WORLD STEEL OPEN FORUM

CCS – STATUS AND TRENDS

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WHO WE ARE

Independent climate change think tank

Not-for-profit; Member-based

Over 180 members across governments, global corporations, private companies, research bodies and NGOs, all committed to a net-zero future.

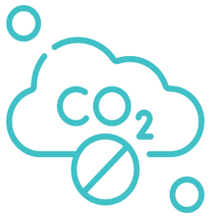
MISSION:

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

WHAT WE DO

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

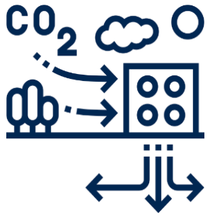
CCS IS AN ESSENTIAL TOOL FOR REACHING NET-ZERO, ALONGSIDE OTHER TOOLS



Achieving deep decarbonisation in hard-to-abate industry.

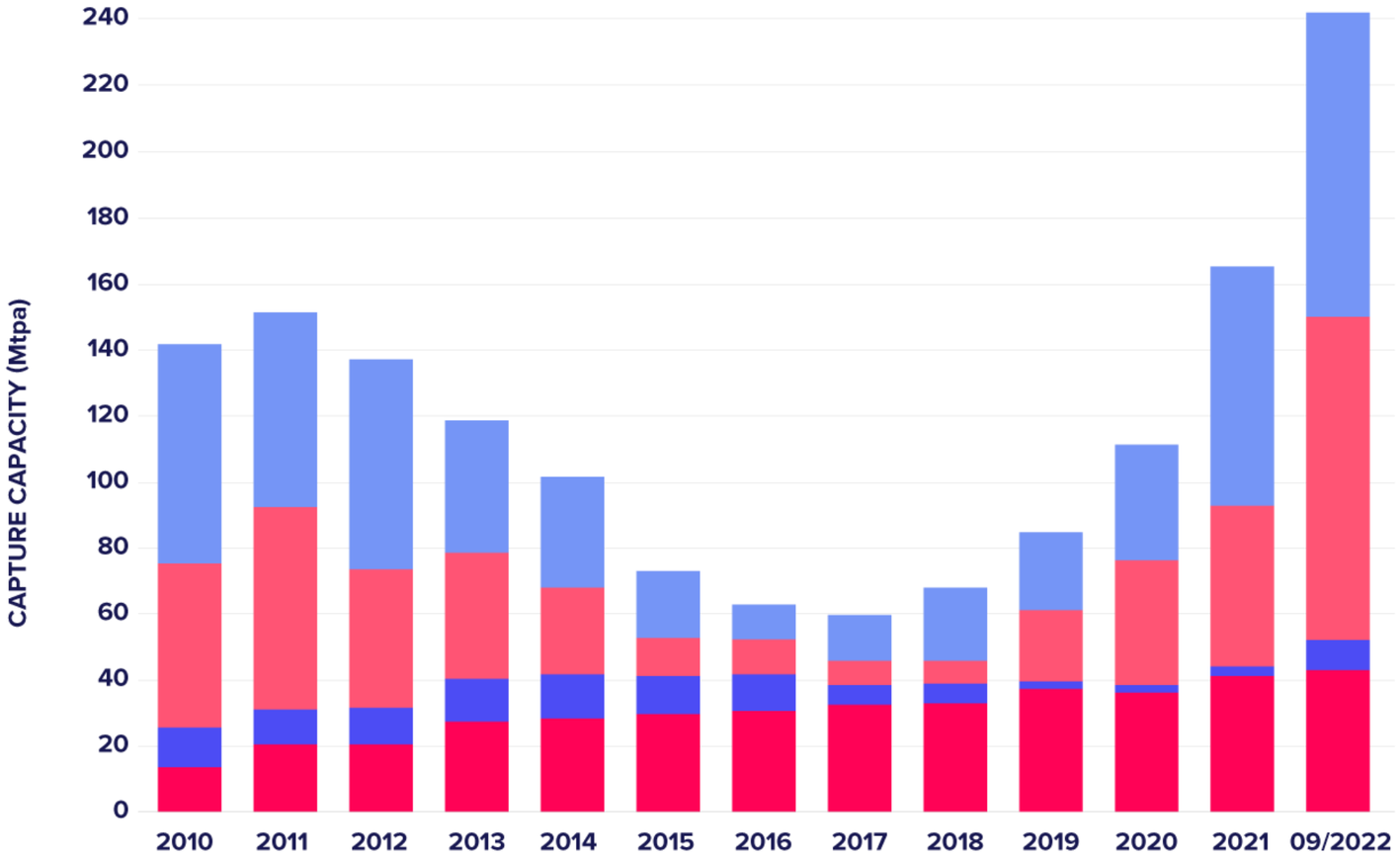
Enabling the production of low-carbon hydrogen at scale.

