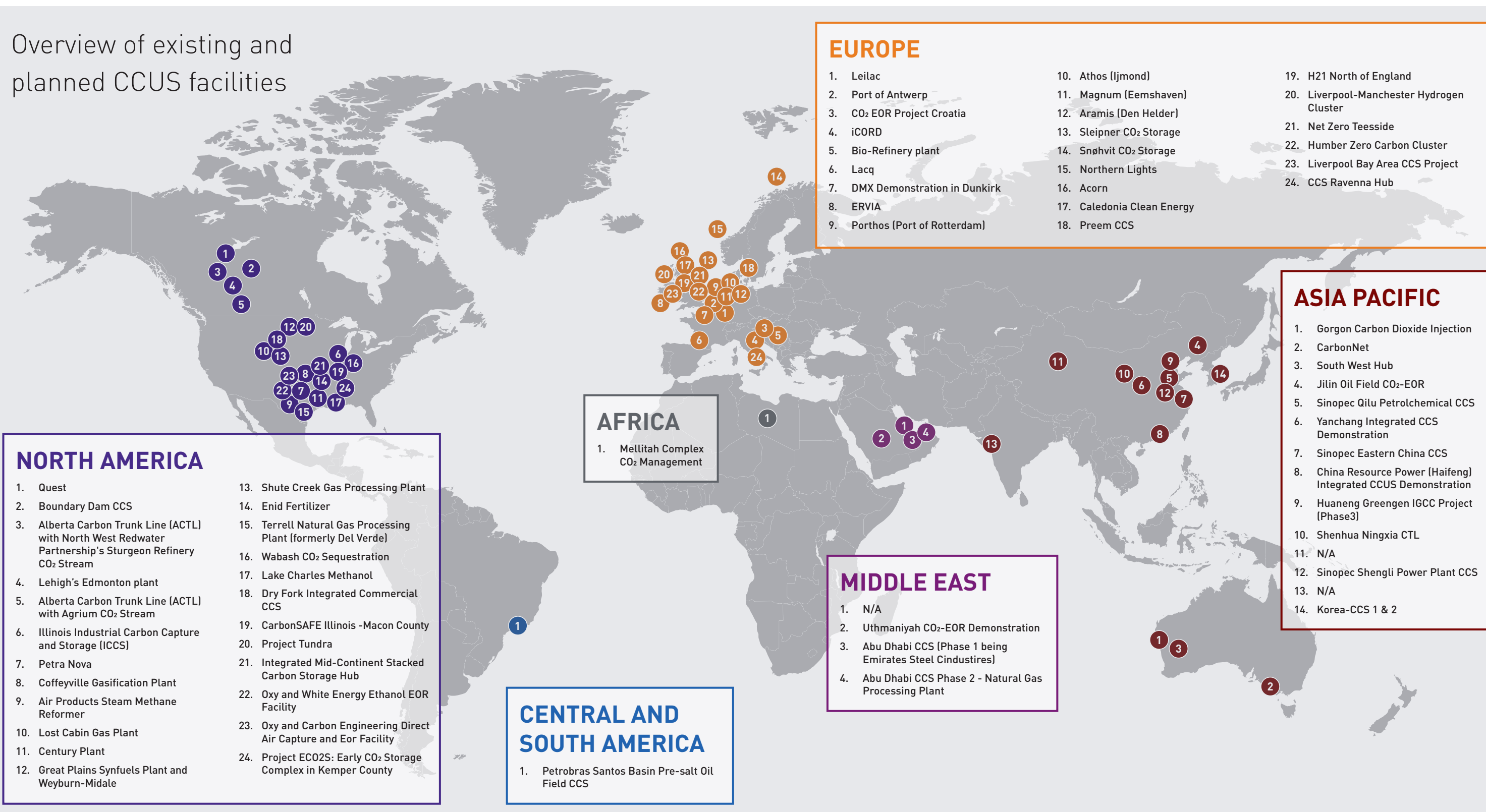


# Global CCUS projects

Overview of existing and planned CCUS facilities





# CCUS projects in ASIA PACIFIC

1. Gorgon Carbon Dioxide Injection\*
2. CarbonNet
3. South West Hub
4. Jilin Oil Field CO<sub>2</sub>-EOR
5. Sinopec Qilu Petrochemical CCS
6. Yanchang Integrated CCS Demonstration
7. Sinopec Eastern China CCS
8. China Resource Power (Haifeng) Integrated CCUS Demonstration
9. Huaneng Greengen IGCC Project (Phase3)
10. Shenhua Ningxia CTL
11. N/A
12. Sinopec Shengli Power Plant CCS
13. N/A
14. Korea-CCS 1 & 2

