



EP STRASBOURG – 11 March 2025

# What place for CCUS in a competitive EU energy transition?



In cooperation with the EEF Associate Members



Chatham House Rule

# Eni CCS strategy

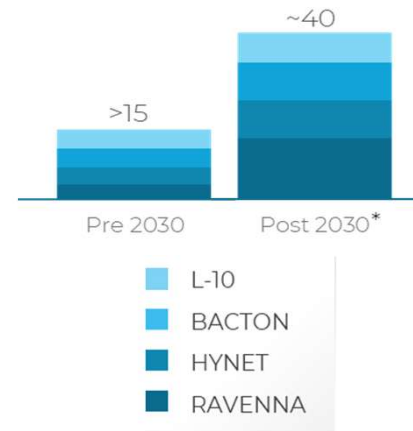
EMERGING ENERGY TRANSITION LEVER



Source:  
 1 Eni Analysis based on data from IEA and GCCSI Facility database  
 2 Wood Mackenzie Carbon Lens – February 2024

## PROJECT HIGHLIGHT RAVENNA CCS - ITALY AUGUST 2024 START UP

### VISIBLE PIPELINE Gross Storage Capacity | MTPA

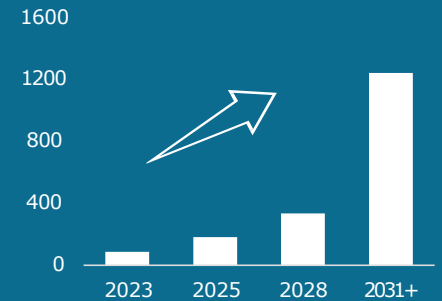


**DISTINCTIVE AND INTEGRATED  
 BUSINESS MODEL**

**OPERATORSHIP IN COST  
 COMPETITIVE ASSETS**

**~15% OF ANNOUNCED EUROPEAN  
 CCS CAPACITY AT 2030<sup>1</sup>**

### GLOBAL CCS GROWTH FORECAST | MTPA<sup>2</sup>

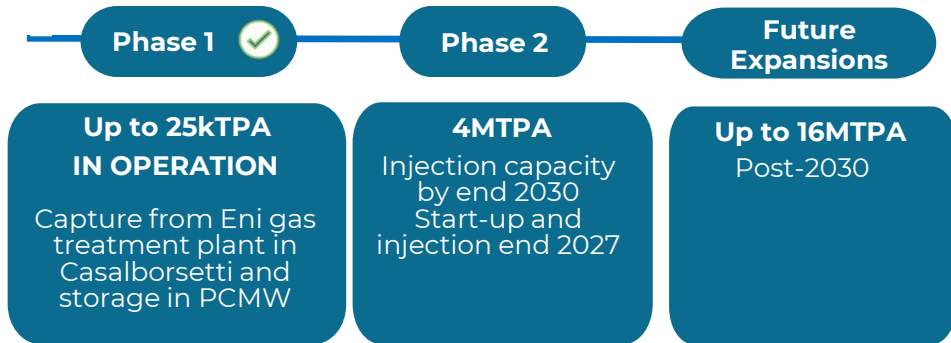


# Ravenna CCS



## Main features

- Infrastructure for the reception, offshore transport and permanent geological storage of CO2 in offshore depleted gas fields
- Total storage capacity exceeding 500 Mtons - Eni depleted fields located offshore the Adriatic sea
- CCS Reference Hub for Southern Europe and the Mediterranean
- Supports the decarbonization of industrial clusters in Italy and the Mediterranean area
- Transportation network is being developed to receive the CO2 both via pipeline and shipping
- Over 20 feasibility studies in collaboration with national and international industrial emitters





# Positive externalities of CCUS for Europe


CCUS is a key technology to **reduce emissions by at least 55% by 2030** and to reach **carbon-neutrality by 2050** while ensuring **competitiveness** of industry and economy.



