



Mona J. Mølnevik

Director NCCS

Research Director Gas Technology, SINTEF

Energy Transitions 2018-02-26

- The role of natural gas in the future energy system and the need for flexibility



Centres for Environment-friendly Energy Research (FME)





NCCS

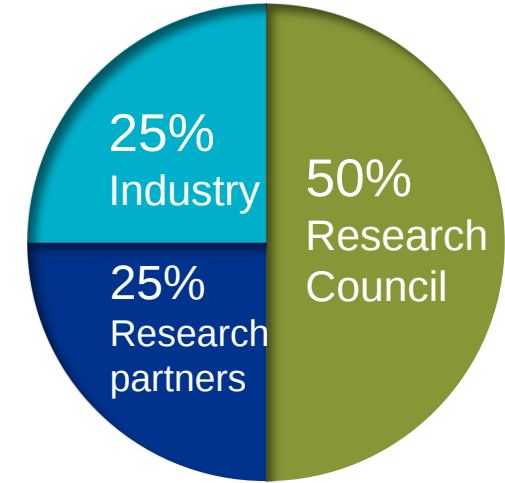
NORWEGIAN CCS RESEARCH CENTRE



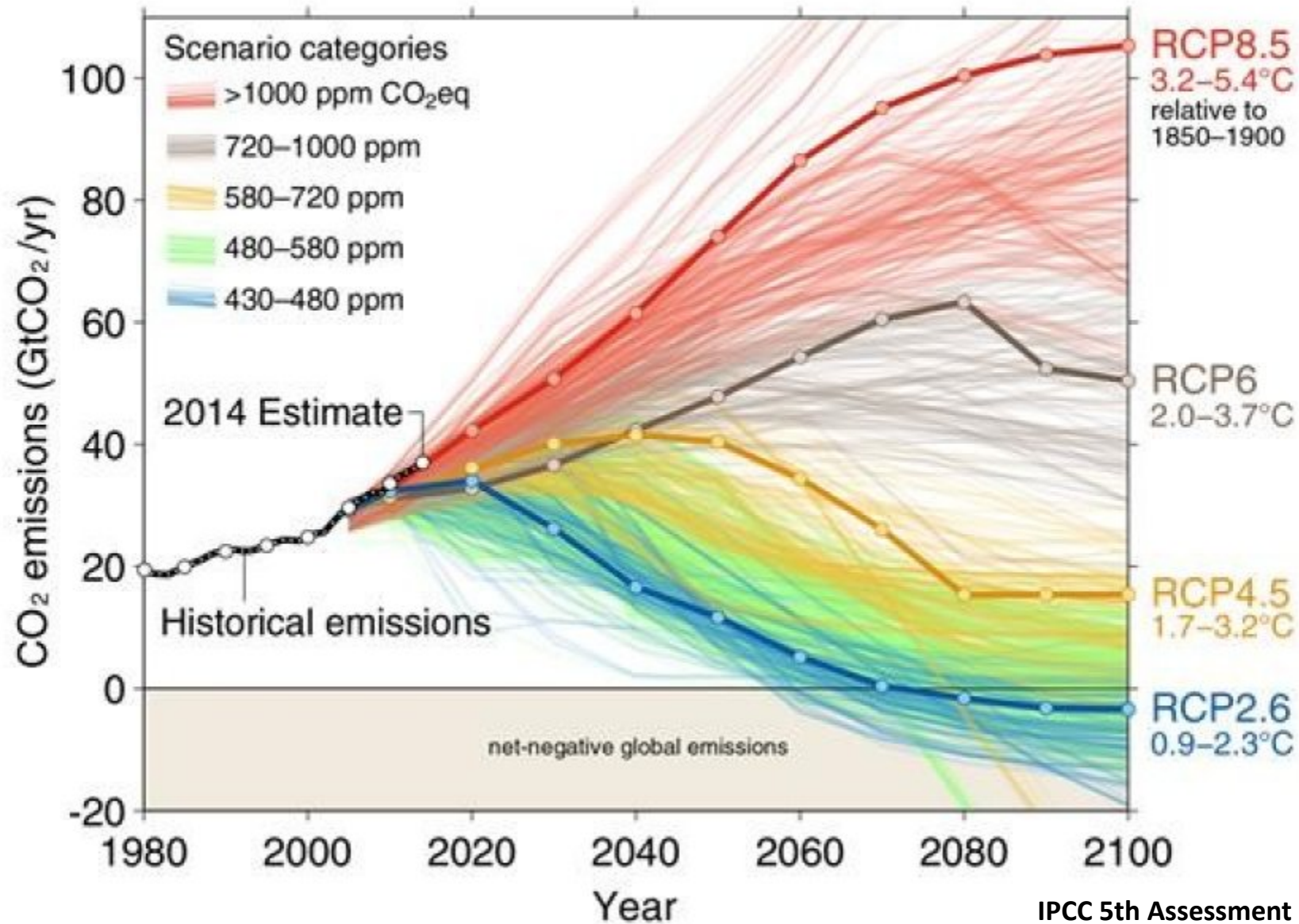
Close working relationships generate innovation and high quality

