



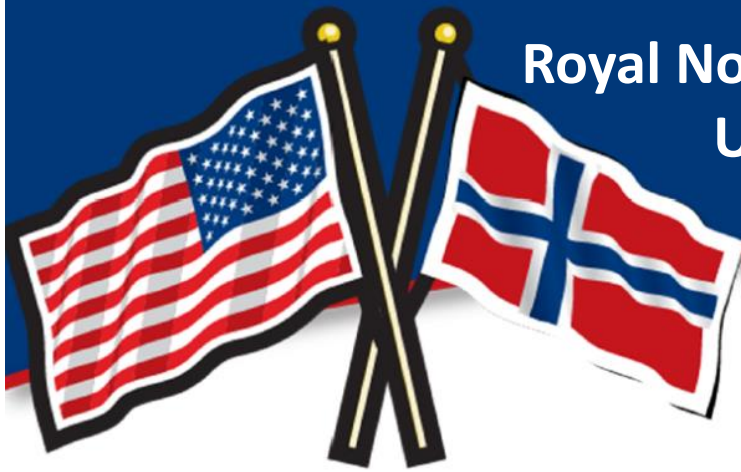
**Royal Norwegian Ministry of Petroleum and Energy
United States Department of Energy**

Update on CO₂ Capture Task

Task Leads: Norway – Bjorn-Erik Haugan; United States – John Litynski

**28 August 2017
Washington, DC USA**

Royal Norwegian Ministry of Petroleum and Energy United States Department of Energy



US capture co under Climit funding

- Air Products, membranes
- RTI at Norcem + Sintef, SDR and small scale Tiller
- IoN at Sintef SDR
- SES/Tel Tek: TEA
- WES/CMC +Sintef: low grade heat integration
- Fluor at Sintef SDR, PNNL funded

Exchange of interns 2016 and 2017: data for CCSI, alignment of TRL scaling

Large-Scale Testing at TCM completed

- IoN Engineering

LLNL work shop on Modular technologies Jan 2017 Co-sponsored by DoE-Gassnova

Candidates for NETL 2017 FoA: 5+ potential candidates



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2016 Update on Recent Activities

Meetings

- DOE/NETL Capture Meeting – August 2016 and 2017
- CLIMIT Transformational Workshop – Mar 2016
 - Lynn Brickett and Traci Rodosta (NETL)

International Test Center Network Meetings

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TCM and the «Research world»

continue to expand our cooperation with
research institutions and academia



Full scale

Demo TCM

Mobile test unit

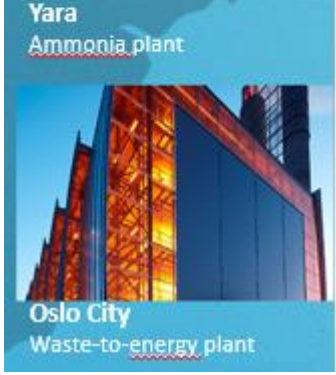
Full height pilot; Sintef NCCC

Lab pilot Sintef

Bench scale

Chemistry

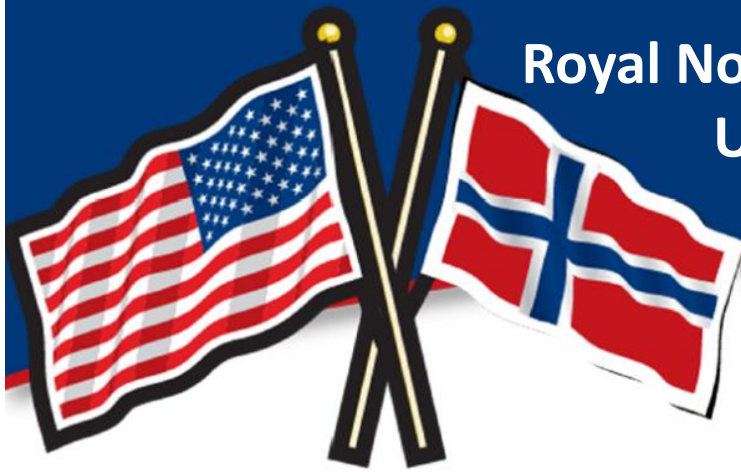
Solvent degradation Sintef



Modelling & simulation

Verification

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Progress on Large Scale Testing

- Ion Engineering and TCM
 - Testing Complete
- Fluor
 - Conducting solvent degradation testing at SINTEF
- Dialogue with other developers (2017)
 - Ten (10) US Based Developers
- Large Scale Testing
 - 2017 FOA Notice of Intent Released
 - Solvent testing and Engineering Scale of Membranes
- Carbon Capture Simulation Initiative (CCSI)





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Future Opportunities *Leveraging our Strengths*

Funding Opportunity Announcement

DOE - FEED Studies Solvents and Membranes

DOE – Fossil Proviso – Large Scale Pilots

DOE - Transformational Capture Technologies

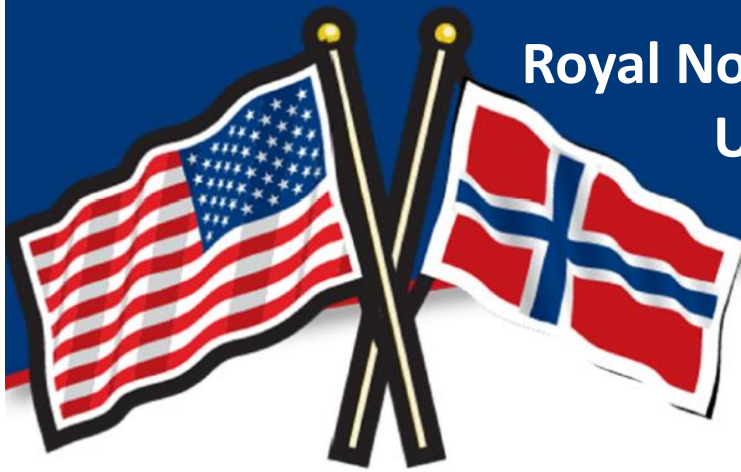
CLIMIT – Capture Technologies and Demos

Advanced computational tools (CCSI, others)

Industrial Sources and Capture – Lessons learned and applicability of Capture Tech

Modularization of Capture systems (Construction and/or systems)

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Future Opportunities *Leveraging our Strengths*

Test Centers – TCM and NCCC

- IPR and Liability
- Reporting Requirements
- Lessons learned in contracting between international agencies
- Flowdown provisions
- Cost share requirements and timing
- Capabilities of facilities

Other opportunities

- ACT CCS funding opportunity
- Assessment of modular CCS opportunities
- Norwegian CCS Research Center (bi-lateral activities)
- Carbon Utilization – LCA workshop in October, business case assessments