ZEP @ ERTC – CCUS: Implementing CCUS into Europe's refineries

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Lamberto Eldering, Vice-Chair, Zero Emissions Platform

Intro – My role in ZEP

- Vice-Chair of the Zero Emission Platform (ZEP); a European Technology and Innovation Platform that advises the EU Commission on CCS
- Co-Chair of the CCS Association Policy and Regulatory Working Group.
- Business Developer for Low Carbon Solutions in Equinor, with a focus on CCS and hydrogen solutions.

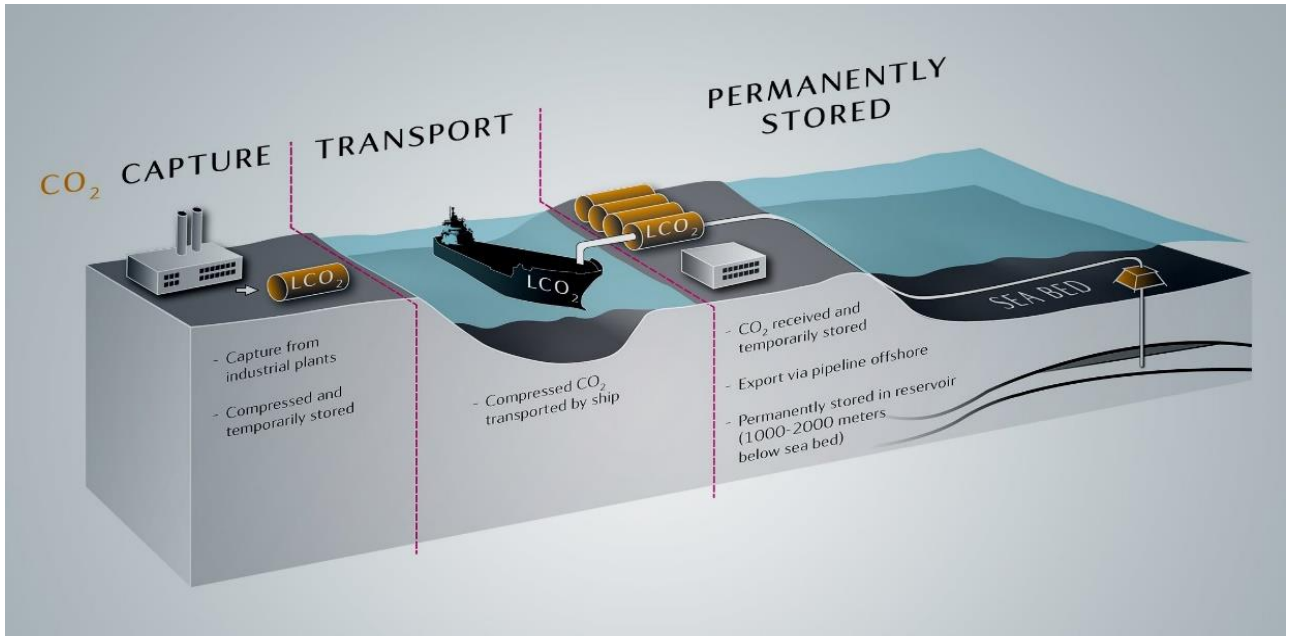
About the Zero Emissions Platform

- Technical adviser to the European Commission on the deployment of CCS and CCU
- Broad membership basis
- Go-to organisation to liaise with the EU Commission and Parliament
- Output –Technical reports with an eye to the policy developments

