

# GLOBAL STATUS OF CCS

2024



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INSTITUTE

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# GLOBAL CCS INSTITUTE

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## WHO WE ARE

Independent climate change think tank

Not-for-profit; Member-based

Over 215 members across governments, global corporations, private companies, research bodies and NGOs

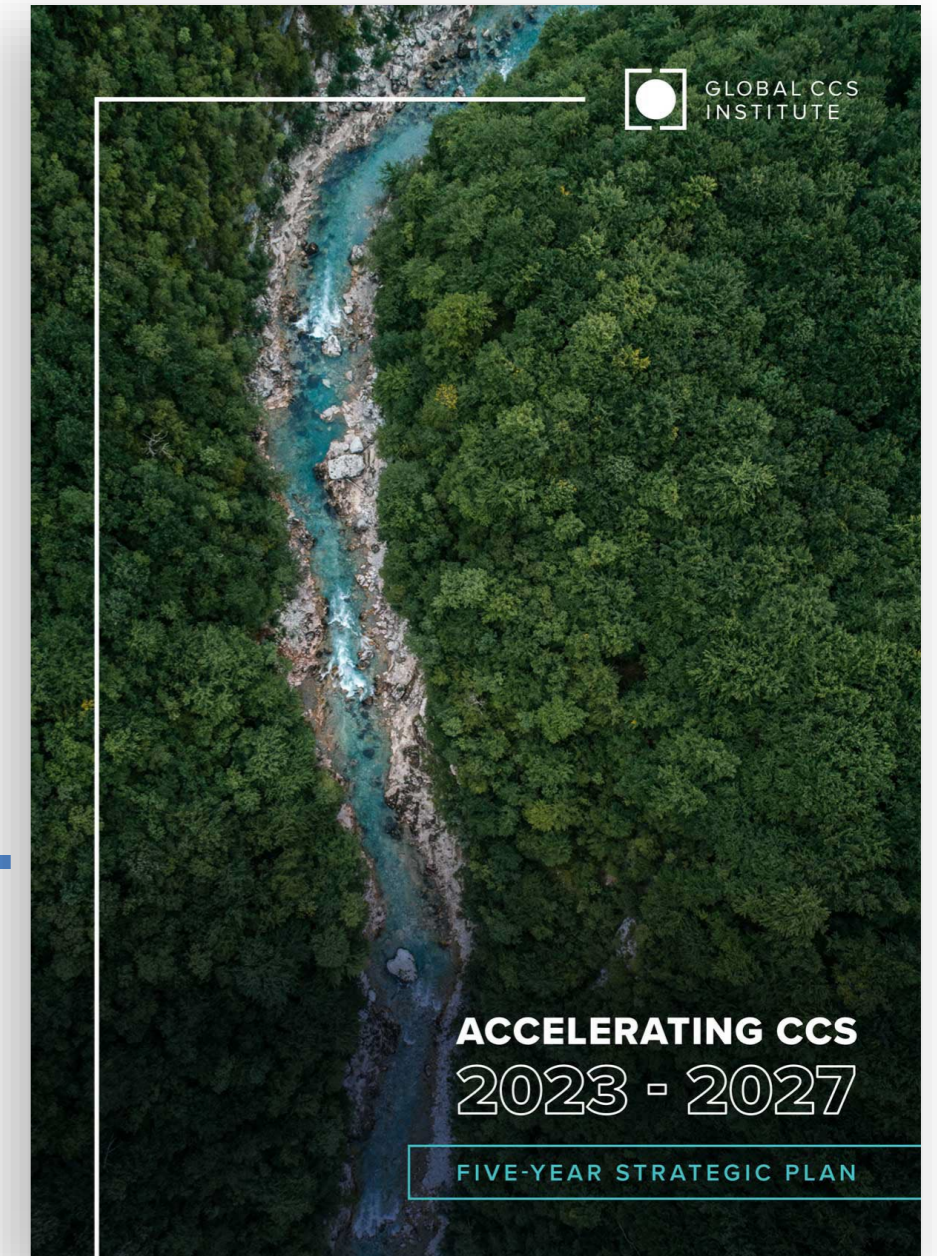
## MISSION:

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

## WHAT WE DO

Fact-based advocacy, thought leadership, knowledge creation and sharing, networking.

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# **CCS: SCALING UP THROUGH 2030**

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- **WHY CCS**
- **GLOBAL POLICIES AND PROJECTS STATUS**
- **REGIONAL UPDATES**

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# WHY: CCS IS ESSENTIAL TO REACH NET ZERO

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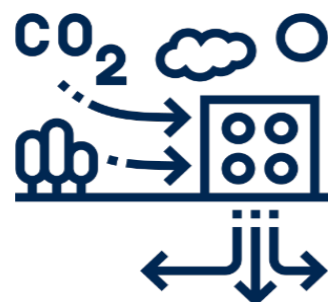
Achieving deep decarbonisation in hard-to-abate industry.



Enabling the production of low-carbon hydrogen at scale.



Providing low carbon dispatchable power.



Delivering negative emissions.

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# CCS: SCALING UP THROUGH 2030

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- **POLICY:** Growth has been driven by strong policy, particularly in North America and Europe.
- **PROJECTS:** strong pipeline growth over the last 6 years: compound rate of **35% pa** since 2017.
- **FACILITIES: 392** in the pipeline, representing a 102% year-on-year increase (July 2023).
  - **41 facilities are in operation**, with a capacity to capture and store **49 Mtpa**
  - 351 facilities are in development.
- **DIVERSITY** of CCS applications; development of networks → new industry category of “CO<sub>2</sub> transport and storage” facilities.

But ... global climate targets need CO<sub>2</sub> storage of approx. 1 Gtpa (2030) and multiple Gtpa (2050).

As more projects progress from planning and development to execution phase, **permitting, public acceptance and project management** will increasingly become more critical.

