

Climate Change – Industrial Solutions in the Making

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5 June 2007

Climate change – Reduction targets and ambitions for 2020

EU: - 20 %

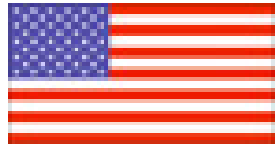
**Norway,
Netherlands,** - 30 %

UK:

Germany: - 40 %

US: ?





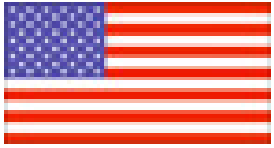
EU-US Summit 30 April 2007



President Bush after meeting Merkel and Barroso on 30 April 2007:

We recognize that

- we have a **problem with greenhouse gases**;
- we have a **problem with a dependence on oil**;
- we can **use technologies to help solve this problem**; and,
- we have **an obligation to work together** to promote the technologies necessary to solve the problem, and encourage the developing world to use those technologies.



EU-US Summit 30 April 2007



Agreement on **CCS** as a **key priority**
in the cooperation:

Advancing **commercialization of CCS**
Technologies:

- **Policy incentives** to reduce cost and other barriers
- **Bilateral cooperation** on CCS



The goal is Zero Emissions Power (ZEP)...



*...carbon capture
and storage
(CCS) is
identified as the
essential part of
the solution*

Norway as a "CO₂-laboratory"

