

SEPTEMBER 2023

# A GLOBAL PERSPECTIVE ON CCS

CLEAN COAL DAY

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GLOBAL CCS  
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# THE GLOBAL CCS INSTITUTE

**Accelerating the deployment of CCS for a net-zero emissions future.**

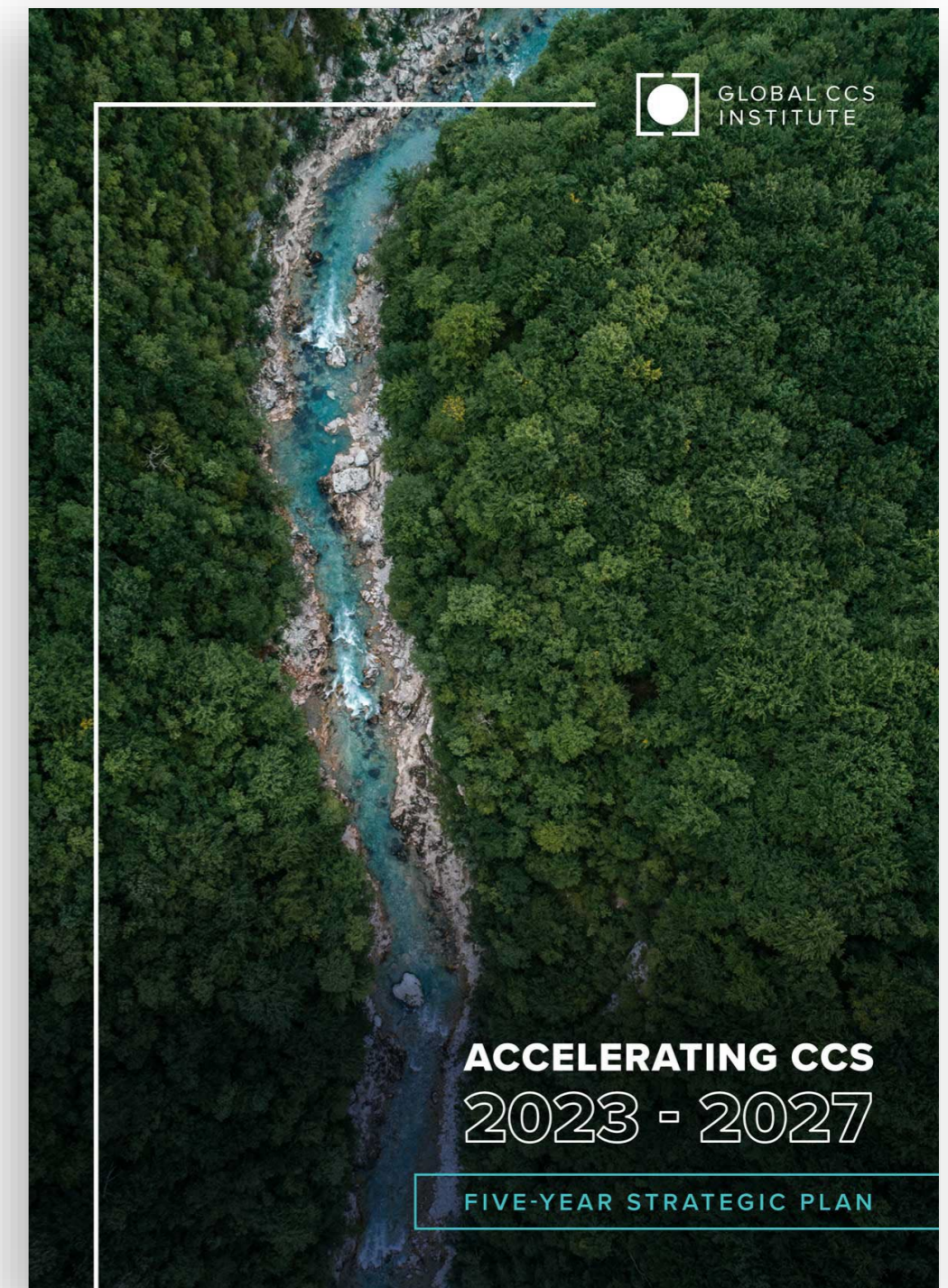
## **WHO WE ARE**

International CCS think tank with offices around the world.