Providing low carbon dispatchable power.



Delivering negative emissions.

GROWTH – COMMERCIAL SCALE PROJECTS



OPERATIONAL 37

IN CONSTRUCTION

ADVANCED DEVELOPMENT

EARLY DEVELOPMENT

~~244~~ 308 MT CAPTURE CAPACITY

~~196~~ 257 CCS FACILITIES WORLDWIDE

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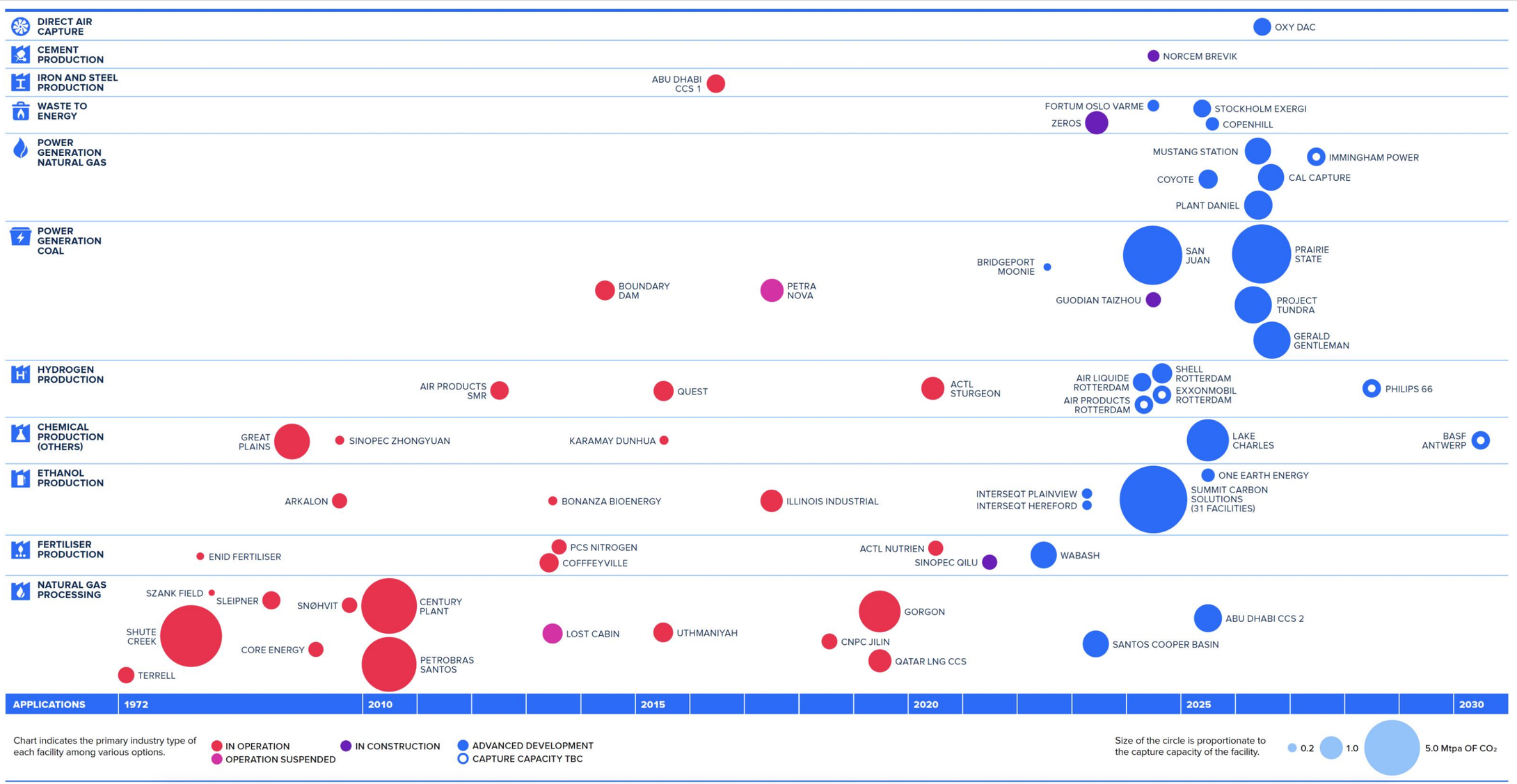
CCS VERSATILITY