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# **POLICY: STRONG POLICY DRIVES STRONG GROWTH**

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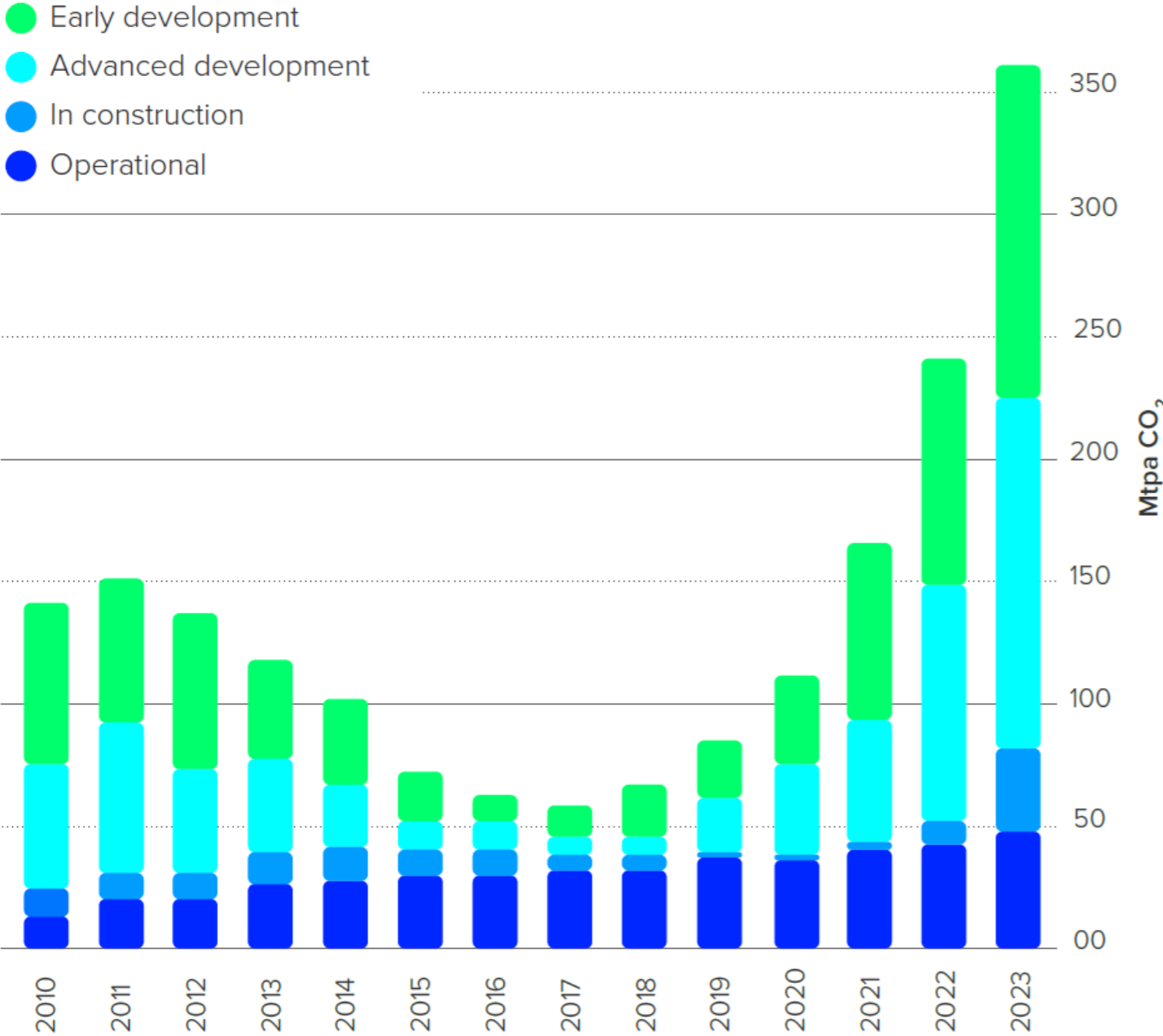
## **In 2023:**

- Strengthening general climate policy
- Greater recognition of role of CCS in NDCs, National Roadmaps, etc.
- Establishment of national CCS targets
- Creation of International CCS ambition: Carbon Management Challenge
- Strengthening fiscal incentives – operational and capital support
- Development of CCS regulations

## **In 2024:**

- Progress in United Kingdom, Germany, Belgium, France, Austria, Switzerland, CBAM “copies”

# PROJECTS PIPELINE: UNPRECEDENTED LEVELS



49

MTPA OF CO<sub>2</sub> CAPTURE CAPACITY IN OPERATION

32 Mtpa CO<sub>2</sub> in construction, 280 Mtpa CO<sub>2</sub> in development – total project pipeline capacity is 361 Mtpa CO<sub>2</sub>

41

CCS FACILITIES IN OPERATION

26 in construction, 325 in development

198

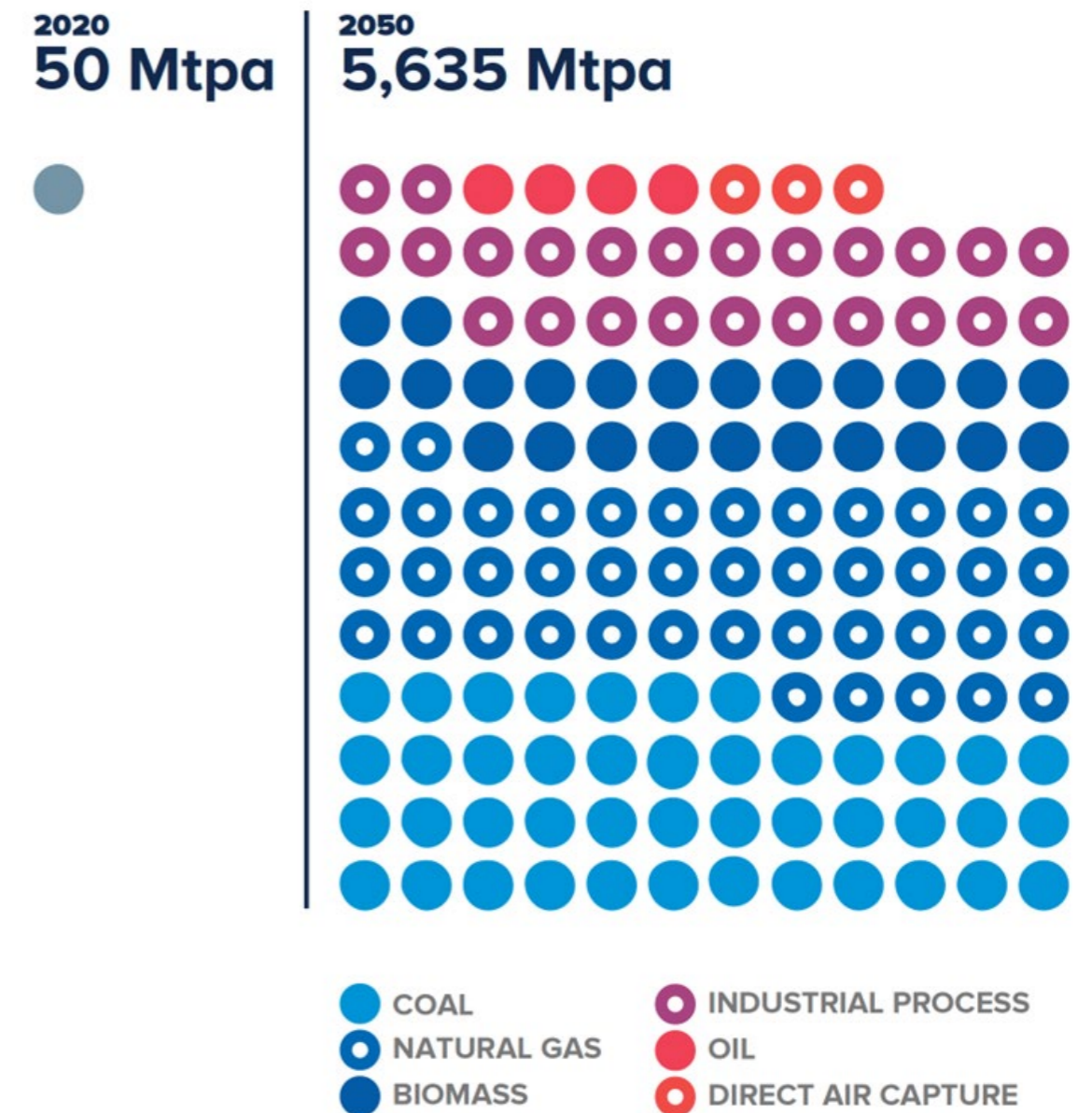
NEW CCS FACILITIES ADDED TO THE PROJECT PIPELINE SINCE 2022 GLOBAL STATUS OF CCS REPORT

