CCS STATUS AND TRENDS

OCT 2023

Bruno Gerrits
Client Engagement Manager Europe
Global CCS Institute

GLOBAL CCS INSTITUTE

GLOBAL CCS INSTITUTE

WHO WE ARE

Independent climate change think tank

Not-for-profit; Member-based

Over 210 members across governments, global corporations, private companies, research bodies and NGOs, all committed to a net-zero future.

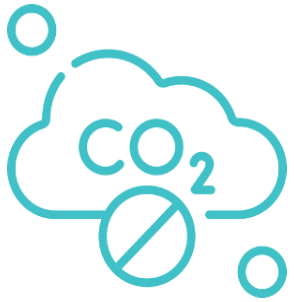
MISSION:

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

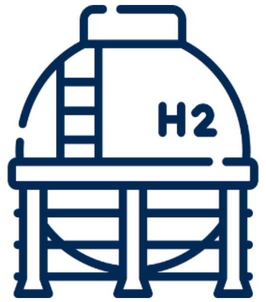
WHAT WE DO

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

CCS IS AN ESSENTIAL TOOL FOR REACHING NET-ZERO, ALONGSIDE OTHER TOOLS

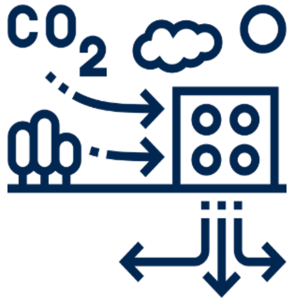


Achieving deep decarbonisation in hard-to-abate industry.



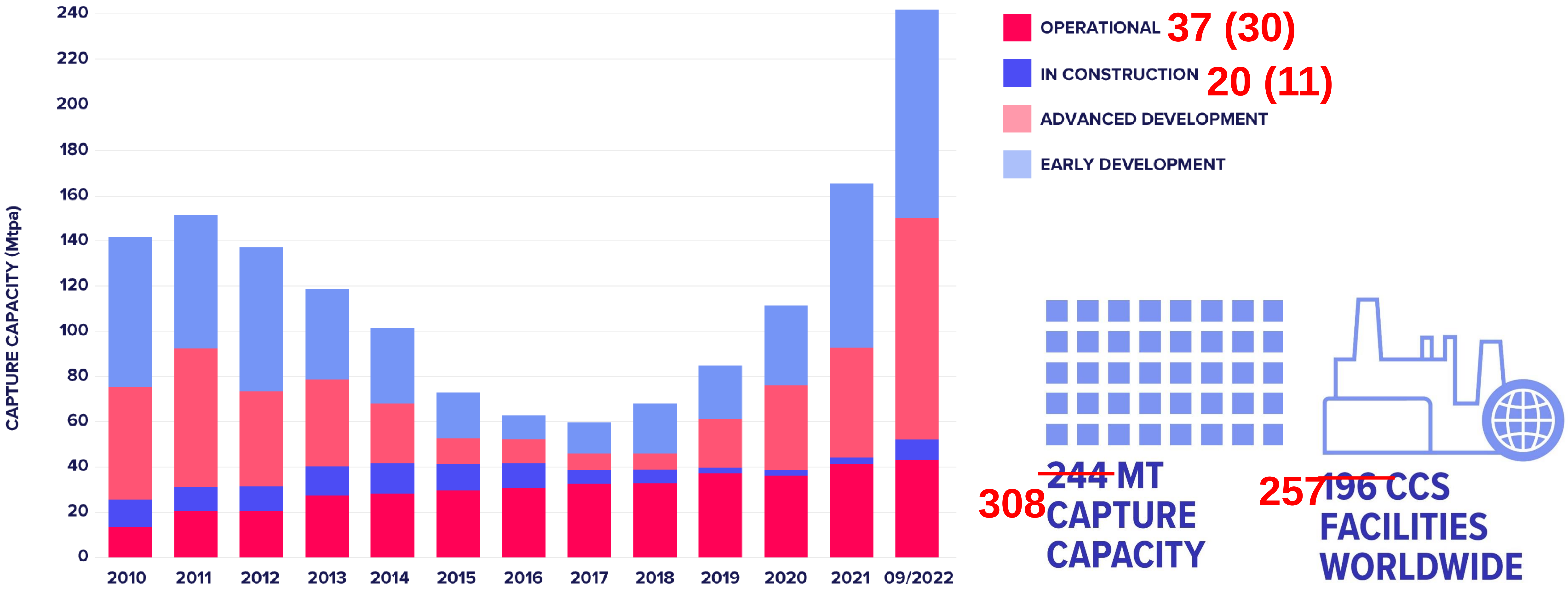
Enabling the production of low-carbon hydrogen at scale.

