WELCOME TO THE TGTC-4

Dr. Mona J. Mølnvik
Research director Gas technology
SINTEF Energy Research
Trondheim, Norway 5 December 2016

Scandinavia's largest independent research organization

NOK 3,2 billion
Revenues

NOK 500 million
International sales

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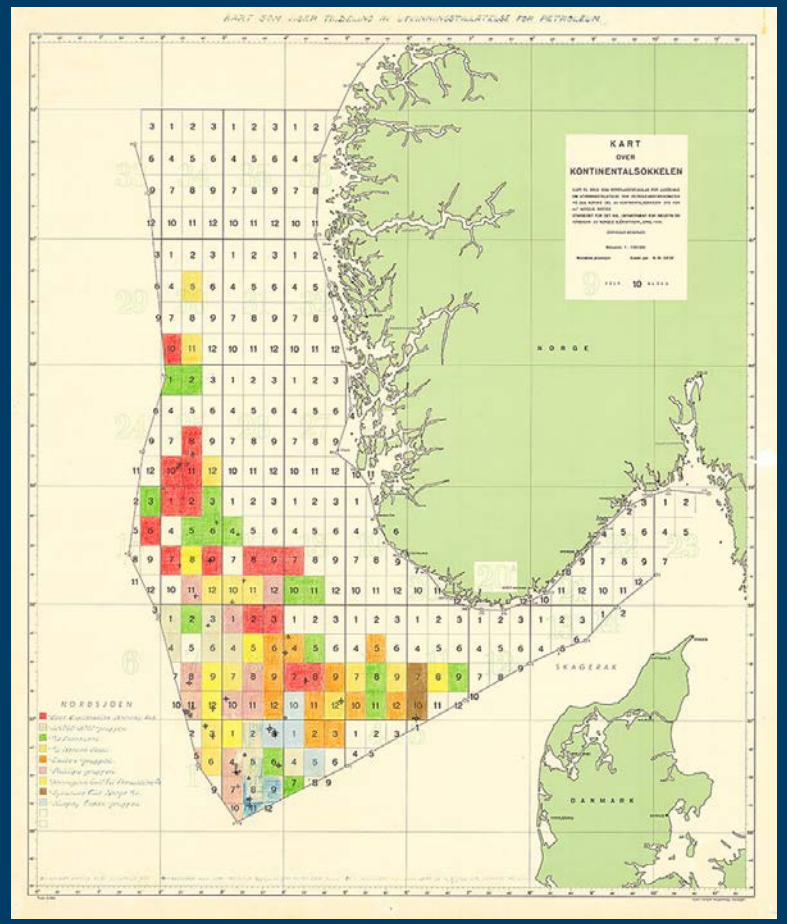
Partnership with NTNU

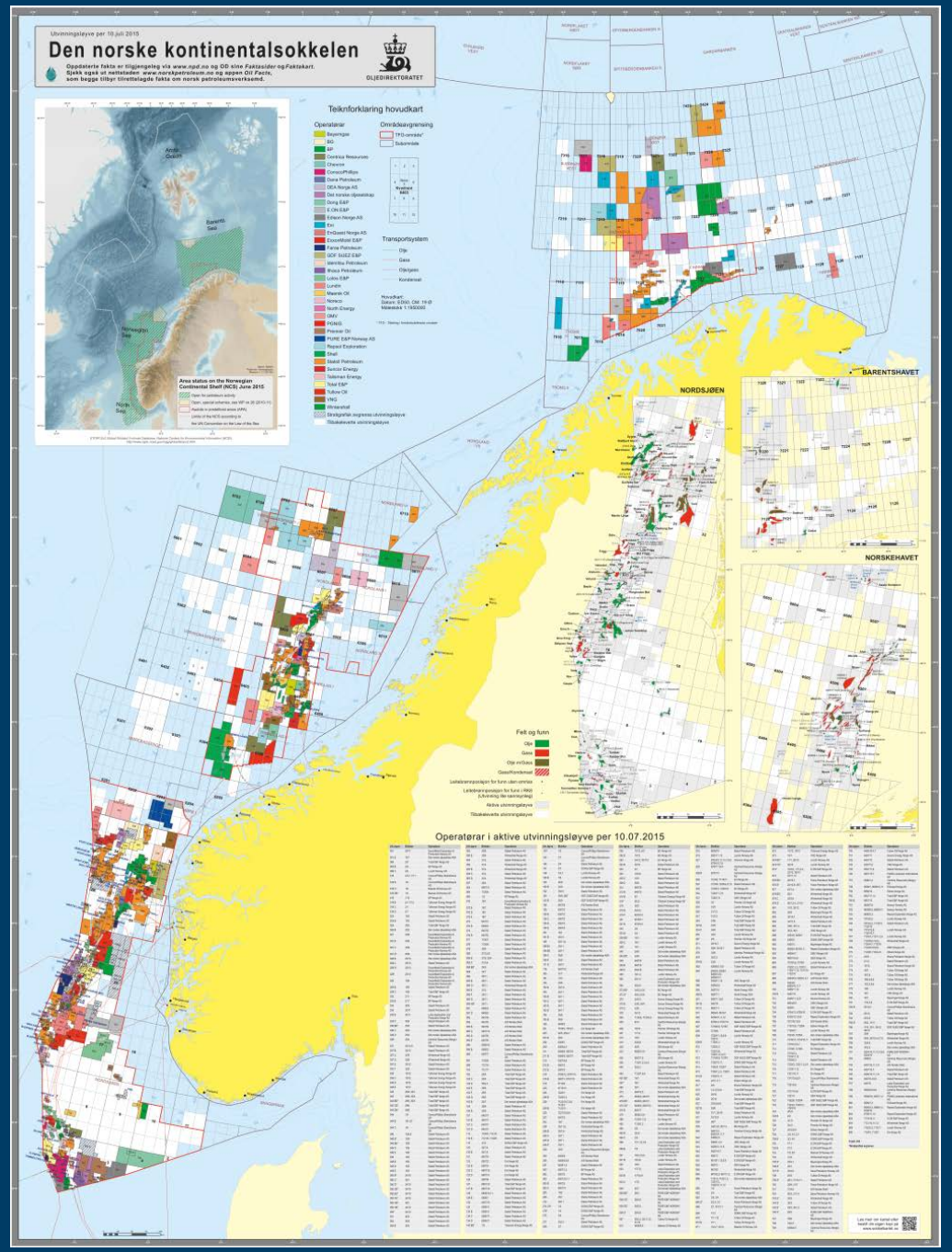
- Strategic and operational cooperation since 1950
- Joint use of laboratories and equipment
- Cooperation covers research projects, research centers and teaching