\* Project where IOGP members are involved

NO.	LOCATION	PROJECT NAME	PROJECT TYPE	INDUSTRY	DESCRIPTION	CO <sub>2</sub> CAPTURED/ YEAR	STARTING DATE (OPERATION)	STATUS OF THE PROJECT	PARTICIPANTS	IOGP MEMBERS INVOLVED
1	Australia <i>Western Australia</i>	Gorgon Carbon Dioxide Injection	Industrial capture	Natural gas processing	Reservoir carbon dioxide vented from the Acid Gas Removal Units at the Gorgon gas processing plant on Barrow Island are captured, compressed, transported by pipeline and injected over 2km below the earth's surface into the Dupuy Formation	3.4-4 Mtpa	2019	Operational	Chevron (The Gorgon Project is operated by Chevron Australia and is a joint venture of the Australian subsidiaries of Chevron (47.3%), ExxonMobil (25%), Shell (25%), Osaka Gas (1.25%), Tokyo Gas (1%) and JERA (0.417%)	Chevron, Shell, ExxonMobil
2	Australia <i>Victoria</i>	CarbonNet	Under evaluation	tbd	CCS network from Victoria's Latrobe Valley, transportation and storage in the underground storage in the Gippsland region	3 Mtpa	2020s	Advance development	Government of Victoria, Australia	
3	Australia <i>Western Australia</i>	South West Hub	Power and capture	Fertilizer production and power generation	CO <sub>2</sub> capture from industrial facility and power plants in Western Australia, transporation and storage in a dedicated site	2.5 Mtpa	2025	Early development	The Department of Mines, Industry Regulation and Safety (DMIRS)	
4	China <i>Jilin province</i>	Jilin Oil Field CO <sub>2</sub> -EOR	Industrial capture, EOR	Natural gas processing	CO <sub>2</sub> capture from a natural gas processing plant at the Changling gas field, transportation by pipeline and injection for EOR at the Jilin oil fields	0.6 Mtpa	2018	Operational	CNPC	
5	China <i>Shandong province</i>	Sinopec Qilu Petrochemical CCS	Industrial capture, EOR	Chemical production	CCS to retrofit a cle/coke water slurry gasification at a fertilizer plant at Zibo city, transportation to the Shengli oil field for EOR	0.40 Mtpa	2020-2021	Under construction	Sinopec	
6	China <i>Shaanxi province</i>	Yanchang Integrated CCS Demonstration	Industrial capture	Chemical production	Capture at coal-to-chemical plant, storage for EOR in oil fields in the Ordons basin	0.41 Mtpa	2020-2021	Under construction	Yangchang Petroleum	
7	China <i>Jiangsu province</i>	Sinopec Eastern China CCS	Industrial capture	Fertiliser production	CO <sub>2</sub> capture from a syntetic ammonia facility and a coal to hydrogen facility in Jiangsu province, transportation to Sinopec oil fielda for EOR	0.50 Mtpa	2021	Early development	Sinopec	
8	China <i>Guangdong</i>	China Resource Power (Haifeng) Integrated CCUS Demonstration	Power and capture (post-combustion)	Power generation	CCS-equipped Haifeng power plant in Guangdong, storage site under evaluation	1 Mtpa	2020s	Early development	China Resources Power	
9	China <i>Tijanin province</i>	Huaneng Greengen IGCC Project (Phase3)	Power and capture (pre-combustion)	Power generation	IGCC power plant with associated CCS in Tijanin province, transportation and storage under eveluation	2 Mtpa	2020s	Early development	China Huaneng Group	
10	China <i>Ningxia</i>	Shenhua Ningxia CTL	Industrial capture	Coal-to liquid	CO <sub>2</sub> capture from a coal-to-liquids plant in Ningxia province, various storage options under consideration	2 Mtpa	2020s	Under evaluation	Shenhua Group	
11	China <i>Xinjiang Province</i>	N/A	EOR	Hydrogen production	CO <sub>2</sub> from the hydrogen production units of refineries transported to nearby oil fields by truck, then injected into the ground for EOR. Once at scale, CNPC plans to expand capture to the chemical industry and power, constructing an exclusive carbon dioxide transport pipeline	3 Mtpa	2025	Demonstration project	CNPC	
12	China <i>Shandong province</i>	Sinopec Shengli Power Plant CCS	Power and capture (post-combustion), EOR	Power generation	Capture from a thermal power production plant in Dongying city, transportation to the Shengli oil field for EOR	1 Mtpa	2020s	Early development	Sinopec	
13	India <i>Gujarat</i>	N/A	EOR	Refining	CO <sub>2</sub> captured from IOCL's Koyali refinery injected for EOR in the Gandhar field			MOU	Oil and Natural Gas Corporation Limited (ONGC) and Indian Oil Corporation Limited (IOCL)	
14	South Korea <i>Gangwon province</i>	Korea-CCS 1 & 2	Power and capture (post-combustion)	Power generation	CO <sub>2</sub> capture from a powe plant, transportation and storage under evalutaion	1 Mtpa	2020s	Early development	Korea Carbon Cpature and Sequestration R&D Center (KCRC)	



