

Hvordan kan Petroleums-klyngen med sin kompetanse og ressurser være en del av løsningen på klimautfordringene?

Offshore Strategikonferansen 2010

Torstein Haarberg, Dr.Ing.
Konserndirektør
SINTEF Materialer og Kjemi

Innhold

■ Scope

- Sustainable energy
- Klima / CO₂
- Energisikkerhet

■ Perspektiv

- Kompetanse, ressurser og kreativitet i petroleumssektoren for å kunne adressere de store spørsmålene.

Hva er utfordringene?



- **EUs Strategic Energy Technology Plan (SET Plan):**
 - 20/20/20 i 2020:
 - 20 % renewables, 20 % energy efficiency, 20 % reduced GHG
 - 80 % reduced GHG emissions in 2050!

- **European Industrial Initiatives** innen 6 teknologiområder blir satt opp:
 - Wind, Solar, CCS, Bio-energy, Nuclear, Grids

- SET plan. **HVORFOR?**

Hvorfor SET plan?

Why does Europe need to move to a "low-carbon economy"?

http://ec.europa.eu/energy/technology/set_plan/set_plan_en.htm

- **To fight against climate change: fossil fuels are the chief culprits in the production of greenhouse gases**
 - ...By increased energy efficiency, renewable energy, nuclear power and Carbon Capture & Storage.

- **To ensure our energy security**
 - ...Primary energy supply in EU is 80% dependent on fossil fuels, mostly imported from outside the EU. Supplies from fossil fuels are becoming scarcer, more expensive and less secure. On the contrary, the majority low-carbon energy sources, like wind, solar or energy efficiency are locally produced and far less dependent from abroad.

- **To create growth and jobs**
 - ...Put Europe at the forefront of the fast-growing economic sector of clean and efficient technologies. They will create many new jobs.

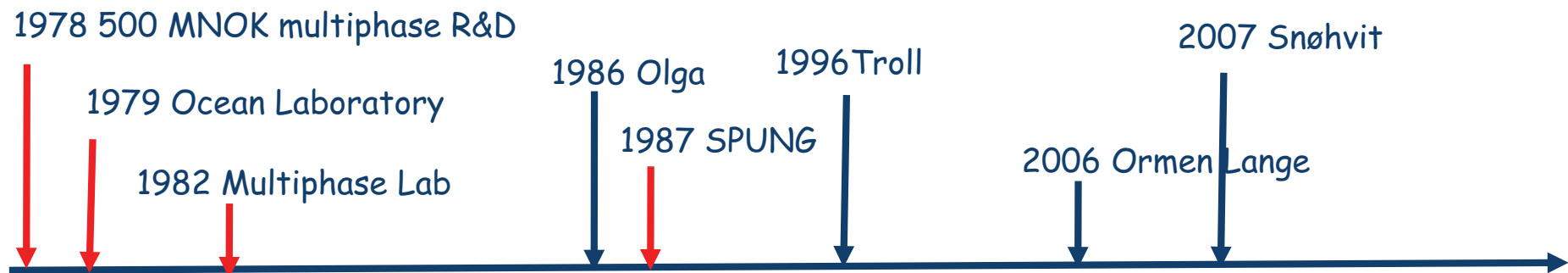
Low carbon society

Trussel eller mulighet for petroleumssektoren?

The oil and gas adventure:

We chose to invest in knowledge.