Providing low carbon dispatchable power.



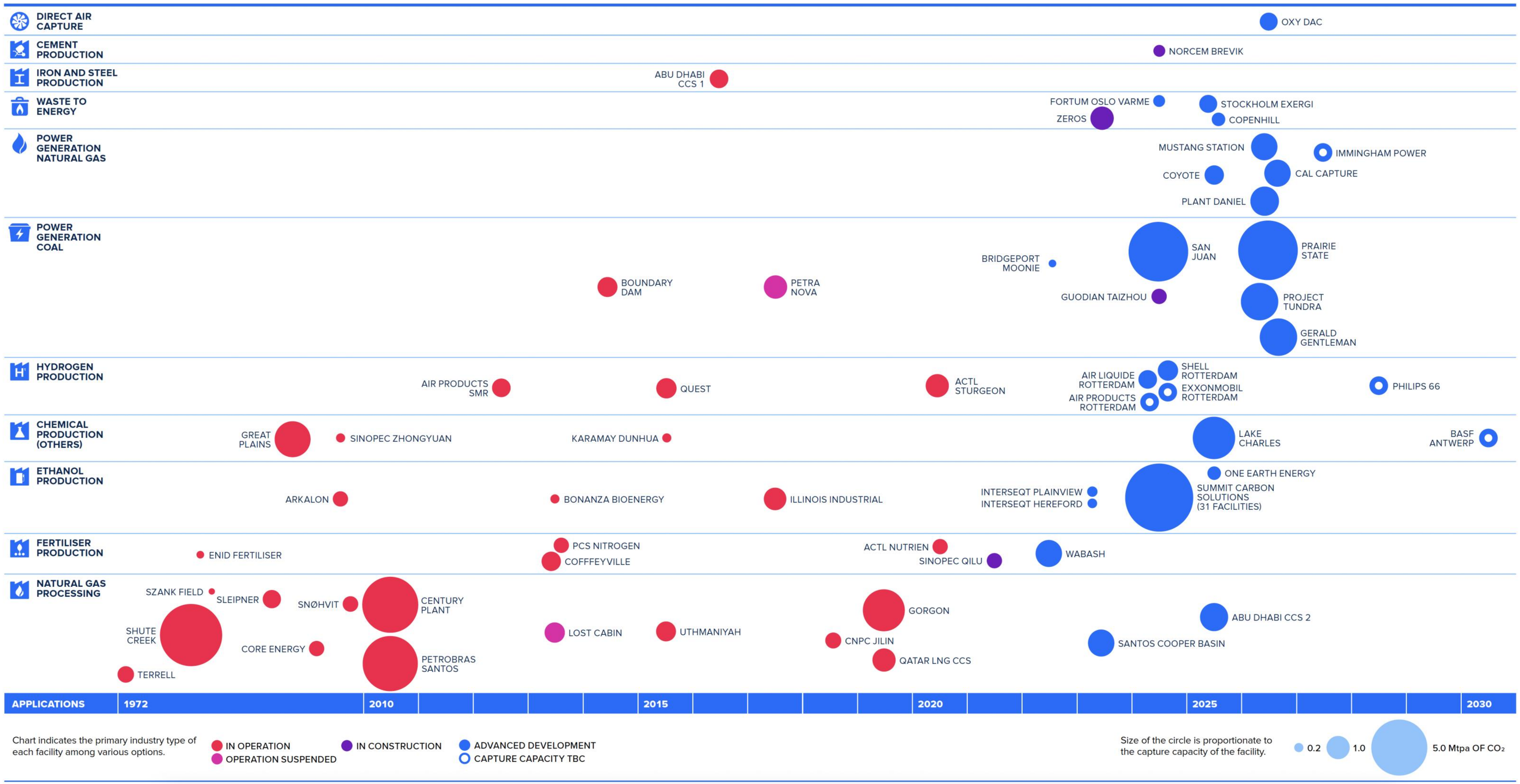
Delivering negative emissions.