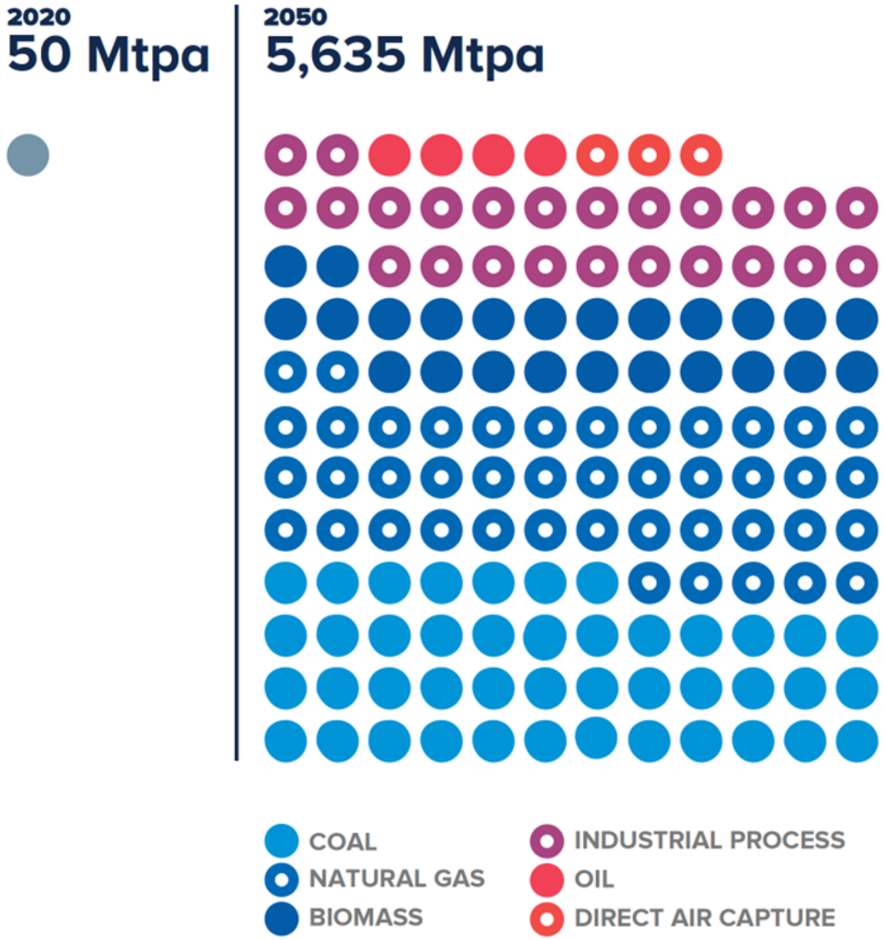


GROWTH REQUIREMENTS

Current annual capture capacity approx. 50 Mtpa

Global emissions = 40 Gtpa

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