**Environmental**  
Reduction of CO<sub>2</sub> and enabler of carbon removal technologies



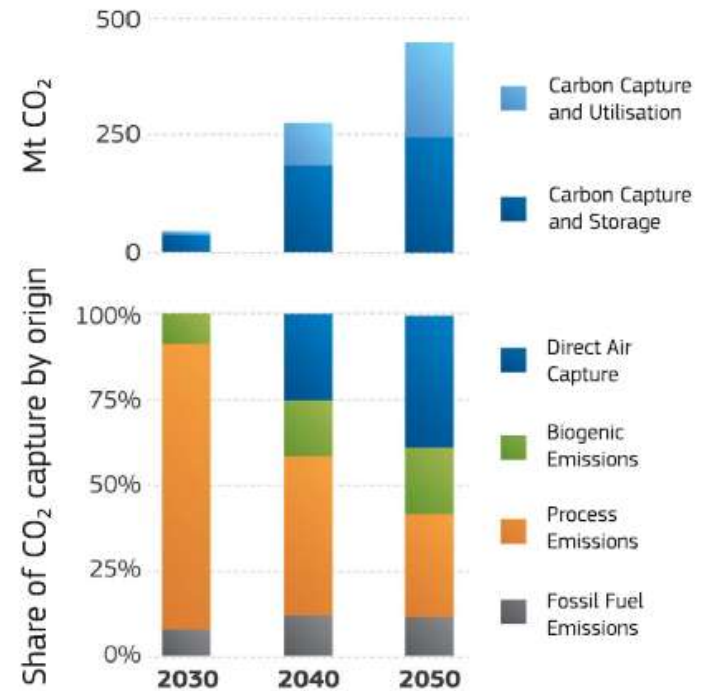
**Economic**  
Creation of new jobs and valorisation of existing competences



**Energy transition**  
Balance intermittency of solar/wind and bridge for renewable hydrogen

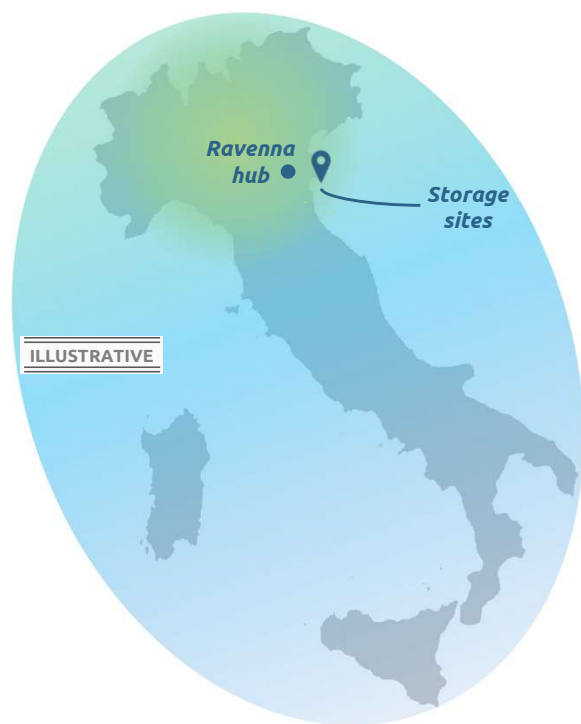


**Cross-border impact**  
Fosters collaboration between countries



Industrial Carbon Management strategy, February 2024

# Ravenna CCS Project: among the largest CO<sub>2</sub> storage projects in Europe, crucial enabler for Italy and Mediterranean basin decarbonization

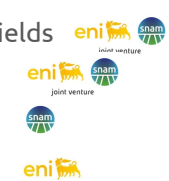


### Indicative areas for CO<sub>2</sub> delivery

- In gaseous phase via pipeline network
- In liquid phase via ship, truck and train

## Project

- CO<sub>2</sub> permanent storage in the Adriatic sea's depleted fields
- CO<sub>2</sub> collection and regasification hub in Ravenna
- CO<sub>2</sub>-dedicated transport pipeline in north Italy
- CO<sub>2</sub> Shipping services

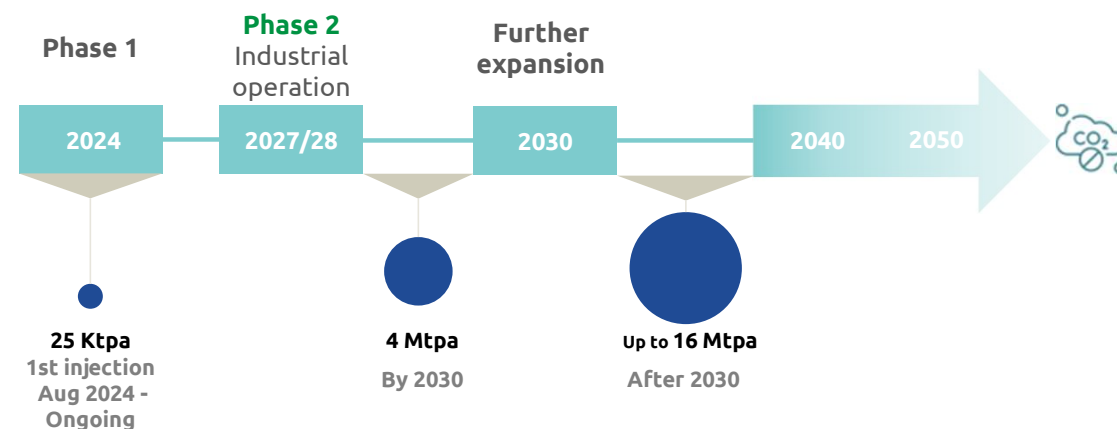


Maximization of existing infrastructure repurposing

## KPI

- Total storage capacity: over **500 Mton**
- Annual storage capacity **over 16 Mtpa**
- Decarbonization solution for **over 30 years**