Over 200 members across governments, global corporations, private companies, research bodies and NGOs, all committed to a net-zero future.

## **WHAT WE DO**

Fact-based influential advocacy, catalytic thought leadership, authoritative knowledge sharing.



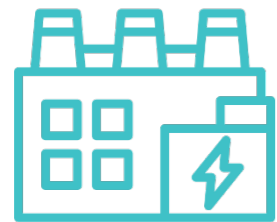
# CCS AND REACHING NET-ZERO



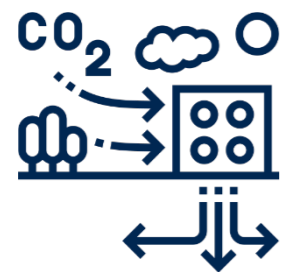
Achieving deep decarbonisation in hard-to-abate industry.



Enabling the production of low-carbon hydrogen at scale.

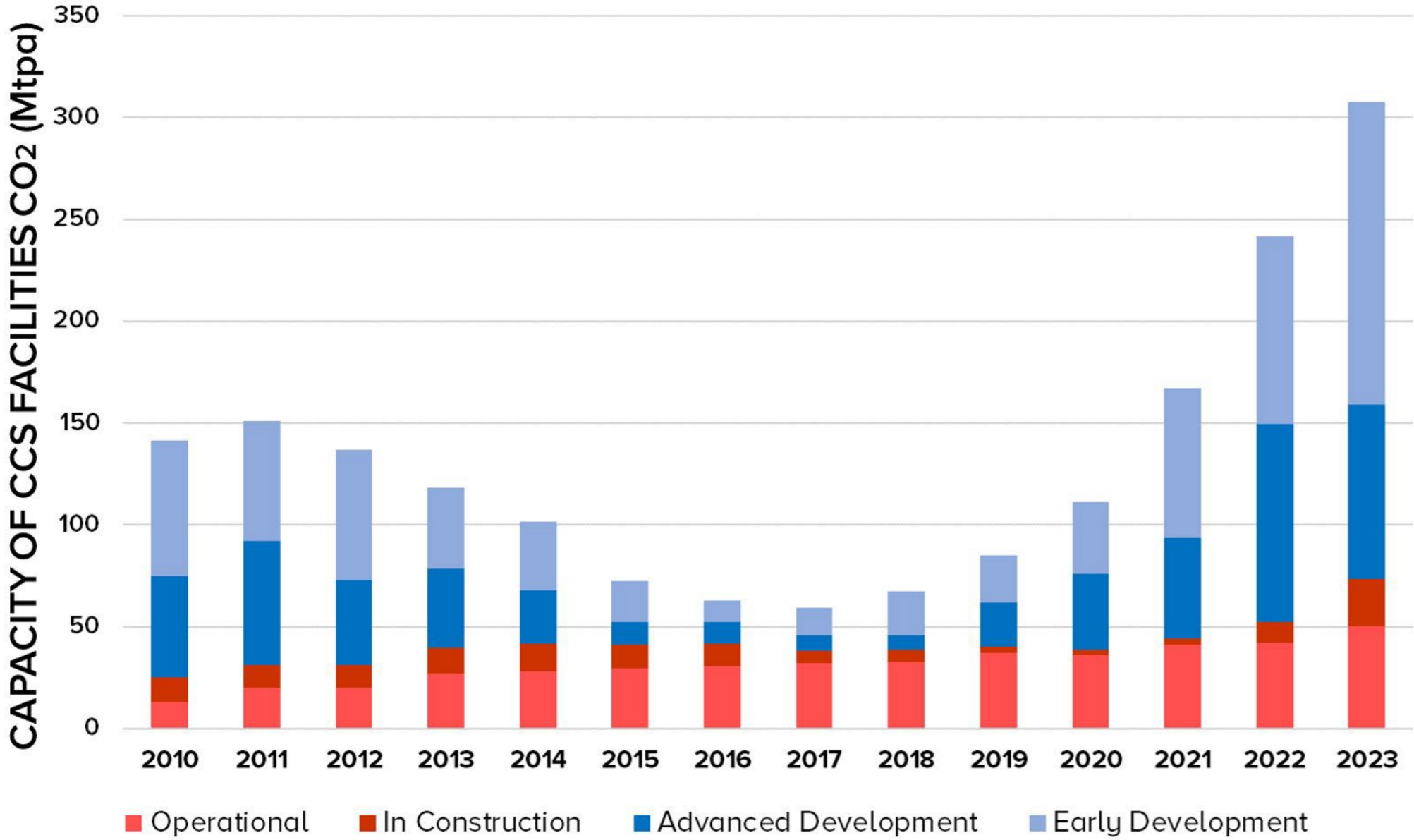


Providing low carbon dispatchable power.



Delivering negative emissions.

# CCS FACILITY PIPELINE GROWING



Status	GSR 2022	CO2RE 2023
Operation	30	37
Construction	11	20
Adv Dev	78	97
Early Dev	75	103
<b>Total</b>	<b>194</b>	<b>257</b>

\* By capture capacity



# COUNTRIES SHOWING INCREASING AMBITION

- **The EU** needs to have 300 to 550 mtpa of installed CCUS capacity by 2050 to meet its NZE target. Net-Zero Industry Act aims to have **50 mtpa** storage developed by 2030.
- **The UK's** CCUS roadmap foresees **20 to 30 mtpa** of installed capacity by 2030.
- **The US**, through the Inflation Reduction Act (IRA), has given immense stimulus to the deployment of CCUS and Direct Air Capture (DAC) and could increase the deployment of CCS by 13-fold\* compared to existing policy to between **200 and 250 mtpa** of capacity by 2030.
- **Japan** announced its CCS Long-Term Roadmap in January 2023, setting a target for Japan's first commercial CCS projects to commence by 2030 and aiming to store up to **240 Mtpa** of CO<sub>2</sub> by 2050.
- **The KSA** has announced the target of capturing and storing **44 mtpa** by 2035.
- In **Brazil**, Petrobras injected more than 10 mt of CO<sub>2</sub> in 2022, a world record for a company, and aims to inject **40 mtpa** between 2023 and 2025.

