

WORKSHOP ON CO₂ CROSS-BORDER TRANSPORT AND STORAGE (CCS) IN ASIA AND THE PACIFIC

OVERVIEW OF GLOBAL CCS AND CO₂ CROSS-BORDER TRANSPORT PROJECTS

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ASIA AND THE PACIFIC

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GENERAL MANAGER – KNOWLEDGE AND ANALYSIS



GLOBAL CCS
INSTITUTE

THE GLOBAL CCS INSTITUTE

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

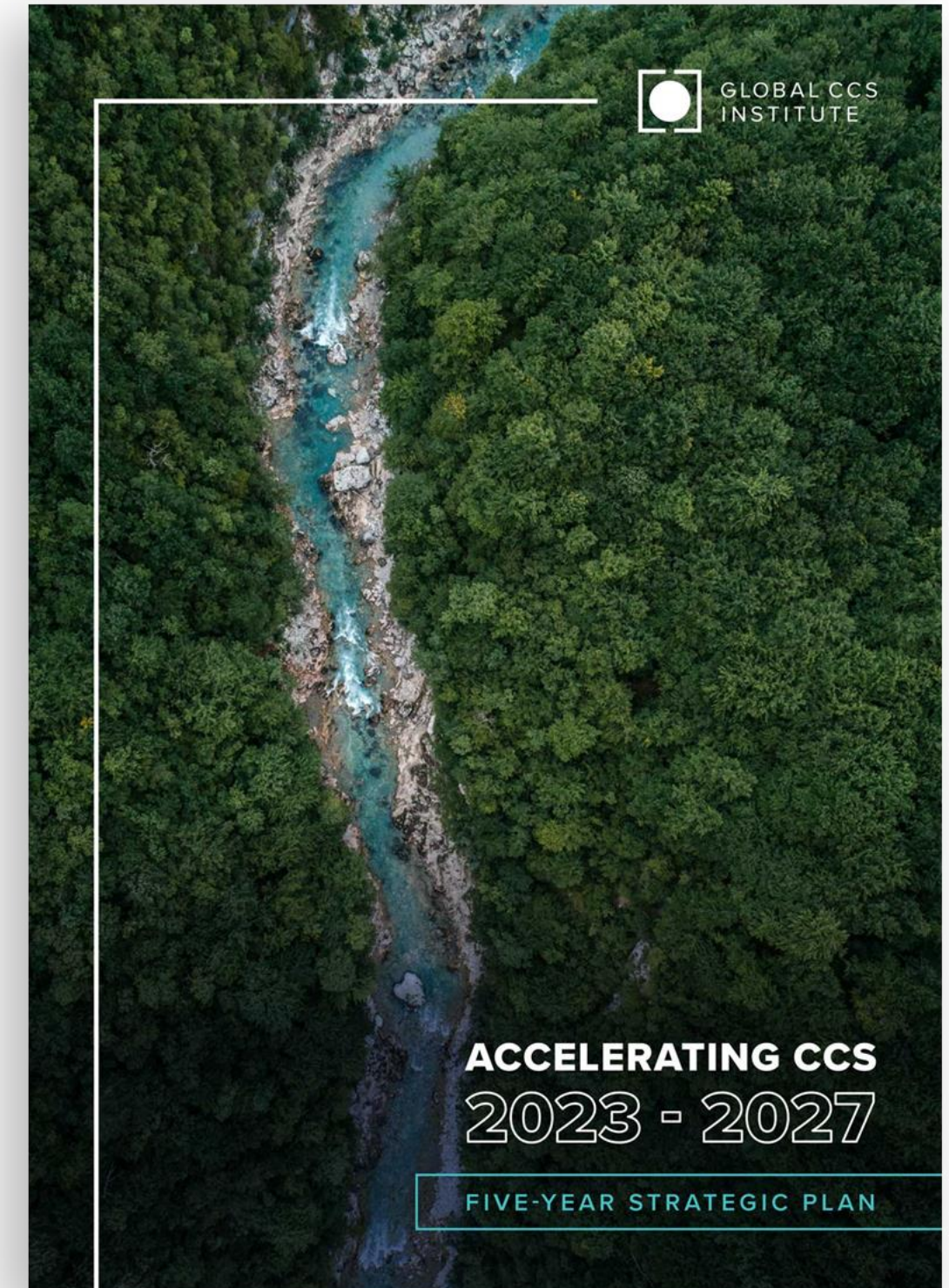
WHO WE ARE

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

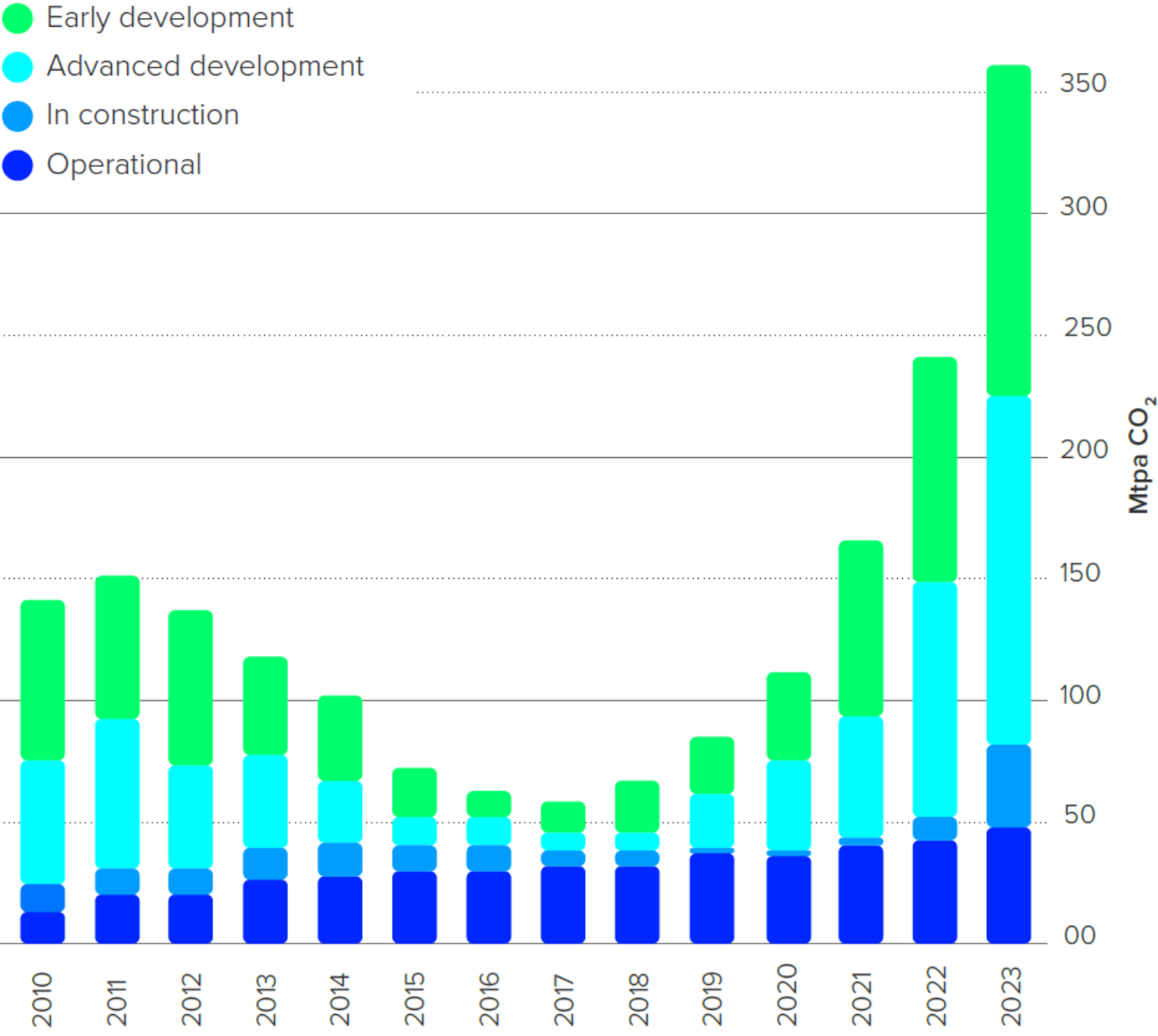
Fact-based influential advocacy, catalytic thought leadership, authoritative knowledge sharing.