The Norwegian continental shelf 50 years ago

1965



2015



Becoming a gas nation

Discoveries of natural gas e.g. at Haltenbanken and Tromsøflaket

1973 1981 1984 1987 **SPUNG** 1993 2002 2007

Hammerfest LNG plant at Melkøya

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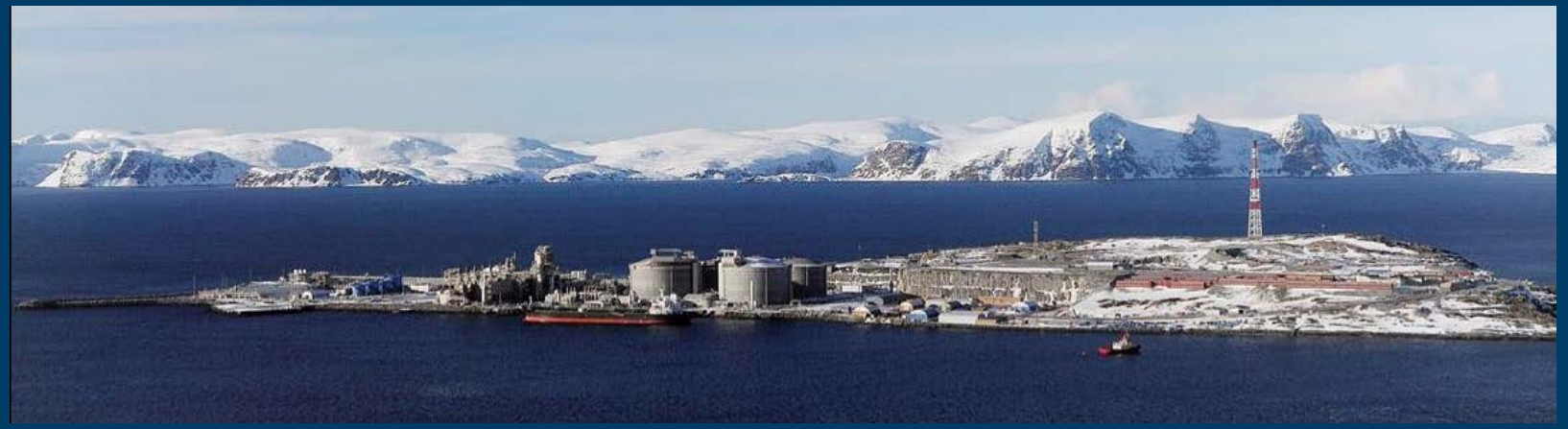

