

NCCS

NORWEGIAN CCS RESEARCH CENTRE
Industry-driven innovation for fast-track CCS deployment

Examples of collaborations with the United States



**US - NORWAY
COLLABORATION ON CCS/CCUS**

**2017 Bilateral Meeting
August 28-29, 2017**



Centres for Environment-friendly Energy Research (FME)

Objective:

To establish time-limited research centres which conduct concentrated, focused and long-term research of high international calibre in order to solve specific challenges in the field.



Centre for intelligent electricity distribution – CINELDI

Centre for an Energy Efficient and Competitive Industry for the Future - HighEFF



Mobility Zero Emission Energy Systems MoZEES



Norwegian CCS Research Centre NCCS



Research Centre for Sustainable Solar Cell Technology

Norwegian Research Centre for Hydropower Technology



Norwegian Centre for Sustainable Bio-based Fuels and Energy NorSusBio

The Research Centre on Zero Energy Neighbourhoods in Smart Cities – ZEN Centre

Deployment Cases - NCCS approach

We want NCCS to:

- Have strong industry ownership
- Overcome critical barriers identified in demo and industry projects
- Align research across disciplines
- Provide targeted research in areas that contribute to large-scale CCS deployment

Deployment Case 1:
CCS for Norwegian industry



0,5 – 1,5 Mt/a



Deployment Case 2:
Storing Europe's CO₂ in the North Sea basin



> 100 Mt/a



NCCS

A world-leading partnership



users

vendor, in-kind

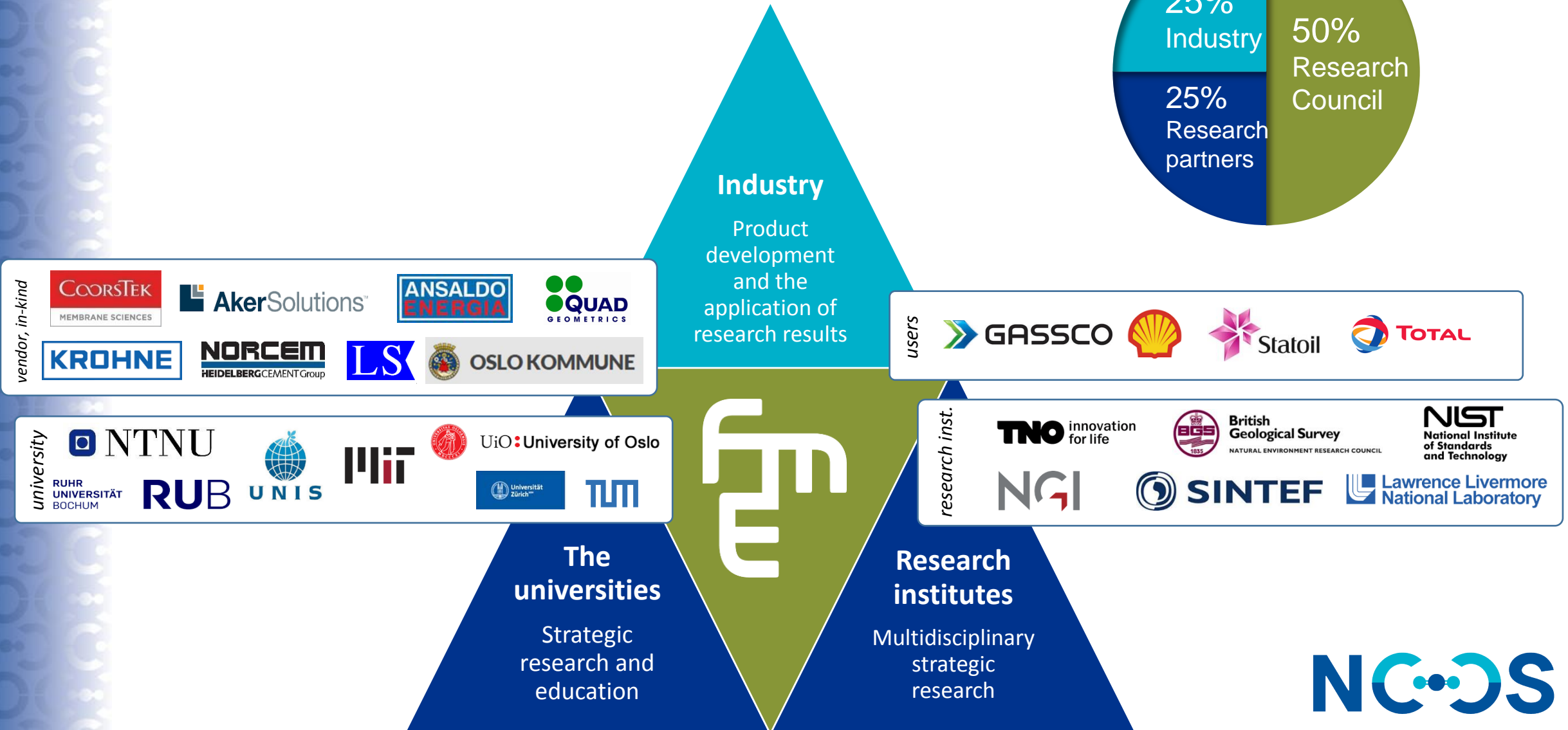
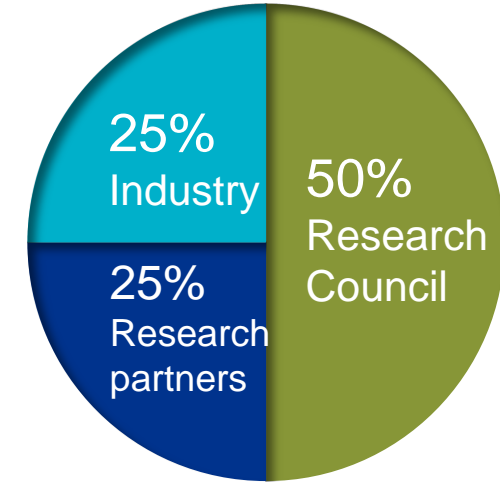
university