Duration: 8 Years (5+3 years) (2016-2024)

Budget: 436 MNOK

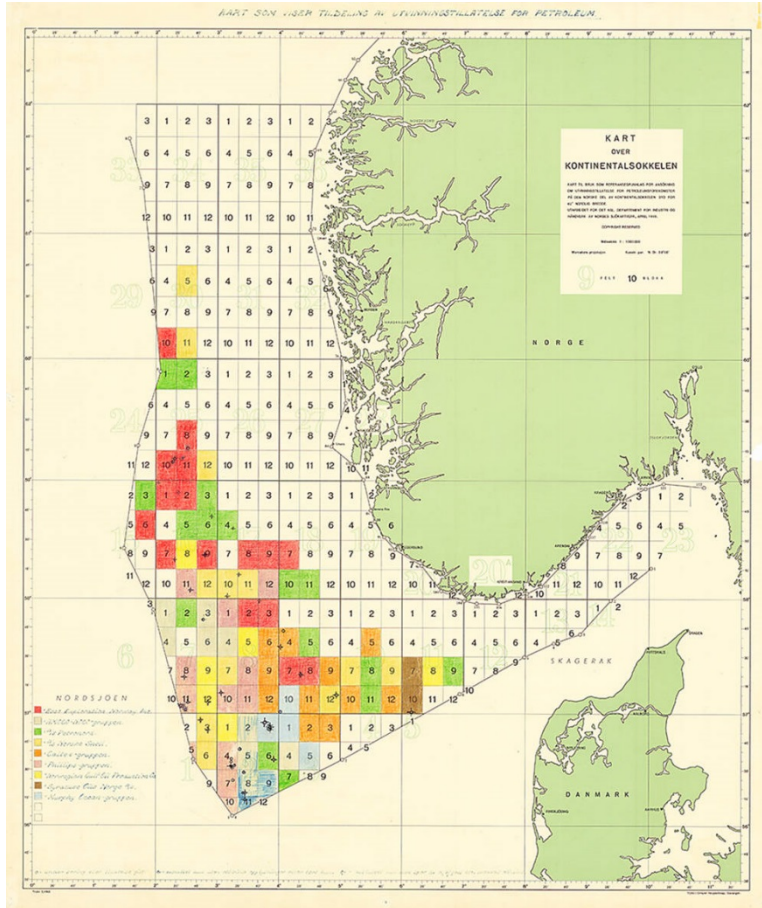


Scenarios for reaching the climate targets

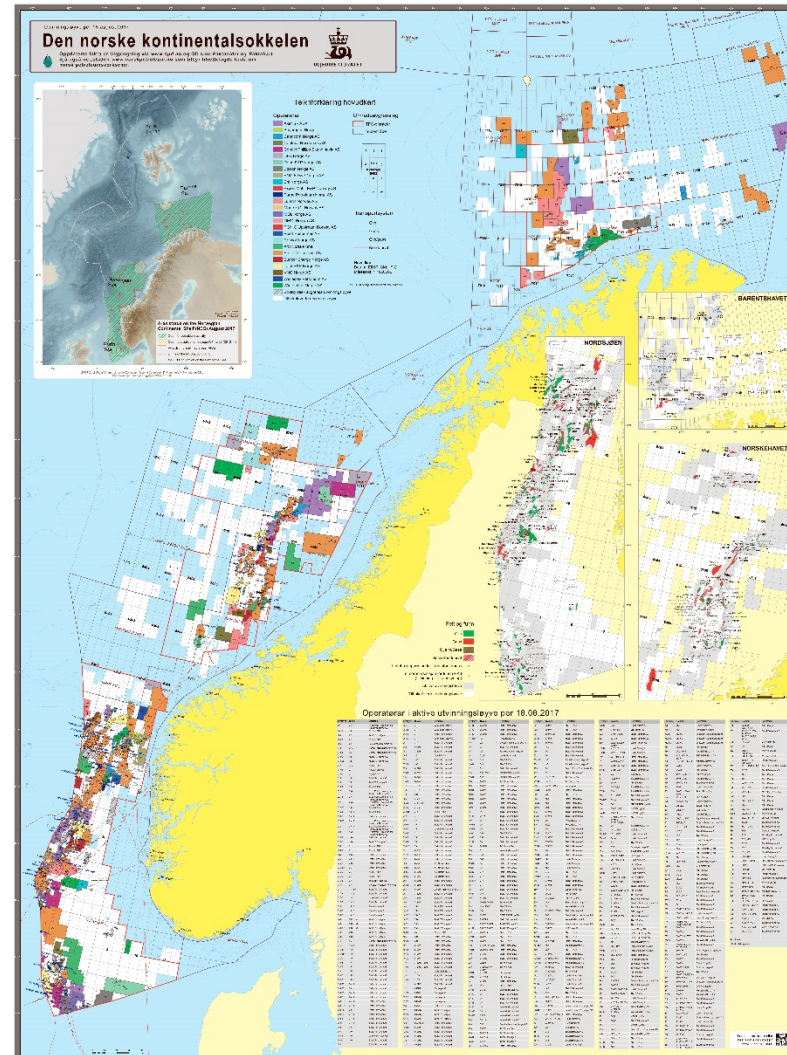