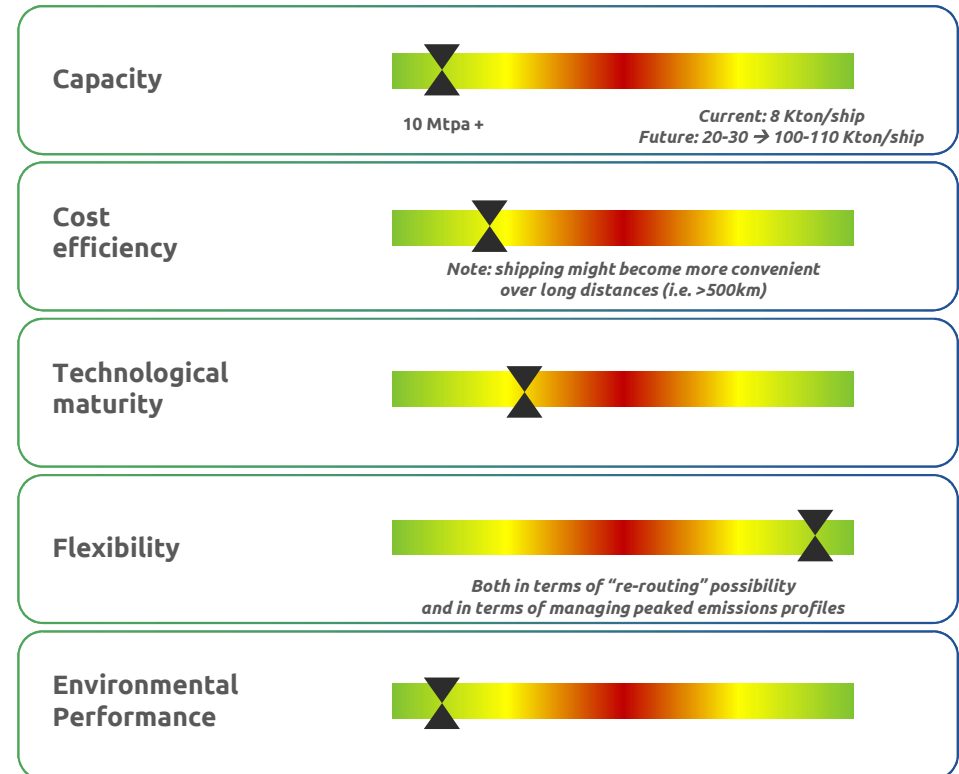
## Timeline



# Ravenna CCS allows multiple transport options including pipeline, shipping, trucks and train

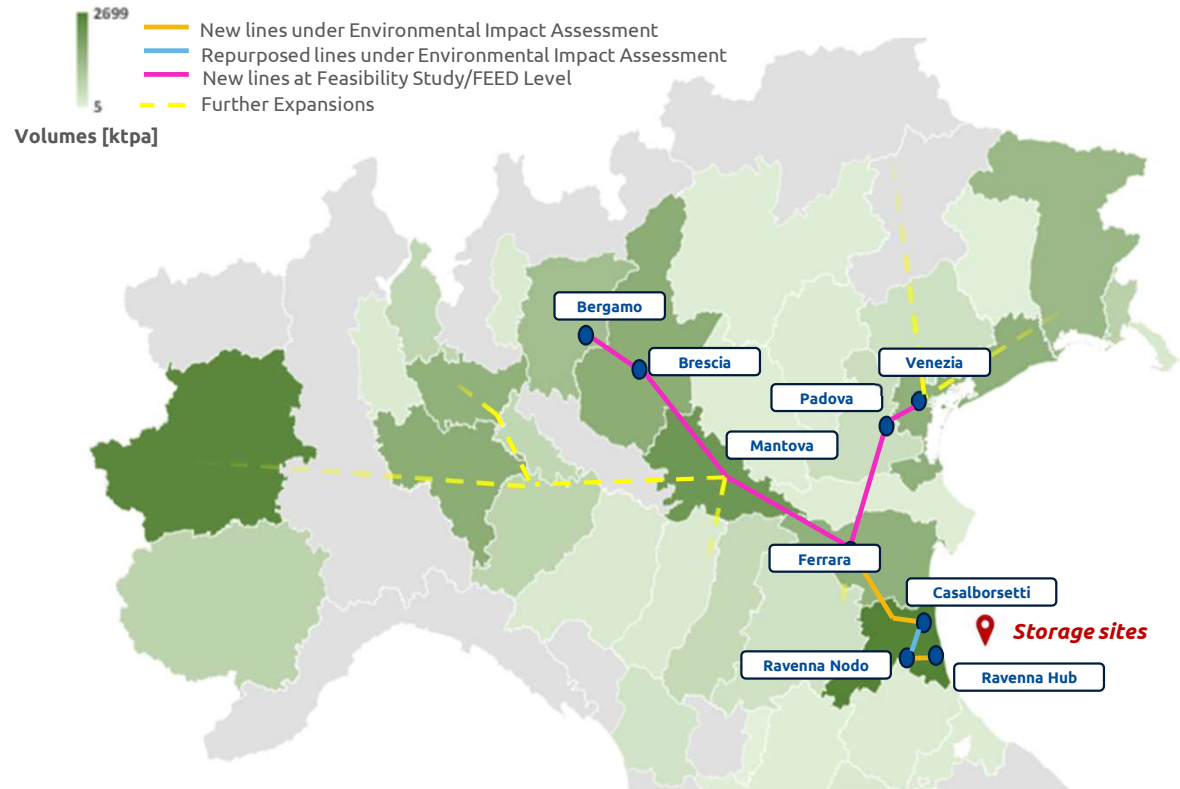
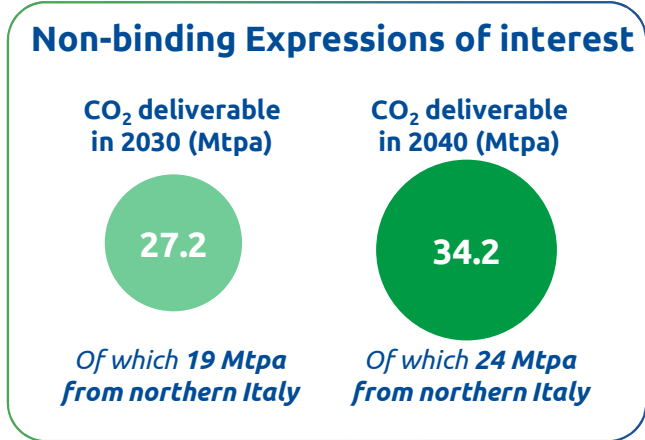
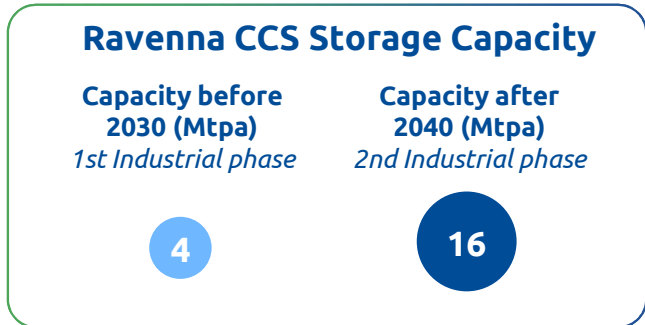
**PIPELINES**  
Gaseous    Liquid

**SHIPPING**  
Liquid



For CCUS development, pipeline transportation is a cost efficient, mature solution that shall be complemented, depending on project specificities, by other transportation solutions, thus allowing to best connect the different nodes of CCUS networks

# A dedicated CO2 pipeline network will be progressively deployed in Northern Italy, which represents 70% of the estimated demand, to enable emitters to gain access to the Ravenna CCS storage



Pipelines routes will be carefully developed according to demand, policies and the opportunity to repurpose existing assets and/or existing infrastructural corridors

# A robust regulatory framework would favor the development of a full-scale CO2 transport infrastructure

## Regulation

- **Regulated third-party access** in principle, with exemptions as applicable by the regulatory framework
- **Single Carbon Network Operator** appointed by each Member State
- **Standardization** processes should be prioritized and supported
- **Regulated Asset Base model** with guarantees for the operators to incentivize infrastructure development and the market ramp-up phase

## Funding

- Implement the ICM Strategy through **enhanced funding of strategic CCUS projects**
- Substantially increase the **CEF Energy and Innovation Fund budgets for CCS** under the MFF 2028-2034
- **Support network users** with effective funding schemes especially during the start-up phase
- **National governments** to complement EU funding with robust subsidy schemes for CCUS



# Carbon Capture and Storage - CCS



- TotalEnergies' CCS strategy:
  - In priority, decarbonization of our own activities after undertaking other levers such as electrification, energy efficiency, ...
  - Afterwards, providing storage capacity for large industrial emitters to decarbonize their activities.