GROWTH – COMMERCIAL SCALE PROJECTS



GLOBAL CCS INSTITUTE

CCS VERSATILITY

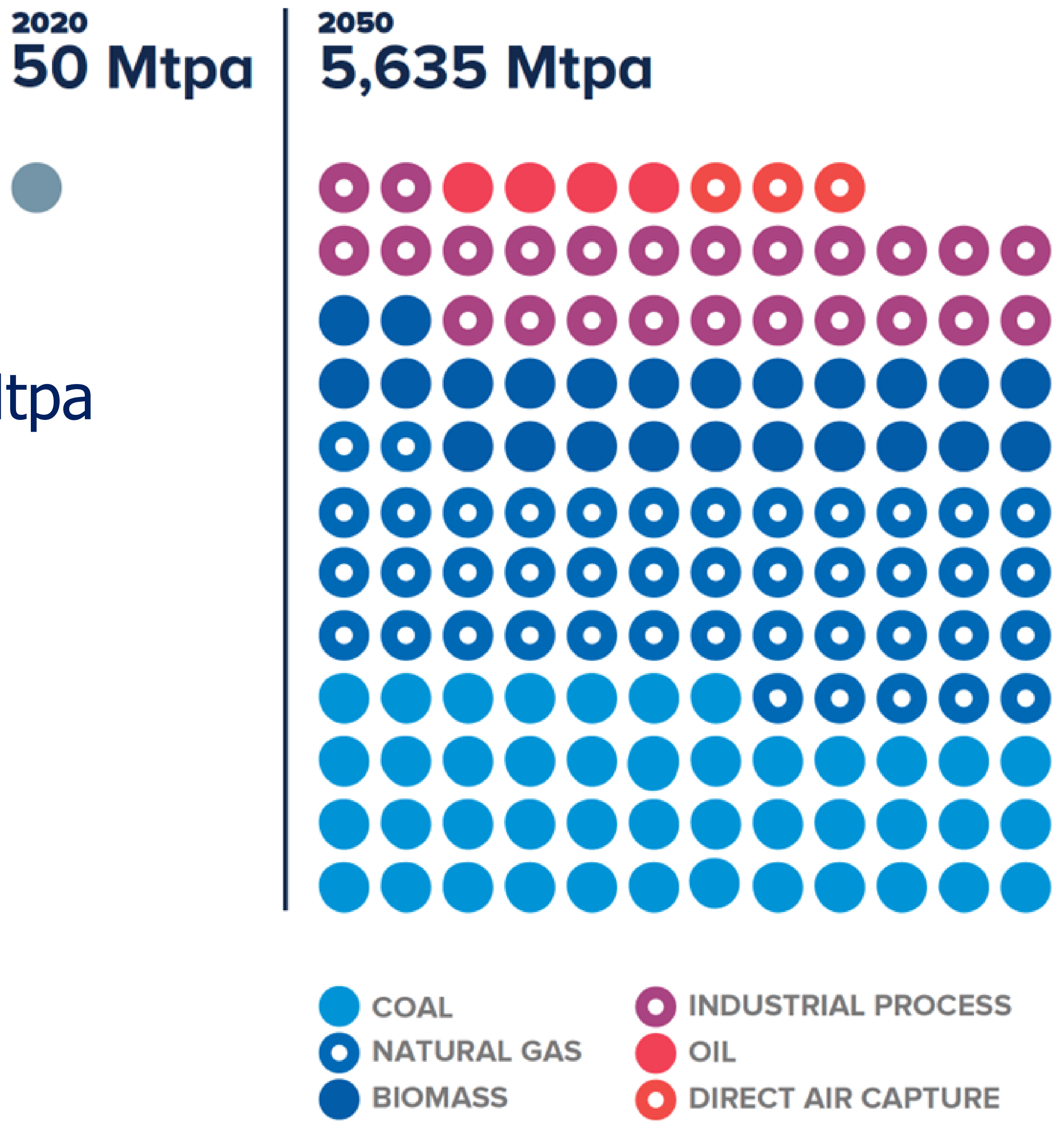


GROWTH REQUIREMENTS

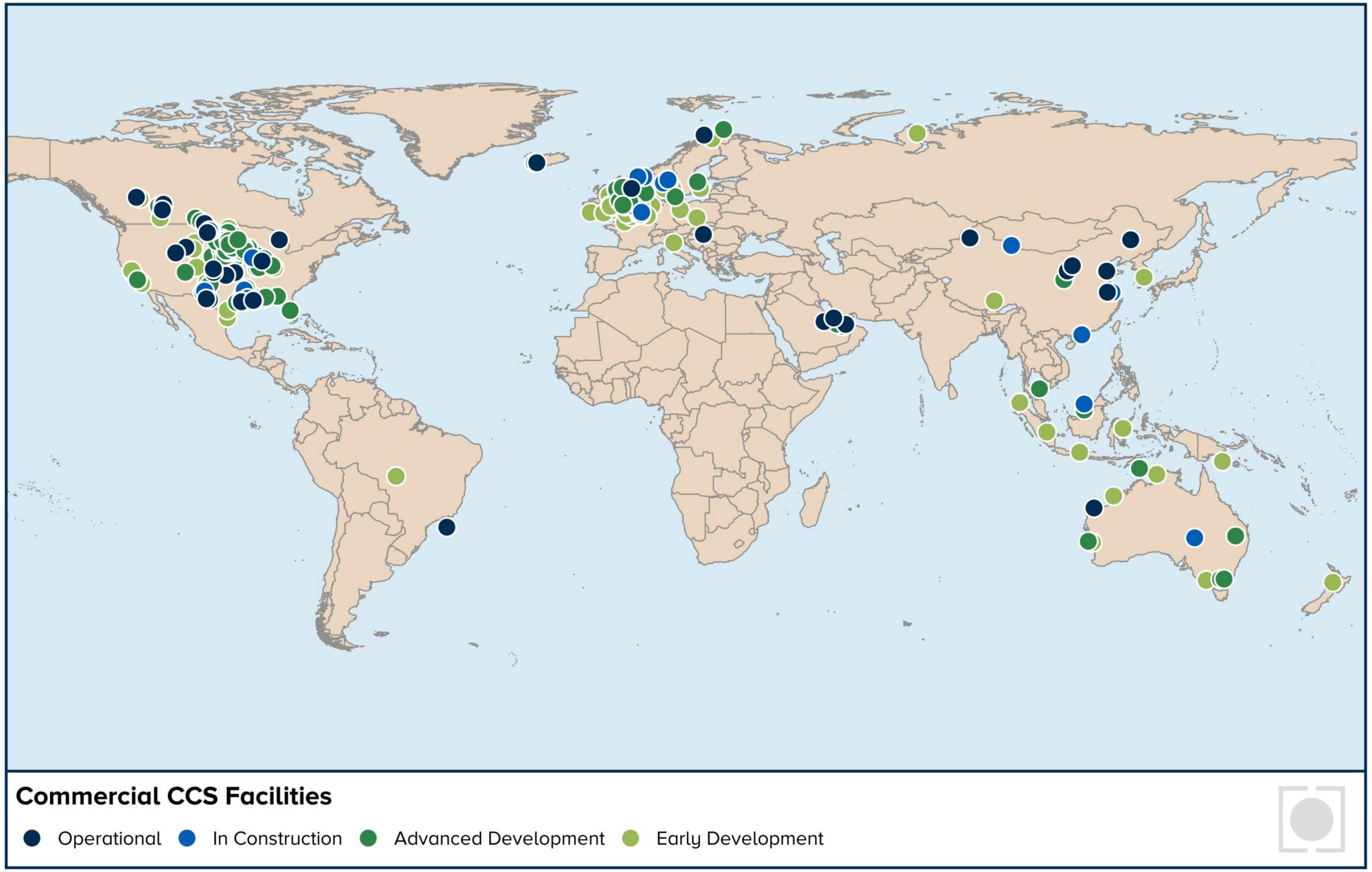
Global emissions = 40 Gtpa

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