\* According to analysis carried out by REPEAT project



# GLOBAL ACTION GOING INTO COP28

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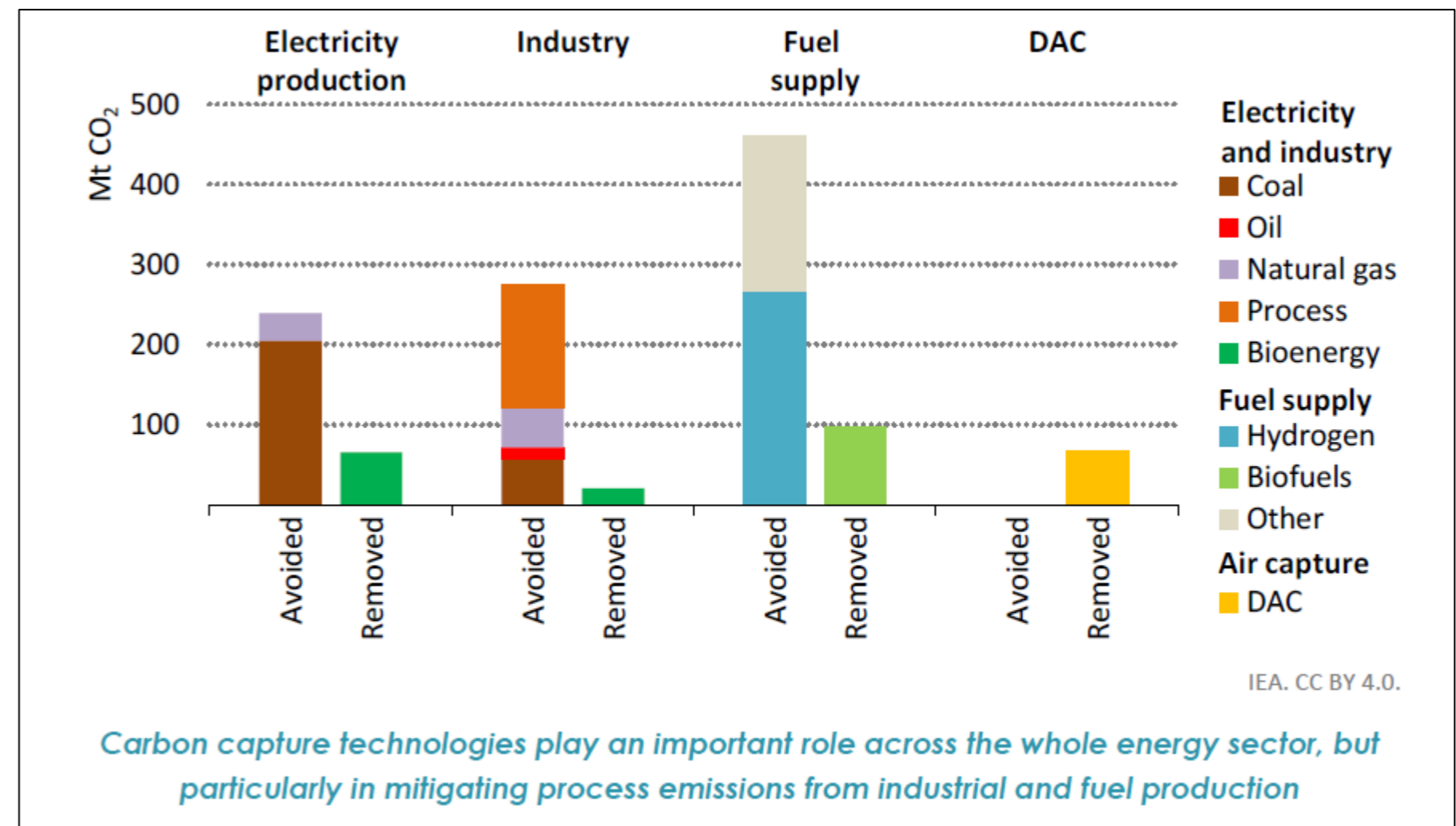
- Global Carbon Management Challenge
  - Australia, Canada, Egypt, EU, Japan, Saudi Arabia, United Arab Emirates, United States, United Kingdom, Norway, Denmark, Brazil and Sweden
- Global Decarbonisation Alliance
  - Private sector initiative under the COP28 Presidency
- *IEA's Credible pathways to 1.5°C Four pillars for action in the 2020s*
- CEM-14 in July 2023
  - Side events on Cement and CCS, Financing CCS and Carbon Management Challenge



# SCALING UP THROUGH 2030

- According to IEA NZE, 1.2 GtCO<sub>2</sub> per annum should be captured by 2030, including for removals.
- Capturing 1.2 GtCO<sub>2</sub> by 2030 as modelled, requires 25-fold increase over current operational capacity and 4 times increase over the current pipeline.
- CCUS is required across diverse sectors and is increasingly important to industry.
- Stronger policy to incentivise rapid CCS investment is needed.

**Total CO<sub>2</sub> capture by sector and type in the NZE, 2030**



IEA. CC BY 4.0.