# PROJECTS GROWTH REQUIREMENTS

Global emissions = 40 Gtpa

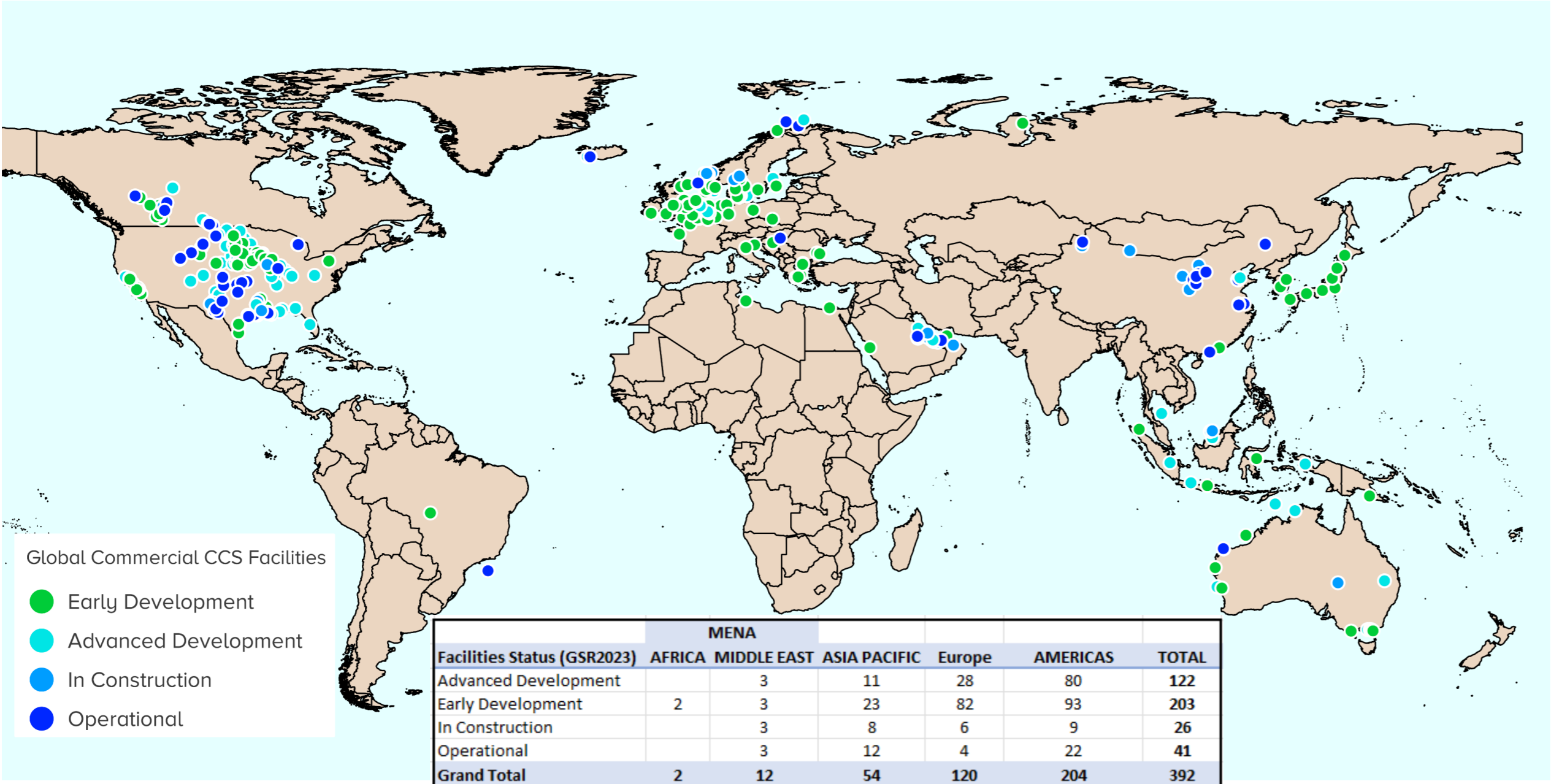
Estimated CCS need: approx. 14% = 5,600 Mtpa