# CCUS projects in EUROPE

1. Leilac
2. Port of Antwerp\*
3. CO<sub>2</sub> EOR Project Croatia\*
4. iCORD\*
5. Bio-Refinery plant\*
6. Lacq\*
7. DMX Demonstration in Dunkirk\*
8. ERVIA
9. Porthos\*
10. Athos
11. Magnum\*
12. Aramis
13. Sleipner CO<sub>2</sub> Storage\*
14. Snøhvit CO<sub>2</sub> Storage\*

\* Project where IOGP members are involved

NO.	LOCATION	PROJECT NAME	PROJECT TYPE	INDUSTRY	DESCRIPTION	CO <sub>2</sub> CAPTURED/ YEAR	STARTING DATE (OPERATION)	STATUS OF THE PROJECT	PARTICIPANTS	IOGP MEMBERS INVOLVED
1	Belgium	Leilac	Industrial capture	Cement	Cement plant carbon capture (pilot project)	N/A	2018 until 2020	Pre-study	HeidelbergCement, Calix	
2	Belgium <i>Antwerp</i>	Port of Antwerp	Industrial capture	N/A	CCS-equipped industrial cluster, CO <sub>2</sub> transportation and storage in the North Sea and reuse	N/A	N/A	Feasibility study	Air Liquide, BASF, Borealis, INEOS, ExxonMobil, Fluxys, Port of Antwerp and Total	ExxonMobil, Total
3	Croatia <i>Zagreb County</i>	CO <sub>2</sub> EOR Project Croatia	EOR	N/A	EOR project started in 2014. Injected 1.400 kt CO <sub>2</sub> in the EOR fields Ivanić and Žutica near Ivanić Grad (Zagreb County) .The pipeline Molve-Ivanić is 88 km long (30 bar)	0,560 Mt/y	2015	In operation	INA MOL	MOL
4	Croatia <i>Central Croatia</i>	iCORD	Industrial capture	Fertiliser	Capturing the CO <sub>2</sub> produced at a fertilizer plant at Location in central Croatia and at a concrete production plant at Location in eastern Croatia, and storing it at Moslavina basin oil fields and Pannonia basin oil fields as part of INA EOR project	Approx. 1Mt/y	2025	Feasibility Study to be ordered by end of 2019, and to be prepared by Q3 2020	INA MOL	MOL
5	Croatia <i>Sisak-Moslavina County</i>	Bio-Refinery plant	Industrial capture	Bioethanol production	Bio-Refinery plant (bio-Ethanol production) on the Sisak Refinery location. On the existing pipeline route, new pipe of 16 km will be built for CO <sub>2</sub> storage, for the yearly production of 60 kt of CO <sub>2</sub>	0,06 Mt/y	2024	Signing the contracts for basic design and technology selection	INA MOL	MOL
6	France <i>Pyrenees</i>	Lacq	Capture Storage (oxycombustion)	Natural gas	CCS Oxy fuel combustion CO <sub>2</sub> captured and storage in depleted natural gas field at Rousee (Pyrenees)	Approx. total 50,000 tonnes	2009	Capture and storge phase ended on 15/03/2013	Total	Total
7	France <i>Dunkirk</i>	DMX Demonstration in Dunkirk	Industrial capture	Steelmaking	CCS-equipped steel-making plant, CO <sub>2</sub> transportation and storage in the North Sea	Approx. 1 Mtpa	2025		ArcelorMittal, IFPEN, Axens, Total, ACP, Brevik Engineering, CMI, DTU, Gassco, RWTH, Uetikon	Total
8	Ireland	ERVIA	Power & Capture	Natural gas power and refining	Large scale CCS project in Ireland, capturing Co2 from 2 exsting power plants at the former Kinsale Gas Fields, then storing in a 300 m tonnes depleted gas field	Approx 2Mtpa	2028	Feasibility study	ERVIA	
9	The Netherlands <i>Port of Rotterdam</i>	Porthos	Industrial capture	Chemical, refining	CO <sub>2</sub> transportation and storage infrastructure to the industrial area of the Port of Rotterdam	Approx. 5Mtpa	2024	Feasibility study	Gasunie, the Port Authority and EBN	BP, Shell
10	The Netherlands <i>Ijmond</i>	Athos	Industrial capture	Steelmaking	CCUS network capturing CO <sub>2</sub> from TATA steel plant and reusing it or storing it in empty gas fields under the North Sea	7.5 Mtpa	2030	Feasibility study	Gasunie, Port of Amsterdam, EBN and TATA Steel	
11	The Netherlands <i>Eemshaven</i>	Magnum	Power & Capture	Hydrogen production	Three units of the Magnum gas-power plant in the Eemshaven in Groningen producing electricity from hydrogen by 2023. Statoil is responsible for converting Norwegian natural gas into hydrogen and CO <sub>2</sub> .The CO <sub>2</sub> captured will be gathered and stored in underground facilities off the Norwegian coast	Approx. 4 Mtpa	2023	Feasibility study	Equinor, Vattenfall, Gasunie, MHPS	Equinor
12	The Netherlands <i>Den Helder</i>	Aramis	Industrial Capture		CO <sub>2</sub> supplied by third parties from Den Helder and stored in the North Sea floor. This CO <sub>2</sub> can be brought to Den Helder by boat or by pipeline (for example from IJmuiden)	N/A	N/A	N/A	N/A	
13	Norway <i>North Sea</i>	Sleipner CO <sub>2</sub> Storage	Industrial Capture	Natural gas	Pre-combustion capture CO <sub>2</sub> is directly injected into an offshore sandstone reservoir	Approx. 1Mtpa, and over 17 million tonnes has been injected since inception to date.	1996	Operational	Equinor (operator), Vår Energi, Total	Equinor (operator), Vår Energi, Total
14	Norway <i>Barents Sea</i>	Snøhvit CO <sub>2</sub> Storage	Industrial Capture	LNG facility	Pre-combustion capture at an LNG facility CO <sub>2</sub> captured is via pipeline back to the Snøhvit field offshore where it is injected into an offshore storage reservoir	0.70 Mtpa	2008	Operational	Statoil (operator) Petoro, Total, Engie, Norsk Hydro, Hess Norge	Statoil, Total, Hess