*Carbon capture technologies play an important role across the whole energy sector, but particularly in mitigating process emissions from industrial and fuel production*



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# CASE STUDY: US POLICY AND PROJECT PROGRESS

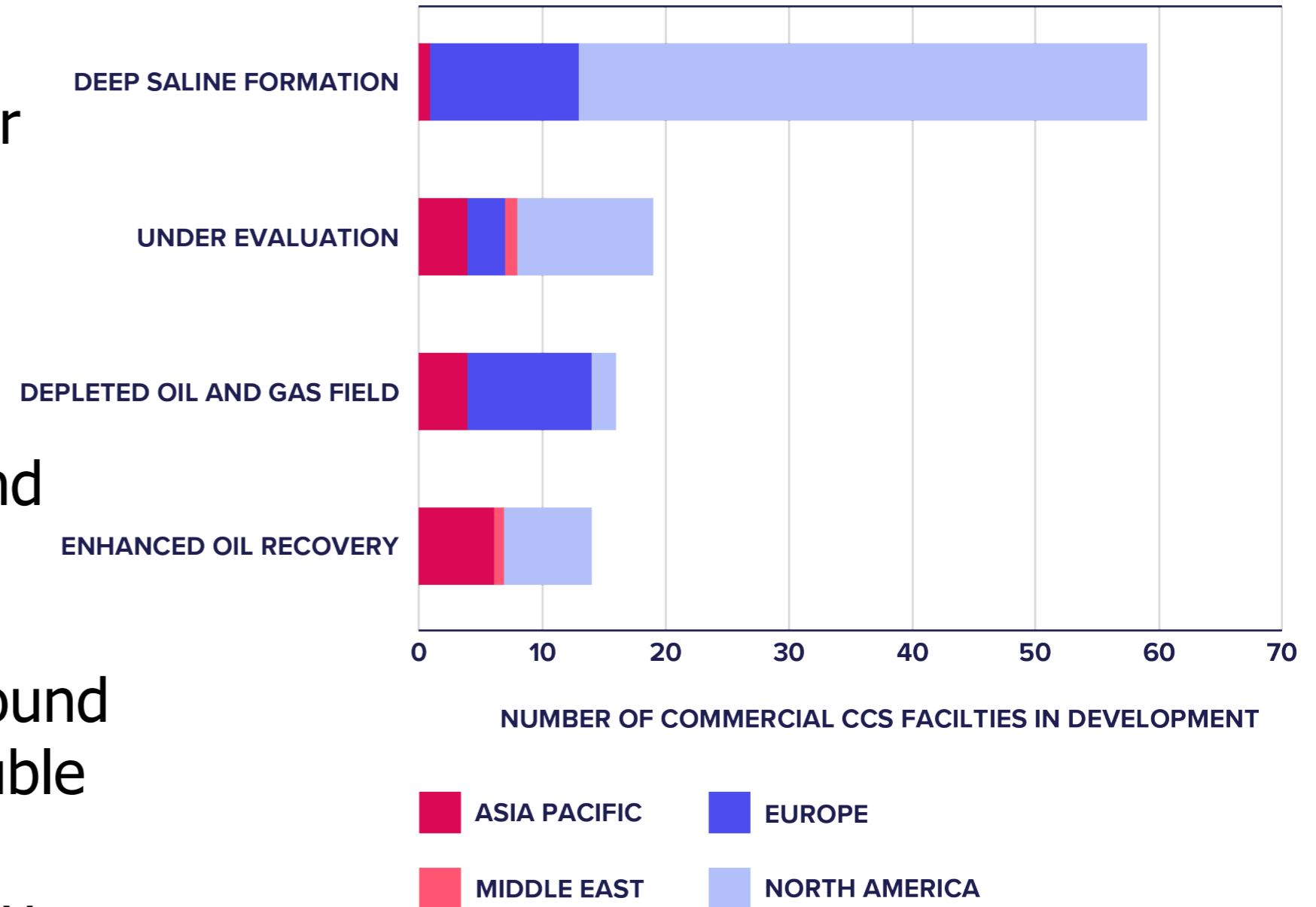
- **Bipartisan Infrastructure Law included** over \$12 billion in investments in next-generation carbon capture, direct air capture, integrated CCUS demonstrations, and industrial emissions reduction demonstration projects, as well as CO<sub>2</sub> transport and storage infrastructure.
- **Inflation Reduction Act** provides tax credits of \$85 per tonne of CO<sub>2</sub> captured and stored and \$180 for every tonne of CO<sub>2</sub> removed through direct air capture and permanently stored.
- A study from Princeton shows that the total volume of CO<sub>2</sub> captured for transport and geologic storage across energy & industry could reach **200 million** tons per year by 2030, a **13-fold increase** compared to previous policy.
- Currently there are 14 commercial facilities in operation in the US, and close to **90 facilities under development.**