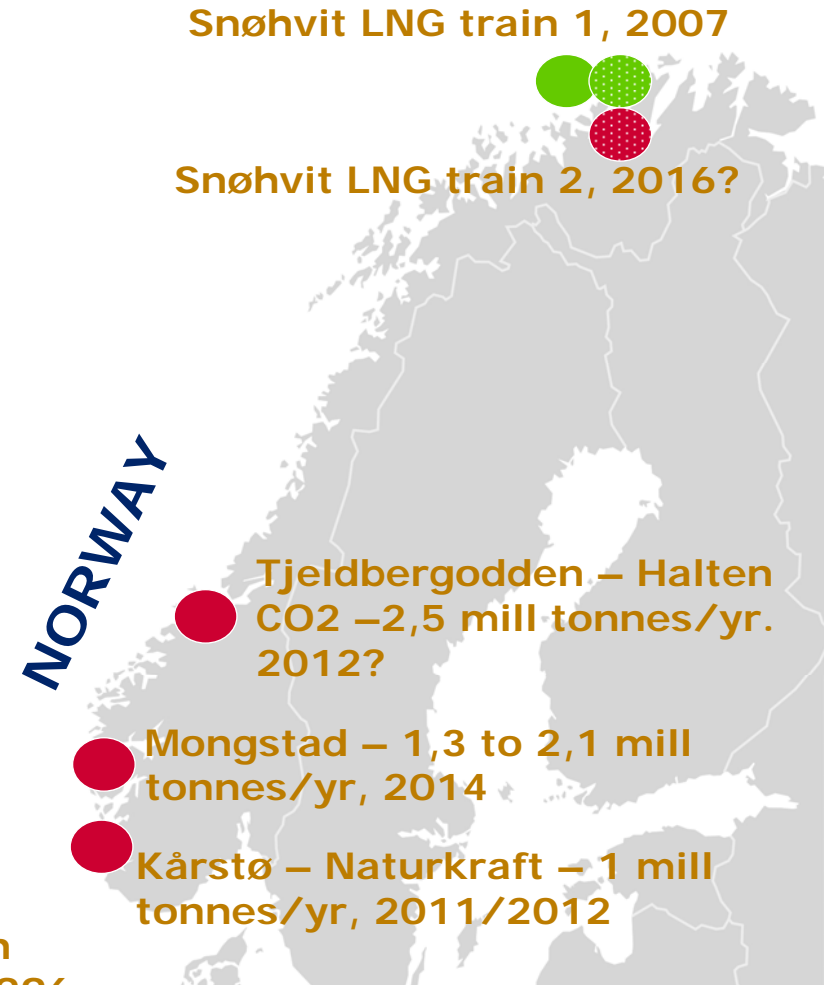
Cleaning up
our operations

CO₂ from
natural gas

Cleaning up
our products


CO₂ from electricity
generation

Sleipner, 1 million
tonnes/yr from 1996



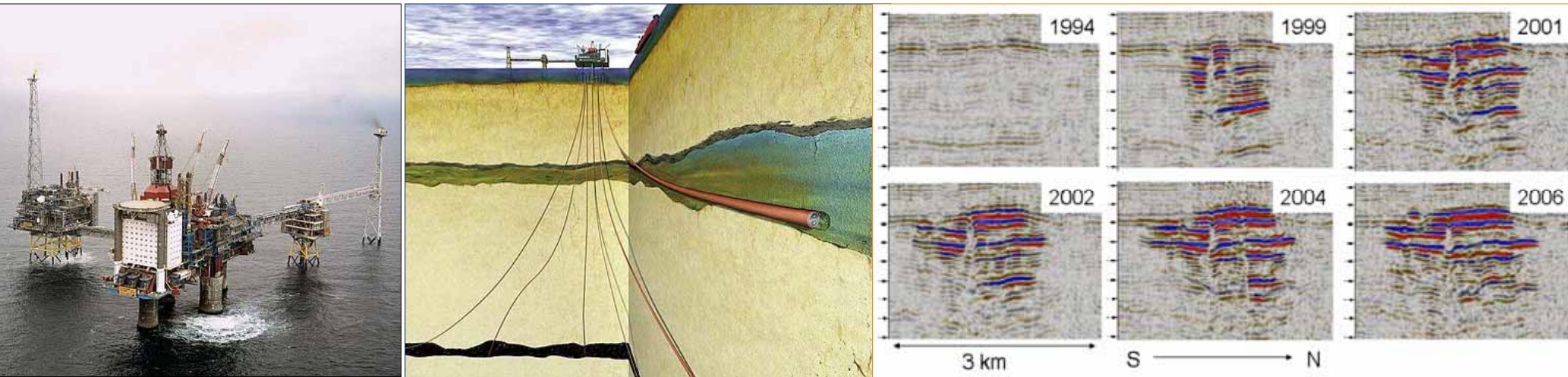
Step 1

Cleaning up our operations – since 1996



CO₂ from
natural gas

The Sleipner experience – Statoil's starting point



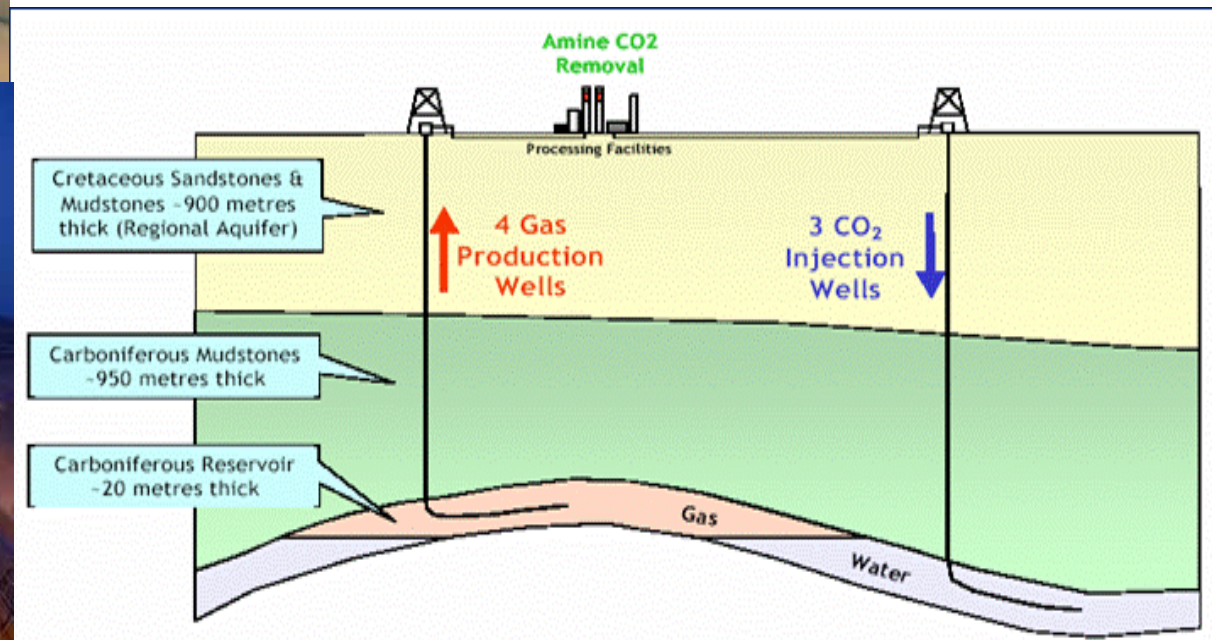
- Started in 1996 – **10 year of CO₂ injection** in October 2006
- Separating and **injecting nearly 1 mill. tons CO₂ annually**
- Storing in a saline aquifer above natural gas reservoir
- **Drivers: CO₂-tax, commercial needs, environmental engagement**
- Learning and confidence-building through a series of large EU-wide R&D programmes