Harald Pettersen, Statoil ASA

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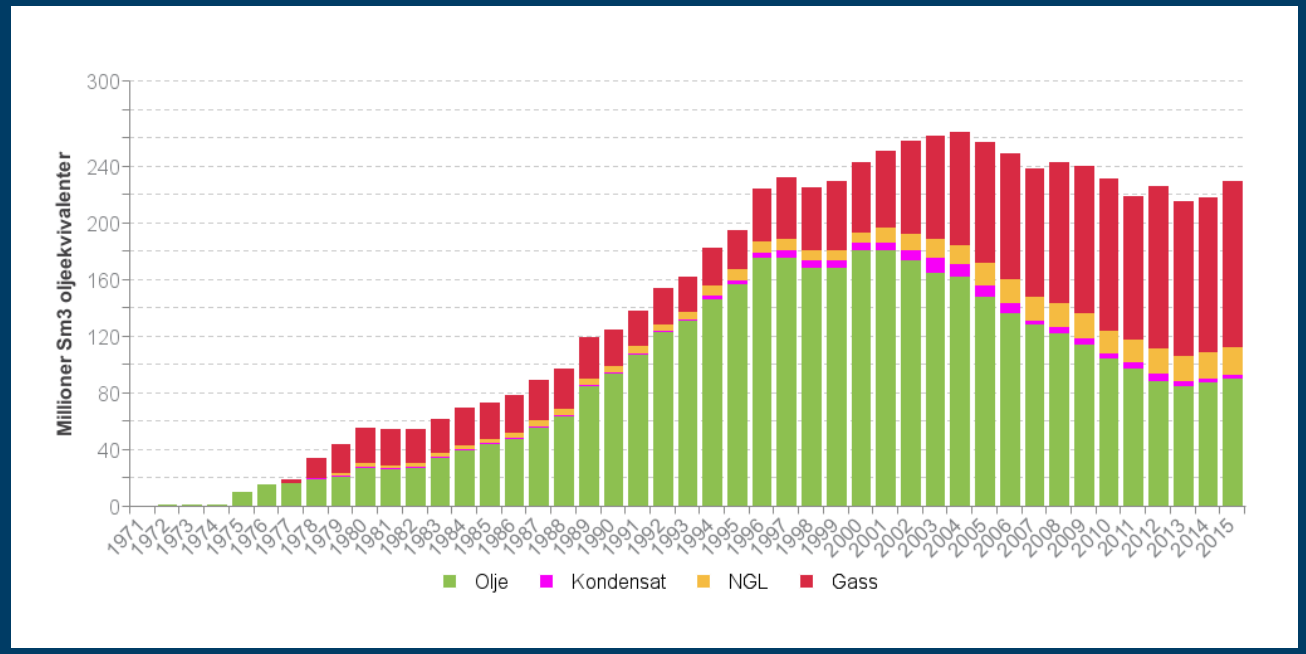

39 years

Norway exported 2,7 mrd sm^3 o.e natural gas (Norpipe) in 1977

114 mrd sm^3 o.e in 2015

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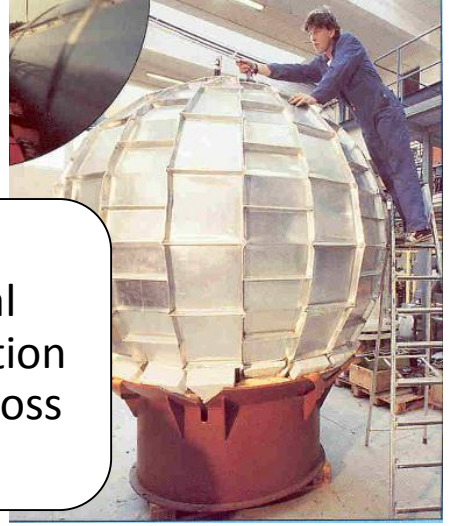
SINTEF/NTNU - Achievements

90ties: Innovation project, Mini LNG, Naturgass

80ties: fundament for the today MFC LNG process, SPUNG

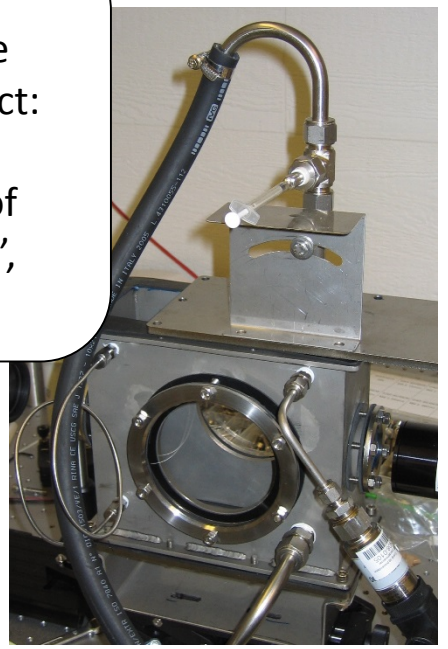


70ties: fundamental studies insulation LNG vessels Moss Rosenberg

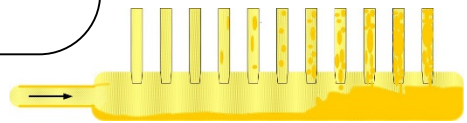
2003-2006: Innovation project, "Next Generation LNG Heat Exchangers"