Getting to know CCS and CCU

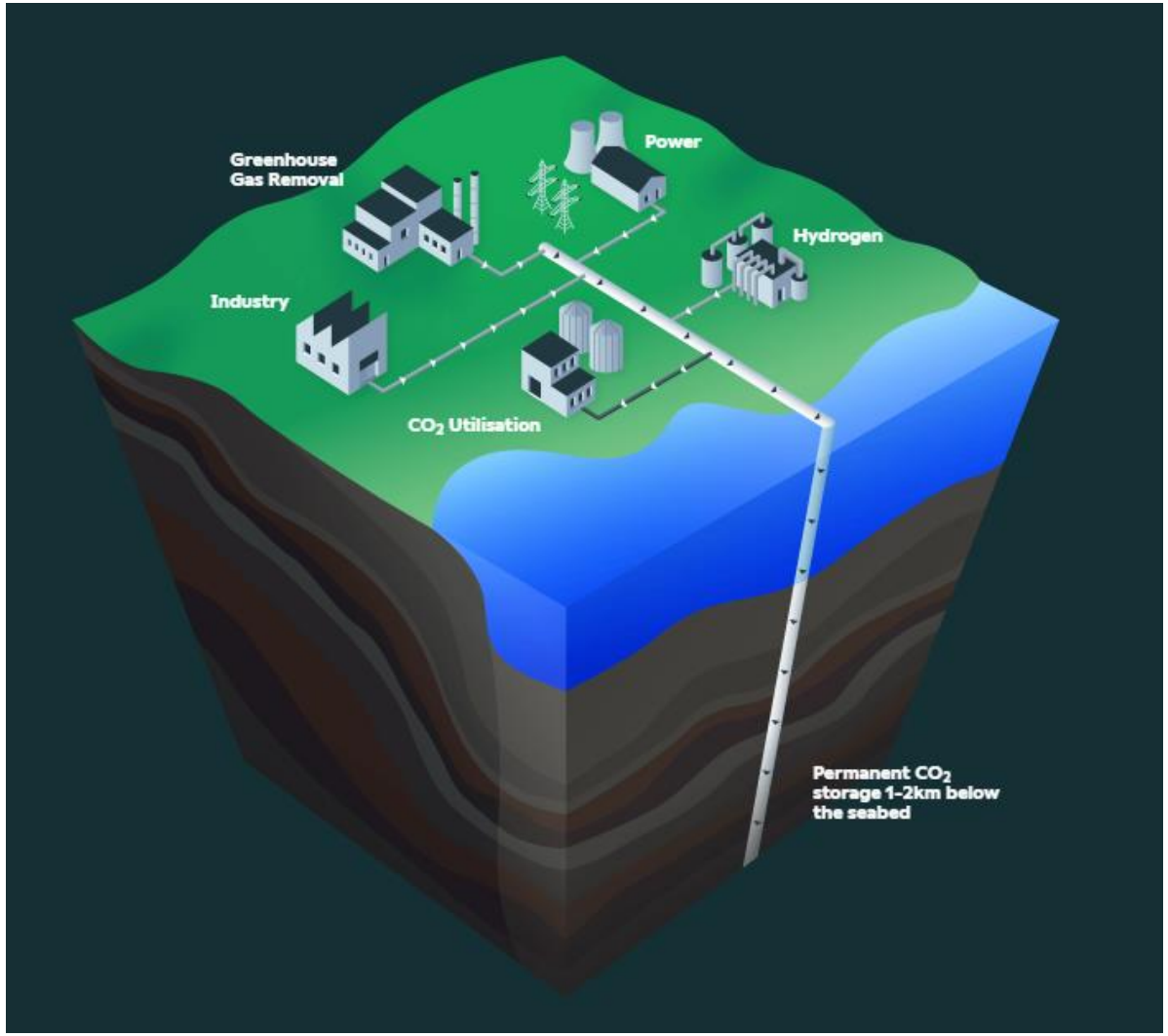
Carbon capture and storage (CCS) is a technology which captures carbon dioxide (CO2) emissions produced from industrial and power processes and permanently stores the CO_2 in geological formations.

- Capture
- Transport
- Storage



Carbon capture and utilisation (CCU) can also be used for a variety of industrial purposes, yet the climate effects have not been proven and scalability is limited.

Carbon management in a low-carbon economy



CO_2 transport network allows for an integrated approach towards a net-zero 2050, connecting CO_2 emitters to secure storage/use.

CO_2 transport network is a stepping stone towards a clean hydrogen economy by enabling the timely production of early, large quantities of low-carbon hydrogen.

Besides nature-based solutions, CCS is a real enabler of large volumes of carbon dioxide removals.

History of CCS in Europe

2000 → **2010** → **Mid 2020s** → **2019** → **2020** → **2020s**

Initial focus on the power sector	Change of paradygm: shift towards CCS in industry	European Green Deal, **'Europe's new climate and growth strategy'**

Today: Renewed and growing interest in CCS for industry

- Industrial decarbonisation
- Carbon Dioxide Removals
- Low-carbon hydrogen production

Current status of CCS

- CCS projects have been in operation since the 1970s with 19 large-scale CCS facilities currently operating globally. In Europe – Norway and the Netherlands are at the forefront of the developments.
- Geological permanent storage is safe and secure, with over 260 Mt of CO_2 emissions from human activity already captured and stored.

Upcoming CCS projects in Europe

- **5 European Projects of Common Interest, market-ready projects** in support of EU recovery (and more...)

