3rd International Workshop on Offshore Geologic CO₂ Storage

May 3 - 4, 2018
Research Council of Norway
Oslo, Norway
DAY 1    THURSDAY MAY 3, 2017

Common Session Capture and Storage workshops

Welcome, Objectives of meeting, agendas, logistics (safety announcements)

08:30  Welcome: Torgeir Knutsen, Deputy Director General, Ministry of Petroleum and Energy, Norway
08:40  Safety moment, Research Council of Norway

Session 1: Value Chains for Offshore: Chair - Lars Ingolf Eide

08:45  Emerging hydrogen value chains for Norway - Steinar Eikaas, Statoil
09:05  Emerging hydrogen value chains for Japan - KHI/Ryozo Tanaka, RITE
09:25  USA 45 Q and how it should accelerate potential CCUS projects – Brian Hill, SSEB
09:45  Discussion
09:55  COFFE BREAK and POSTERS

3rd International Workshop on Offshore Geologic CO₂ Storage

10:20  Welcome and Scene-setting: How to ‘Learn from our learnings’ Tim Dixon IEAGHG and Katherine Romanak, BEG

Session 2: Infrastructure: Chair - Paulo Negrais Seabra

10:35  New subsea systems for CO₂ storage/EOR– making it cheaper and more efficient - Pål Nokleby, Aker Solutions
10:55  Technical considerations in re-use of pipelines platforms - Steve Murphy, ACORN / Pale Blue Dot
11:15  New technology for handling legacy well integrity issues - Malin Torsæter, SINTEF
11:25  Discussion

Session 3: Monitoring offshore CO₂ storage/EOR - Chair: Katherine Romanak

11:45  Handling microseismic background – Volker Oye, NORSAR, Norway
12:05 STEMM-CCS project updates on seafloor/environmental monitoring – Maribel I. García-Ibáñez, University of Bergen
12:35 UK AUV update on seafloor/environmental monitoring – Graham Brown, Sonardyne
12:55 LUNCH and POSTERS

13:55 Update on leakage detection – Keisuke Uchimoto, RITE
14:15 Update on shallow seismic (p-cable) at Tomakomai – Tip Meckel, BEG
14:35 Geophysical monitoring offshore – Philip Ringrose, Statoil
14:55 Discussion

Session 4: Offshore CO₂ storage resource assessment - Chair: Mike Carpenter
15:05 Storage resource assessment for offshore CO₂-EOR in Norway - Eva Halland, Norway Petroleum Directorate
15:25 Update on US projects – Darin Damiani, US DOE
15:45 Approaches to evaluations, example from Gulf of Mexico - Tip Meckel, BEG
16:05 COFFE BREAK and POSTERS
16:35 Updates on databases for CO₂ Storage - informal discussion
16:45 South Africa depleted fields and platform re-use - Noel Kamrajh, SANEDI on behalf of PetroSA
17:05 Discussion

Session 5: Project updates: Chair - Phillip Ringrose
17:25 Update on Norwegian project under development - Mike Carpenter, Gassnova
17:45 Pre-salt development and CO₂ management - Paulo Negrais Seabra, formerly of Petrobras
18:05 Tomakomai - Jiro Tanaka, Japan CCS
18:25 Discussion
18:35 Adjourn day 1

19:00 Reception at Research Council of Norway, drinks and tapas to be served, co-hosts Statoil and Research Council of Norway.

DAY 2   FRIDAY MAY 4, 2018
08:30 Welcome - Åse Slagtern, Lars Ingolf Eide

Session 6: Standards and Regulatory Frameworks - Chair: Tim Dixon
08:55 Tomakomai lessons learned in offshore CO₂ storage regulations - Ryozo Tanaka, RITE
09:15  ISO storage standard (ISO 27914), and certification framework - Jorg Aarnes, DNV

09:35  Discussion on London Protocol application to Norway and EOR - Ingvid Ombudstvedt, GCCCSI and Tim Dixon, IEAGHG, Chaired by Ryozo Tanaka, RITE

09:55  Discussion

10:05  COFFEE BREAK and POSTERS

Session 7: Interactive Session - Brainstorming towards an international collaborative project - facilitated by Katherine Romanak, Tim Dixon

10:25  Discussion on technical criteria for international collaborative project

10:50  Comments on public funding and new funding mechanisms from Hans Olav Ibrekk, Norwegian MFA, and Egil Meisingset, Norwegian MPE