## CCS for our assets

CCS complements main emission reduction levers for our S1+S2: Energy efficiency, Electrification, ...

### Reduce emissions from existing assets

- Snøhvit (Norway): under operation
- Refineries (EU, US): under study

### Avoid emissions for new projects:

- Greenfield projects North Field East & South (Qatar): under development
- LNG N(2) (Qatar): under study

## Offering CCS services

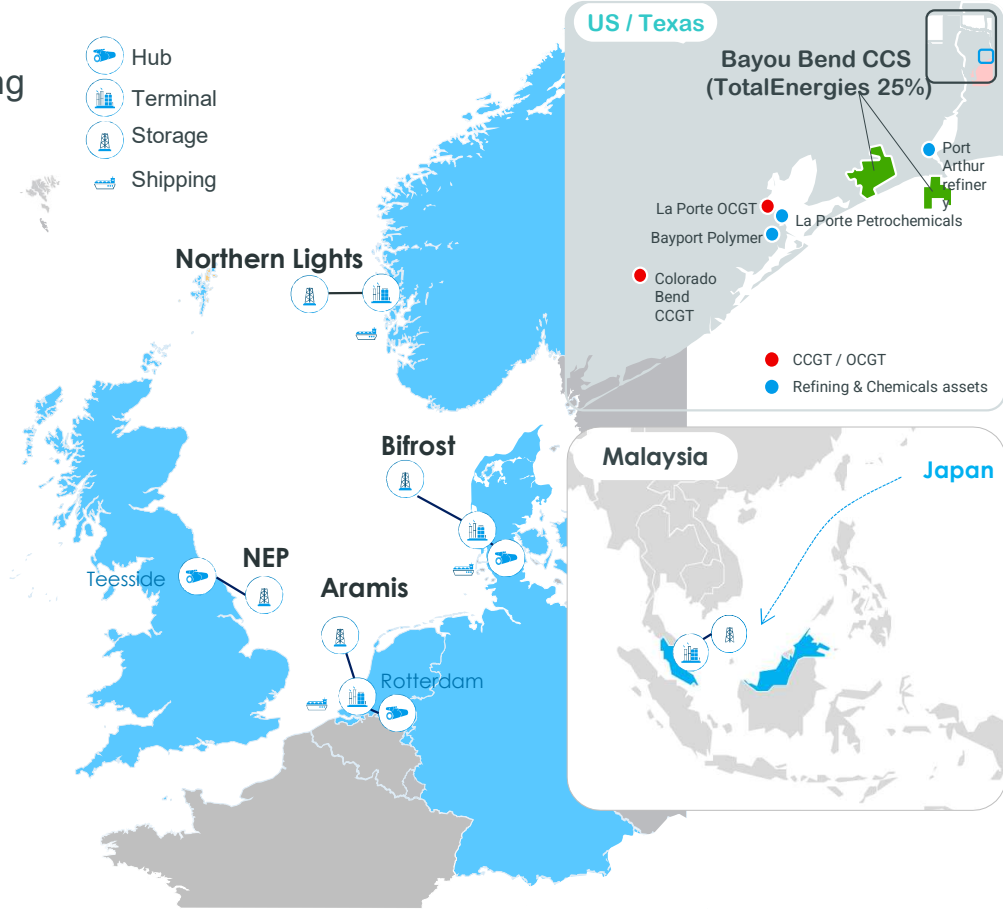
Offering CCS solutions to industrial emitters to reduce their emissions

### North Sea core area

- Ready for start-up: **Northern Lights (NO)**
- Construction from mid-2025: **NEP (UK)**
- Under development:
  - **Aramis (NL, op.), Bifrost (DK, op.)**

### Worldwide growth

- Under development:
  - **Bayou Bend (US), Southern Cluster (Malaysia)**



# CCS as a service for our customers in Europe



## Norway

**Northern Lights** (TotalEnergies 33%, Equinor 33%, Shell 33%)

### → Pioneering merchant CCS project

#### → Phase 1

- Ready for start up
- 1.5 Mtpa, Start up in 2025

#### → Phase 2

- Expansion to over 5 Mtpa
- FEED completed

#### → Initial Clients

- Celsio (Waste to Energy)
- Norcem (Cement)
- Yara (Fertilizer)
- Orsted (Biomass Power Station)