Current annual operational capture capacity approx. 50 Mtpa





# PROJECTS: WHERE



41 Facilities in operation

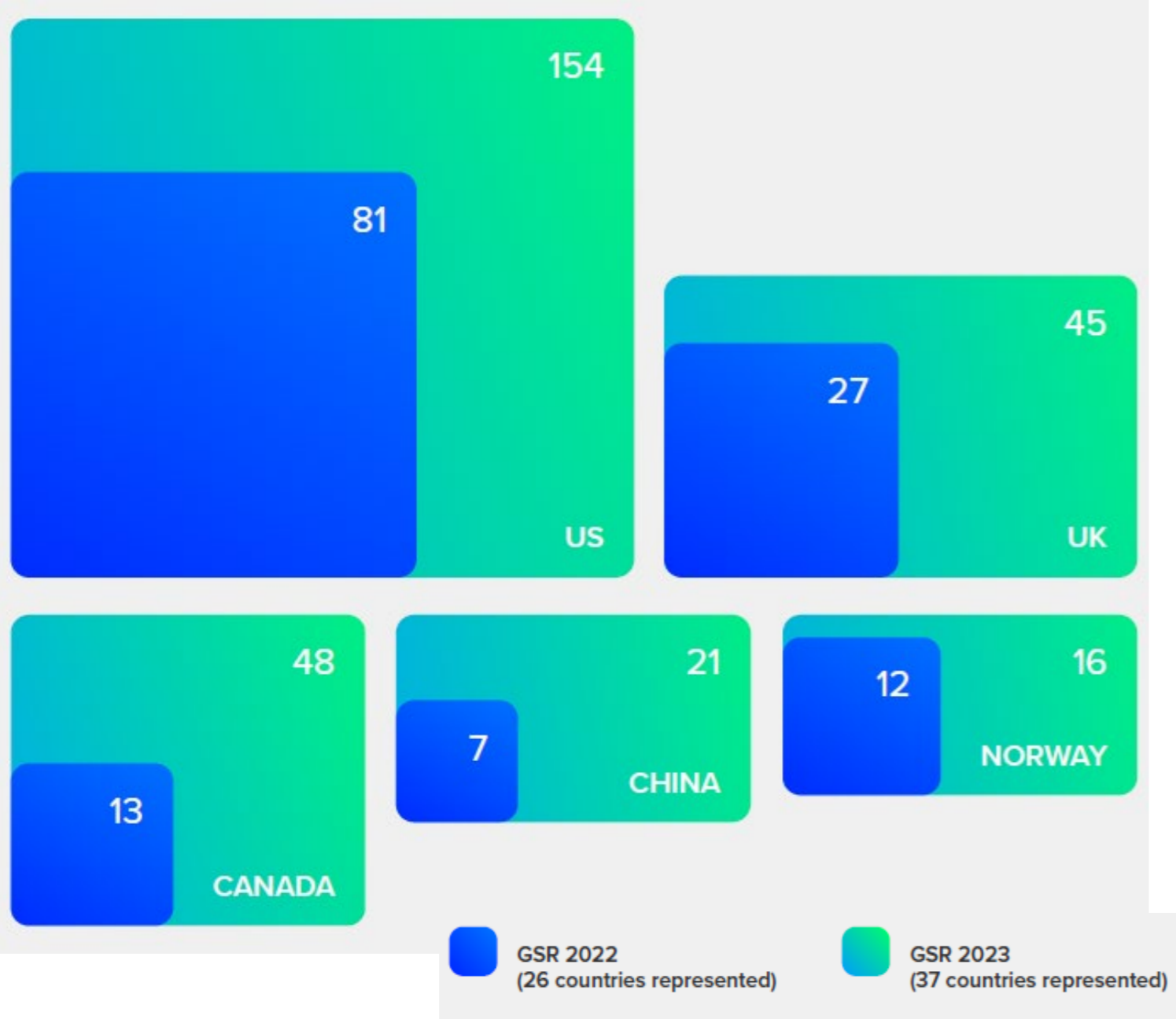
26 Facilities in construction

325 Facilities in development

**102%**  
 year-on-year increase in  
 number of CCS facilities  
 in development pipeline.

\*Includes Navigator Heartland Greenway network

# PROJECTS: HOW MANY



Growth in projects -dev to operating:  
top 5 countries:

- USA
- UK
- Canada
- China
- Norway

(colours not indicative of development status)

# PROJECTS: DIVERSITY



# GLOBAL DEVELOPMENTS

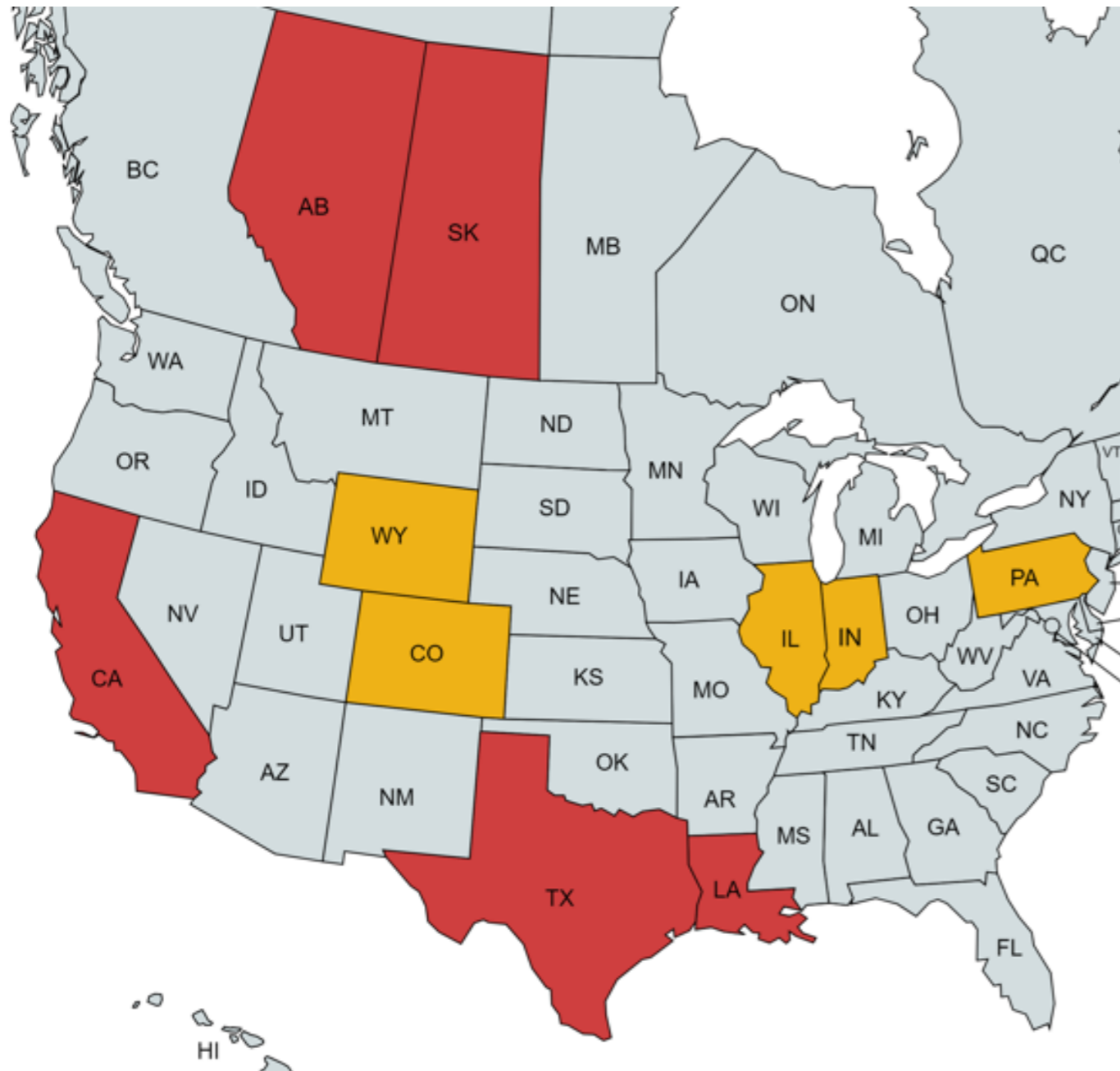
WEST – TO- EAST



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# CCS DEVELOPMENTS IN THE USA