Statoil Experience - In Salah, Algeria

In Salah Gas

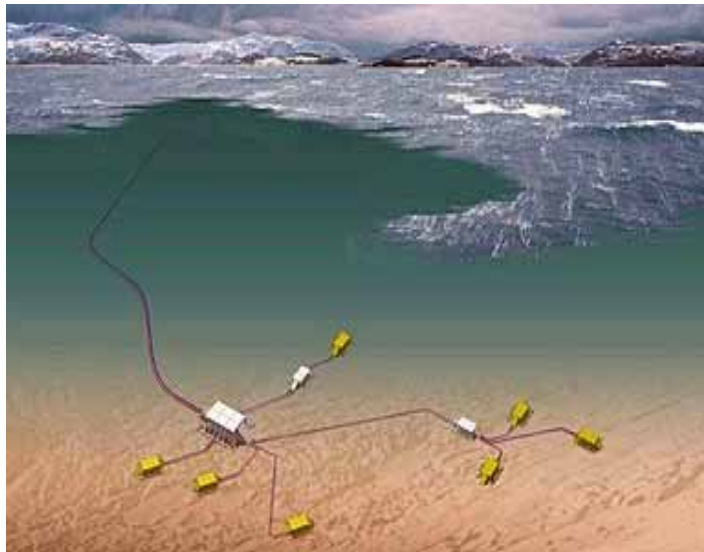
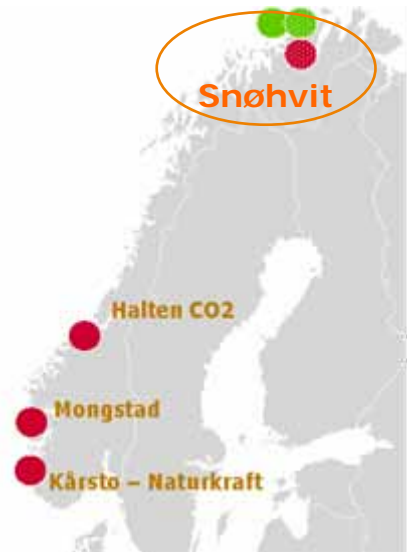
Carbon Dioxide Storage:
The In Salah Gas Project
Central Algeria

- BP, Statoil and Sonatrach
- start in 2004
- CO₂-injection of 1 mill. tons per year



Snøhvit LNG – the next milestone

- Barents Sea
- Piped CO₂ separated from natural gas in onshore LNG plant
- Storing 700.000 tons CO₂ annually from 2007
- Injecting in sandstone below natural gas reservoir