## UK

**NEP\*\*** (TotalEnergies 10%, BP 45%, Equinor 45%)

Onshore and offshore infrastructure for storage in the Endurance reservoir, a large-scale saline aquifer

- **Phase 1: 4 Mtpa**, start-up 2028
  - Construction from mid-2025
  - Initial clients: capture projects in Teesside region (*NZT Power, H2Teesside, Teesside Hydrogen CO<sub>2</sub> Capture*)
- **Expansion: over 20 Mtpa**

\*\*Northern Endurance Partnership



## Netherlands

**Aramis** (TotalEnergies 60% op.\*, EBN 40%)

### Storage

- **Phase 1: 2,5 Mtpa**, start-up 2029
- **Expansion: 5 Mtpa**

### Transport & gathering

- 22 Mtpa transport capacity
- CO<sub>2</sub> terminal for gas & cryo
- Sourcing: gas pipe (local) + shipping (international)

\* Storage part, equities differ on transportation and terminal



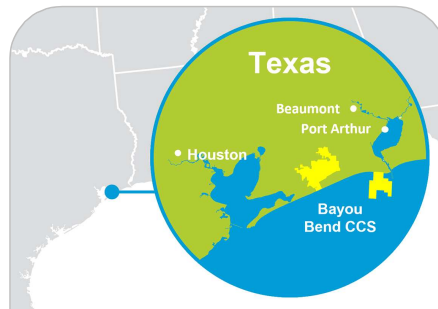
## Denmark

**Bifrost** (TotalEnergies 80% op., Nordsøfonden 20%)

### Project

- Infrastructure to link EU industrial hubs with offshore storage in depleted gas field and saline aquifer
- **> 5 Mtpa**
- 2 licenses, appraisal phase

# CCS as a service in the US & Asia Pacific



## US

**Bayou Bend** (TotalEnergies 25%, Chevron op., Equinor 25%)

**One of largest CCS projects in US for industrial emitters**

### Storage

- Onshore & offshore (circa 600km<sup>2</sup>) for **several hundreds Mt**

### Transport & gathering

- Sourcing (pipeline): two large US industrial corridors with 100Mtpa emissions (Houston Ship Channel, Beaumont/Port Arthur region)



## Malaysia

**Southern Cluster** (TotalEnergies, Petronas, Mitsui)

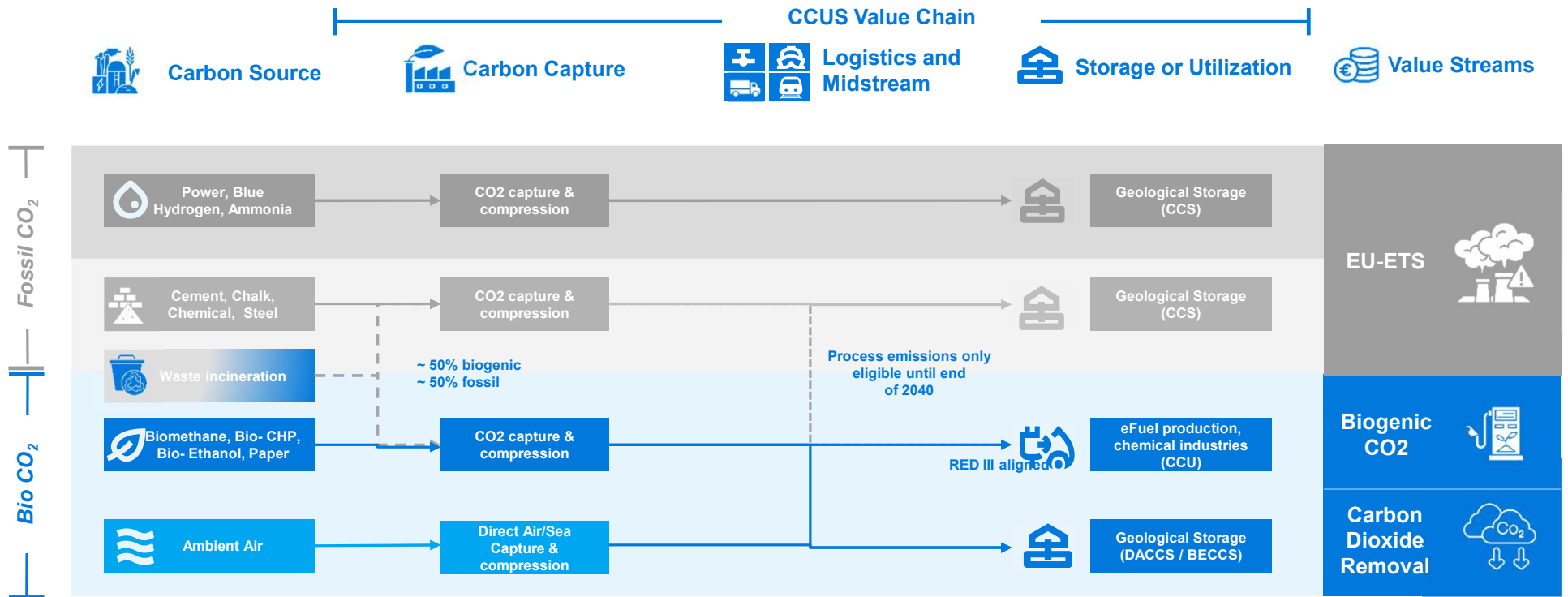
- **CCS Development agreement signed on 26<sup>th</sup> June 2023**
- Joint evaluation of potential storage sites in the **Malay Basin**, offshore Peninsula Malaysia
- Full chain project that anticipates delivery of **CO<sub>2</sub> sourced from international trading partners**, namely Japan, South Korea and Taiwan
- Expected start-up later this decade