 +73  
US Facility count increased  
by 73 since GSR 2022\*



## United States

- Bipartisan Infrastructure Law (2021): \$12bn for carbon mgmt.
- Inflation Reduction Act (2022): “45Q” tax credits
- CHIPS and Science Act (2022): \$1bn for research into CO<sub>2</sub> removal R&D.
- US EPA class VI permit applications queue
- California: four class VI wells permitted
- CDR support mechanism
- Risks exist here too: Navigator ventures announced cancellation of its pipeline project

# CCS DEVELOPMENTS IN CANADA & BRAZIL



## 19 hubs

Canada's Alberta awards 19 hubs through provincial TIER system – in addition to 6 sequestration hub agreements announced in spring 2022.



## 40 MtCO<sub>2</sub>

Brazil's Petrobras injects 10.6 MtCO<sub>2</sub> into pre-salt reservoirs in Santos Basin in 2022, yielding a cumulative 40.8 MtCO<sub>2</sub> – surpassing its 40 MtCO<sub>2</sub> target – and aims to reinject 80 MtCO<sub>2</sub> by 2025.

## Canada

- Federal 2030 Emissions Reductions Plan (2022) incl carbon price (C\$65/t up to C\$170/t in 2030)
- Federal Government released carbon management strategy and announced investment tax credit covering up 37% to 60% of the capex of CO<sub>2</sub> capture projects until 2030.
- Federal C\$7 billion allocated to carbon contracts for difference.
- Alberta: grant to top up tax credit; 19 additional CCS hubs under TIER Regulations → total 25!

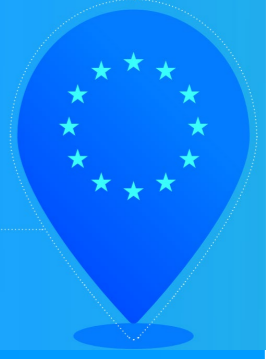
## Brazil

- Petrobras CCS project in the Santos Basin injected 10.6 Mt in 2022; 40 Mt since start of operations. Aim to inject cumulative total of 80 Mt CO<sub>2</sub> by 2025.
- CO<sub>2</sub> storage regulations bill passed by the Brazilian Senate – **just passed the Chamber of Deputies.**

# CCS DEVELOPMENTS IN EUROPE

119

projects across Europe



## GROWTH

- 119 facilities
- Hydrogen, ammonia, fertilizer, power generation and heat, cement and biomass to power/heat
- North Sea sites dominates storage; other countries emerging, including onshore

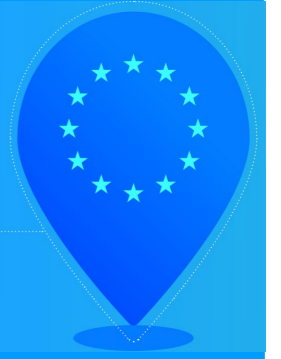
## EU

- CAPTURE: EU Innovation Fund to invest in 22 CCUS projects → Is this enough?
- TRANSPORT:
  - 14 PCI Storage and Transport projects
  - Bilateral agreements to facilitate cross-border collaboration and transportation
- STORAGE:
  - NZIA aims to have 50 Mtpa storage developed by 2030 → shorten regulatory timelines.

# CCS DEVELOPMENTS IN EUROPE

119

projects across Europe



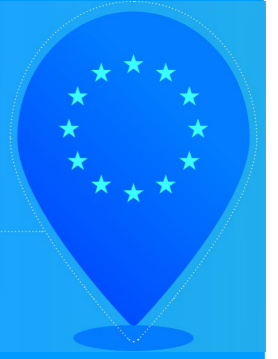
	Belgium	Denmark	France	Germany	Iceland	Netherlands	Norway	Sweden	Switzerland	UK
Belgium										
Denmark	<a href="#">MoU</a>									
France		<a href="#">LoI</a>								
Germany	<a href="#">Agreement</a>	<a href="#">Declaration of Intent</a>								
Iceland										
Netherlands	<a href="#">MoU</a>	<a href="#">MoU</a>	<a href="#">Pact</a>							
Norway	<a href="#">Negotiations for bilateral agreement</a>	<a href="#">MoU</a>	<a href="#">LoI</a>	<a href="#">Declaration to cooperate</a>		<a href="#">Mou</a>				
Sweden							<a href="#">MoU</a>			
Switzerland					<a href="#">Decl of Int</a>	<a href="#">MoU</a>	<a href="#">exploring collaboration</a>			
UK		<a href="#">MoU</a>					<a href="#">MoU</a>			



# CCS DEVELOPMENTS IN EUROPE

119

projects across Europe



## DENMARK:

Government funding €3.6 billion allocated for Ørsted Bioenergy & Thermal Power. More coming. Permits, onshore storage;