The Norwegian Continental Shelf

1965



2017



2050 - in 33 years



NORWAY: FULL-SCALE CCS PROJECT

CO₂ STORAGE

- Statoil contract for concept and FEED studies
- Onshore hub
- Offshore storage



CO₂ TRANSPORT Ship transportation



Norcem HeidelbergCement
Cement plant

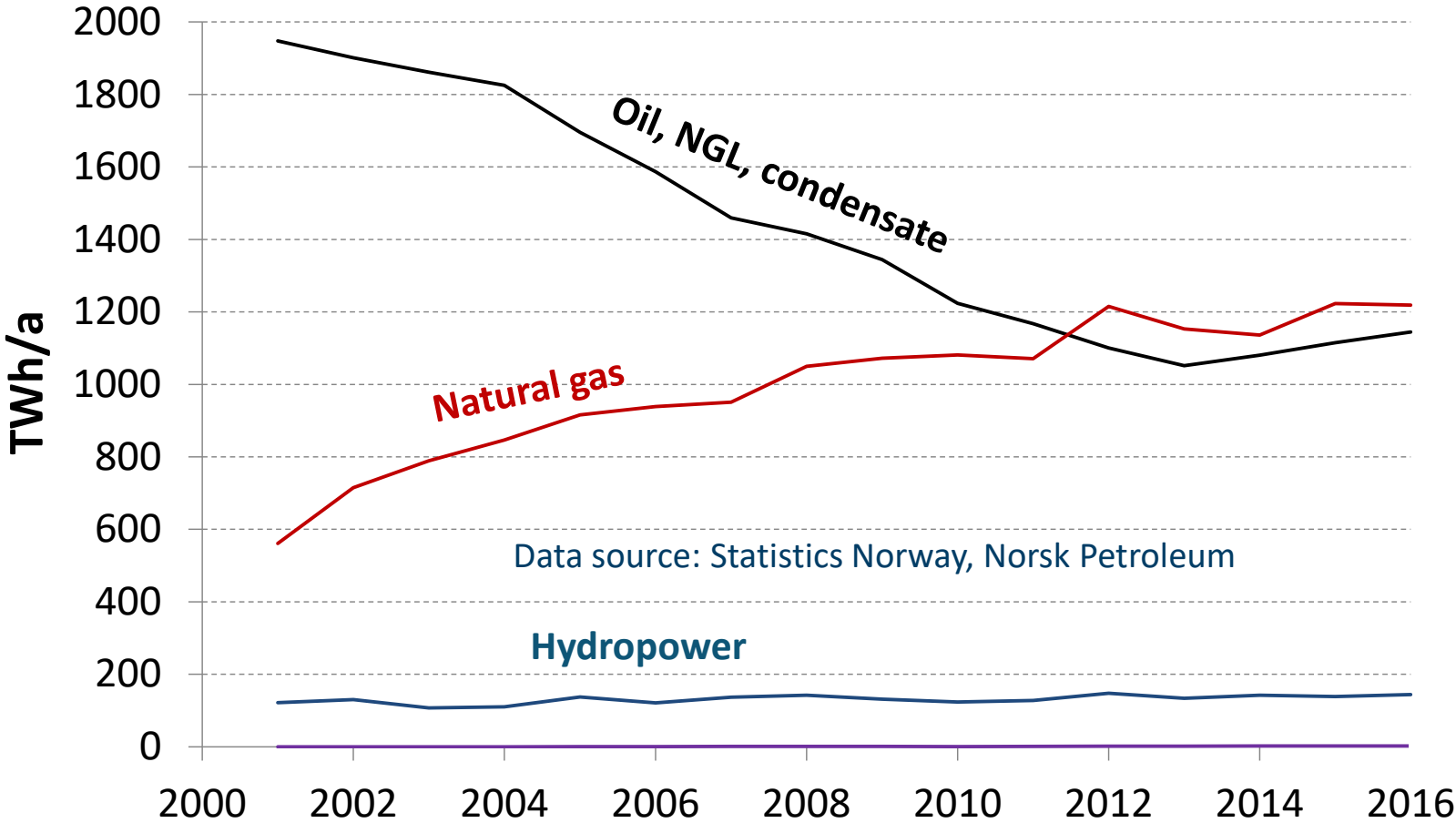


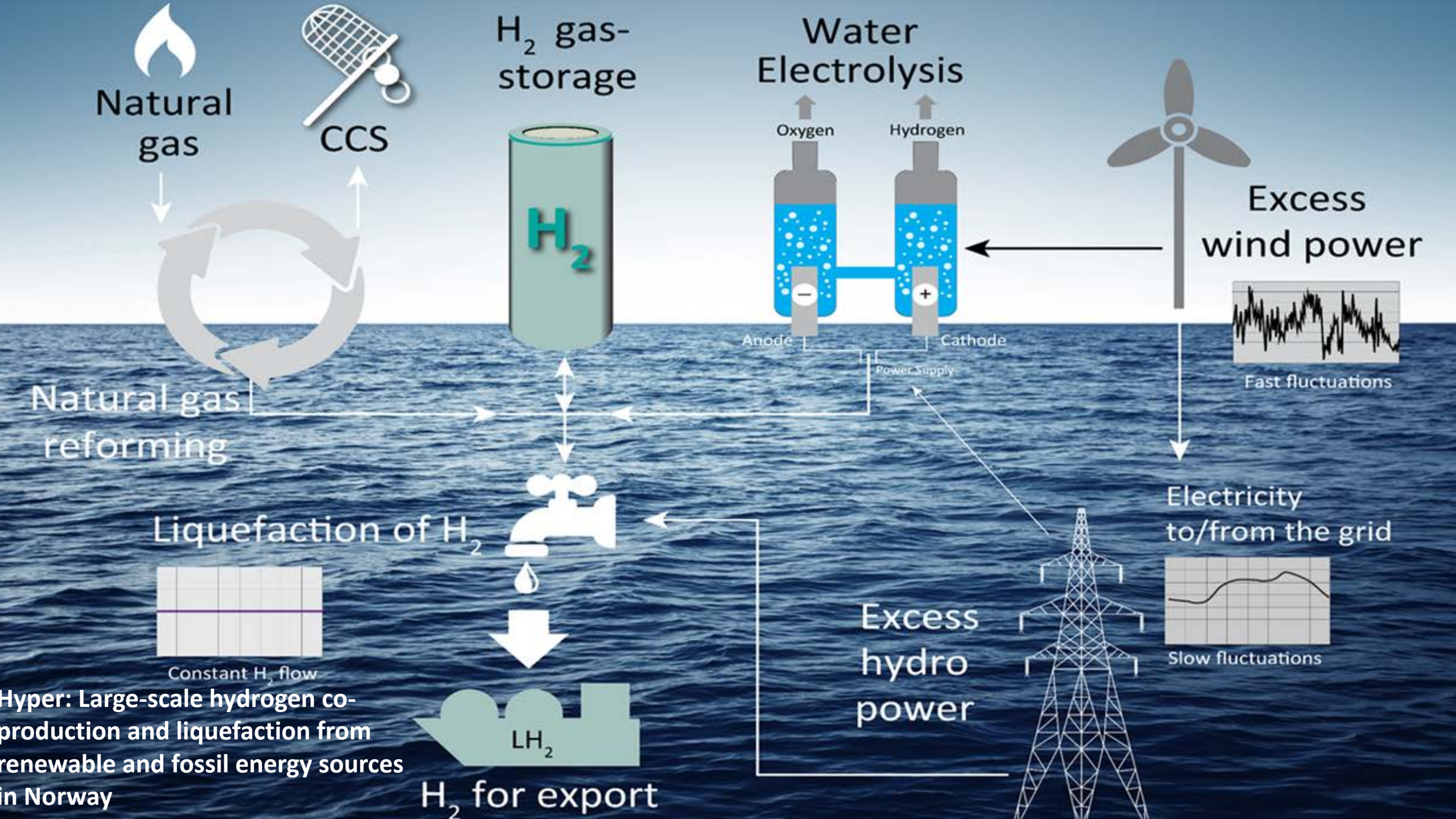