11:00  Discussion

11:30  Workshop Conclusions and Recommendations - Lars Ingolf Eide, Tim Dixon, Katherine Romanak, Tip Meckel

12:00  LUNCH (Box lunches distributed)

12:30  BUS DEPARTURE FOR KLEMETSRUD WASTE-TO-ENERGY PLANT

15:00  BUS RETURNS FROM KLEMETSRUD TO OSLO CENTRAL STATION

POSTERS

<table>
<thead>
<tr>
<th>Title</th>
<th>Presenter/author</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Integration of laboratory rock physics and field scale monitoring for offshore CO₂ storage</td>
<td>Joonsang Park, Magnus Soldal, Guillaume Sauvin and Lars Grande</td>
<td>Norwegian Geotechnical Institute (NGI), Oslo, Norway</td>
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<tr>
<td>Simplified transport models for statistical representation of seep footprints, with application to machine learning and inverse modelling.</td>
<td>Anna Oleynik¹, Kristian Gundersen¹, Guttorm Alendal¹, Hans J. Skaug¹, Helge Avlesen³, Jarle Berntsen¹, Jeremy Blackford², Nello Blaser¹, Pierre Cazenave².</td>
<td>¹Department of Mathematics, University of Bergen, Bergen, Norway, ²Plymouth Marine Laboratory, Plymouth, UK., ³Uni Research, Bergen, Norway</td>
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<tr>
<td>Acoustic and chemical technologies for environmental monitoring of geological carbon storage</td>
<td>Ann Blomberg, Espen Eek, Ivar-Kristian Waarum, Joonsang Park</td>
<td>Norwegian Geotechnical Institute (NGI), Oslo, Norway</td>
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<td>Subsea compression</td>
<td>Zabia Elamin, Pål Helge Nokleby</td>
<td>Aker Solutions, Bærum, Norway</td>
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<td>CO₂ Data Share - establishing and sharing reference datasets from CO₂ storage projects</td>
<td>Odd Andersen</td>
<td>SINTEF Digital, Mathematics and Cybernetics Oslo, Norway</td>
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<td>Fast tracking infrastructure development for future offshore</td>
<td>Brian W. Hill</td>
<td>Southern States Energy Board, USA</td>
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<td><strong>CO₂ storage</strong></td>
<td>Lydia Cumming on behalf of CarbonSAFE Cascadia Phase 1 Project Team</td>
<td>Battelle, USA</td>
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<td>Integrated pre-feasibility study for CO₂ sequestration in the Cascadia Basin, offshore of Washington State and British Columbia</td>
<td>A. Shchipanov, L. Kollbotn, R. Berenblyum</td>
<td>International Research Institute of Stavanger (IRIS), Stavanger, Norway</td>
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<td>Ensuring CO₂ reservoir containment from well pressure monitoring</td>
<td>M. I. García-Ibáñez¹, A. M. Omar¹, and G. Alendal².</td>
<td>¹Uni Research, Bjerknes Centre for Climate Research, Bergen, Norway, ²University of Bergen, Bergen, Norway.</td>
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<td>The stoichiometric ΔC₀²ₑᵉᵖ method as a monitoring tool for detection of CO₂ leakage from subsea storage sites</td>
<td>Lydia Cumming</td>
<td>Battelle, USA</td>
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<td>Carbon storage resource assessment for offshore Mid-Atlantic United States</td>
<td>Kirtsi Midtømme, Arvid Nøttvedt</td>
<td>Christian Michelsen Research (CMR), Bergen, Norway</td>
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<td>DEMODAS - Distributed seismic monitoring for geological carbon sequestration</td>
<td>Elin Skurtveit¹, Mark Mulrooney², Johnathon Osmond³, Jung Chan Choi¹ and Alvar Braathen³.</td>
<td>¹NGI Oslo, Norway, ²Department of Geosciences, University of Oslo (UiO), Oslo, Norway</td>
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<td>Structural derisking for Smeaheia - Improved fault characterization workflow</td>
<td>Jerry Blackford¹, Gutorm Alendaï², Yuri Artioli³, Helge Avlesen¹, Pierre Cazenave¹, Baixin Chen¹, Andy Dale³, Marius Dewar³, Kristian Gundersen³, Matthias Haekel³, Sorush Khajepor³, Gennadi Lessin¹, Anna Oleynik², Umer Saleem³.</td>
<td>¹Plymouth Marine Laboratory, Prospect Place, Plymouth, PL1 3DH, UK, ²Department of Mathematics, University of Bergen, Bergen, Norway, ³Uni Research, Bergen, Norway, ⁴Institute of Mechanical, Process and Energy Engineering, Heriot-Watt University, Edinburgh, EH14 4AS, UK, ⁵GEOMAR Helmholtz Centre for Ocean Research Kiel, Wischhofstrasse 1-3, 24148 Kiel, Germany</td>
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<td>STEMM - Ensuring efficient and robust offshore storage – the role of marine system modelling.</td>
<td>Ryosuke Sakaizawa¹, Chiaki Mori¹, Toru Sato¹, Hiroyuki Oyama¹, Daisuke Tsumune², Takaki Tsubono², Yuki Kano³.</td>
<td>¹University of Tokyo, ²CRIEPI, ³AIST</td>
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<td>Numerical estimation of the position and rate of CO₂ seepage at the seafloor</td>
<td>Roland Kaufmann,</td>
<td>Uni Research CIPR</td>
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<td>Safe CO₂ Storage Workflow</td>
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INTERNATIONAL STEERING COMMITTEE