SCALING UP THROUGH 2030

- The CCS project pipeline has exhibited strong year-on-year growth over the last 6 years, growing at a compound rate of more than 35% per annum since 2017.
- As of July 2023, there are 392 facilities in the pipeline, representing a 102% year-on-year increase. 41 facilities are in operation, with a capacity to capture and store 49 Mtpa and 351 facilities are in development.
- Growth has been driven by strong policy, particularly in North America and Europe.
- There is increasing diversity in CCS applications across industries; the ongoing development of CCS networks has resulted in a new industry category of “CO₂ transport and storage” facilities.
- Whilst the progress is encouraging, achieving global climate targets will require annual CO₂ storage rates of approximately 1 Gtpa by 2030 and multiple Gtpa by 2050.
- As more projects progress from planning and development to execution phase, permitting, public engagement and project management will increasingly become more critical.

CCS PROJECT PIPELINE: UNPRECEDENTED LEVELS



49

MTPA OF CO₂ CAPTURE CAPACITY IN OPERATION

32 Mtpa CO₂ in construction, 280 Mtpa CO₂ in development – total project pipeline capacity is 361 Mtpa CO₂

41

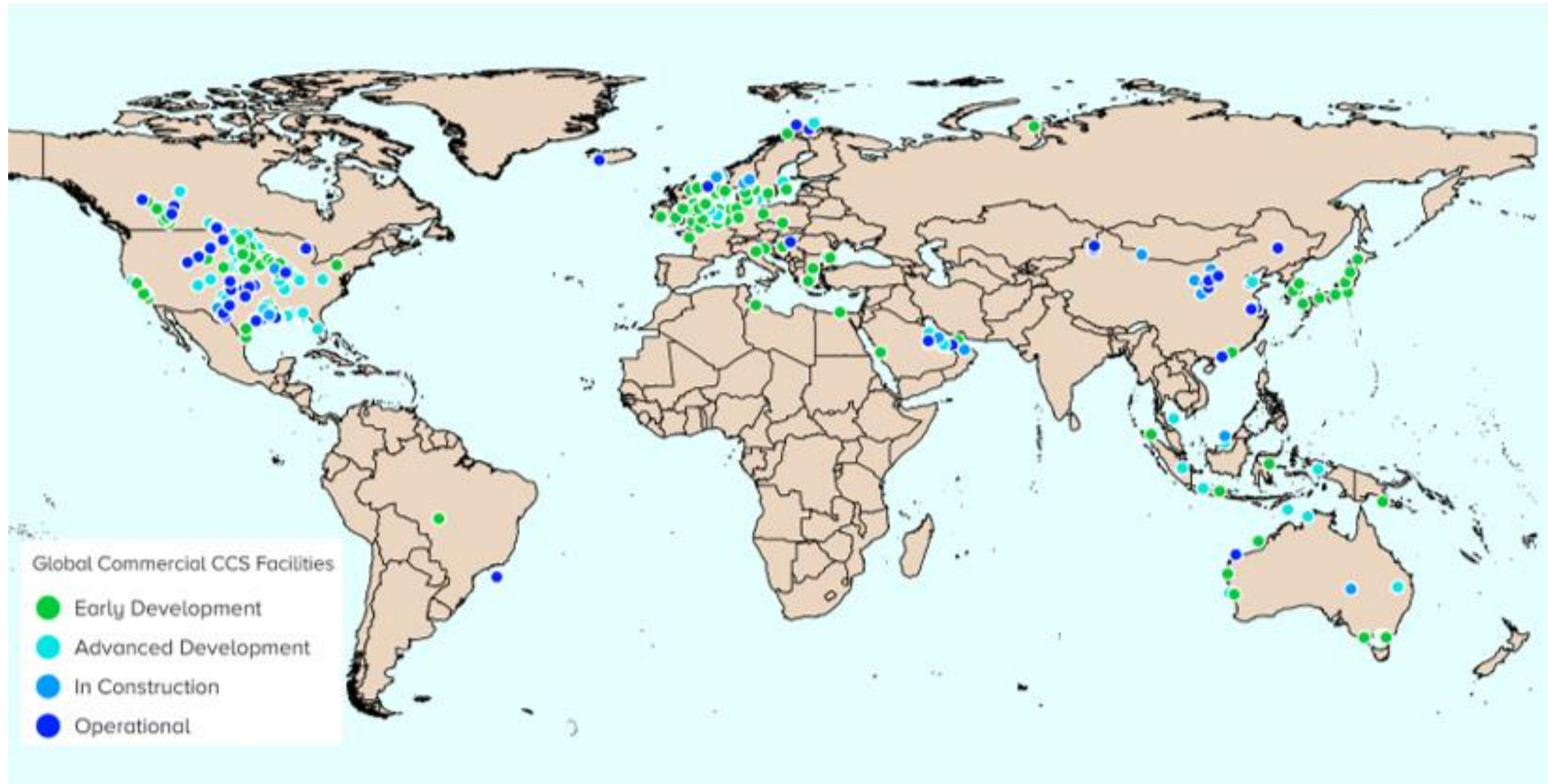
CCS FACILITIES IN OPERATION

26 in construction, 325 in development

198

NEW CSS FACILITIES ADDED TO THE PROJECT PIPELINE SINCE 2022 GLOBAL STATUS OF CCS REPORT

GLOBAL CCS FACILITIES: 2023



41 Facilities in operation

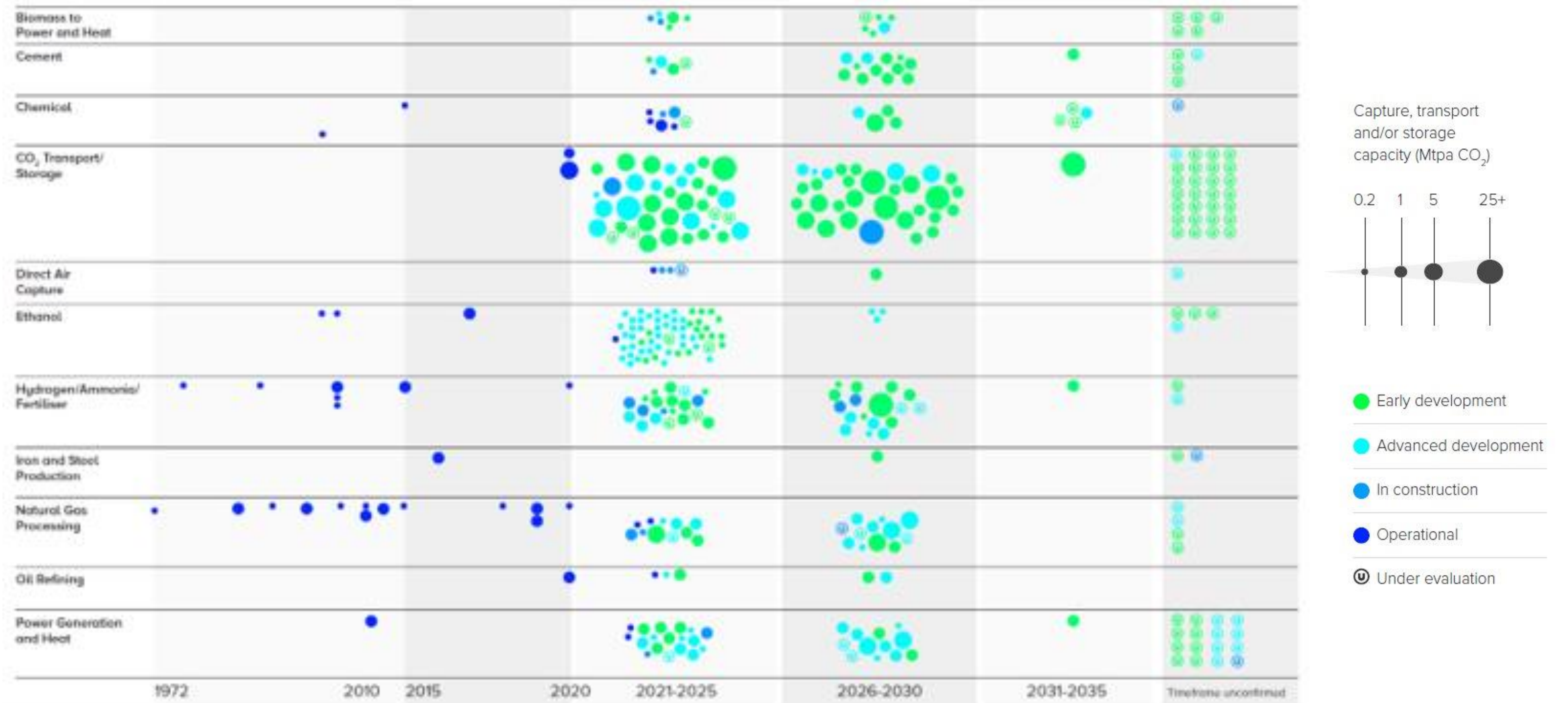
26 Facilities in construction

325 Facilities in development

102%

year-on-year increase in number of CCS facilities in development pipeline.

APPLICATION OF CCS ACROSS INDUSTRIES



DEVELOPMENT OF CROSS-BORDER CCS PROJECTS