- Energy production (3000 TWh/year).
- Value creation 7000 BNOK



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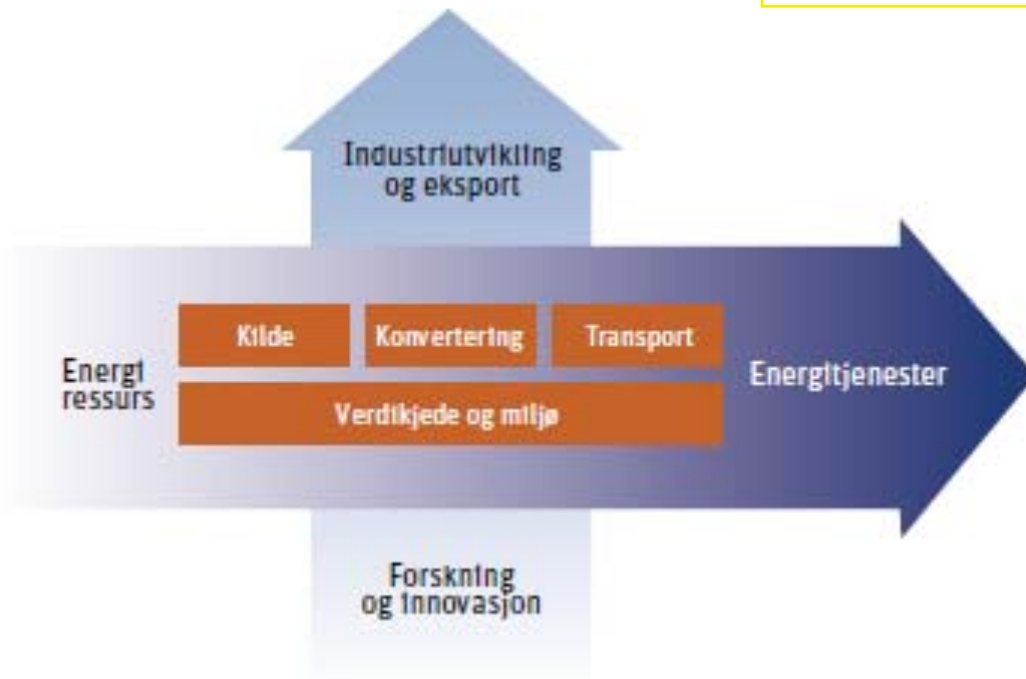
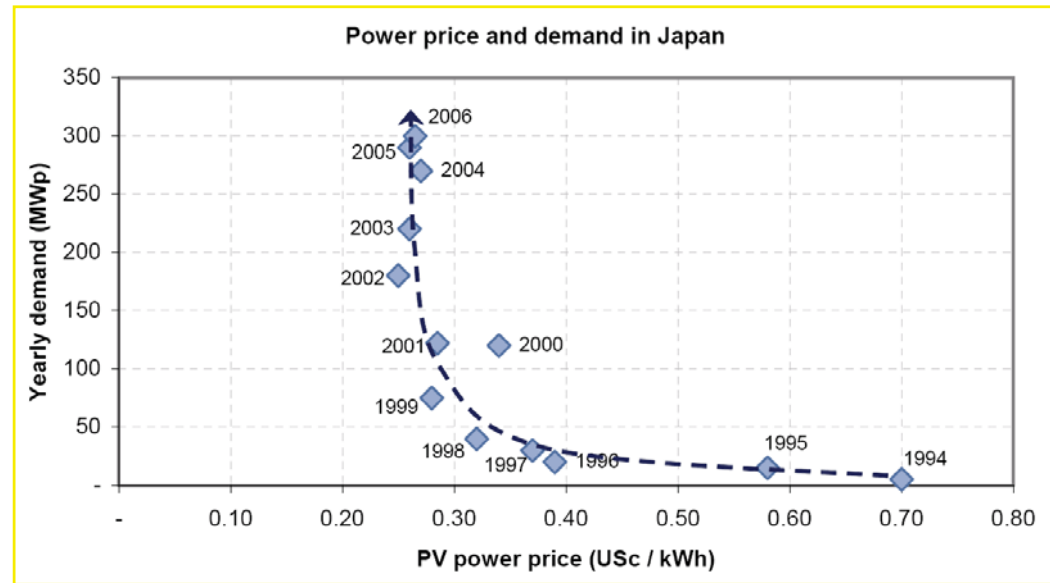
Sustainable energy: The new industrial adventure

“In no area will innovation be more important than in the development of new technologies to produce, use, and save energy.”

from President Obama's address to the National Academy of Sciences' Annual Meeting, April 27, 2009



Two dimensions



Silicon based solar energy and offshore wind energy from Norway - WHY?

Follow the timeline:

Natural resource



Industrial exploitation



New innovation

Waterfalls

Metallurgical industry

Solar industry



Oil and gas reserves

Oil and gas industry

Offshore wind adventure



Offshore vind, CCS

- Andre ting?