Current annual operational capture capacity approx. 50 Mtpa



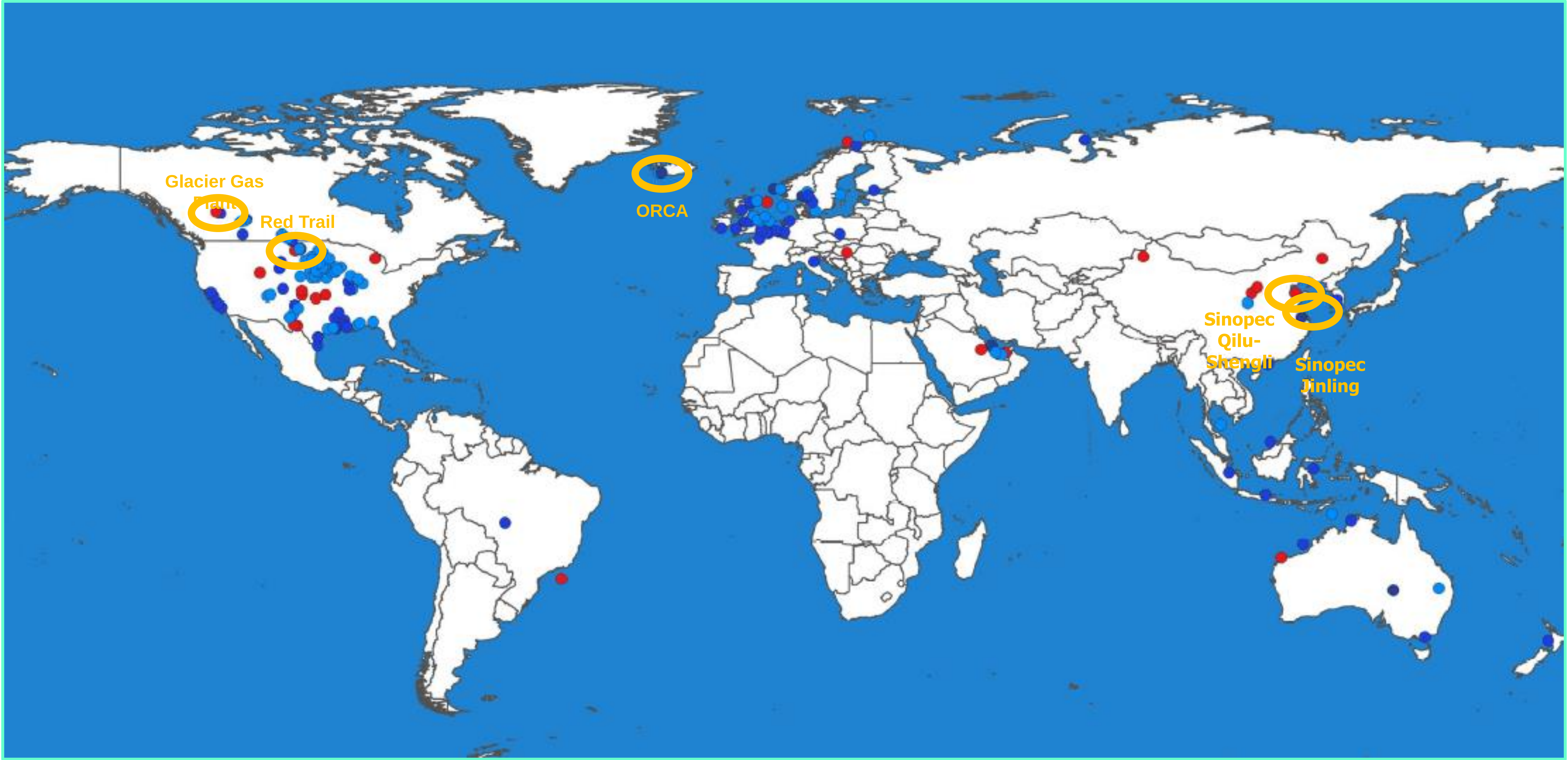
CCS FACILITIES AROUND THE WORLD



37 ~~30~~ CCS FACILITIES OPERATIONAL

20+ COUNTRIES WITH COMMERCIAL CCS & DACCS FACILITIES
IN OPERATION OR UNDER DEVELOPMENT

CCS FACILITIES AROUND THE WORLD



Advanced Development • Early Development • Operational • Under Construction

Modified from *Global Status of CCS 2022 Report*, GCCSI

GLOBAL CCS INSTITUTE

WHAT'S NEEDED NEXT?