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CCS 2023: BUSINESS CASE

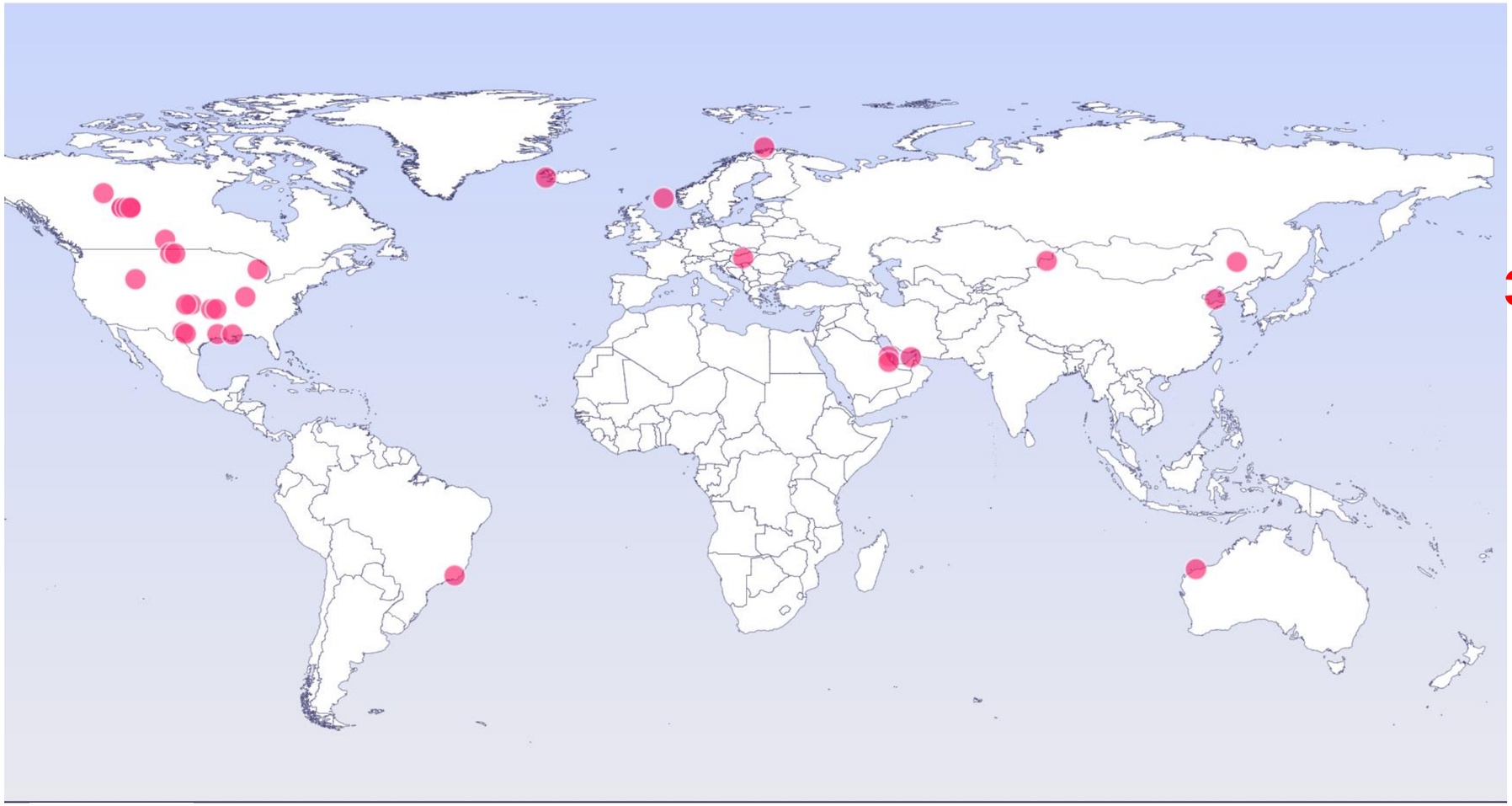
DIRECT contributors

- 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

CCS FACILITIES AROUND THE WORLD



Operational