Oil refinery vs. Biorefinery

Oil refinery



Biorefinery



Products

- Fuel
- Heat & Power
- Materials & Chemicals



SET Plans prioriterte områder

- Wind
- Solar
- CCS
- Grids
- Bioenergy
- Nuclear
- Energy Efficiency

SET Plans prioriterte områder

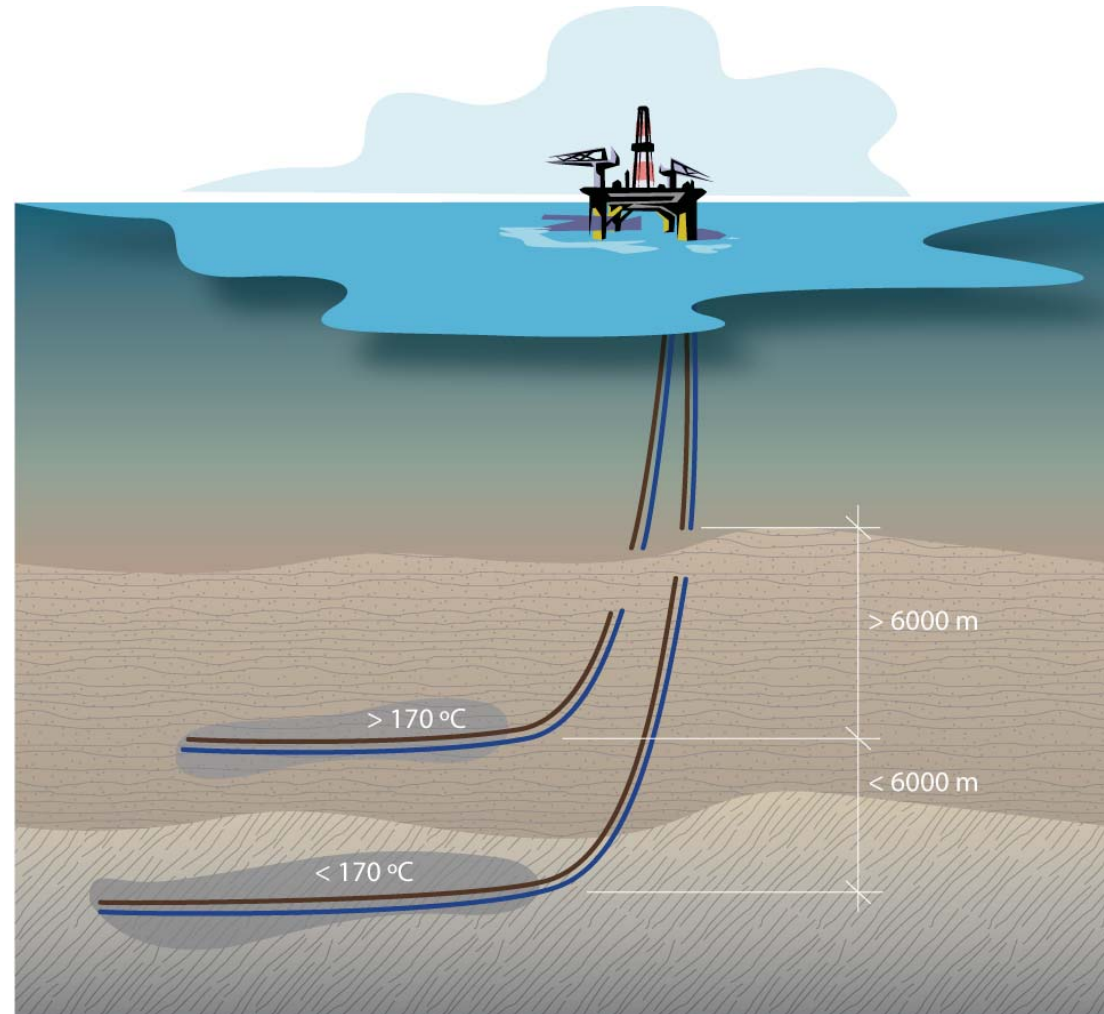
- Wind
- Solar
- CCS
- Grids
- Bioenergy
- Nuclear
- Energy Efficiency

Petroleumssektoren!

Flere muligheter for petroleumssektoren?

Deep geothermal in the oil industry

- Deep oil fields at high temperatures and pressures
- Requires new and cost effective drilling and operation technologies
- Opportunities to deep geothermal energy / electricity from extraction/injection of water or CO_2



Bakgrunn: Dyp geotermisk energi

- Dypere Geotermisk energi (bore dyp over 300 m) kommer fra radioaktiv spalting og varmekonveksjon fra jordens indre.
- Dekker 0.5 % av verdens energibehov i dag. Kan teoretisk dekke 100% i all fremtid.
- Store energimengder kan hentes effektivt ved superkritisk vann (over 374 °C). Krever normalt bore dyp til 10-15.000 m.
- Dagens bore, styre og loggeteknikk innen olje/gass industrien går til 150 - 200 °C (ca. 5-6000 m bore dyp).
- Ny teknologi vil gi utvidet marked for norsk oljeindustri både mot dyp/varm oljeutvinning og dyp geotermisk energi.

Technological challenges to deep geothermal drilling

- Drilling bits for hot/hard rock
- New drilling technology (water jet etc.)
- Materials for corrosion environments at high temperatures and pressures
- Mud systems for high temperatures
- Connections and lubrication for high temperatures
- Mono casing
- Electronics for high temperatures and pressures
- Robots for high temperature and pressures
- Well heads, drilling procedures and safety systems for high temperatures and pressures

Til slutt

- En stor omveltning i den internasjonale økonomien
 - Fra bruk av ikke-fornybare til bruk av fornybare ressurser
 - På lang sikt har vi ikke noe valg
- Aktørene i Petroleumssektoren har store muligheter til å ta del, og gjør det til dels allerede:
 - CCS
 - Offshore vind
 - Fra oljeraffineri til bioraffineri
 - Dyp geotermisk energi
 - ...
 - **Resources are limited - creativity is unlimited!**
- Takk for oppmerksomheten