Olje og gass

2005-2009: Competence building project: "Enabling production of Remote Gas", Petromaks



2009-2014: Competence building project: "Low- emission LNG systems", Petromaks



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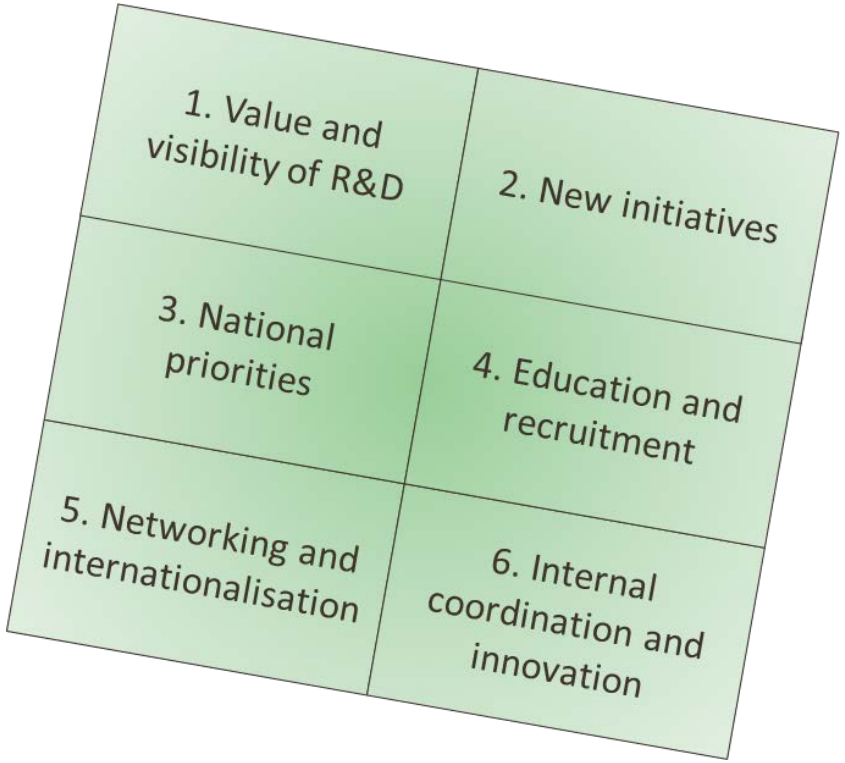
Gas Technology Centre NTNU- SINTEF 2014-2017 Priorities

GTS works through six axes:

1. Increase the visibility of gas technology R&D at NTNU/SINTEF
2. Promote new R&D initiatives
3. Influence Norwegian national priorities
4. Ensure top quality education and recruitment of students and researchers
5. Active in networking and internationalization
6. Promote internal coordination and synergism in gas technology R&D at NTNU/SINTEF



NTNU SINTEF Statoil

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A global outlook- where are we heading?

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Challenges faced by Norwegian exporters

- Maintain economic viability
  - Expensive production
  - Low current prices
- Maintain flexible production and transport
- Reduce greenhouse gas emissions
- Enable production from new fields