Yara Porsgrunn
Ammonia plant



Fortum Oslo Varme AS
Waste-to-energy plant

Energy production in Norway



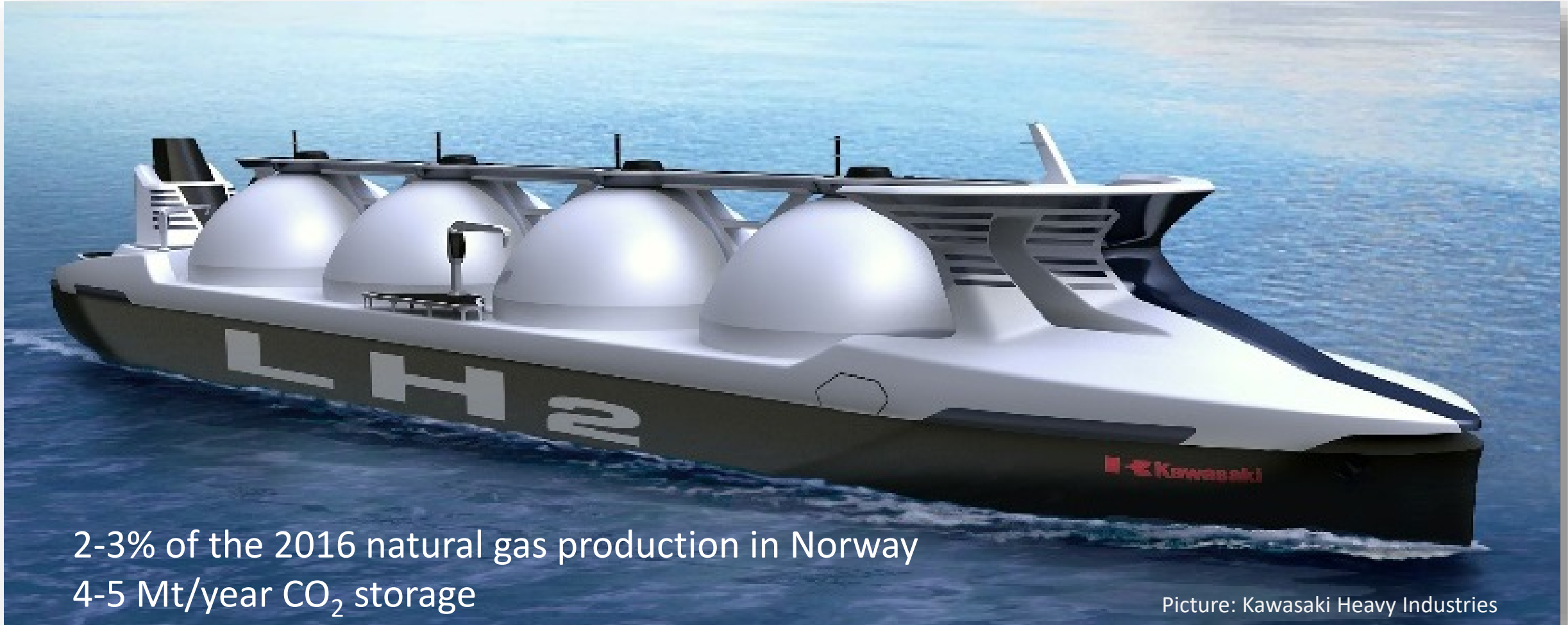


How large?