# Key Messages on CCS in Europe

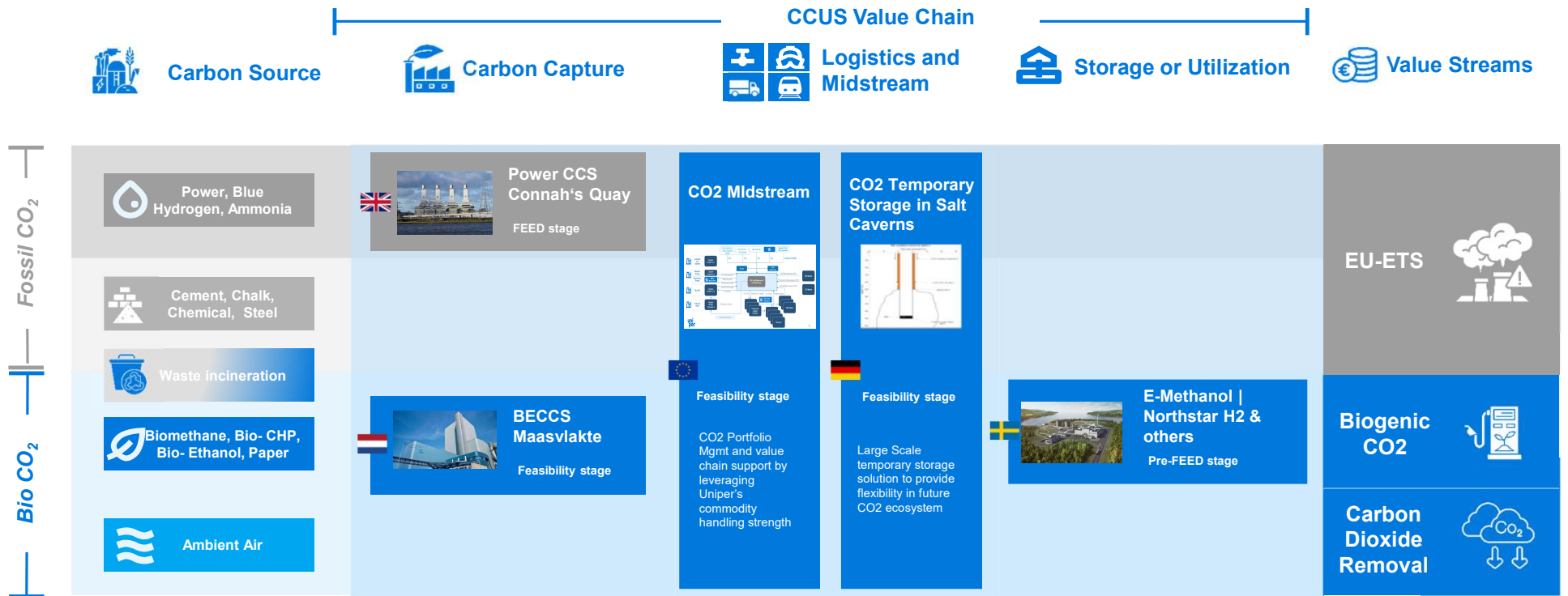


- CCS technologies and operations have a long-lasting track record that has enhanced significantly the know-how and expertise of involved companies.
- CCS Business model viability is the cornerstone of CCS development:
  - Synchronous decision making along the value chain to be promoted.
  - EU and National subsidies to bridge the gap between CCS project costs and ETS, awaiting market development.
    - CCfDs are powerful tools in this regard (as well as ETS increase obviously).
- CO2 specifications require regulations to create compatibility and interoperability between service providers.
- Midstream and Transport networks development needs a special focus:
  - Pre-investments in full capacity, permitting and access criteria for pipeline, high cost of long-distance shipping