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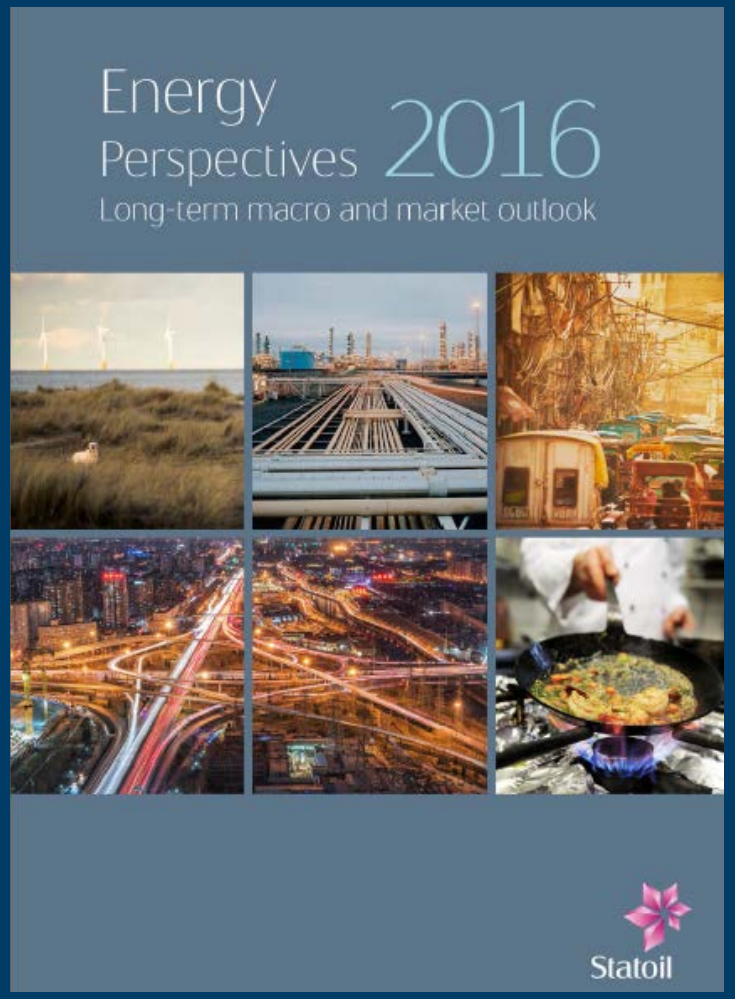
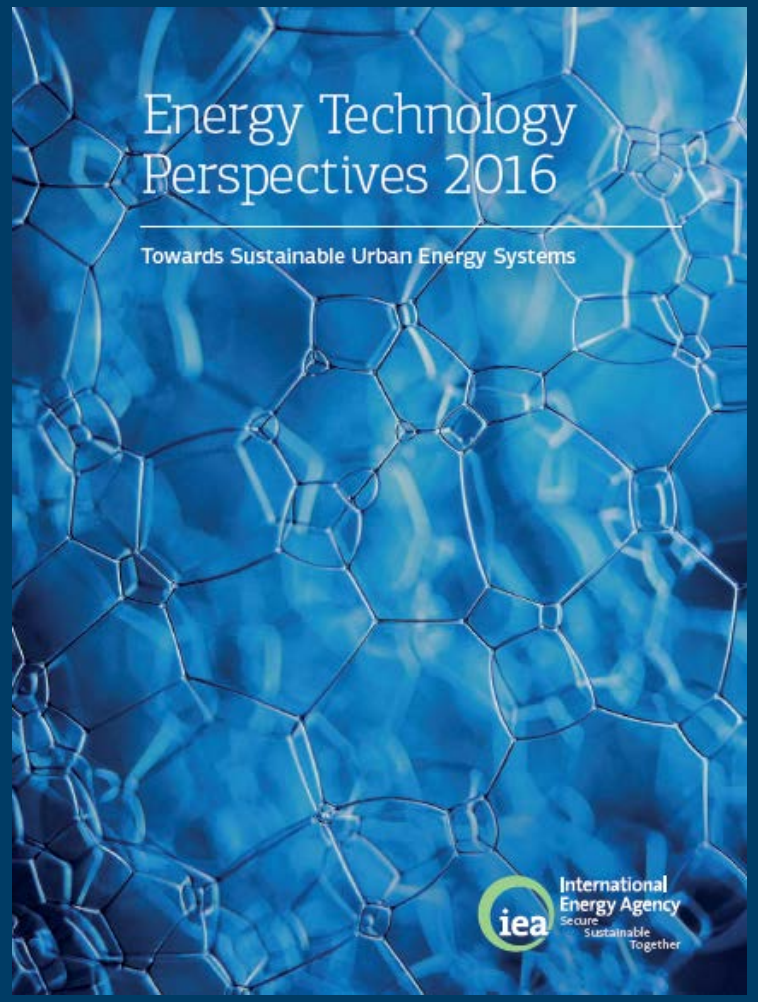

