



CCUS CRITICAL FOR CARBON NEUTRALITY

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CCUS R&D program

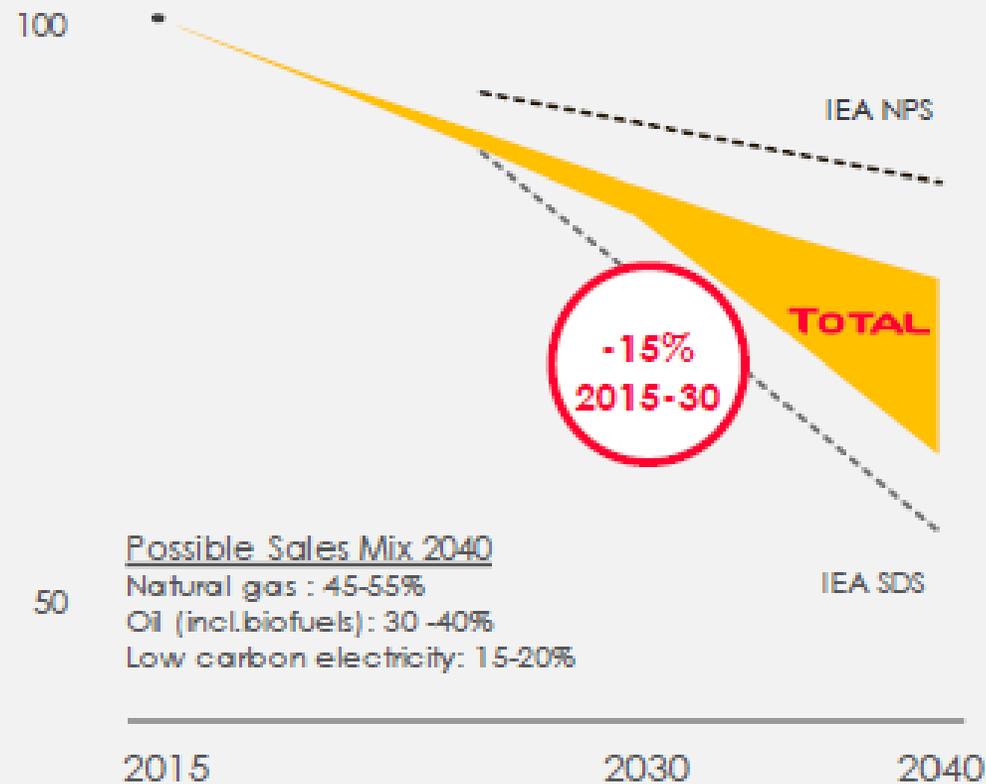
REDUCING CARBON INTENSITY OF OUR ENERGY SALES

Carbon intensity

Base 100 in 2015 (75 gCO₂/kbtu)

NPS: New Policy scenario ~2.7°C by 2100

SDS: Sustainable Development scenario ~2°C by 2100



Responsible contribution to tackle climate challenge

- Further improving our **operations efficiency**
- Growing in **natural gas**
- Developing **low carbon electricity**
- Increasing **biofuels**
- Investing in **carbon sinks** (CCUS & forests) post-2030

ONE R&D GLOBAL VISION FOR CCUS PROGRAM

Our ambition in CCUS :

To have CCUS globally recognized leadership by 2035

To provide our customer a CCUS solution towards carbon neutrality.

To prepare for new business opportunities.