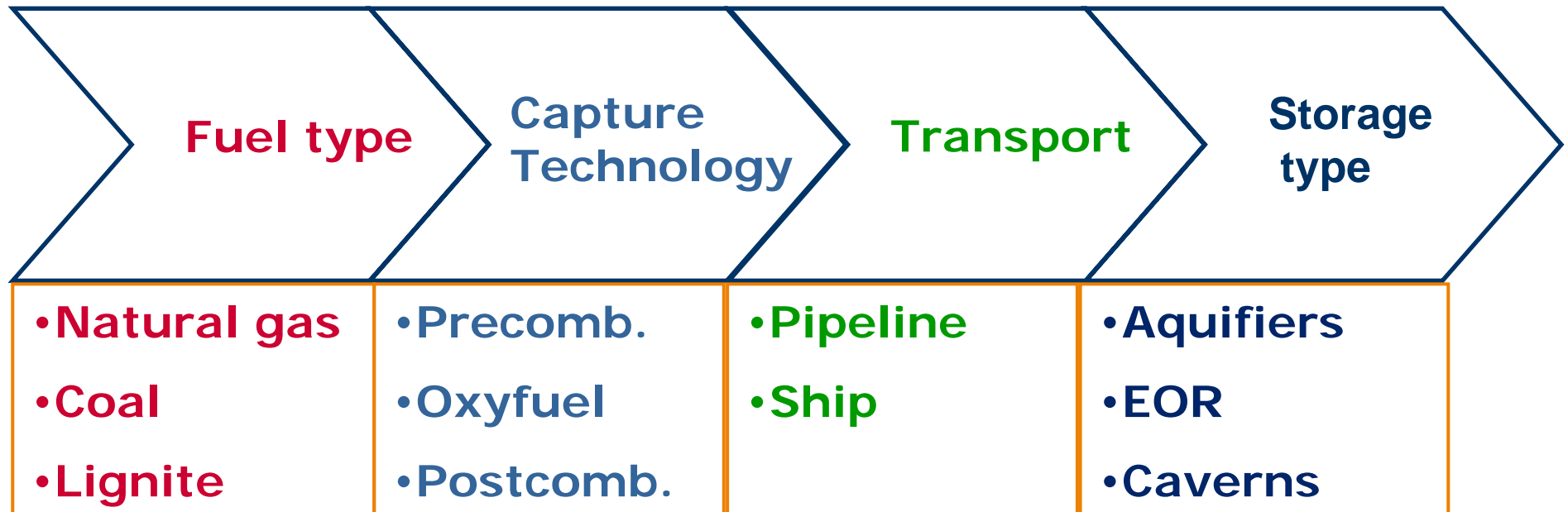
Step 2

Cleaning up our products – from 2014

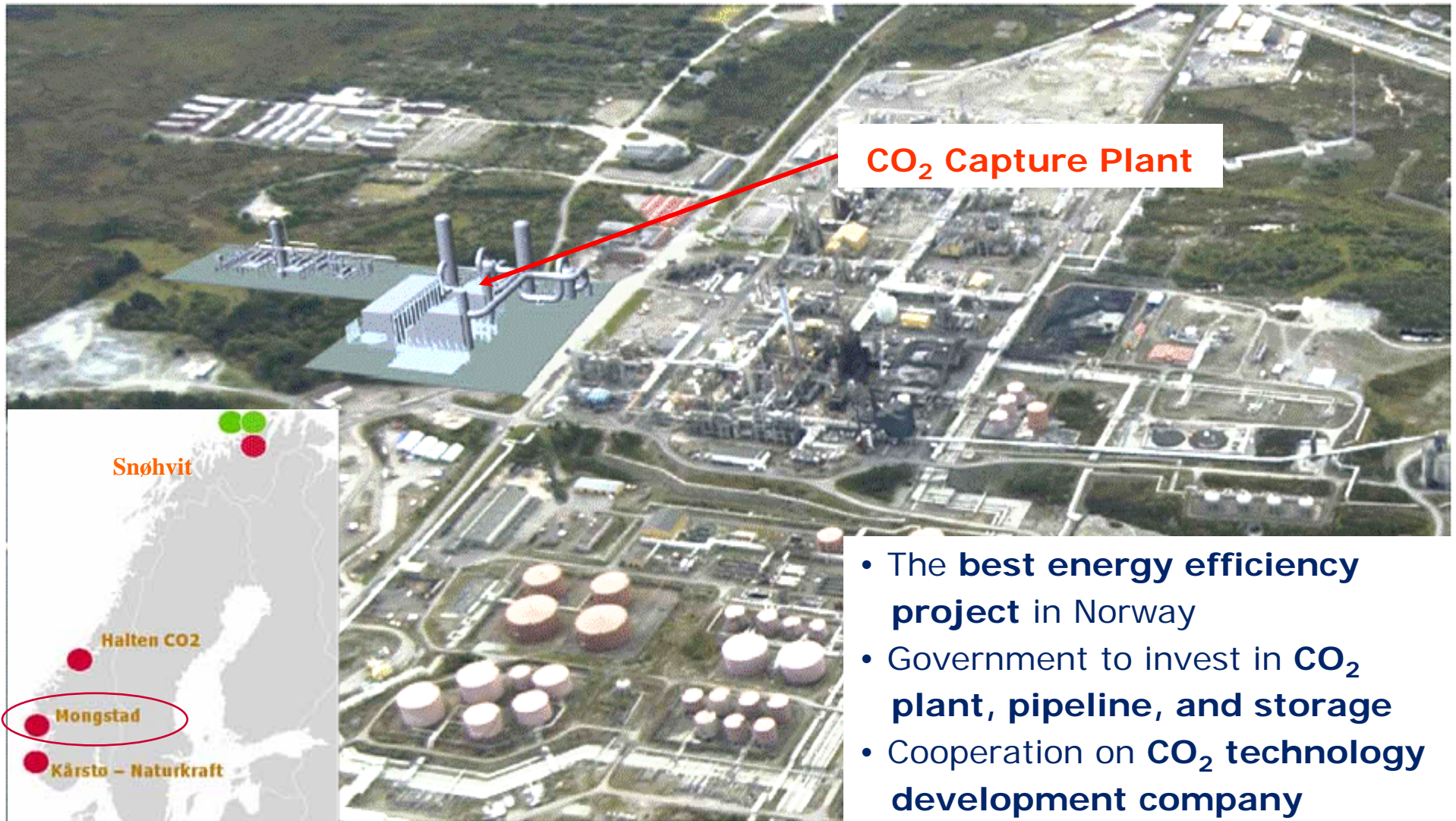
CO₂ from electricity
generation

How it can be done?...

