

Status of storage activities within the US-Norway bilateral agreement on CCUS

General

Issue: Organize workshops defined during storage and capture breakout sessions, to be held over the next 18 months until the next meeting.

Status:

Consider possible webinars autumn 2020/spring 2021

Storage

Issue: The exploration license for the Northern Lights well should be translated to English

Status:

Exploitation license EL001 has been translated and distributed to those that requested it from the US side. The English version will be posted on the web sites of the Norwegian Petroleum Directorate (NPD) and the US-Norway CCUS bilateral.

Issue: Information the Gassnova invitation to participate in a CO₂ plume dynamics modeling challenge should be translated to English and placed on the Gassnova web site.

Status:

Application deadline expired by the end of 2019.

Issue: Identifying learnings for emerging CCS hubs – de-risking

- *Bigger risk issues for offshore, e.g. slope stability*

Status:

Ongoing – can be part of next bilateral

Issue: Modeling Sleipner benchmark – workshops in 2020 and possible joint paper

Status:

Update and status meeting held in Bergen on 13th Feb 2020 – with US participations, including University of Texas/Gulf Coast Carbon Center, Southern States Energy Board, and DOE. Participants from Norway included Equinor, Sintef, Norsar, NGI, UiB, UiO, NORCE. Plans to hold a dedicated workshop in early 2021
Two more applications might come

Issue: Adding further to operator experience to well integrity atlas; more need to look at approaches to handle legacy well issues

Status:

The collaboration between NCCS (Sintef) and the Lawrence Livermore National Laboratory (LLNL) was strengthened by mutual work on a well integrity problem survey. A detailed

questionnaire was sent to all active CO₂ injection operations worldwide. A first round of answers was received and analyzed, giving us unique insight in which difficulties are most encountered, and where future research efforts are needed. This work will feed into the Well Integrity Atlas, a compilation of well integrity issues encountered at CO₂ storage operations, their severity, mitigation measures and their success. This will be available to all operators, such that learnings can be more readily distributed, but also naturally lead the research community in identifying and addressing remaining gaps.

Issue: Real-time machine-learning applications (pressure analysis) and new geophysical sensing /monitoring methods etc)

Status:

Cooperation in CLIMIT and/or ACT 2 projects (only US and Norwegian participants listed)

- ACTOM - ACT on Offshore Monitoring – (<http://www.act-ccs.eu/actom>) headed by University of Bergen and involving Los Alamos National Lab (LANL) from USA and NORCE and Octio AS from Norway. The primary objective of ACTOM is to develop internationally applicable capabilities for the design and execution of appropriate, rigorous and cost-effective monitoring of offshore carbon storage, aligning industrial, societal and regulative expectations with technological capabilities and limitations.
- DigiMon - Digital Monitoring of CO₂ storage projects – (<http://www.act-ccs.eu/digimon>) headed by NORCE and involving Lawrence Livermore National Lab (LLNL) from USA and NTNU, Octio AS, Equinor and Repsol Norge from Norway. The overall objective of the DigiMon project is to materially accelerate the implementation of CCS by developing and demonstrating an affordable, smart, flexible and societally embedded Digital Monitoring early-warning system, for monitoring any CO₂ storage reservoir and subsurface barrier system.
- SENSE - Assuring integrity of CO₂ storage sites through ground surface monitoring – (<http://www.act-ccs.eu/sense>) headed by NGI (Norwegian Geotechnical Institute) and involving LLNL and University of Texas from USA and University of Oslo, Equinor and Quad Geometrics from Norway. The primary objective is to demonstrate reliable, cost efficient CO₂ storage monitoring using ground surface deformation detection combined with geomechanical models to provide information on pressure distribution and hydraulic behavior of the storage sites.
- REX-CO₂ - Reusing existing wells for CO₂ storage operations – (<http://www.act-ccs.eu/rexco2>) headed by TNO (Netherlands Organisation for Applied Scientific Research) and involving LANL and Chevron from USA and Sintef and RESTONE AS from Norway. REX-CO₂ will increase the technical feasibility and economic competitiveness of high-potential depleted hydrocarbon fields earmarked for CO₂ storage.

Issue: Solving Gt-scale storage problems – focused on pressure development

- *Data handling challenge for major basin-scale projects and hubs*

Status:

- NORCE and the University of Texas, Bureau of Economic Geology, are co-operating on a new CLIMIT Demo project (soon to be submitted)
- Interested in contact with NETL labs (ACT 3 an opportunity?)

Issue: New ACT projects give good vehicle for further collaboration

Status:

- How to solve partnership agreements between US and EU/Norway?

Issue: Scaling up to handle the large data volumes

Status:

- No news

Issue (not in minutes): Microseismic

Norsar continues the close collaboration with Illinois State Geologic Survey (ISGS) within the CO2CAPII project (Climit project 618233). The project will continue until June 2021. Norsar tries to continue collaboration with ISGS and other institutes that extend the CO2CAPII and Decatur (including Quest) project, but they have not done any action there

Norsar also has a researcher project (lead is UiO, Alvar Braathen) together with Boise University and Colorado School of Mines on monitoring of an active CO₂ leak in Utah. This is just about to start up, but our field work will be delayed due to Corona.

Issue: Possible new topics for collaboration (mentioned by Norwegian parties)

Planning and operation of CO₂ storage in connection with conversion from hydrocarbon production to storage (challenges, types of wells, cost, time frames etc)

Research on fluid properties (with applications in capture, transport and storage) and fiscal metering are topics we would be interested in including in these meetings.

Issue: Transport (On the sideline of the core activities under the MoU):

Sintef has ongoing collaboration with National Institute of Standards and Technology (NIST), Boulder, through the CLIMIT R&D project ImpreCCS. Baker Hughes, new US based vendor, has become partner of Task 8 of ImpreCCS.