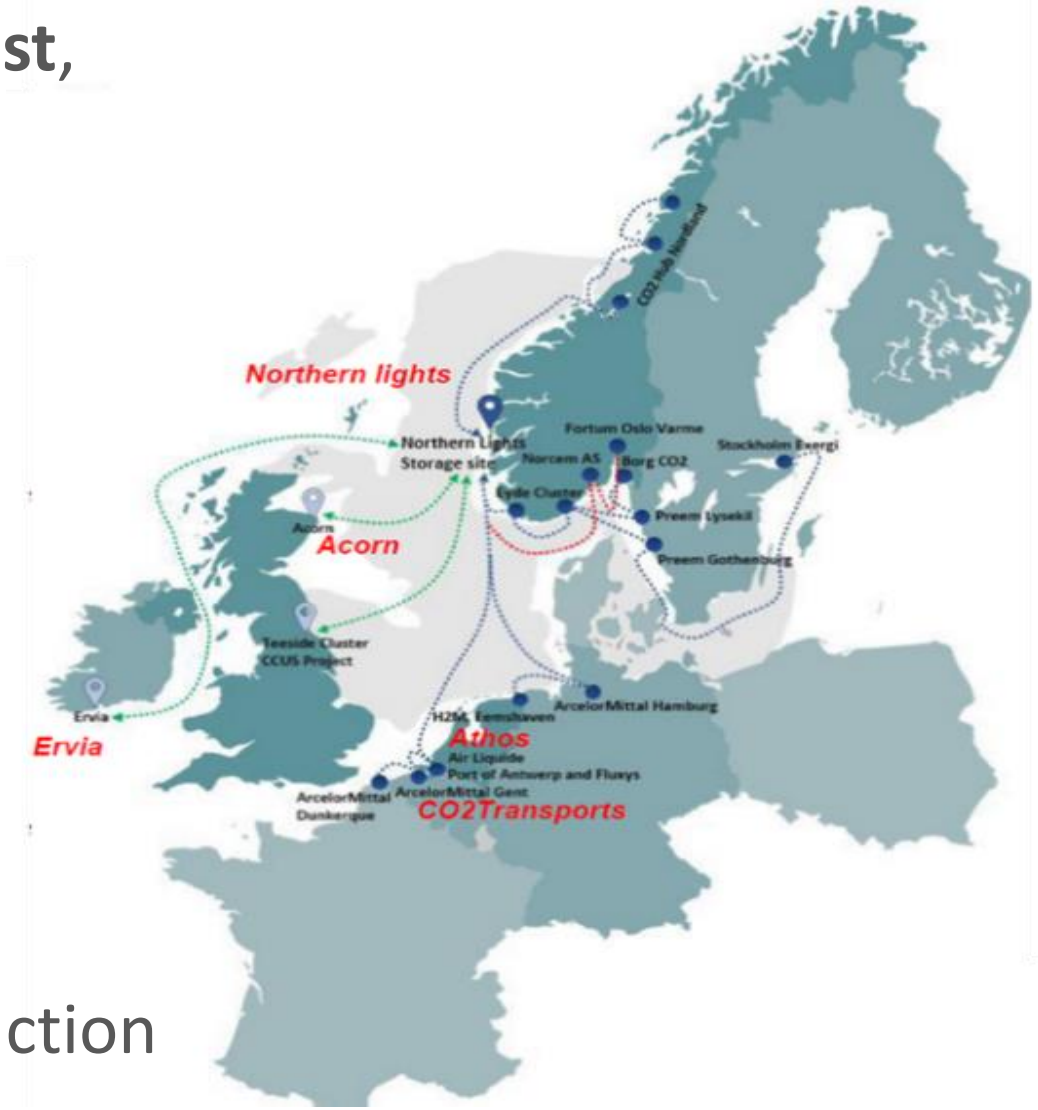
Longship project (Northern Lights)

PORTHOS

Athos

ERVIA

Acorn Sapling (Scotland)



- UK developments – Net-Zero Teesside, Humber region, Wales, etc – industrial decarbonisation fund + hydrogen production

How much CCS will be needed by 2030?

- Increased climate ambitions – also globally (China, South Korea, Japan)
- The 2020s becomes crucial – urgency to develop CCS – European Commission: “zero or very low carbon technologies, including hydrogen and CCUS, will need to be developed and tested at scale in this decade”.
- Not all necessary information available: EU 2030 target has not yet been agreed upon, new European Commission’s reference scenarios for climate neutrality by 2050
- Modelling 1.5DS scenarios by UCL Energy Institute : Median CO_2 captured by CCS is 230-430 MtCO2/yr in 2030 (EU numbers)
- “Market-ready” CCUS projects: 50 MtCO2/yr captured by CCS could be reached in 2030

Political direction

- **European Green Deal** – 'Europe's new growth strategy'
- European Climate Law– setting the legally-binding objective of **climate neutrality by 2050** – net-zero GHG emissions by 2050
- Increased ambition for **2030**: from 40% to 50-55% GHG emissions reduction compared to 1990 levels – not yet agreed upon
- Connecting Europe Facility announcement – € 102M allocated to PORTHOS, support for studies in other projects (ERVIA, Acorn Sapling, Antwerp cluster, ATHOS)
- EU ETS Innovation Fund call / European Taxonomy – CCS is an enabler of climate change mitigation for economic activities

Business models

Funding:

- **Carbon price** under EU ETS – incentives shall be foreseen to support the development of low-carbon technologies
- **Innovation Fund** – first call for large-scale projects has closed - € 10bn over 10 years for pilots on low-carbon technologies
- **Connecting Europe Facility** for Energy – once a project is awarded the PCI status

Finance:

- **EU Taxonomy** – CCS can be applied to economic activities as it is 'an enabling technology to achieve climate neutrality by 2050 – delegated acts will be adopted in December 2020

Conclusions / Q&A

- Conclusions
  - CCS is essential for Europe to reach net-zero by 2050

- **Q&A - What could CCS mean for the refineries? How could ZEP support?**
  - What could CCS bring to you?
  - What would CCS mean for a refinery?
  - What is the future of the refining industry?
  - Which possibilities can CO_2 infrastructure open up for the decarbonisation of refineries?