Tim Dixon, IEAGHG (Chair) Ryozo Tanaka, RITE
Katherine Romanak, BEG (Co-Chair) Owain Tucker, Shell
Lars Ingolf Eide, Research Council of Norway (Host) Michael Carpenter, Gassnova
Áse Slagtern, Research Council of Norway (Host) Mark Ackiewicz, US DOE
Susan Hovorka, BEG Traci Rodosta, US DOE
Tip Meckel, BEG Di Zhou, China Academy of Sciences
Philip Ringrose, Statoil Filip Neele, TNO
Noel Kamrajh, SANEDI Paulo Negrais Seabra, formerly of Petrobr

ATTENDEES

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<thead>
<tr>
<th>First name</th>
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<th>Company/department name</th>
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<td>Jørg</td>
<td>Aarnes</td>
<td>DNVGL Group Technology and Research</td>
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<td>Odd</td>
<td>Andersen</td>
<td>SINTEF Digital</td>
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<td>Roman</td>
<td>Berenblyum</td>
<td>IRIS / IRIS Energy</td>
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<td>Geir</td>
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<td>Ann</td>
<td>Blomberg</td>
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<td>Lynn</td>
<td>Brickett</td>
<td>U.S. Department of Energy/National Energy Technology Laboratory</td>
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<td>Graham</td>
<td>Brown</td>
<td>Sonardyne International Ltd</td>
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<td>Mike</td>
<td>Carpenter</td>
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<td>Susan</td>
<td>Carroll</td>
<td>Lawrence Livermore National Laboratory</td>
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<td>Pierre</td>
<td>Cerasi</td>
<td>SINTEF Industry</td>
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<td>Lydia</td>
<td>Cumming</td>
<td>Battelle/Infrastructure &amp; Environment</td>
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<td>Darin</td>
<td>Damiani</td>
<td>US DOE Office of Fossil Energy</td>
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<td>Ganeswara</td>
<td>Dasari</td>
<td>ExxonMobil</td>
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<td>Marius</td>
<td>Dewar</td>
<td>Heriot-Watt University/EPS</td>
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<td>Tim</td>
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<td>Lars Ingolf</td>
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<td>Zabía</td>
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<td>Aker Solutions AS / Front End CCUS</td>
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<td>Maria Isabel</td>
<td>García Ibáñez</td>
<td>Uni Research/Uni Research Climate</td>
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<td>Sarah</td>
<td>Gasda</td>
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<td>Bettina</td>
<td>Goertz-Allmann</td>
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<td>Arne</td>
<td>Graue</td>
<td>University of Bergen, Dept. of Physics and Technology</td>
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<td>Alv-Arne</td>
<td>Grimstad</td>
<td>SINTEF Industry, Petroleum</td>
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<td>Eva</td>
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<td>Norwegian Petroleum Directorate</td>
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Hans Olav Ibrekk Ministry of Foreign Affairs
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Michael Jordan SINTEF Industry South African National Energy Development Institute/
Noel Kamrajh Cleaner Fossil Fuels
Roland Kaufmann Uni Research CIPR
Jun Kita Marine Ecology Research Institute / Central Laboratory
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Jiro Tanaka Japan CCS Co., Ltd./International Relations
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