● **One R&D strategy for CCUS**

1. To reduce CCS Cost

- Optimize mature technologies thought scale-up effect
- Promote technologies competition
- Push disruptive technologies to the market

2. To evaluate mass market opportunities in CO₂ Utilization

3. To be present all along the value chain of CCUS

- Take part in industrial projects
- Create new business models

4. To scale-up CCUS impact on Climate

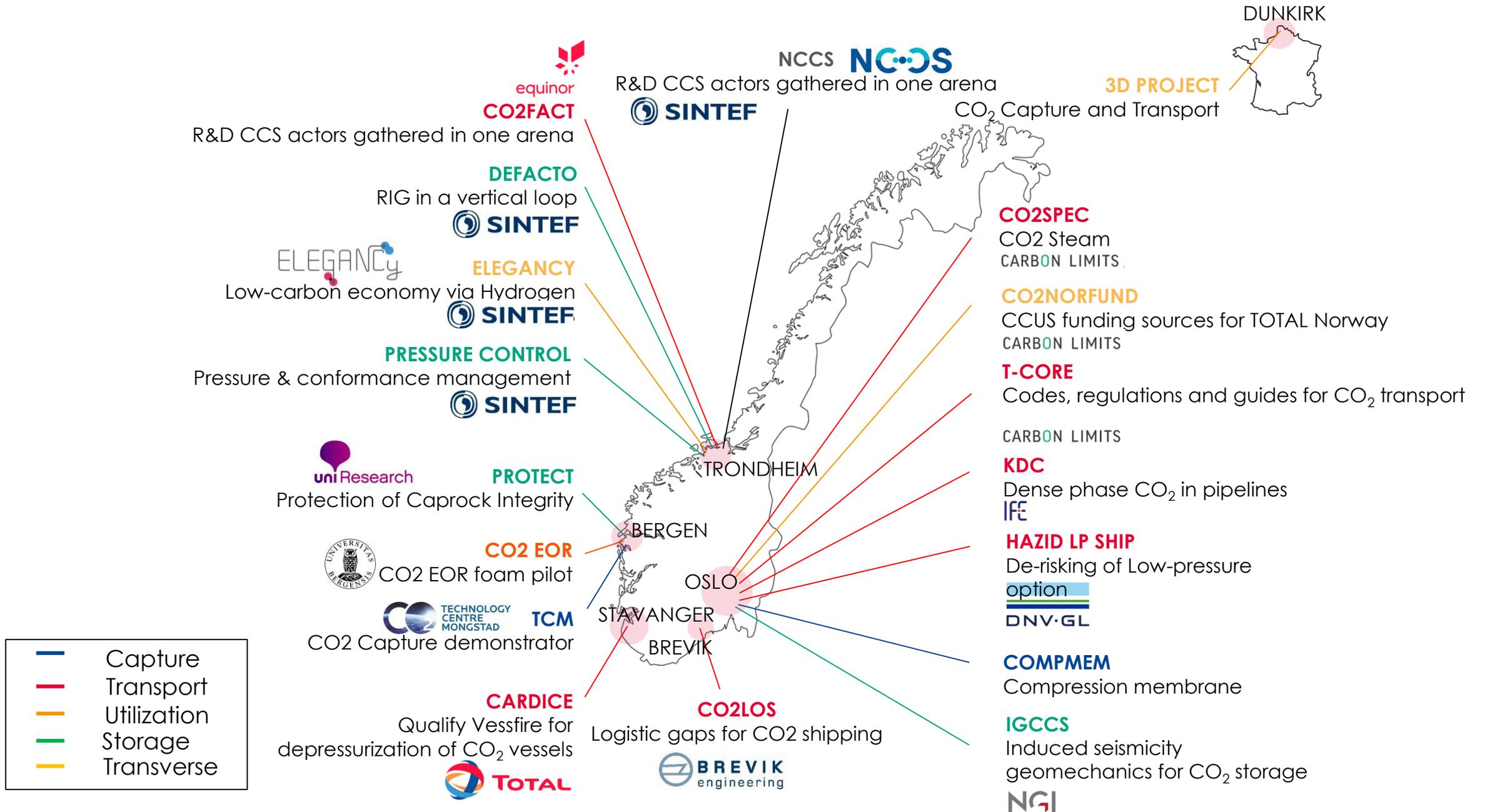
- Derisk mega CO₂ storage capacities

● **R&D key enabling factors**

- Work for CCUS sustainability
- Develop internal expertise
- Leverage our impact through OGCI and through partnership fundings