...We need to build entire value chains



The next step: Mongstad CHP* with CO₂ plant

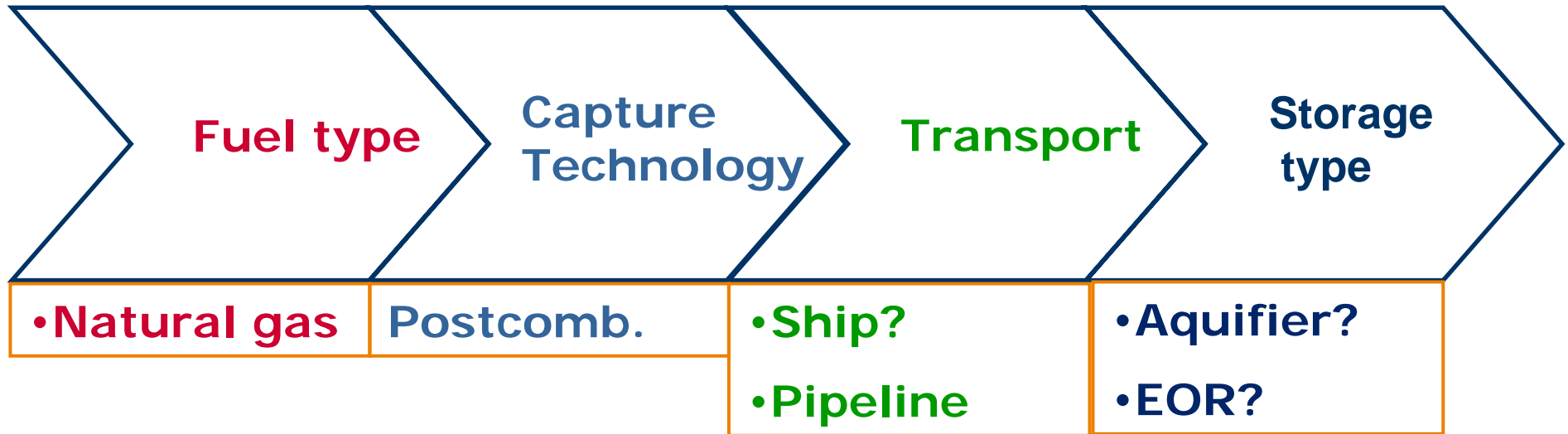


CO₂ Capture Plant

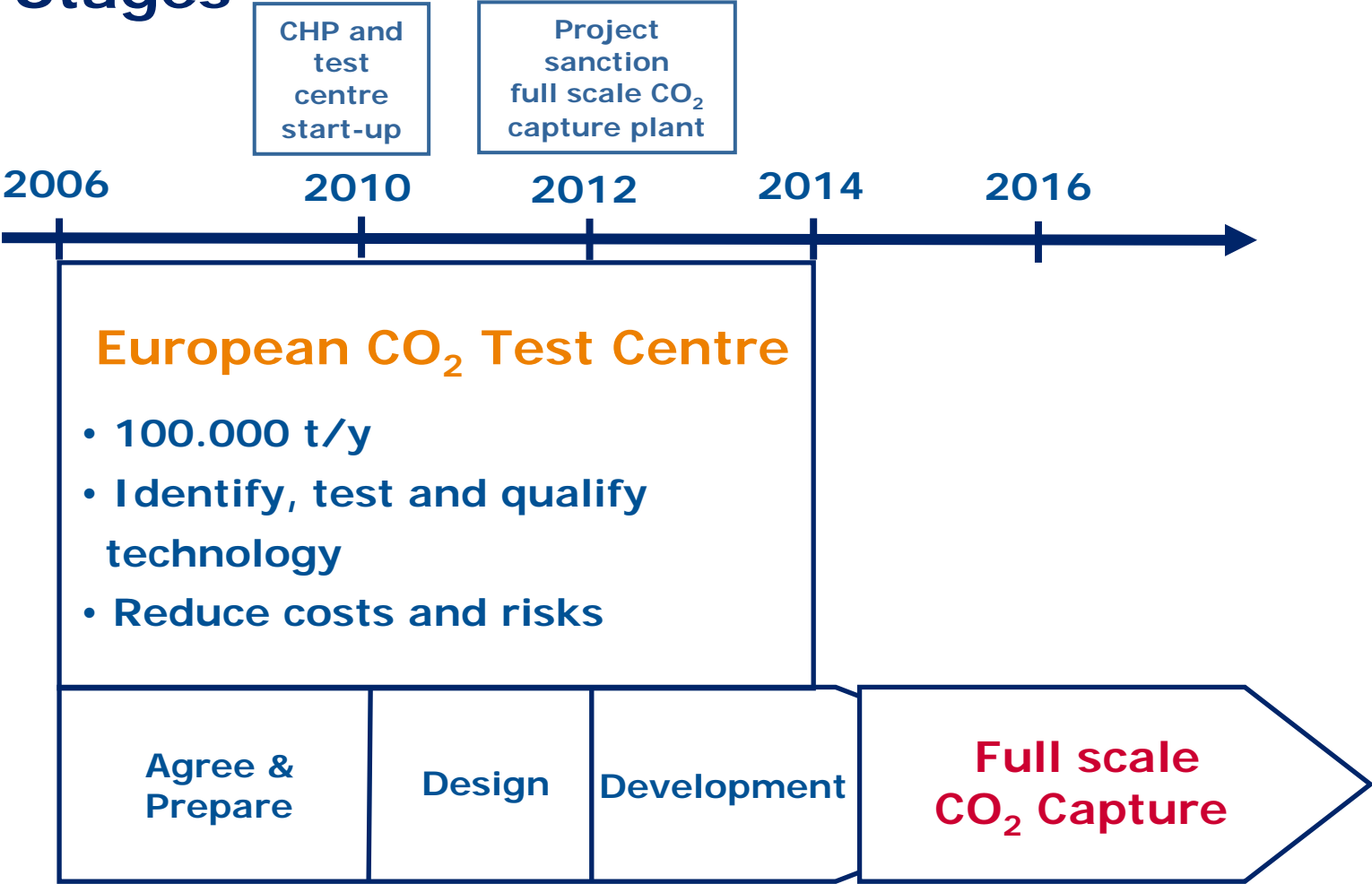
- The **best energy efficiency project** in Norway
- Government to invest in **CO₂ plant, pipeline, and storage**
- Cooperation on **CO₂ technology development company**