KHI-ship: $160.000\text{m}^3 \sim 0,373\text{TWh}$

1 ship/week: 19TWh/a ($\sim 1500\text{ ton LH}_2/\text{day}$)

Norway's electricity export: $\sim 15\text{TWh/a}$



2-3% of the 2016 natural gas production in Norway

4-5 Mt/year CO_2 storage

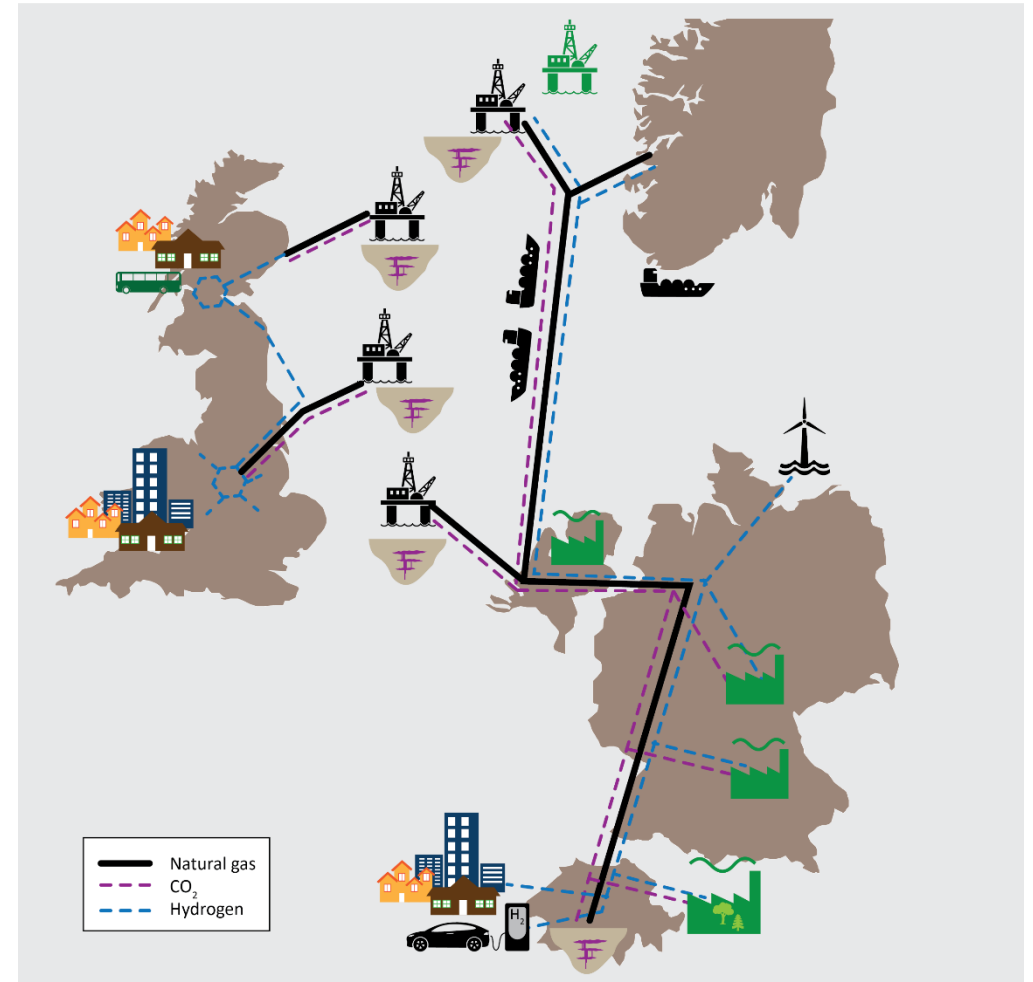
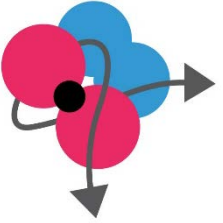
Picture: Kawasaki Heavy Industries