# EVOLUTION OF STORAGE

- 13 of the 37 facilities currently operating use dedicated geological storage with the remainder using EOR.
- 70% of the commercial CCS projects in development aim to use dedicated geological storage (deep saline formations, depleted oil and gas fields).
- Operational facilities, on average, can inject around 1 mtpa CO<sub>2</sub>. That average could more than double within a decade. Many storage sites associated with the development of CCS networks generally have rates of around 5 Mtpa.



\* Analysis of 108 facilities in development with dedicated storage sites



# CARBON DIOXIDE REMOVAL

- CDR continues to gain momentum and is viewed as critical to net-zero.
- Engineered-CDR costs, specifically of DACCS, are currently relatively high but projected to fall over time.
- The extent to which costs fall will determine deployment.
- CDR can play an important role in drawing down historical emissions even after we reach net-zero and provides a safety net.



Image: Carbon Engineering



# FINANCE AND INVESTMENT

- Private finance with government incentivization is key to deploying at scale.
- Capital investment of \$655 billion - \$1.28 trillions required over the next 30 years.
- Taxonomies emerging in various jurisdictions – efforts to adopt common principles key to a consistent approach.
- Carbon Markets – Compliance and Voluntary- becoming increasingly important. Convergence expected, but time frame uncertain.
- ESG-related reporting remains important to commercial activity:
  - Demand for detailed disclosure remains critical for investors.
  - Companies with significant emissions under pressure to report.
  - Although CCS not excluded, a clearer reporting pathway would be beneficial



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# CCS DEVELOPMENTS AROUND THE WORLD

- **EUROPE**

- CCUS in Net-Zero Industry Act; EC developing CCUS strategy
- The EU through, the Innovation Fund, to invest in 22 CCS and CCU projects (and counting)
- Netherlands, Denmark, the UK are progressing their CCS policies and projects.

- **NORTH AMERICA**

- The US leads globally with project and policy development.
- In Canada, CCUS Strategy under development and CCUS investment tax credit in federal budget.

- **MENA**

- 3 facilities in operation in the region, equivalent to ~10% of global capture capacity.
- Ambition and momentum going into COP28.

- **APAC**

- JOGMEC selected 7 candidate projects for feasibility studies in Japan and overseas
- China's first 1 Mtpa CCUS facility started operations in 2022, with several other projects now in construction or in development.
- Project progress in Malaysia, Indonesia, and Australia



# LESSONS LEARNED

- Despite significant progress since 2017, more is required, urgently.
- CCS capacity needs to scale from 50 million tons today to multiple gigatons by mid-century.
- Capital investment of \$655 billion - \$1.28 trillion is required over the next 30 years.
- Governments to establish appropriate policies; Industry to build, own, and operate CCS facilities at scale and the Finance Sector to include CCS in their portfolios, ESG and green taxonomies.
- Stronger policy coupled with strong action by 2030 is crucial.



# WHAT IS NEEDED GLOBALLY?

- Define the role of CCS and CDR in meeting national climate strategies and plans, set and communicate targets.
- Create a long-term, high value on the storage of CO<sub>2</sub>.
- Support the identification and appraisal of geological storage resources.
- Develop specific CCS laws and regulations.
- Identify opportunities for CCS networks and facilitate the establishment of transport and storage infrastructure.
- Enable investment in CCS through appropriate policy and market mechanisms.



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# THANK YOU