* CHP – Combined Heat and Power

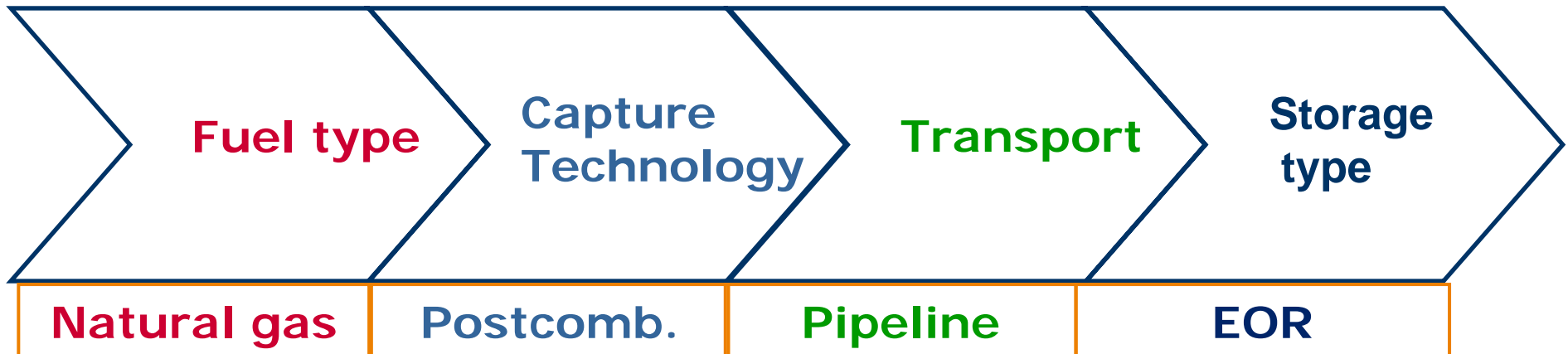
The Mongstad CO₂ value chain:



Statoil-Government Agreement: Towards full scale CO₂ Management at Mongstad in Two Stages



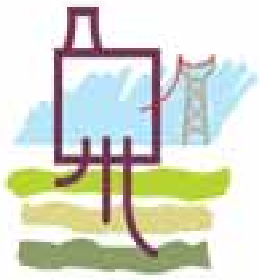
The Halten CO₂ value chain:



What next?

The United States has FutureGen -

- **Recent milestone:**
Review of all **4 remaining candidate sites** in Draft Environmental Impact Statement by the DOE
 - **Next step: Public hearings** at each site
 - **Final site selection** in fall
- **what will Europe do?**



European Technology Platform (ETP) on Zero Emission Fossil Fuel Power Plants (ZEP):

*"To enable European fossil fuel
power plants to have **zero CO₂**
emissions by 2020"*



ZEP:

- Develop and deploy new competitive options for zero emission power within the next 15 years
- **10-12 full scale commercial plants that will be in place and operational by 2015**

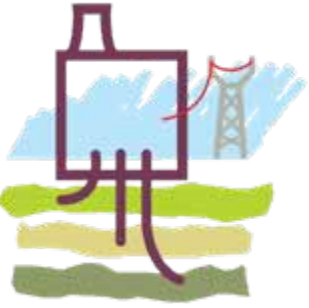


EU Council:

“ establish a mechanism to stimulate the construction and operation by 2015 of up to 12 demonstration plants of sustainable fossil fuel technologies...”