research inst.

associated



Close working relationships generate innovation



Research tasks

Deployment case 1: CCS for Norwegian Industry

1) CCS value chain and legal issues

- 2) Solvent - environmental issues
- 3) Low emission H₂ production
- 4) CO₂ capture by liquefaction
- 5) Gas turbines
- 6) CO₂ capture process integration

- 7) CO₂ transport
- 8) Fiscal metering and CO₂ thermodynamics

- 9) Structural derisking
- 10) Containment
- 11) Reservoir management and EOR
- 12) Monitoring technologies

Deployment case 2: Storing Europe's CO₂ in the North Sea basin



1) CCS value chain and legal issues

- 2) Solvent - environmental issues
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University of Pittsburgh

Identifying membrane properties required for a coal power plant



Identifying membrane properties for post-combustion capture from a coal power plant.

- Based on the module optimization and cost
- 1600 membrane properties combinations considered
- 6 cases looking at different scenarios and membrane costs
- Oral presentations at TCCS-8 and Pittsburgh Coal Conference 2015



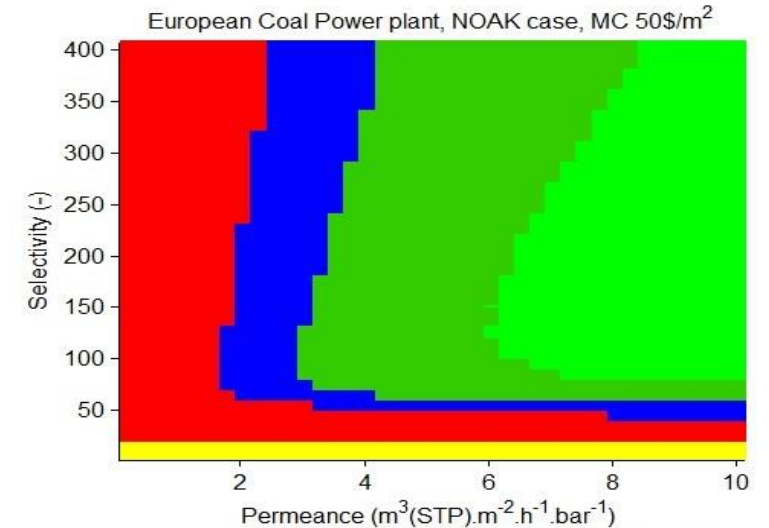
Simon Roussanaly (SINTEF Energy Research) – visiting researcher at Carnegie Mellon University Fall 2015

Joint paper Haibo Zhai and Edward Rubin

- Visit also promoted collaboration with CMU and the NETL.