- Recent years have seen a focus upon alternative business models that have the potential to accelerate deployment, reduce costs and remove supply chain risks.
- A key example has been the development of networks that connect multiple capture sources to storage resources using shared CO₂ transport infrastructure.
- In several jurisdictions, the focus has turned to projects which include the transport of captured CO₂ across territorial boundaries - including between nations – for permanent geological storage.
- Significant opportunities recognised by government and industry, in supporting projects of this nature – strong interest in Asia Pacific and Europe.
- Project proponents, policymakers and regulators required to consider the legal implications of transporting captured CO₂ across territorial boundaries, and between nations.

ASIA PACIFIC

- Transboundary CCS projects are featured heavily within the region's project pipeline, although many at very early stages of development:
 - Bayu-Undan, Carbon Aceh Arun Hub, ExxonMobil Indonesia Regional Storage Hub
- Regional governments are increasingly offering support for projects:
 - Australian Commonwealth government's recent legal amendments
 - Japanese government has provided formal funding support for projects which include transboundary transport and storage
 - MOUs signed between Singapore and Australia, and Singapore and Brunei.
- Strong industry interest in transboundary operations throughout the region:
 - Petronas is developing a project with several Japanese corporations with a view to supporting storage operations in Malaysia by 2028.
 - Woodside and Santos have signed MOUs with Japanese and South Korean corporations to investigate and develop storage operations in Australia
 - Several international corporations have signed an MOU aimed at examining potential CCS value chains in the APAC region, which includes consideration of export and storage options.