Energy
Perspectives 2016
Long-term macro and market outlook
Statoil


Energy Technology
Perspectives 2016
Towards Sustainable Urban Energy Systems
iea
International
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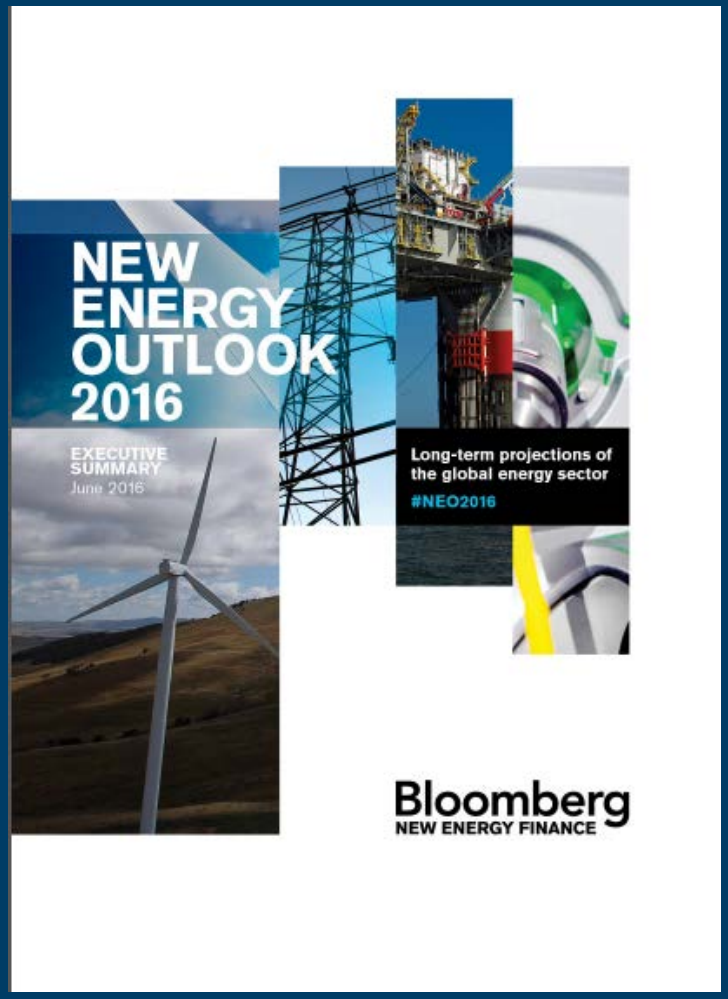
Secure
Sustainable
Together


NEW
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OUTLOOK
2016
EXECUTIVE
SUMMARY
June 2016
Long-term projections of
the global energy sector
#NEO2016
Bloomberg
NEW ENERGY FINANCE

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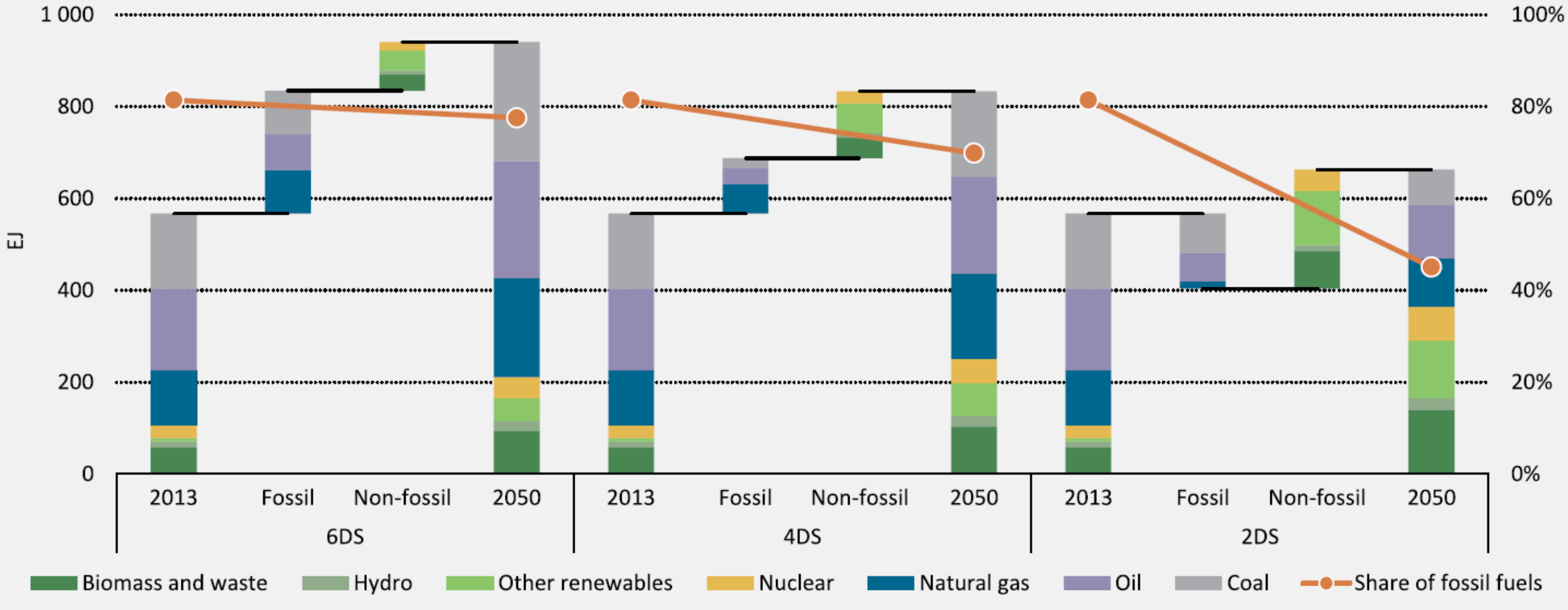
Figure 1.1 Global primary energy use in the three *ETP* scenarios, 2013-50



Key point *The primary fuel mix in the 2DS is more balanced across different sources.*

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Source: IEA Energy Technology Perspectives 2016

AN ACCELERATING IMPERATIVE

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

- Kyoto – 8 years from signing to coming into force
- Paris < 1 year!