## NORWAY:

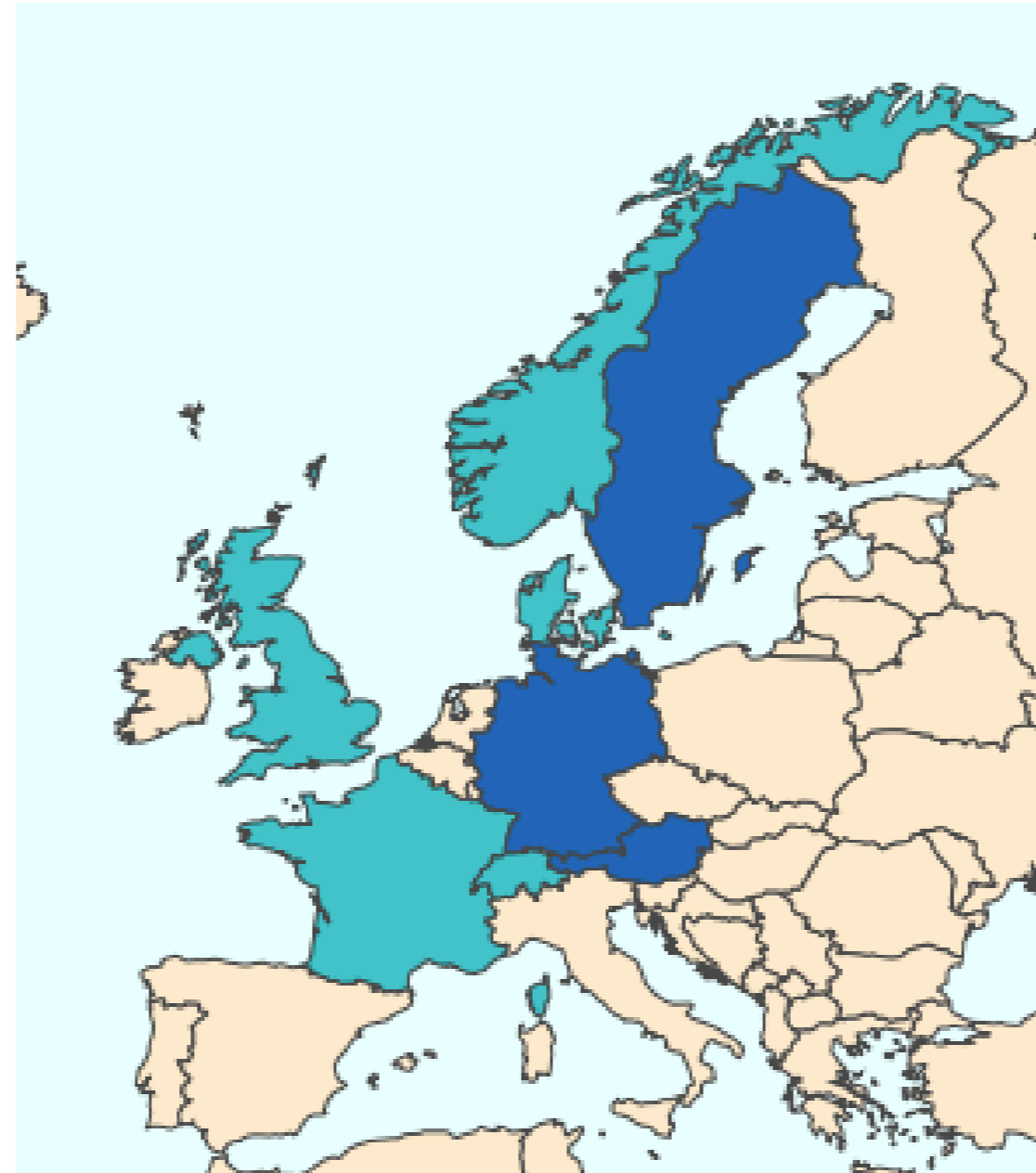
Growth beyond Northern Lights: Barents Blue, LUNA, Noordkaap, Borg CO2

## BELGIUM:

Bilateral agreements; onshore CO2 pipeline network incl. regulation; offshore pipeline to Norway; EU IF success; CEF success

## GERMANY:

CCfD's: €4 billion over 15 years



## THE NETHERLANDS:

SDE++; Aramis; Delta-Rhine corridor; Porthos finally approve + FID

## UNITED KINGDOM:

4 CCUS networks by 2030 capturing 20-30 mtpa; £20 billion allocated Spring Budget 2023. Negotiations with recipients ongoing. 24 storage permits; Vision

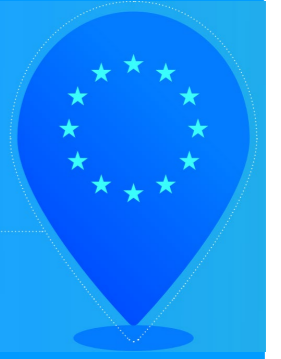
## GREECE:

EU IF successes; local storage (Prinos); active local storage regulator; shipping

# CCS DEVELOPMENTS IN GERMANY

119

projects across Europe



## POLICY:

- Climate Change Act 2021: Climate neutrality 2045
- Carbon CFD's
- Carbon Management Strategy
- Draft Carbon Storage Act

## BILATERAL AGREEMENTS:



MATHILDE BLANCHARD  
Senior Policy Lead, Knowledge and Analysis  
DANIELA PETA  
Public Affairs Lead EMEA  
ELIINA LEVINA  
Head of Public Affairs

## PROJECTS:

### Commercial scale:

- Everest
- GeZero
- Carbon2Business
- ...

### Transport & Storage

- Delta Rhine Corridor
- Co2nnectNow
- EU2NSEA
- Bremen transshipment Hub
- Bavaria

## PUBLIC ACCEPTANCE?

# CCS DEVELOPMENTS IN MIDDLE EAST AND AFRICA

8%

Regional operating capture capacity ~8% of global total



## POLICIES

- NZ targets; emphasis on industrial diversification; low-carbon hydrogen and ammonia as future export market driving CCS deployment
- Hosting COP28 turns spotlight on region's commitment to sustainability
- **KSA** = newest GCCSI member
- **Oman** working on Legal & Reg framework

## PROJECTS

Regional operational CCS capacity = 8% of global total capacity:

3 facilities in operation in the region, capturing 3.7 Mtpa CO<sub>2</sub>

- **UAE:** ADNOC took 1.5 Mtpa FID on the Habshan facility; aiming for 5 Mtpa (2030)
- **KSA:** Al Jubail CCUS hub targeting capturing 9 Mtpa (2027) and 44 Mtpa (2035)
- Qatar Gas up to 11 Mtpa (2035)



# CCS DEVELOPMENTS IN ASIA PACIFIC

+34

APAC facility count increased  
by 34 since GSR 2022\*

- APAC facility count +34 from GSR2022: 50+ CCS facilities (12 operating; 8 in construction).
- Natural gas processing and chemical manufacturing
- Significant policy/regulation development across the region, but much left to be done.
- Transboundary transport of CO<sub>2</sub> emerging as a significant issue and opportunity.
- Projects positioning to receive third party CO<sub>2</sub> for storage for a fee.
- Increased international collaboration in the region: **Malaysia, Indonesia, Thailand, Brunei** and **Timor-Leste** are all moving forwards to develop opportunities to receive international CO<sub>2</sub>.