37 ~~30~~ CCS FACILITIES OPERATIONAL

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

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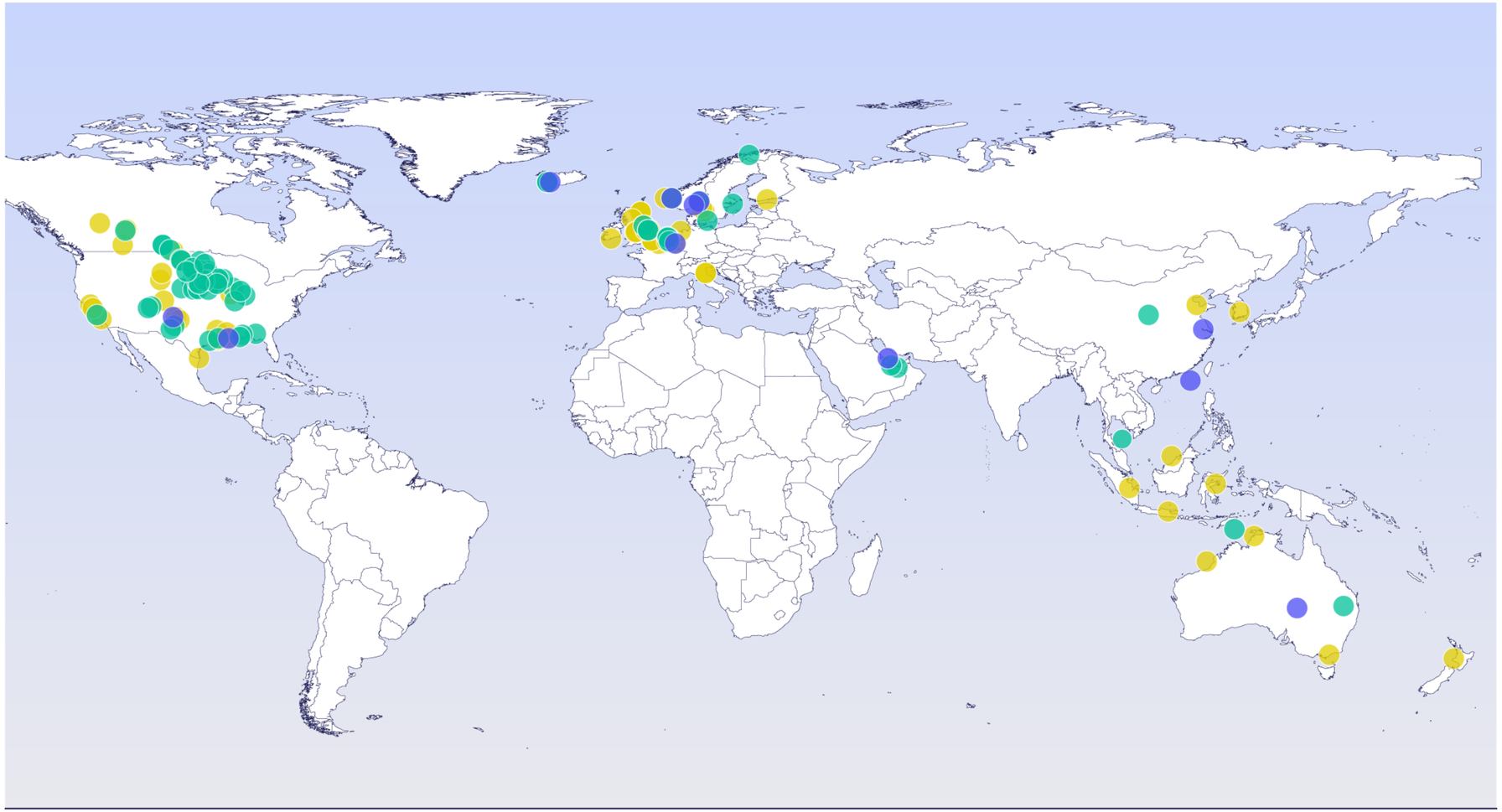
CCS FACILITIES AROUND THE WORLD