**Worldwide involvement :
USA, EU, Asia, Middle Est**



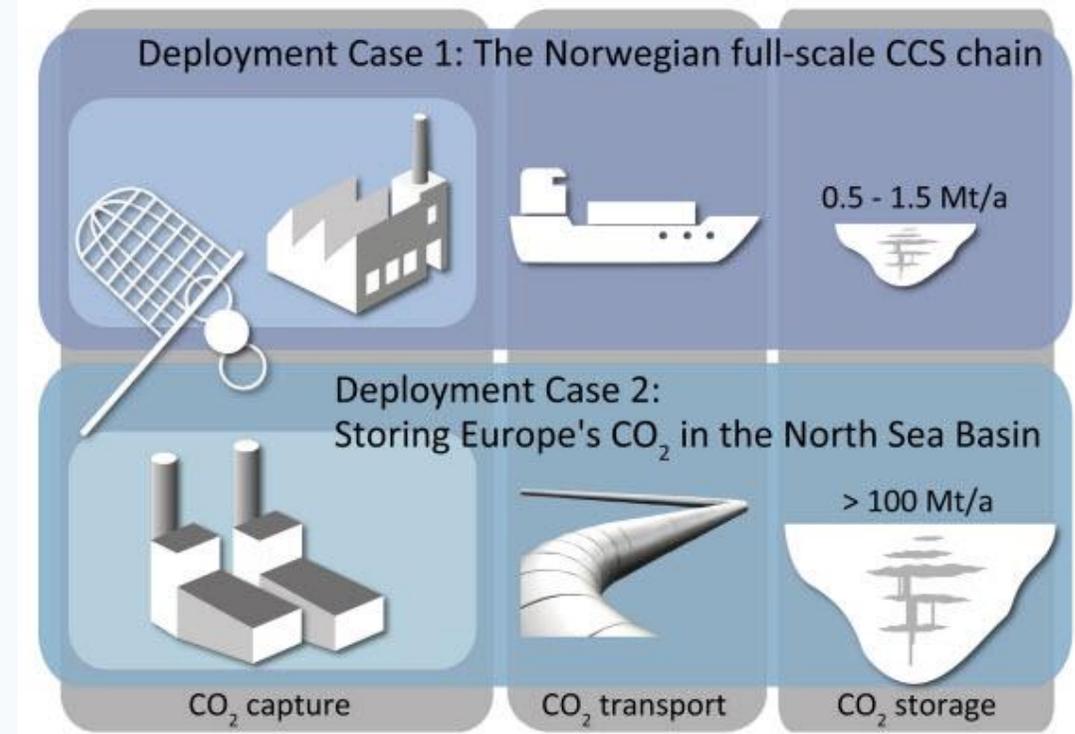


NCCS – NORWEGIAN CCS RESEARCH CENTRE

- A unique arena where all the major Norwegian CCS players are gathered



- Industry driven project
- New spin-off projects
- Access to high quality facilities
- Highly experienced and qualified researchers
- International visibility (GHGT-18, Summer school...)



CCUS VALUE CHAIN DEVELOPMENT - STEEL PLANT



3D project : DMX™ Demonstration in Dunkirk



CO₂ Cluster :

12 Mt CO₂/y that could be captured in a short term

DMX™ Demonstration Unit in Arcelor Mittal Steel Plant



3D project received funding from the European Union's Horizon H2020 research and innovation programme under grant agreement No 838031

A geophysical monitoring test platform

Provide a world-leading site for the improvement and the development of new continuous and discrete subsurface and surface, monitoring technologies related to CCS



Partners: Chevron, Shell, Equinor, Total, LBNL, SINTEF, GFZ, Norsar, Halliburton

TOTAL LEADER IN CCUS VALUE CHAIN BY 2035



Decrease technologies **C**ost

Improve our **C**arbon footprint

Contrib **U**te to a more favorable development context

To **S**ustain our activities in the future



DECREASE CCUS TECHNOLOGIES COST



DECREASE GLOBAL CARBON FOOTPRINT



INCREASE CCUS SOCIAL ACCEPTABILITY