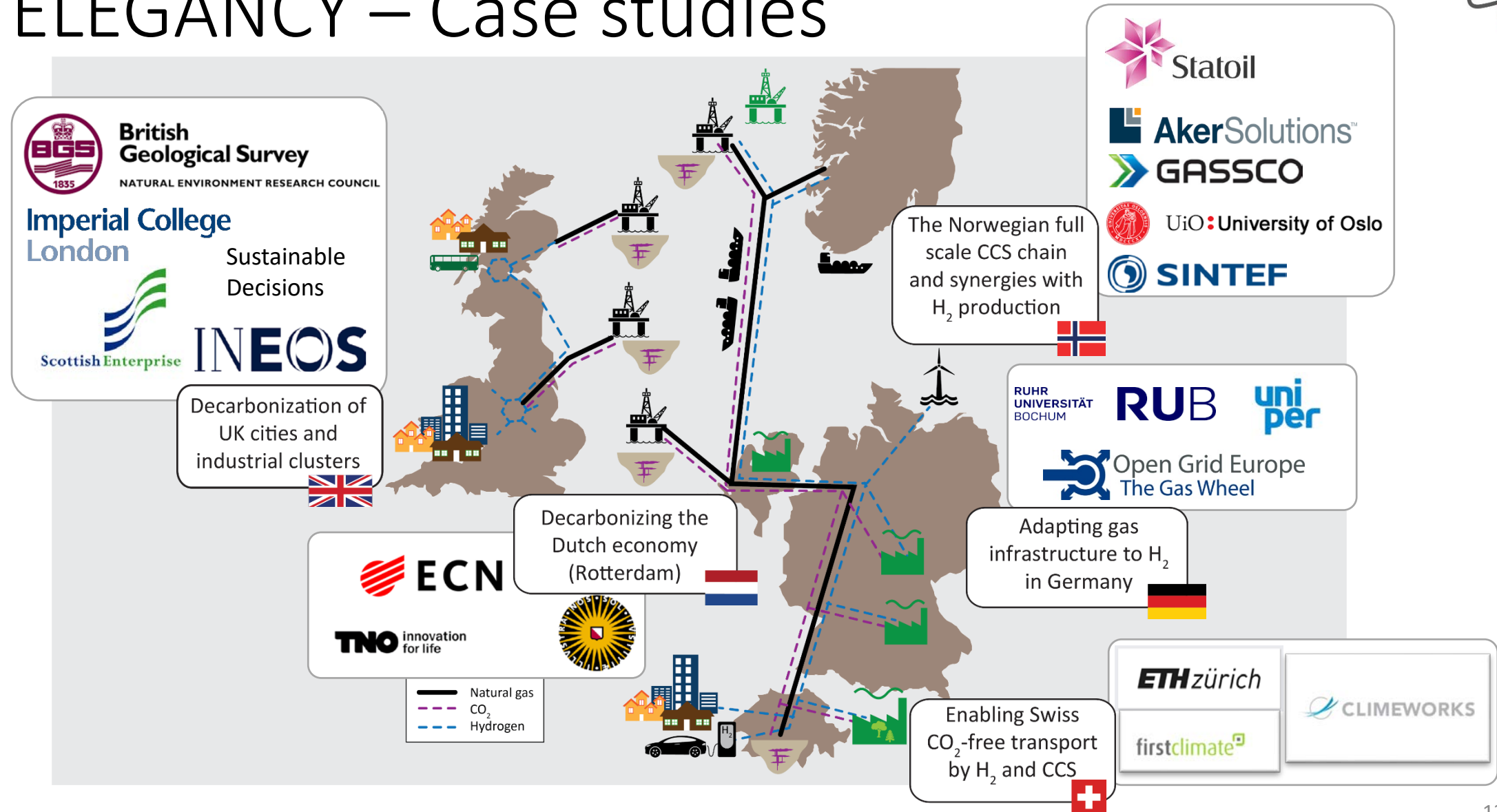
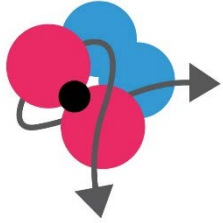
Enabling a Low-Carbon Economy via Hydrogen and CCS

Project coordinator:
Svend Tollak Munkejord

An NCCS SPIN-OFF PROJECT



ELEGANCY – Case studies



Summary

1. Talk nice about all the technologies required
2. Imagine the changes
3. Norway is a gas nation
4. Possible to produce hydrogen from natural gas with CCS
5. Several interesting H₂/CCS business cases in ELEGANCY

Acknowledgement

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NORWEGIAN CCS RESEARCH CENTRE

Industry-driven innovation for fast-track CCS deployment

Thank You!