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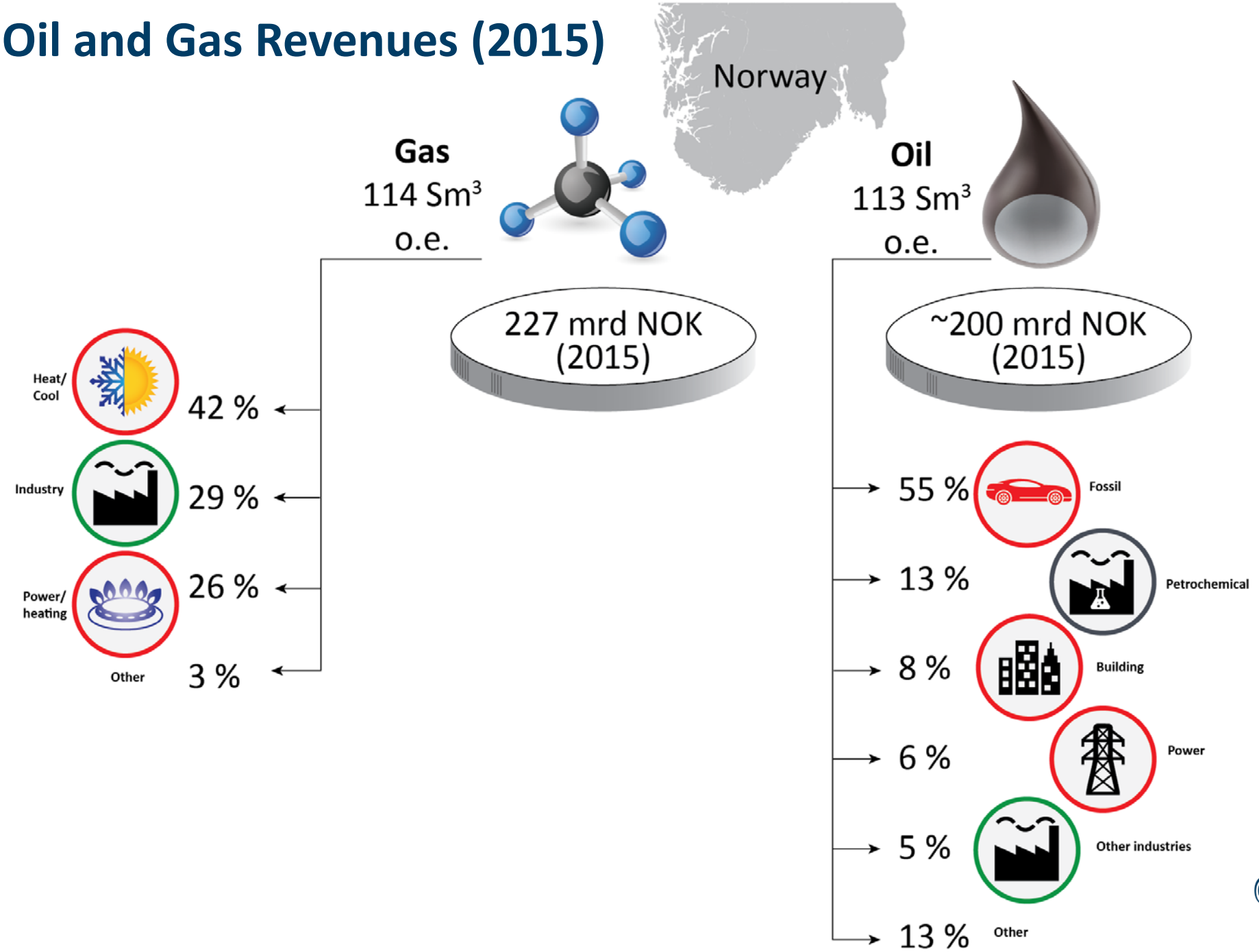
Norwegian Oil and Gas Revenues (2015)



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Documents
What's new
Ministries
You are here: Government.no • What's new • Development of a full-scale CCS project
Development of a full-scale CCS project
Press release | Published: 2016-10-06
| No: 050/16
The Government proposes to grant 360 million Norwegian kroner for the continued planning of a full-scale CCS (Carbon Capture and Storage) demonstration facility in Norway. The Government also proposes continued