  - Cross border CO2 transport regulation: ratification of 2009 amendment to Article 6 of London Protocol and Bilateral agreements between the two parties.

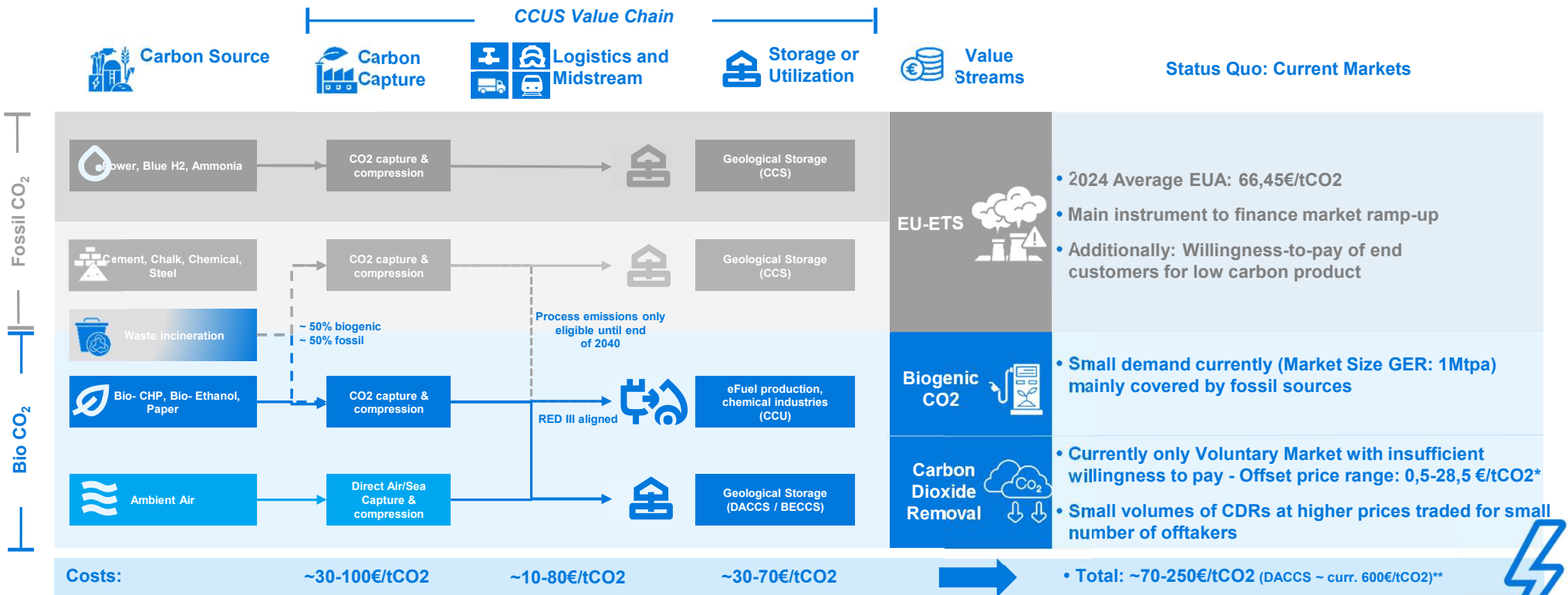
# Main elements of the CCUS value chain and the relevant monetization mechanisms to enable the future ramp-up of the CCUS ecosystem



# Uniper is active along the CO2 value chain with different projects



# Status Quo: The current financial incentives do not suffice to ramp-up the CCUS market– further market mechanisms and subsidies required



Sources:

\* Argus | Argusmedia.com / Monthly reports on state of voluntary market

\*\* Global CCS Institute – Advancements in CCS technology and costs | Jan. 2025



# Required: Reliable market mechanisms, CCfDs and compliance markets for Carbon Dioxide Removals are needed to unlock CCUS market

