

## Input to the SET-Plan Steering Group on market-ready projects

This document aims to respond to the SET-Plan Secretariat's request to identify CCS and CCU market-ready projects that are innovative and mature enough and that could be financed through the Recovery and Resilience Fund as well as other sources.

This is a general overview of projects, a living document that will be regularly updated. More and specific information can be found by contacting the projects directly or the companies involved.

Project	Where	What	CO2 capture/year	Operational	Companies Involved
Technology Centre Mongstad	NO	Post-combustion capture technologies.		Operational	Shell, Equinor, Total
ViennaGreen CO2	AT	Solid sorbent capture technology pilot.		2018	Shell
AVR-Duiven	NL	CO2 captured from energy-from-waste company and supplied to greenhouse horticulturists	0.1 Mtpa	2019	AVR
LEILAC	BE	Pilot project – cement plant carbon capture.	N/A	2018-2020	HeidelbergCement, Calix
LEILAC 2 project	BE	Pilot installation for breakthrough technology in cement production.	N/A	2020	HeidelbergCement
Fresme	SE	CO2 captured from the steel industry to produce methanol for the ship transportation sector.	N/A	2020	SSAB, TATA, StenaLine
Fortum Oslo Värme's waste-to-energy plant	NO	Captured CO2 is converted into a liquid form, transported to a port, and shipped to storage site.	0.4 Mtpa	2020/2021	Fortum
Norcem	NO	Capture from cement plant.	0.4 Mtpa	2020/2021	HeidelbergCement
Cleanker	IT	Demonstration system in a cement plant of calcium-looping process for CO2 capture.	N/A	2021	HeidelbergCement, Bucci Unicem
CCU Lighthouse Carboneras	ES	CCU: CO2 capture through chemical absorption from cement kiln flue gas	0.05 Mtpa	2022	LafargeHolcim Spain, Carbon Clean Solutions, ECCO2, Marubeni Europe



Cheers	China/NO	Demonstration in an operational environment of 2nd generation chemical-looping technology	N/A	2022	Dongfang power group
Northern Lights – <b>EU PCI</b>	NO	CO2 transport and storage in North Sea Basin. Capture at industrial plants.	1.5 Mtpa (phase 1), 5 Mtpa (phase 2)	2023/2024 (phase 1)	Total, Shell, Equinor
Acorn Sapling – <b>EU PCI</b>	UK	CCS-equipped natural gas processing plant, CO2 transport and storage in the North Sea.	0.2 Mtpa	2023	Shell, Total, Pale Blue Dot, Chrysaor
Power-to-Methanol Antwerp BV	BE	CCU: Methanol from renewable hydrogen and CO2 from point sources	0.011 Mtpa	2023, first phase	ENGIE, Fluxys, Indaver, INOVYN, Oiltanking, Port of Antwerp, Vlaamse Milieuholding
North-CCU-Hub	BE	CCU: Methanol from renewable hydrogen and CO2 from point sources (8,000 tpa of methanol)	0.063 up to 0.305 Mtpa in the final phase	2023	Stad Gent, North Sea Port, UGent (CAPTURE), Bio Base Europe Pilot Plant, Cleantech Flanders, POM Oost-Vlaanderen, ENGIE, ArcelorMittal, Anglo Belgian Corporation, Alco Bio Fuel, Oiltanking, Terranova Solar, Fluxys, Catalisti, Flux50
Westküste100	DE	CCU: Green hydrogen from offshore wind energy combined with CO2 from cement industry for methanol and aviation fuels. (first phase 30 MW electrolyser)	N/A	2023 first phase	EDF Germany, Holcim Germany, OGE, Ørsted Germany, Raffinerie Heide, Stadtwerke Heide, Thüga and thyssenkrupp Industrial Solutions, Heide development agency, Westküste University of Applied Sciences
H2M - Magnum	NL	Hydrogen from natural gas with CCS for power generation.	Approx. 2 Mtpa	2024	Equinor, Vattenfall, Gasunie, MHPS
Porthos – <b>EU PCI</b>	NL	CCS-equipped industrial cluster, CO2 transport and storage in the North Sea.	2.5 Mtpa	2024	Port of Rotterdam, EBN, Gasunie Shell, ExxonMobil, Air Liquide



