt-scale by 2030
- **Finnish (or Nordic) Carbon Management Alliance?**
 - Sharing knowledge
 - Identifying leaders and champions





Thank you!

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Clean Energy Ministerial CCUS Initiative

Fourteen Member Countries:

Lead countries



Norway



Saudi Arabia



United Kingdom



United States

Participating CEM Members



Australia



Canada



China



EU Commission



Germany



Japan



Mexico



Netherlands



Nigeria



South Africa



United Arab Emirates

Other countries and Partners:

Links to further countries: Brazil, Denmark, Finland, India, Indonesia, Sweden etc.

Industry: Global Cement and Concrete Association, Oil and Gas Climate Initiative, worldsteel

Financial institutions: Multilateral Development Banks, private banks, investment firms

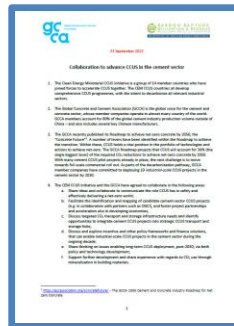
Organizations: International Energy Agency (IEA), IEA Greenhouse Gas R&D Programme (IEAGHG), Global CCS Institute (GCCSI), Mission Innovation (MI)

CEM CCUS: Key activities

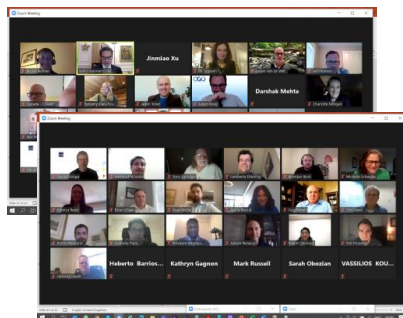
1. WORKING WITH INDUSTRY TO ACCELERATE PROJECT DEPLOYMENT



Working with Global Cement and Concrete Association to materially accelerate CCUS in the cement sector.



Working with Oil and Gas Climate Initiative to accelerate strategic CCUS hubs and infrastructure.

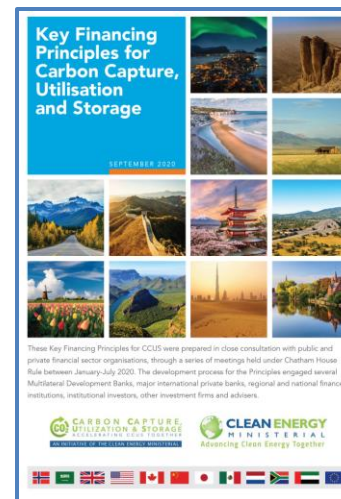


2. LINKING WITH THE FINANCE SECTOR

“Finance Sector Lead Group for CCUS”

- Informal group of banks interested in CCUS: development banks, commercial banks etc.
- Platform to discuss CCUS as investment opportunity and to link with industry
- Opportunity to give advice to governments and ministers

“Key Financing Principles for CCUS” drafted in collaboration with the finance group.



3. DISSEMINATING BEST PRACTICE

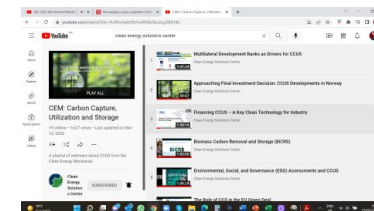
Sharing country developments in monthly meetings.



Sharing best practice in regional workshops and events.



Sharing best practice in webinars.