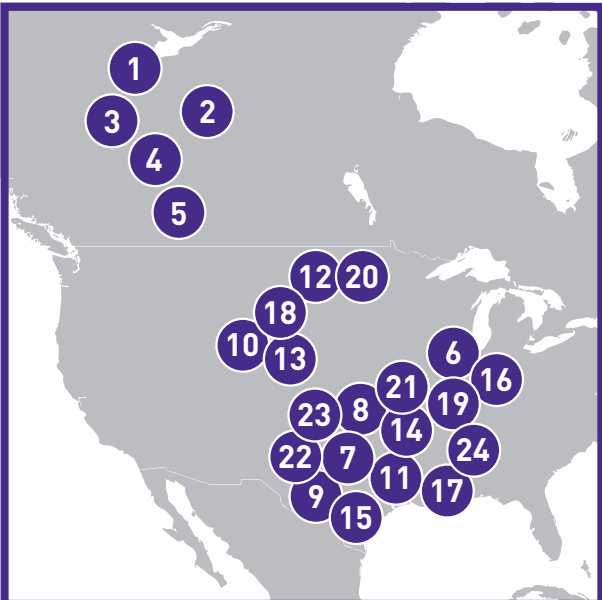
# CCUS projects in EUROPE

- 15. Northern Lights\*
- 16. Acorn\*
- 17. Caledonia Clean Energy
- 18. Preem CCS
- 19. H21 North of England
- 20. Liverpool-Manchester Hydrogen Cluster
- 21. Net Zero Teesside\*
- 22. Humber Zero Carbon Cluster\*
- 23. Liverpool Bay Area CCS Project\*
- 24. CCS Ravenna Hub\*