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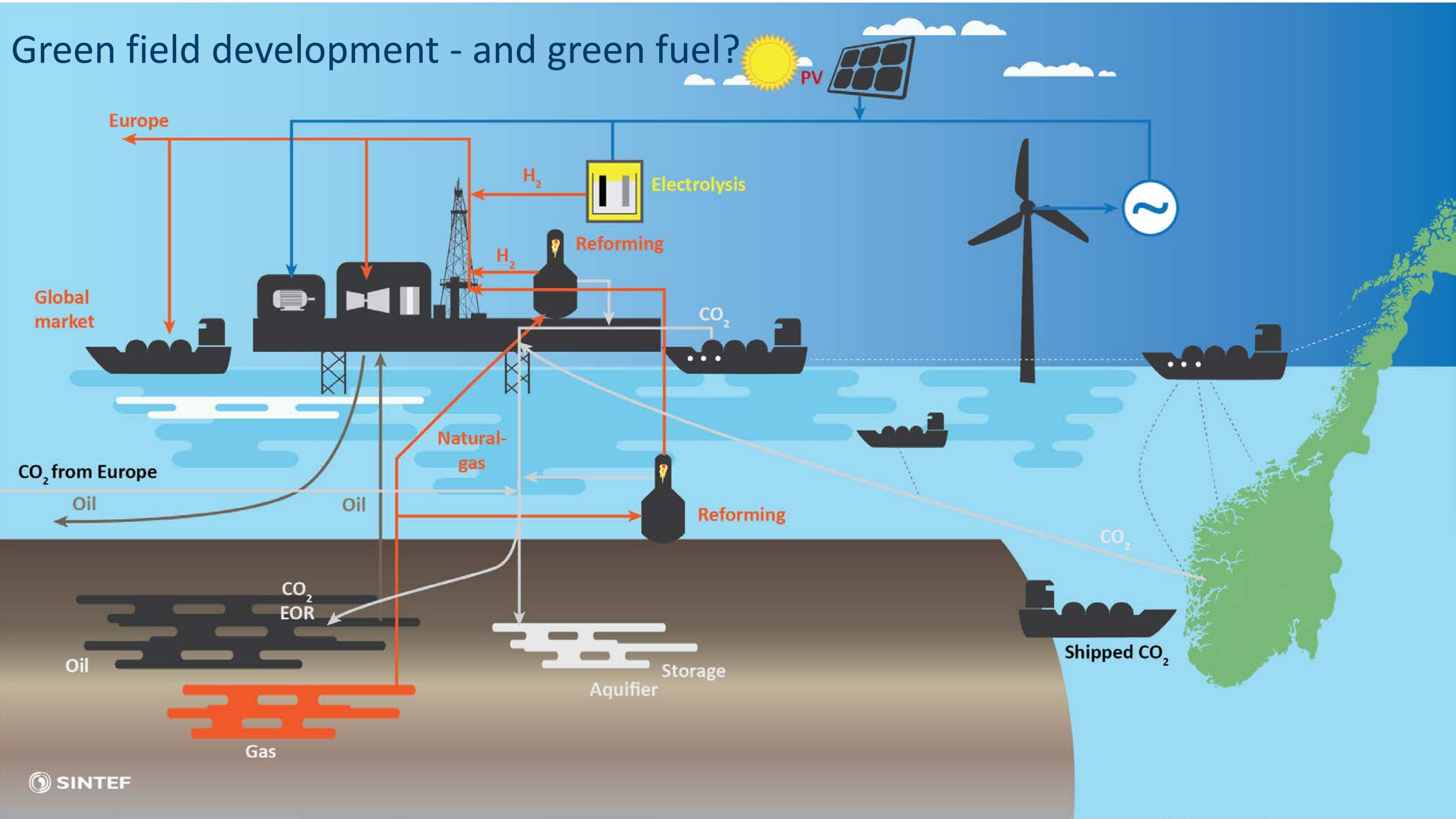
Green field development - and green fuel?



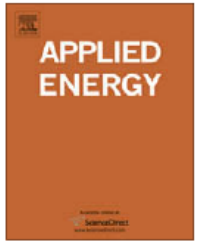
Scenarios for remote gas production (2009) – time to do it again?

Applied Energy 86 (2009) 2681–2689

Contents lists available at ScienceDirect

Applied Energy

journal homepage: www.elsevier.com/locate/apenergy



Scenarios for remote gas production

Grethe Tangen, Mona J. Mølnvik *

SINTEF Energy Research, Sem Sælands vei 11, N-7465 Trondheim, Norway

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Summary

- Natural gas can be integral in the energy and climate revolution – many opportunities
- Several opportunities to grab which are not yet taken- it's time to put bets on some developments which will happen
- Linear thinking and extrapolation don't work any more
- Innovations are needed in the field – core technologies to pave the road for continued and long term value creation from natural gas
- Scenario building can be a helpful tool

Good luck with the conference and the fruitful discussion to be hosted at the TGTC-4 event!

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Teknologi for et bedre samfunn