C4U	BE	Demonstration of two highly energy-efficient high-temperature solid-sorbent CO <sub>2</sub> capture technologies for steel industries.	N/A	2024	ArcelorMittal
Onshore storage projects	CZ, RO	Including capture of emissions in cement plants.		2024/2025	HeidelbergCement
3D Project-DMX Demonstration in Dunkirk	FR	CCS-equipped steel-making plant, CO <sub>2</sub> transport and storage in the North Sea.	Approx. 1 Mtpa	2025	Total, IFPEN, ArcelorMittal, Axens, ACP, Brevik Engineering, CMI, DTU, Gassco, RWTH, Uetikon
H-Vision	NL	Production of hydrogen using natural gas and refinery fuel gas.	2.2-4.3 Mtpa	2025-2026	Deltalinqs, Air Liquide, BP, Gasunie, Port of Rotterdam, Power Plant Rotterdam, Shell, Uniper, Royal Vopak, ExxonMobil.
Stockholm Exergi	SE	Bio-based CHP and CCS.		2025	Stockholm Exergi
FLITE	BE	CCU: Sustainable Aviation Fuel (SAF) from ethanol produced from steel-mill off-gases. (44 million litres of SAF using sustainable ethanol as feedstock).	CCU at the Steelanol plant will convert 500 million Nm <sup>3</sup> /year of carbon-rich industrial off-gases to sustainable ethanol.	2025, first phase	LanzaTech BV, LanzaJet ATJ, SkyNRG, Port of Antwerp, Total Raffinaderij Antwerpen, Flanders Investment & Trade, International Airlines Group, ArcelorMittal, Mitsui & Co. LTD, RSB, Airbus, E4tech
Drax Bioenergy & CCS	UK	Creation of the infrastructure to transform the Humber region into a net zero carbon industrial cluster. Focus on BECCS.	Up to 16 Mtpa	2025-2030	Drax Group, Equinor and National Grid Ventures
H2H Saltend	UK	Hydrogen from natural gas with CCS (ATR).	0.9-2.6 Mtpa	2026	Equinor
HyDemo	NO	Demonstration of natural gas-based hydrogen production with CO <sub>2</sub> removal and storage for maritime sector.	0.15-0.2 Mtpa (connected to Northern Lights)	2026	Equinor
Norsk e-fuel	NO	CCU: Co-electrolysis of CO <sub>2</sub> (from DAC and point sources) and water with renewable electricity for	0.025 will go up to 0.25 Mtpa	2026	Sunfire GmbH, Climeworks AG, Paul Wurth SA, Valinor



		synthetic liquid hydrocarbons.			
Net-Zero Teesside	UK	CCS-equipped natural gas power plant, CO2 transport and storage in the North Sea.	5 Mtpa	2026	BP, Shell, Equinor, Total
ERVIA CCUS – <b>EU PCI</b>	IE	CCS-equipped CCGT and refinery, CO2 transport and storage in Celtic Sea.		2028	Ervia
H2Morrow	DE	Reformed natural gas with CCS for clean steel production.	10.5 Mtpa	2025/2030	Equinor, Thyssenkrupp, OGE
Athos – <b>EU PCI</b>	NL	CCUS network infrastructure with CO2 capture from a steel plant, transport, reuse or storage in North Sea Basin.	7.5 Mtpa	2027	EBN, Port of Amdsterdam, Gasunie, Tata Steel
Aramis	NL	Conversion of depleted offshore gas fields into carbon storage sites.	N/A	Not available	Shell, Total