NO.	LOCATION	PROJECT NAME	PROJECT TYPE	INDUSTRY	DESCRIPTION	CO <sub>2</sub> CAPTURED/ YEAR	STARTING DATE (OPERATION)	STATUS OF THE PROJECT	PARTICIPANTS	IOGP MEMBERS INVOLVED
15	Norway <i>Norwegian Continental Shelf (NCS)</i>	Northern Lights	Industrial capture	Cement and waste-to-energy	Storage project will store CO <sub>2</sub> captured from onshore industrial facilities in Eastern Norway. This CO <sub>2</sub> will be transported by ship from the capture facilities to a receiving terminal located onshore on the west-coast of Norway. Then CO <sub>2</sub> will be transferred to intermediate storage tanks, prior to being sent through a pipeline on the seabed to injection wells east of the Troll field on the NCS	Approx 1.5 Mtpa	2022	Final Investment Decision (FID)	Shell, Equinor,Total	Shell, Equinor,Total
16	Scotland <i>St Fergus</i>	Acorn	Industrial capture	Natural Gas power	Full chain CCS hub that will capture CO <sub>2</sub> emissions from the St Fergus Gas Terminal in north east Scotland and store the CO <sub>2</sub> at an offshore storage site (to be selected) under the North Sea	The Reference Case assumes a flat rate of 200,000T/yr can be captured from one of the gas terminals at St Fergus	2023	Feasibility Study	Pale Blue Dot Energy (Project leader) along with Chrysaor, Shell and Total with fund of UK and Scotland government	Chrysaor, Shell, Total
17	Scotland <i>Grangemouth</i>	Caledonia Clean Energy	Power & Capture	Natural gas power	Examining construction of a new natural gas feedstock power plant (The Caledonia Plant) with integrated CO <sub>2</sub> capture facilities. Power is developing the Caledonia Clean Energy Project (CCEP), an electricity generating station of up to 1GW located near Grangemouth, central Scotland. The project would use a natural gas feedstock with integrated carbon capture, and has the potential to also co-produce clean hydrogen for modern heat and transport applications	3 Mtpa	2023	Feasibility Study	Summit Power	
18	Sweden	Preem CCS		Refining	Full scale CCS plant for capture at the Lysekil refinery, transport by boat at the planned CCS hub on the Norwegian West Coast and permanently stored in Smeaheia	50000 tonnes	N/A	Pre-study	Sintef, Preem AB, Gassnova, Chalmers University of Technology	
19	UK <i>North of England</i>	H21 North of England	Natural gas to H2	Hydrogen production	Conversion of natural gas to hydrogen with pre-combustion CCS for a 100% grid conversion of the Leeds area and CO <sub>2</sub> storage in salt caverns and Teeside	Approx. 3 Mtpa	2020s	Feasibility study	Northern Gas Networks (Project Management), Kiwa Gastec, Amec Foster Wheeler, Wales and West Utilities, PSC, Cambridge Carbon Capture	
20	UK <i>Liverpool-Manchester</i>	Liverpool-Manchester Hydrogen Cluster	Natural gas to H2	Hydrogen production	Conversion of natural gas to hydrogen with pre-combustion CCS for a 10% H2 injection to the grid in the Liverpool-Manchester cluster area	1.5Mtpa (10% H2) - 9.5Mtpa (100% H2)	2020s	Feasibility study	CADENT	
21	UK <i>Southern North Sea</i>	Net Zero Teesside	Power & Capture	Natural gas power	Large (~ 1 GW) Gas Abated Power Plant in North East England integrated with a Large (~ 5 M t per year) transportation & storage facilities offshore UK CS Southern North Sea	5 Mtpa	2026	Technical evaluation and business model options	BP, OGCI	BP, Eni, Repsol, Shell, Statoil, Total
22	UK <i>North Sea</i>	Humber Zero Carbon Cluster	Industrial capture	H2 production, bioenergy	CCS-equipped industrial cluster, CCS-equipped hydrogen production, bioenergy with CCS (BECCS), CO <sub>2</sub> transportation and storage in the North Sea	N/A	2020s	Technical evaluation and business model options	Drax Group, Equinor, National Grid Ventures	Equinor
23	UK <i>East Irish Sea</i>	Liverpool Bay Area CCS Project	Carbon Capture Sequestration	Chemical, refining, Hydrogen production	CO <sub>2</sub> capture from the existing industrial facilities and new hydrogen production plant in the North West of England	1-3 Mtpa phased program	2025	Concept Selection Phase	Eni	Eni
24	Italy <i>Pianura Padana</i>	CCS Ravenna Hub	Power and capture (post-combustion), Blue Hydrogen	Power generation and potential H2 production	CO <sub>2</sub> capture in North of Italy (Pianura Padana Area) from Industrial Complex (i.e. Ravenna) and trasportation to depleted Reservoirs in Ravenna Hub	0.04-5,0 Mtpa phased program	2025-2028	Prefeasability Study	Eni	Eni

\* Project where IOGP members are involved



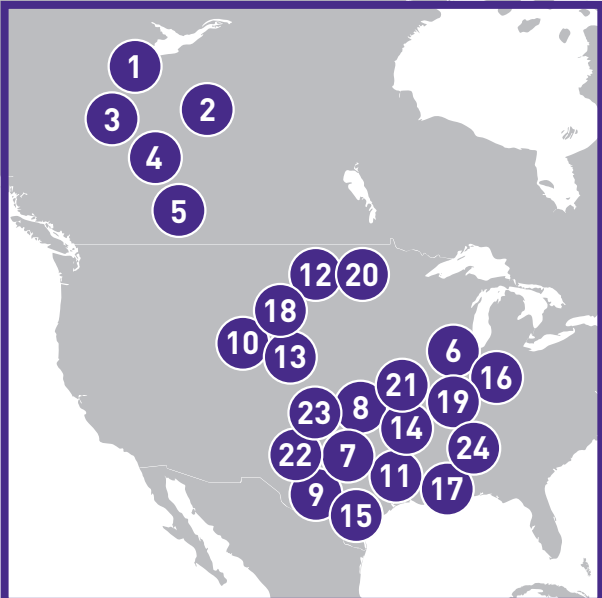


# CCUS projects in NORTH AMERICA

1. Quest\*
2. Boundary Dam CCS
3. Alberta Carbon Trunk Line (ACTL) with North West Redwater Partnership's Sturgeon Refinery CO<sub>2</sub> Stream
4. Lehigh's Edmonton plant
5. Alberta Carbon Trunk Line (ACTL) with Agrium CO<sub>2</sub> Stream
6. Illinois Industrial Carbon Capture and Storage (ICCS)
7. Petra Nova
8. Coffeyville Gasification Plant
9. Air Products Steam Methane Reformer
10. Lost Cabin Gas Plant\*
11. Century Plant
12. Great Plains Synfuels Plant and Weyburn-Midale