- **Business case:**
  - Carbon pricing
  - Programmatic support
  - CCU / CDR
- **Infrastructure**
  - Funding
  - Building
  - Regulation
- **Policy**
  - Bilateral agreements (London Protocol)
  - Build up individual countries' regulators experience
  - Transport standards
  - Creating a market
    - Demand for green premium products
    - Middleman aggregators
    - Buffering capacity
    - Access to UK storage reservoirs for EU emitters
  - Long term liability

CCS 2023: BUSINESS CASE

DIRECT contributors

- Carbon price
- Government funding
- Carbon credits for BECCS/DAC
- CCU

INDIRECT contributors

- License to operate
- Better lending rates
- Better ESG rating
- Lower risk / Director's Duties
- Reputation -> staff

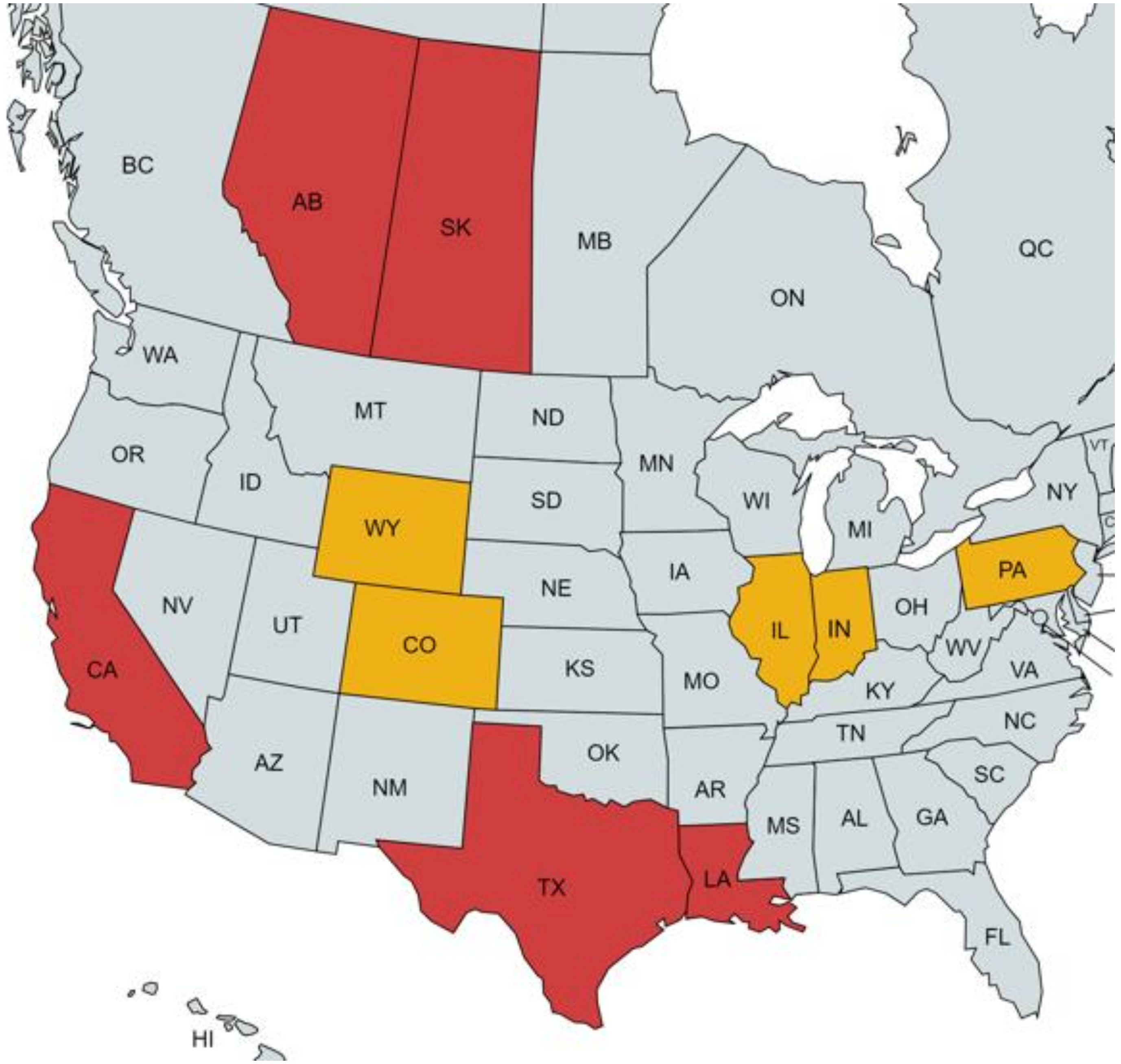
INFRASTRUCTURE DEVELOPMENT

Networks continue to be a bottleneck of development.