CLIMIT support for international collaboration



- At least 10% more cost efficient than MEA
- Cost competitive with MEA
- Cost competitive with MEA considering a 10% margin
- Not cost competitive with MEA
- Not feasible

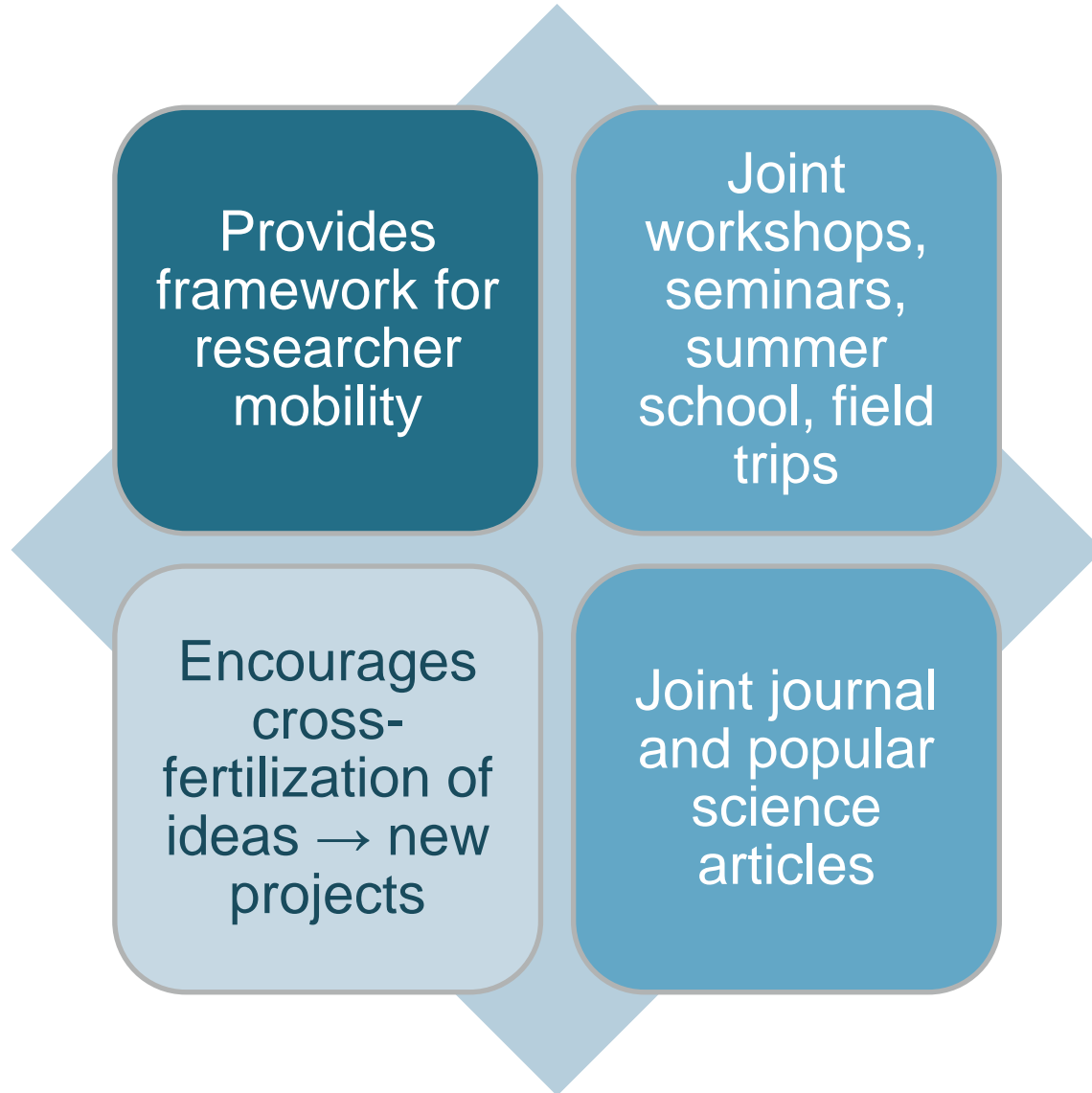


NCOS

Fast TraCCS – The Norway- United States Partnership and Outreach Programme to Fast-Track CCS



Proposal submitted to International Partnerships for Excellent Education and Research (INTPART), 24. May 2017



Overall objective: To strengthen a long-term international partnership between NCCS and two DOE-funded CCS research programs in the US:

- The Carbon Capture Simulation for Industry Impact (CCSI²)
- Center for Geologic Storage of CO₂ (GSCO₂).

Fast TraCCS – The Norway- United States Partnership and Outreach Programme to Fast-Track CCS



- Three-month researcher exchanges: 15
- Joint Workshops and Seminars: 10
- Field Trips: 3
- Summer Schools: 1-2