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CCS FACILITIES AROUND THE WORLD

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

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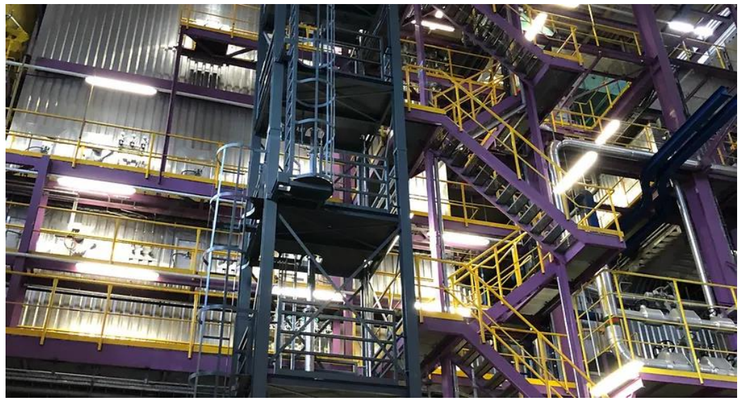
CCS ON STEEL

ADNOC Al Reyadah CCS project at Emirates Steel Industries plant in Abu Dhabi

LANZATECH pilot CCU plant at ArcelorMittal steel plant in Ghent, Belgium

ANDRITZ pilot carbon capture plant at voestalpine' steel mill in Linz, Austria



WHAT'S NEEDED NEXT?

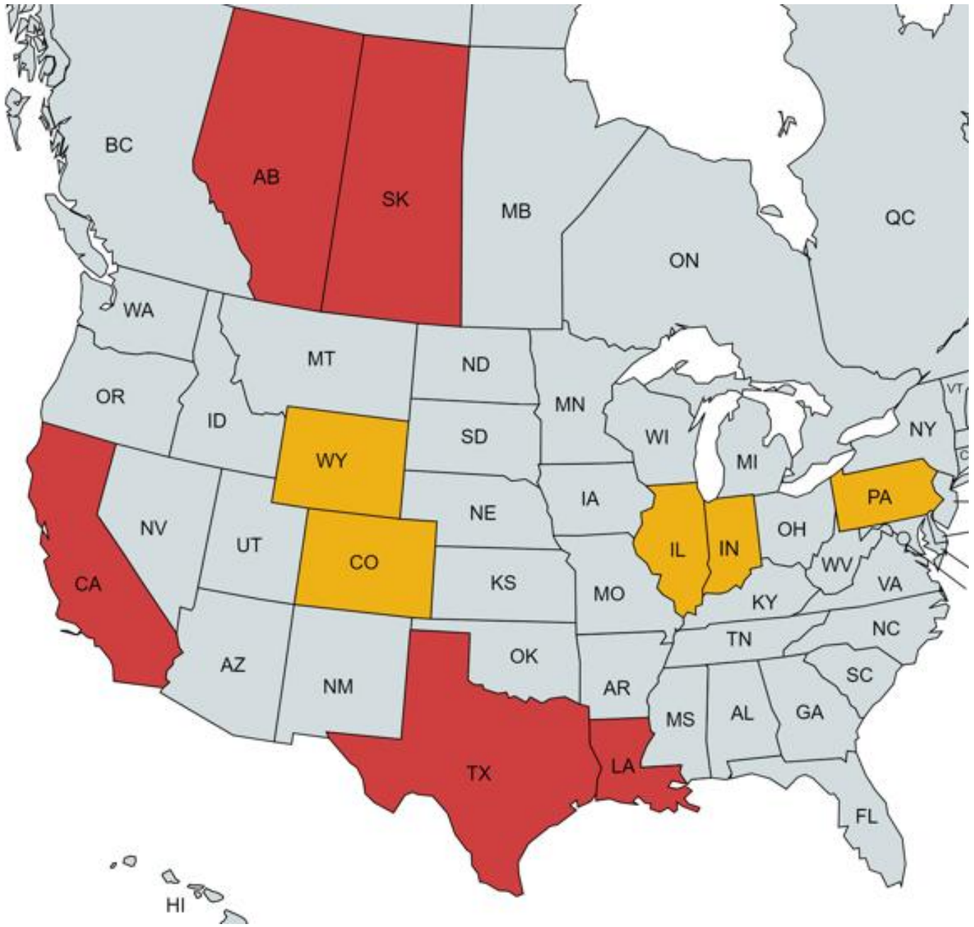
- **Infrastructure**
  - Funding
  - Building
  - Regulation
- **Business case:**
  - Carbon pricing
  - Programmatic support
  - CCU / CDR
- **Policy**
  - Bilateral agreements (London Protocol)
  - Build up individual countries' experience
  - Creating a market
  - Access to UK storage reservoirs for EU emitters
  - Long term liability