- Receiving facilities / trans-shipment hub / terminals
- Pipelines: onshore + offshore Europe; USA
- Shipping: Dan-Unity CO2, Ecolog, Prime Marine, NYK, Mitsui OSK, Stena Bulk
- Storage licensing: UK (24), Norway, Denmark and Italy

- Funding
- Regulation
- Standards
- Geographic expansion

CCS POLICY – N. AMERICA



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_2 removal R&D.

Canada

- 2030 Emissions Reduction Plan (2022), CCUS Strategy, Federal CCUS ITC tax credit, provincial support

GLOBAL CCS INSTITUTE

CCS POLICY - EUROPE

- **Growth continues from 2022 into 2023:**
  - 120+ commercial facilities in various stages of development (from 70+)
  - CCS increasingly trans-national
  - Storage permits: UK, Norway, Denmark, Italy
- **EU:**
  - CBAM now operational
  - Innovation Fund: 4th call 23/11/23; 4 billion €
  - CCS Directive report (OCt23) ; Carbon Management Strategy (2024-Q1)
- **DENMARK:**
  - €5bn funding for CCS projects, biogenic CCS incentive, permits, cross-party support, onshore storage
- **BELGIUM:**
  - Onshore CO_2 pipeline network; offshore pipeline to Norway; EU IF success; CEF success; bilateral agreements;

EUROPE BILATERAL AGREEMENTS

	Belgium	Denmark	France	Germany	Iceland	Netherlands	Norway	Sweden	Switzerland	UK
Belgium										
Denmark	MoU									
France										
Germany	Agreement	Declaration of Intent								
Iceland										
Netherlands	MoU	MoU	Pact							
Norway	Negotiations for bilateral agreement	MoU	LoI	Declaration to cooperate		Mou				
Sweden							MoU			
Switzerland					Decl of Int	MoU	exploring collaboration			
UK		MoU					MoU			

CCS POLICY – EUROPE (2)

- **The Netherlands:**
  - SDE++ subsidy
  - Aramis trunk line ; Delta-Rhine corridor
  - New project "Noordkaap"
  - Porthos finally approved: FID expected Dec2023
- **The United Kingdom:**
  - 4 CCUS networks by 2030 capturing 20-30 mtpa; £20 billion allocated Spring Budget 2023. Negotiations with recipients ongoing. 24 storage permits
- **Norway:**
  - Growth beyond Northern Lights: Barents Blue, LUNA, Noordkaap, Borg CO2
- **Greece:**
  - EU IF success; local storage (Prinos); active local storage regulator; shipping
- **Progress not linear:**
  - PORTHOS; Celsio Oslo; South-Dakota pipeline;