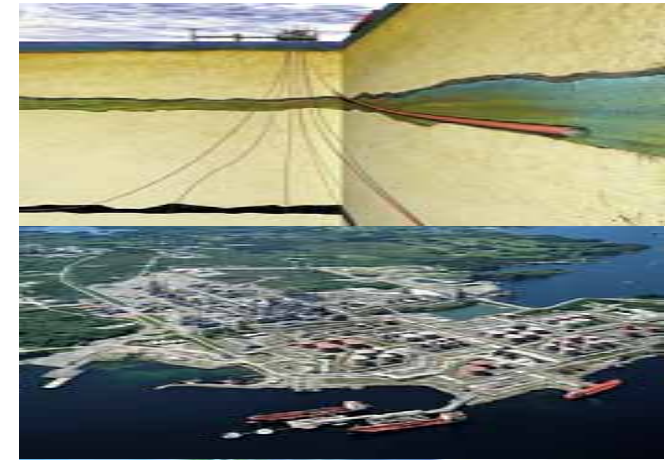


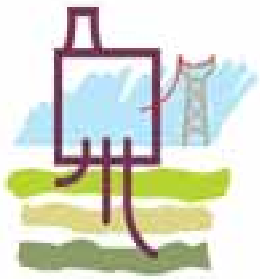
ZEP Flagship Programme



ZEP Flagship Programme – 10-12 demonstration projects by 2015

- **Technological upscaling**
- Improve **cost-effectiveness and availability** of capture technology
- Assess **storage potential**
- Build **CO₂ value chains**
- **Establish partnerships**
- Full-scale **commercial deployment** post 2020





CCS Projects on the drawing board:

approx. 16 -18 CCS Projects in Europe

France: 2

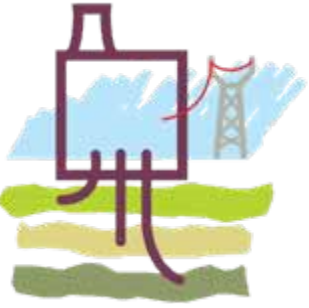
Germany: 3

Italy: 1

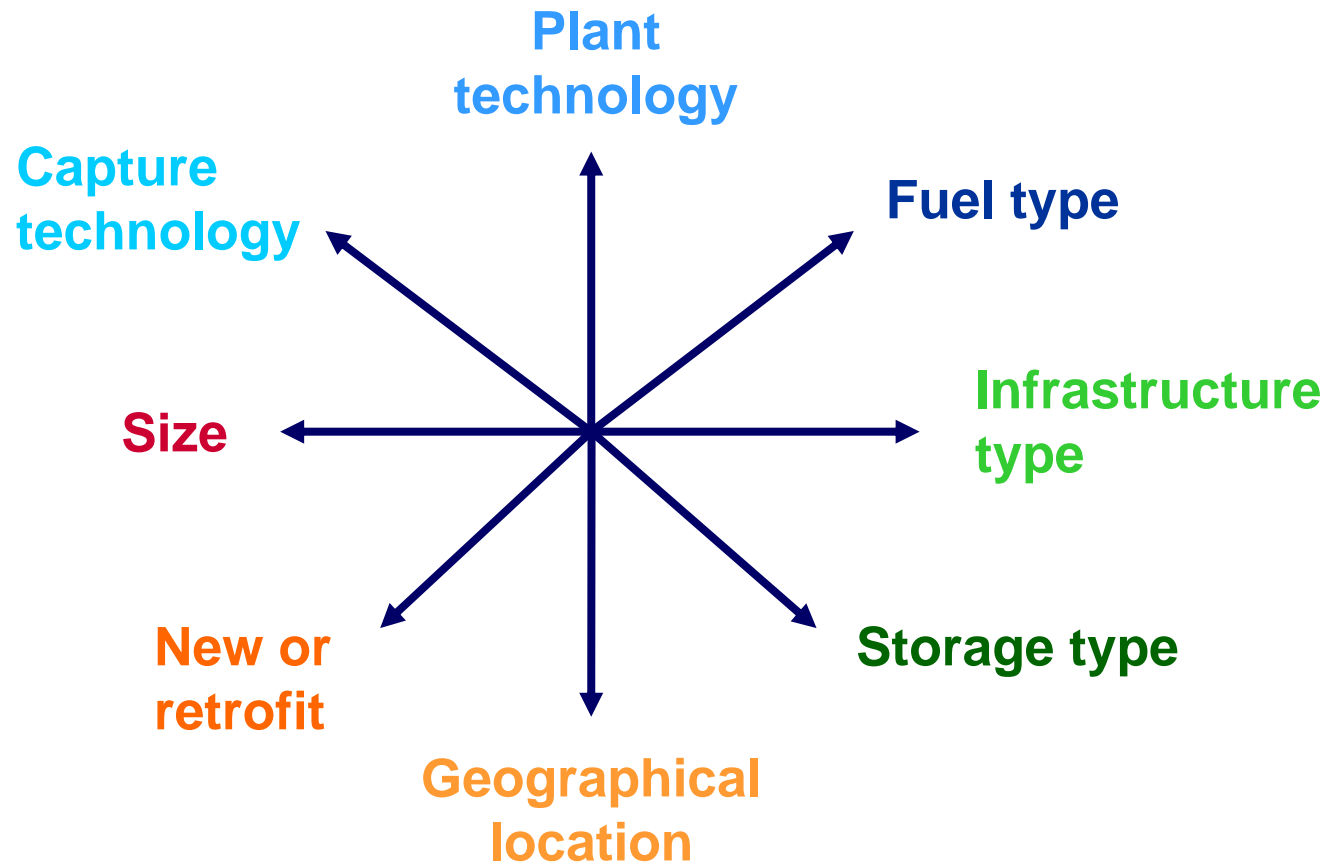
Netherlands: 1

Norway: 4

UK: ~7

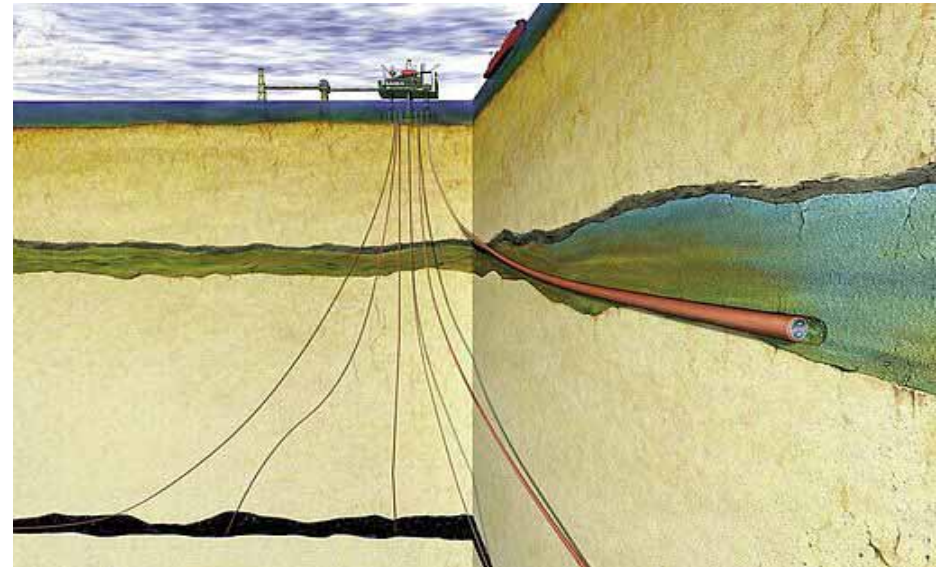


ZEP Flagship Programme – Criteria to be considered...



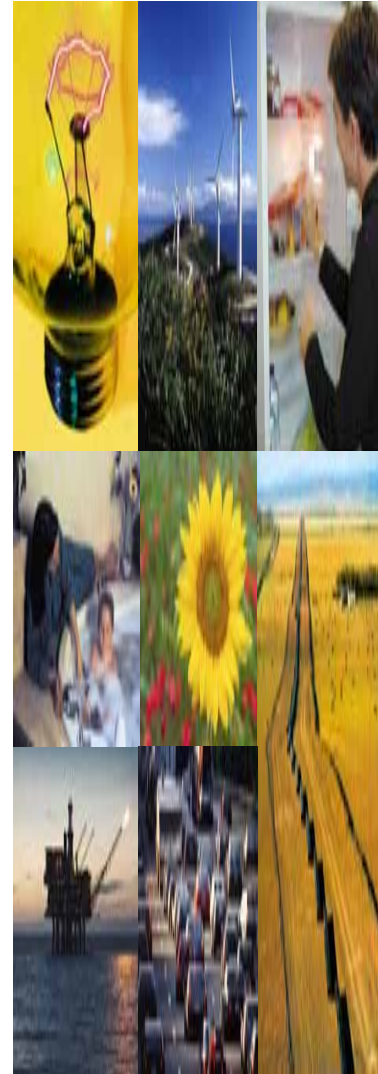
Handling CO₂ is a new and strong driver

- in **energy policy** making
- in the choice of **source of energy**
- in **technology** development



The Low-carbon Economy – the key challenges ahead

- **The drivers:** Is it political fashion or genuine willingness to change?
- **Nuclear:** Source of conflict, but also part of the solution?
- **New fields of competition:** How do you compensate for negative environmental effects?
- **Renewables:** How much subsidies?
- **Technology:** Where to find the research money?
- **Biofuels:** A paradigm shift in agriculture? How sustainable is it?
- **Carrot and stick:** How much can the markets solve?
- **The citizen:** How fast and how radically can we change our behaviour?



IT'S GLOBAL WARMING Stupid