NO.	LOCATION	PROJECT NAME	PROJECT TYPE	INDUSTRY	DESCRIPTION	CO <sub>2</sub> CAPTURED/ YEAR	STARTING DATE [OPERATION]	STATUS OF THE PROJECT	PARTICIPANTS	IOGP MEMBERS INVOLVED
1	Canada <i>Alberta</i>	Quest	Industrial capture, EOR	Hydrogen production for oil refining	Retrofitted CO <sub>2</sub> capture facility to steam methane reformers, transportation via pipeline to a dedicated geological storage	1 Mtpa	2015	Operational	Shell	Shell
2	Canada <i>Saskatchewan</i>	Boundary Dam CCS	Power and capture (post-combustion), EOR	Power generation	It combines post-combustion CCS with coal-fired power generation, some captured CO <sub>2</sub> goes for EOR use in the Weyburn oil unit, a portion of the CO <sub>2</sub> is stored permanently under the ground at the Aquistore project.	1 Mtpa	2014	Operational	SaskPower	
3	Canada <i>Alberta</i>	Alberta Carbon Trunk Line (ACTL) with North West Redwater Partnership's Sturgeon Refinery CO <sub>2</sub> Stream	Industrial capture, EOR	Oil refining	Carbon dioxide captured from Agrium's Redwater fertiliser plant and the North West Redwater Partnership's Sturgeon refinery. CO <sub>2</sub> recovered from the fertiliser plant's emission streams put through inlet cooling, separation, compression, dehydration and refrigeration to produce liquefied CO <sub>2</sub> .The project plans to transport CO <sub>2</sub> from a number of sources in the future coming from Alberta's Industrial Heartland.	1.2-1.4 Mtpa	2020	Operational	Enhance Energy Inc. (and - North West Redwater Partnership)	
4	Canada <i>Alberta</i>	Lehigh's Edmonton plant	Industrial capture	Cement industry	Capture the majority of the carbon dioxide (CO <sub>2</sub> ) from the flue gas of Lehigh's Edmonton, Alberta cement plant	Estimated 600,000 tonnes annually		Feasibility study	Lehigh Cement and the International CCS Knowledge Centre	
5	Canada <i>Alberta</i>	Alberta Carbon Trunk Line (ACTL) with Agrium CO <sub>2</sub> Stream	Industrial capture, EOR	Fertilizer production	At the NWR refinery, CO <sub>2</sub> will be captured within the gasification hydrogen supply unit, which will use unconverted petroleum bottoms (asphaltene) as feedstock to create synthesis gas (syngas).	0.3-06 Mta	2020	Operational	Enhance Energy Inc.	
6	USA <i>Illinois</i>	Illinois Industrial Carbon Capture and Storage (ICCS)	Industrial capture	Ethanol production	CO <sub>2</sub> captured from the fermentation process used to produce ethanol at an industrial corn processing complex in Decatur, Illinois, Transportation to a dedicated geological storage site	1 Mtpa	2017	Operational	Administered by the U.S. Department of Energy's Office of Fossil Energy and managed by the National Energy Technology Laboratory and by a cost share agreement with the Archer Daniels Midland Company, University of Illinois through the Illinois State Geological Survey, Schlumberger Carbon Services, and Richland Community College	
7	USA <i>Texas</i>	Petra Nova	Power and capture (post-combustion), EOR	Power generation	Texas power plant retrofitted with post-combustion CO <sub>2</sub> capture facility, transportation near Houston for EOR	1.4 Mtpa	2017	Operational	NRG Energy and JX Nippon Oil	
8	USA <i>Kansas</i>	Coffeyville Gasification Plant	Industrial capture, fertiliser production, EOR	Fertilizer production	Fertilizer plant in Coffeyville retrofitted with CO <sub>2</sub> compression and dehydrataion facilities, oil delivery to the North Burbank oil unit in Osage county, Ohklaoma for EOR	1 Mtpa	2013	Operational	Coffeyville Resources Nitrogen Fertilizers, LLC, Chapparral Energy and Blue Source	
9	USA <i>Texas</i>	Air Products Steam Methane Reformer	Industrial capture, EOR	Hydrogen production for oil refinery	Air products retrofitted of steam methane reformer within a refinery at Port Arthur, Texas, transportation to oil field in Texas for EOR	1 Mtpa	2013	Operational	Air Products, Covestro	
10	USA <i>Wyoming</i>	Lost Cabin Gas Plant	Industrial capture, EOR	Natural gas processing	Gas plantg in Wyoming supplies CO <sub>2</sub> to compression facolity, transport and delivery via pipeline to the Bell Creek oil fird in Montana for EOR	Approx. 1 Mtpa	2013	Operational	ConocoPhillips	ConocoPhillips
11	USA <i>Texas</i>	Century Plant	Industrial capture, EOR	Natural gas processing	Natural gas treatment facility in Texas, transportation via pipeline for EOR	8.4 Mtpa	2010	Operational	Occidental Petroleum	
12	USA <i>North Dakota</i>	Great Plains Synfuels Plant and Weyburn-Midale	Industrial capture (pre-combustion), EOR	Synthetic natural gas	The plant in North Dakota produces CO <sub>2</sub> as part of a coal gasification process, transportation to the Wyburn and Midale oil units for EOR	3 Mtpa	2000	Operational	Dakota Gasification Company	