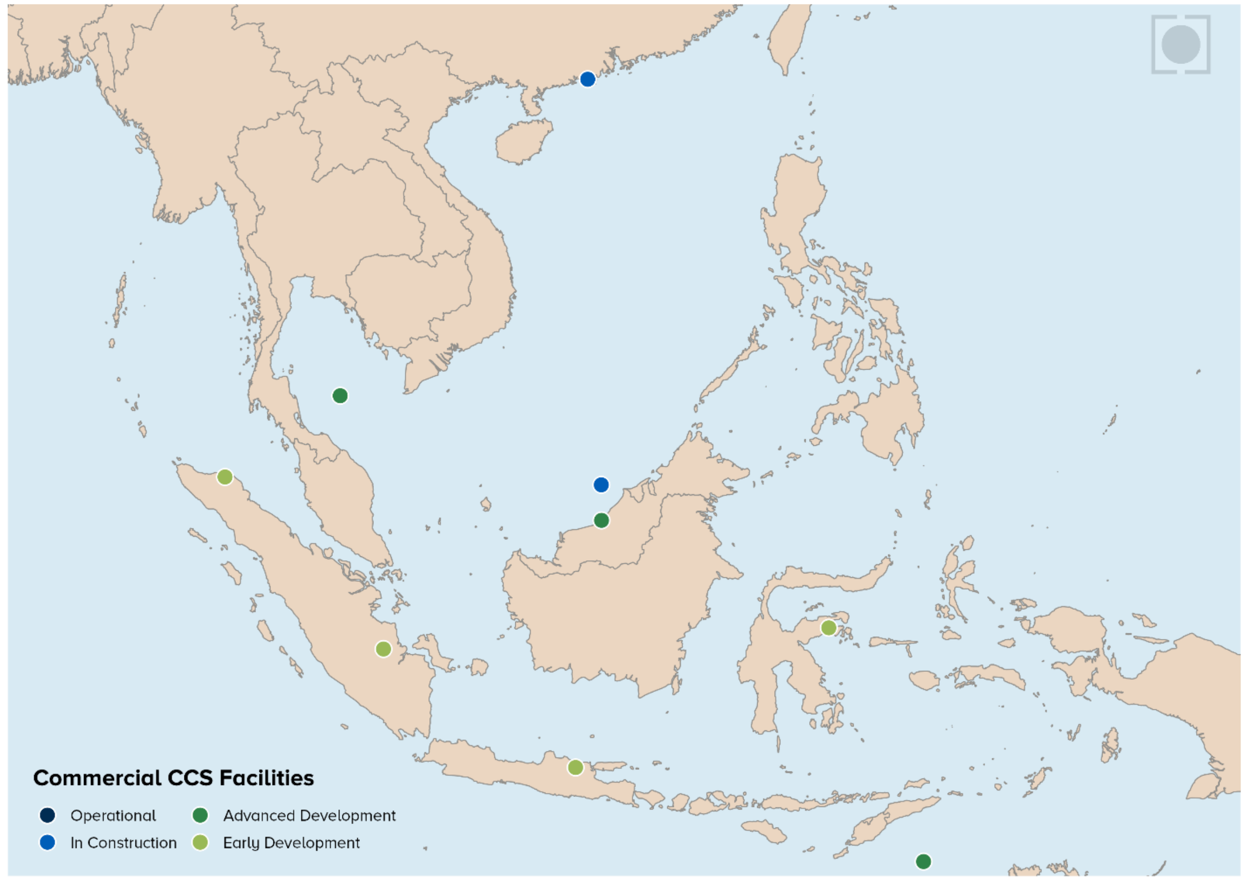
CCS DEVELOPMENTS – MENA REGION

- **3 facilities** in operation in the region, capturing 3.7 Mtpa CO2
- **CCUS** being driven by government ambition and vision:
  - NDCs and net-zero commitments
  - Potential to take a significant share of low-carbon hydrogen market
  - Low-carbon industrialization plans
- **CCS-specific progress:**
  - KSA Al Jubail hub targeting 9 Mtpa (2027) and 44 Mtpa (2035)
  - ADNOC aiming for 5 Mtpa (2030); FID taken for 1.5 Mtpa
  - Qatar Gas up to 11 Mtpa (2035)

CCS DEVELOPMENTS – ASIA PACIFIC

SE ASIA EMERGING CCS PROJECT HOTSPOT

- Most active nations: Indonesia, Malaysia, Thailand, Singapore
- 12 facilities: Indonesia (7); Malaysia (3); Thailand & Timor-Leste (1)
- Vertically integrated and average capture capacity 1.9 Mtpa
- Most projects related to natural gas processing.
- Need for the development of PLR and storage assessments
- SE Asia CCS-specific policies include carbon taxes and carbon pricing e.g. China, Indonesia



INDONESIA

- Economic development remains priority. Ambitions to become regional storage hubs for CCS.
- SEA 2nd largest economy; world 4th most populated country; 60% of electricity supplied by coal fired plants.
- 1st SEA region to establish an integrated CCS-specific legal and regulatory framework
- Government targeting establishing 16 CCS/CCUS projects to be operational by 2023
- Government support of National Center of Excellence for CCS

CCS DEVELOPMENTS – ASIA PACIFIC

CHINA

- Great need for CCS. Carbon price ETS on power stations.
- 3 operational CCS projects. More coming.
- Government support on promoting CCUS

JAPAN / SINGAPORE

- Strong support, limited domestic storage, reliant on export of CO_2.
- CCS Long term Roadmap finalized in March 2023.
- JOGMEC (JPN government agency) selected 7 "advanced CCS projects" as candidates for government financial support (2030)

AUSTRALIA

- Now has "Safeguard Mechanism" = Carbon baseline reduction targets for industry; ACCU = A$75/t
- 2 projects operating and 1 in construction

GLOBAL CCS INSTITUTE

NET-ZERO 2050 REQUIRES STRONG ACTION 2030

- Policy and project progress is encouraging, but need to increase 100-fold.
- Reaching the required scale for CCS will require:

Business case, incl. programmatic support and CDR/CCU regulation

Infrastructure funding, building and regulation

Policy

GLOBAL CCS INSTITUTE

THANK YOU

@GlobalCCS
#GLOBALCCS22

GLOBAL CCS INSTITUTE