**Japan** progressed its CCS roadmap and announced support for 7 CCS networks that will capture CO<sub>2</sub> for storage in the offshore waters off Japan and in the wider region. Influencing regional governments through JCM funding and ASEAN

# CCS DEVELOPMENTS IN ASIA PACIFIC (2)

12

facilities currently  
in operation

## China

- Great need for CCS. Carbon price ETS on power stations.
- 11 operating facilities including its first commercial-scale, 109 km long CO<sub>2</sub> pipeline.
- 3 projects became operational in 2023 – Asia's largest coal-power plant CCS facility, the first offshore CO<sub>2</sub> storage facility and carbon capture at an oil refinery.



## Australia: Legal & Regulator Indicator improvement

- “Safeguard Mechanism” = Carbon baseline reduction targets for industry; ACCU = A\$75/t
- House of Representatives passed a bill to ratify the 2009 & 2013 amendments to the London Protocol (transboundary transport of CO<sub>2</sub> for geological storage) → Senate.
- State level legislation

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# REALISING CCS AT SCALE GLOBALLY

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Existing pledges and commitments can get us to hundreds of million tonnes per annum scale.

## WHAT'S NEEDED?



- Business case



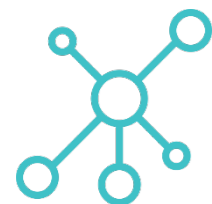
- Collaboration e.g. to learn to cut project lead times



- Policy



- Deployment in emerging markets



- Infrastructure



- Public acceptance

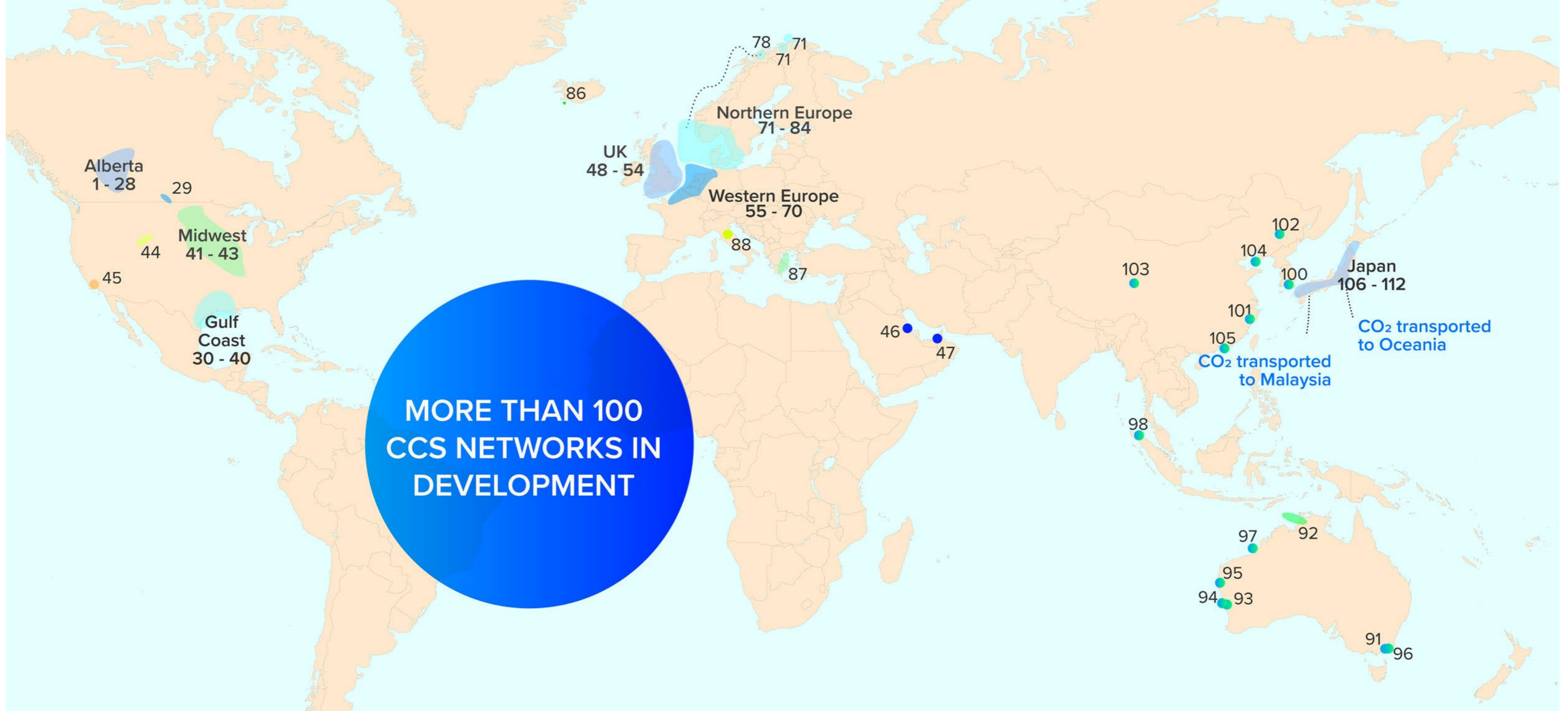
# THANK YOU

Download the report here:

[status23.globalccsinstitute.com](https://status23.globalccsinstitute.com)



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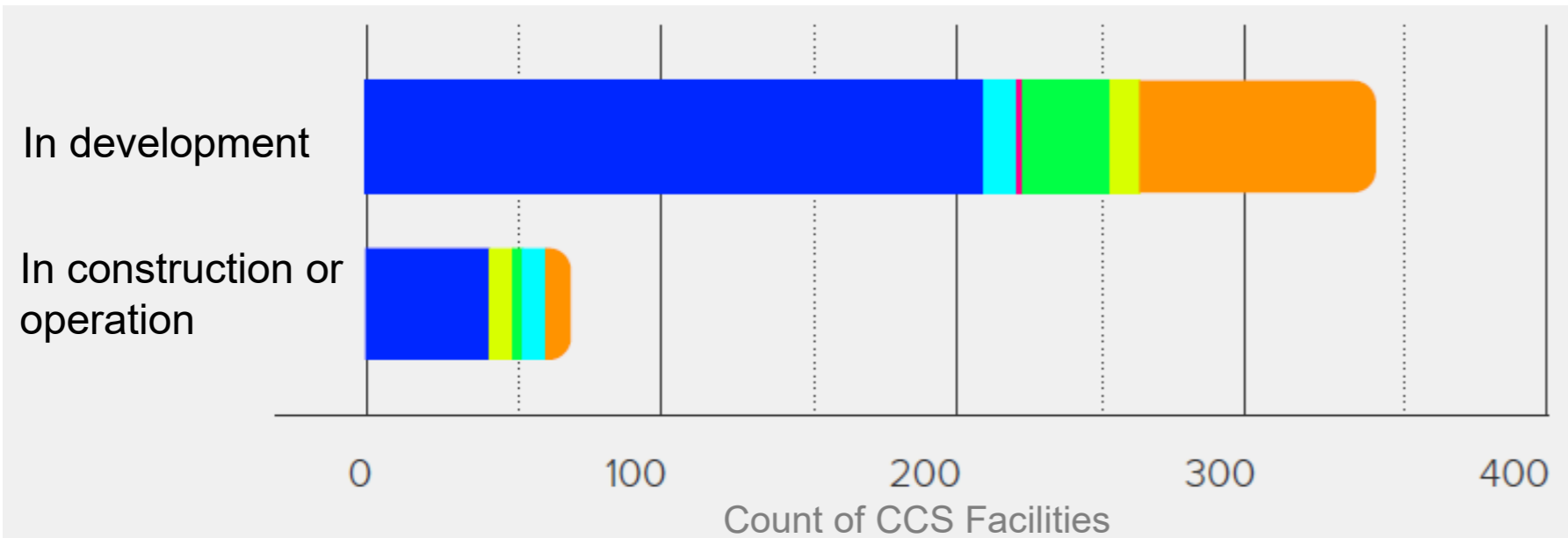
Numbers are unique network identifiers. E.G in Japan, there are 7 separate CCS Networks in development