Clean Energy Ministerial CCUS Initiative: 2024 focus areas

Keeping CCUS momentum by:

- Continuing best practice sharing on policy developments
- Advancing financing solutions and connections with the finance sector
- Actively working with industry sectors to accelerate carbon management: GCCA, OGCI and other industries
- Focusing efforts on emerging economies (both members and non-members)
- Advancing the Carbon Management Challenge

CEM-15 and MI-9 hosted by Brazil

A promotional poster for the CEM15/MI-9 Ministerial Meeting. The top half features a dramatic landscape with a waterfall and a sunset sky. The text 'SAVE the DATE' is prominently displayed in white and green. Below this, the event title 'CEM15/MI-9 MINISTERIAL MEETING' is written in large white letters. To the right, the dates '30 Sept - 03 Oct 2024' and location 'Foz do Iguaçu, Brazil' are listed. The bottom section contains logos for 'CLEAN ENERGY MINISTERIAL', 'MISSION INNOVATION', and 'G20 BRASIL 2024', along with the organizing body 'ITAIPU BINACIONAL'.

DATES

- 30 September: Site Visits
- 1-2 October: CEM/MI side-events
- 3 October: CEM15/MI-9 Ministerial Meeting
- 4 October: G20 Energy Transitions Ministerial Meeting

CARBON MANAGEMENT → PLANS

- Ministerial summit
- Several side-events
- Yearly publication of CEM CCUS countries' deployment programme status

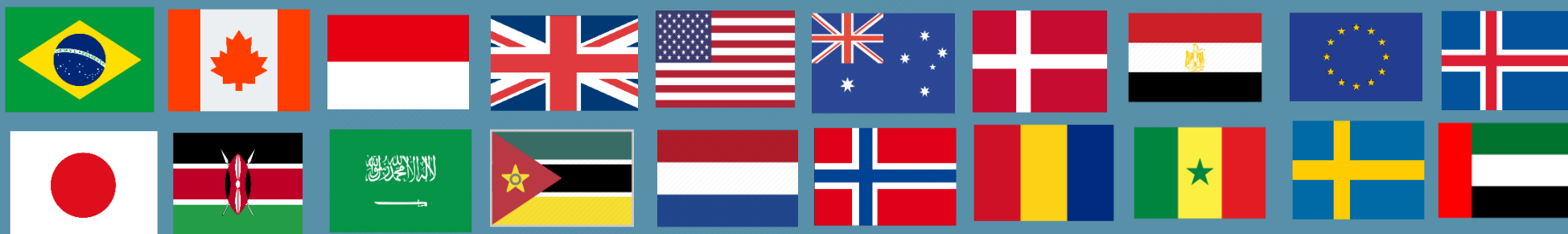


Carbon Management Challenge participants

Carry a message that carbon management, in addition to traditional mitigation efforts, is integral to keeping pathways that limit warming to 1.5°C within reach.

Support a global goal of advancing carbon management projects that will reach gigaton scale by 2030.

Aim to act, as appropriate, joining collaborative efforts, setting national targets or initiatives, building project demonstration and developing policy.



The CMC is Cosponsored by Brazil, Canada, Indonesia, the United Kingdom and the United States and includes participation from Australia, Denmark, Egypt, European Commission, Iceland, Japan, Kenya, Kingdom of Saudi Arabia, Mozambique, Netherlands, Norway, Romania, Senegal, Sweden, and the United Arab Emirates.



What can drive investment into carbon management projects?

Avoided penalties

- Emissions trading systems: EU ETS
- Carbon taxes

Subsidies and financial incentives

- CAPEX support / t CO₂
 - Direct payments, grants
 - Investment tax incentives
- OPEX support / t CO₂
 - Direct payments: SDE++ etc.
 - Operational tax incentives
- Government investment in / provision of transport and storage infrastructure
- Risk-sharing, e.g. loan guarantees, liability arrangements, coordinating hubs etc.

Regulatory measures

- Government directives / mandates to private enterprise
- Mandated investment by state-owned enterprises (SOEs)
- Mandatory phaseout of unabated FF use

Product standards & green procurement

- Green premiums
- Product standards
- Green public procurement: voluntary / mandatory
- Green corporate procurement: voluntary / mandatory

Sale of CO₂ as feedstock

- EOR
- Liquid fuels
- Polymers
- Mineralisation & building materials

Voluntary carbon markets

- Sale of certificates based on verified CO₂ capture and storage: CSUs etc.
- Direct investment in DAC