INFRASTRUCTURE DEVELOPMENT

Networks continue to be a predominant model 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, etc.
- Storage licensing: UK (24), Norway, Denmark and Italy

CCS DEVELOPMENTS – N. AMERICA



United States

- Bipartisan Infrastructure Law (2021): $12bn for carbon mgmt.
- Inflation Reduction Act (2022): “45Q”
- 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

CCS DEVELOPMENTS - EUROPE

- **Growth continues from 2022 into 2023:**
  - 70+ commercial facilities in stages of development
  - CCS is becoming increasingly trans-national
  - Storage permits: UK, Norway, Denmark, Italy

- **EU:**
  - Innovation Fund ; Connecting Europe Facility
  - NZIA includes CCS
  - Some individual MS policies.

- **DENMARK** €5bn funding for CCS projects, biogenic CCS incentive, permits, cross-party support, onshore storage

CCS DEVELOPMENTS – EUROPE (2)

- **The Netherlands:**
  - SDE++ subsidy
  - Aramis trunk line ; Delta-Rhine corridor
  - New project “Noordkaap”: multiple sources and sinks in NL + Norway

- **The UK:**
  - 4 CCUS networks by 2030 capturing 20-30 mtpa; First two recipient clusters announced in late 2021. £20 billion allocated Spring Budget 2023.

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

- **Progress not linear:** PORTHOS delay

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					TBC	TBC	MoU			
Switzerland					Decl of Int	MoU	exploring collaboration			
UK		MoU					MoU	TBC		

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

CHINA

Great need for CCS. High-level policy support through inclusion in "1+N". Energy SOEs driving development yet require enhanced policy and technology support.

JAPAN / SINGAPORE

Strong support, limited domestic storage, reliant on imports of low-carbon energy and export of captured CO_2.
Looking for strong regulatory regimes in countries for storage.

INDONESIA

Economic development remains priority. CCUS regulatory framework is in development and the anticipated carbon pricing mechanism will launch its first phase later this year.

MALAYSIA

Ambitions to become a regional storage hub for CCS. Announced a carbon tax and development of a regulatory framework in late 2021.

NET-ZERO 2050 REQUIRES STRONG ACTION 2030

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


Programmatic support


Infrastructure funding, building and regulation


CDR/CCU regulation so as to help build business case


Policy coordination

THANK YOU

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