# CO<sub>2</sub> TRANSPORT & STORAGE

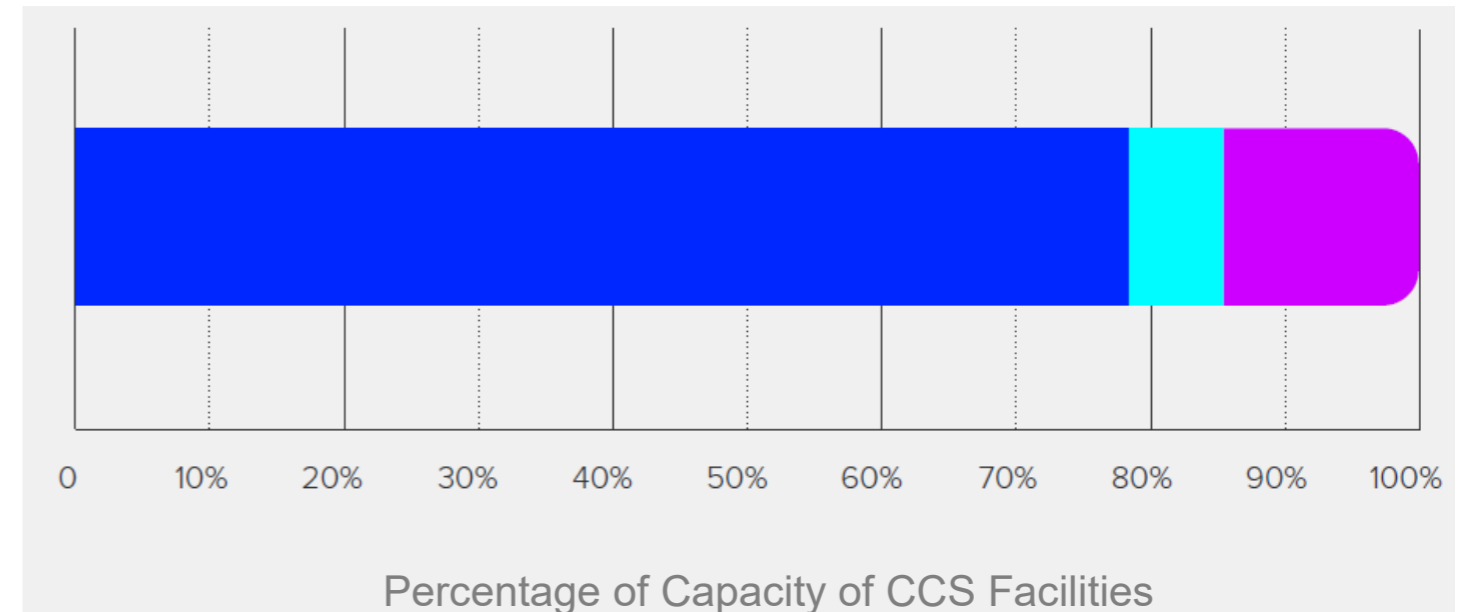
More complex CO<sub>2</sub> transport logistics emerging

CCS Facility by CO<sub>2</sub> Transport Mode



78% of CCS facilities in construction or development by capacity expected to use dedicated geological storage

CCS Facility Capacity by Storage Type



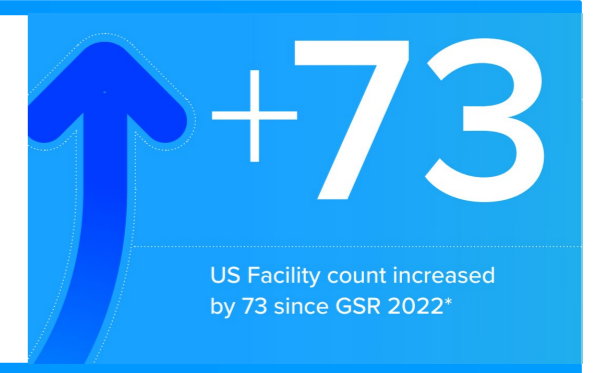
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# FINANCE AND INVESTMENT

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- Financing prospects improved due to strengthened policy support and/or price signals
- Equity investment and M&A activity in CCS increasing
  - USD 4.9 billion ExxonMobil acquisition of Denbury
  - GSR23 notes over USD 2.2 billion investment in CCS companies including Climeworks, Svante, Summit Carbon Solutions, Amogy, Infinium, Ion Clean Energy, Heirloom
- The prevalence of project finance is not well understood but must become widespread to support accelerated deployment

# CCS DEVELOPMENTS IN THE USA



- US facility count (all stages of development) **+ 73** compared to GSR2022 – benefitting from Inflation Reduction Act (2022), CHIPS & Science Act (2022) and Bipartisan Infrastructure Law (2021).
  - BIL includes USD 12 billion in investments in carbon management.
  - IRA lowers carbon capture thresholds, increases the dollar value of tax credits and adds provisions for direct pay and tax credit transferability.
- Ethanol, ammonia, hydrogen and fertiliser production, power generation and heat are the top applications
- The Department of Interior is developing regulations for offshore storage and the Pipeline & Hazardous Material Safety Administration is updating CO<sub>2</sub> pipeline standards.
- The US EPA has received an unprecedented number of Class VI permit applications (169 wells associated with 58 projects).
- Risks to deployment: Regulatory and permitting uncertainty or delays, as well as lack of community support.