EUROPE

- In Europe there is increased growth in cross-border CO₂ networks involving transport by ship as well as pipelines.
- Emergence of projects within the North Sea, but more recently there have been projects proposed in the Baltic and Mediterranean:
 - Northern Lights project remains a leader with transboundary CO₂ T&S agreements with Yara and Orsted
 - Project Greensand in Denmark is currently in the pilot phase, with CO₂ initially transported from an INEOS facility in Belgium to an offshore storage site in Denmark
 - ENI's Ravenna Hub in Italy is in early development and will see the storage of CO₂, that has been transported from across southern Europe.
- These projects and others, are supported by regional frameworks and bilateral agreements between several governments in the region.

CASE STUDY: BAYU-UNDAN PROJECT

- In 2021, Santos signed an MOU with Timor Leste's regulator to develop a CCS project at the Bayu-Undan field in the Timor Sea.
- The project targets the capture of up to 10 million tonnes of CO₂ per annum – initially from the Darwin LNG facility in Australia – for storage in the Bayu-Undan reservoir in Timor Leste.
- Santos has highlighted the proposed repurposing of the existing gas export pipeline from Bayu-Undan to the Darwin LNG plant.
- The repurposing of the existing offshore platform, facilities and wells is also proposed.
- In March 2022, the project formally progressed to the FEED stage.
- Regionally significant project with the potential for the addition of further sources of CO₂ from other nations.
- Project has raised important legal and regulatory considerations for both Timor Leste and Australia.

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