\* Project where IOGP members are involved



# CCUS projects in NORTH AMERICA

13. Shute Creek Gas Processing Plant\*

14. Enid Fertilizer

15. Terrell Natural Gas Processing Plant  
(formerly Del Verde)

16. Wabash CO<sub>2</sub> Sequestration

17. Lake Charles Methanol

18. Dry Fork Integrated Commercial CCS

19. CarbonSAFE Illinois -Macon County

20. Project Tundra

21. Integrated Mid-Continent Stacked  
Carbon Storage Hub\*

22. Oxy and White Energy Ethanol EOR  
Facility

23. Oxy and Carbon Engineering Direct Air  
Capture and Eor Facility

24. Project EC02S: Early CO<sub>2</sub> Storage  
Complex in Kemper County

NO.	LOCATION	PROJECT NAME	PROJECT TYPE	INDUSTRY	DESCRIPTION	CO <sub>2</sub> CAPTURED/ YEAR	STARTING DATE (OPERATION)	STATUS OF THE PROJECT	PARTICIPANTS	IOGP MEMBERS INVOLVED
13	USA <i>Wyoming</i>	Shute Creek Gas Processing Plant	Industrial capture, EOR	Natural gas processing	Gas treating facility in Wyoming, some CO <sub>2</sub> injected for sequestration/disposal, some for EOR	7 Mtpa	1986	Operational	ExxonMobil	ExxonMobil
14	USA <i>Oklahoma</i>	Enid Fertilizer	Industrial capture, fertilizer production, EOR	Fertilizer production	CO <sub>2</sub> captured from the manufacture of fertiliser, transportation for use in EOR at the Golden Trend oilfield and the Sko-Vel-Tum oilfield, south of Oklahoma City	0.7 Mtpa	1982	Operational	Koch Nitrogen Company	
15	USA <i>Texas</i>	Terrell Natural Gas Processing Plant (formerly Del Verde)	Industrial capture, EOR	Natural gas processing	CO <sub>2</sub> capture at natural gas processing plant, CO <sub>2</sub> transportation via Valverde pipeline to McCamey, Texas, and the Canyon Reef Carriers CRC pipeline and the Pecos pipeline, CO <sub>2</sub> for EOR	Approx 0.5 Mtpa	1972	Operational	Blue Source and others	
16	USA <i>Indiana</i>	Wabash CO <sub>2</sub> Sequestration	Industrial capture	Fertilizer production	Gasification plant in Indiana to be converted into an anhydrous ammonia production plant and CCS plant, dedicated geological storage in the Wabash carbonSAFE CO <sub>2</sub> storage hub	1.5-1.75 Mtpa	2022	Advance development	WABASH Valley Resources (WVR)	
17	USA <i>Louisiana</i>	Lake Charles Methanol	Industrial capture, EOR	Chemical production	Gasification facility in Lousiana capturing from synthetic gas syngas to make methanol and other products, captured CO <sub>2</sub> to be used for EOR in Texas	Approx 4 Mtpa	2024	Advance development	Leucadia Energy	
18	USA <i>Wyoming</i>	Dry Fork Integrated Commercial CCS	Power and Capture (post-compbustion), EOR	Power generation	Dry Fork coal-fired power station in Wyoming, targeting adjacent geological storage formations currently under study. EOR under consideration	3 Mtpa	2025	Advance development	The Basin Electric Power Cooperative	
19	USA <i>Illinois</i>	CarbonSAFE Illinois -Macon County	Power and industrial capture (post-combustion), EOR	Power genration and ethanol production	CCS integration of a compression and dehydration facilities to an ethanol plant, transportation and injection in a dedicated geological storage	2-5 Mtpa	2025	Advance development	Carbon Storage Assurance Facility Enterprise (CarbonSAFE) of the U.S. Department of Energy National Energy Technology Laboratory (DOE-NETL)	
20	USA <i>North Dakota</i>	Project Tundra	Power and capture (post-combustion), EOR	Power generation	Retrofit CO <sub>2</sub> capture plant to the Milton R. Young coal fire power station in North Dakota with a dedicated storage site. EOR under study	3.1-3.6 Mtpa	2025-2026	Advance development	Minnkota Power Cooperative	
21	USA <i>Nebraska, Kansas</i>	Integrated Mid-Continent Stacked Carbon Storage Hub	Ethanol production, power generation and/or refinery, EOR	Ethanol production, power generation and/or refinery	CO <sub>2</sub> collection from ethanol plants, power plants and refineries with integrated storage in Kansas and Nebraska	Approx 2 Mtpa	2025-2035	Advance development	The team is led by Battelle Memorial Institute and includes: Archer Daniels Midland Company (ADM), the Kansas Geologic Survey (KGS), the Energy and Environmental Research Center (EERC) at the University of North Dakota, Schlumberger, the Conservation and Survey Division (CSD) at the University of Nebraska-Lincoln (UNL) and others	Schlumberger
22	USA <i>Texas</i>	Oxy and White Energy Ethanol EOR Facility	Industrial capture, EOR	Ethanol production	CO <sub>2</sub> capture from two ethanol facilities in Hereford and Plainview, Texas. The captured CO <sub>2</sub> will be stored via EOR at Occidental's oil fields in Premian basin	0.6-0.7 Mtpa	2021	Early development	Occidental Petroleum Corporation and White Energy	
23	USA <i>Texas</i>	Oxy and Carbon Engineering Direct Air Capture and Eor Facility	Direct air capture, EOR	N/A	CO <sub>2</sub> capture from an Occidental oil field in the Permian Basin, and used for EOR	1 Mtpa	2025	Early development	Oxy Low Carbon Ventures and Carbon Engineering Ltd	
24	USA <i>Mississippi</i>	Project EC02S: Early CO <sub>2</sub> Storage Complex in Kemper County	Under evaluation	N/A	Regional CO <sub>2</sub> storage hub near the Keper County Energy Facility in Missisipi from power and industrial sources	3 Mtpa	2026	Early development	In identification (capture) - Project EC02S, a DOE-supported CarbonSAFE program	

\* Project where IOGP members are involved



# CCUS projects in CENTRAL AND SOUTH AMERICA

1. Petrobras Santos Basin Pre-salt Oil Field CCS\*

NO.	LOCATION	PROJECT NAME	PROJECT TYPE	INDUSTRY	DESCRIPTION	CO <sub>2</sub> CAPTURED/ YEAR	STARTING DATE (OPERATION)	STATUS OF THE PROJECT	PARTICIPANTS	IOGP MEMBERS INVOLVED
1	Brazil <i>Rio de Janeiro offshore</i>	Petrobras Santos Basin Pre-salt Oil Field CCS	Industrial capture	Natural gas processing	CO <sub>2</sub> separation and injection systems on board four floating production storage and offloading (FPSO) vessels. The CO <sub>2</sub> is separated on site as part of the natural gas processing and injected for EOR	3 Mtpa	2013	Operational	Petrobras	Petrobras



# CCUS projects in MIDDLE EAST

1. N/A
2. Uthmaniyah CO<sub>2</sub>-EOR Demonstration
3. Abu Dhabi CCS (Phase 1 being  
Emirates Steel Cindustires)\*
4. Abu Dhabi CCS Phase 2 - Natural Gas  
Processing Plant

NO.	LOCATION	PROJECT NAME	PROJECT TYPE	INDUSTRY	DESCRIPTION	CO <sub>2</sub> CAPTURED/ YEAR	STARTING DATE (OPERATION)	STATUS OF THE PROJECT	PARTICIPANTS	IOGP MEMBERS INVOLVED
1	Qatar <i>Ras Laffan</i>	N/A	EOR		CO <sub>2</sub> sequeststration from Ras Laffan LNG facilities	2.1 Mtpa (5 Mtpa by 2025)	2025	Commissioned	Qatar Petroleum	
2	Saudi Arabia <i>Uthmaniyah</i>	Uthmaniyah CO <sub>2</sub> -EOR Demonstration	Industrial capture, EOR	Natural gas processing	CO <sub>2</sub> capture at the Hawiyah gas plant, transportation to Uthmaniyah in the Ghawar field	0.8 Mtpa	2015	Operational	Saudi Aramco	Saudi Aramco
3	United Arab Emirates <i>Mussafah</i>	Abu Dhabi CCS (Phase 1 being Emirates Steel Cindustires)	Industrial capture, EOR	Natural gas processing	CO <sub>2</sub> capture from the iron and steel industry in Mussafah, transportation to ADNOC oil reserves for EOR	0.8 Mtpa	2016	Operational	Abu Dhabi National Oil Company (ADNOC)	
4	United Arab Emirates <i>Mussafah</i>	Abu Dhabi CCS Phase 2 - Natural Gas Processing Plant	Industrial capture, EOR	Iron and steel production	CO <sub>2</sub> capture from gas processing plant for EOR. Both phase 1 and 2 will store CO <sub>2</sub> in the same reservoir	1.9-2.3 Mtpa	2025	Advanced development	Abu Dhabi National Oil Company (ADNOC)	

\* Project where IOGP members are involved



# CCUS projects in AFRICA

1. Mellitah Complex CO<sub>2</sub> Management\*

\* Project where IOGP members are involved

NO.	LOCATION	PROJECT NAME	PROJECT TYPE	INDUSTRY	DESCRIPTION	CO <sub>2</sub> CAPTURED/ YEAR	STARTING DATE (OPERATION)	STATUS OF THE PROJECT	PARTICIPANTS	IOGP MEMBERS INVOLVED
1	Libya	Mellitah Complex CO <sub>2</sub> Management	CO <sub>2</sub> separation from raw gas	Natural gas production and processing	CO <sub>2</sub> (process) is separated from the raw gas produced by several reservoirs and treated at onshore facilities. CO <sub>2</sub> is injected into Offshore depleted reservoirs	3 Mtpa	2023-2025	FEED	Eni, National Oil Company	Eni

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