



**Working Group on Evaluating Existing and New
Ideas for Possible Future Technical Group Actions**

Recommendations

**CSLF PIRT Meeting
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Outline of presentation

- Background
- Process for identifying new activities
- Results
- Recommendations



The Process

At the Technical Group meeting in Abu Dhabi, United Arab Emirates, May 1, 2017 it was decided to form a review group to:

- Appraise all unaddressed items in the Action Plan from 2015.
- Propose new topics for appraisal
- Review past task force reports with the aim to see if any updates are needed.
- Delegates from Australia, Saudi Arabia, the United Kingdom, and the United States volunteered to participate in the new working group, while delegates from Canada, Japan, and the Netherlands offered to provide input as needed.



The Process (2)

This group would:

- Review Action List 2015 and past task force topics
- Recommend which, if any, activities are worth pursuing for these actions. Possible actions are:
 - Start with an appraisal for later decision on how to proceed
 - Establish Task Forces with voluntary participants from CSLF members.
 - Suggest the topic as study for or in cooperation with an other organizations, e.g. IEAGHG or GCCSI.



The Process (3)

- 24 projects on longlist
 - 11 from Action List 2015
 - 11 past task force topics to be reviewed for update
 - 2 new proposals
- Longlist distributed to group July 2
- As of September 16, 2017, three responses had been received despite reminder, one commented on the text of a new topic only.
- Shortlist reduced to 12



The Process (4)

- Low feedback from the review group
- both the longlist and shortlist were sent to ***41 delegates to the Technical Group.***
- The delegates were invited to
 - Comment and suggest new topics.
 - Four highest priority votes on the short list, ranking from 1 (highest) to 4 (lowest).
- The invitation sent 22 September, deadline 13 October.



Results

- 11 delegates out of 41 responded, even with an extended deadline.
- The 11 represent six member states and the European Commission.
- The scores were turned around, so that 4 is highest priority, 1 is lowest, resulting in a ranking where highest scores is top priority.



Recommendations

- CSLF Technical Group considers establishing task forces or to undertake appraisals, as resources will allow, on the following topics, in order of priority:

Topic	Possible lead	Contributors
1. Hydrogen as a tool to decarbonize industries	Norway	Netherlands, Saudi-Arabia, UK
2. Reviewing Best Practices and Standards for Geologic Monitoring and Storage of CO ₂		Australia, France, Norway, Saudi-Arabia,
3. Capture by mineralisation		France, Netherlands, Saudi-Arabia
4. Global scaling of CCS		France, Saudi-Arabia



Comments

- CSLF Technical Group awaits the results of the Task Force on Pore space utilisation before a decision is made regarding a new Task Force on Geo-steering and pressure management techniques and applications to see how much has been incorporated into the Pose Space Utilization report.
- In addition, CSLF Technical Group considers if the topic Utilisation options of CO₂ should be added to the list of potential new task forces.



Hydrogen, some topics to be addressed

- **Hydrogen production and use**
 - Status technologies, costs
 - Present and future role, demand and use
- **Hydrogen with CCS**
 - Status: examples, technologies, costs
 - Cost reductions and needs for improved technology
- **Synergy with renewables**
- **Life cycle costs and carbon footprint, comparison to hydrogen from renewables**
- **Hydrogen value chain**

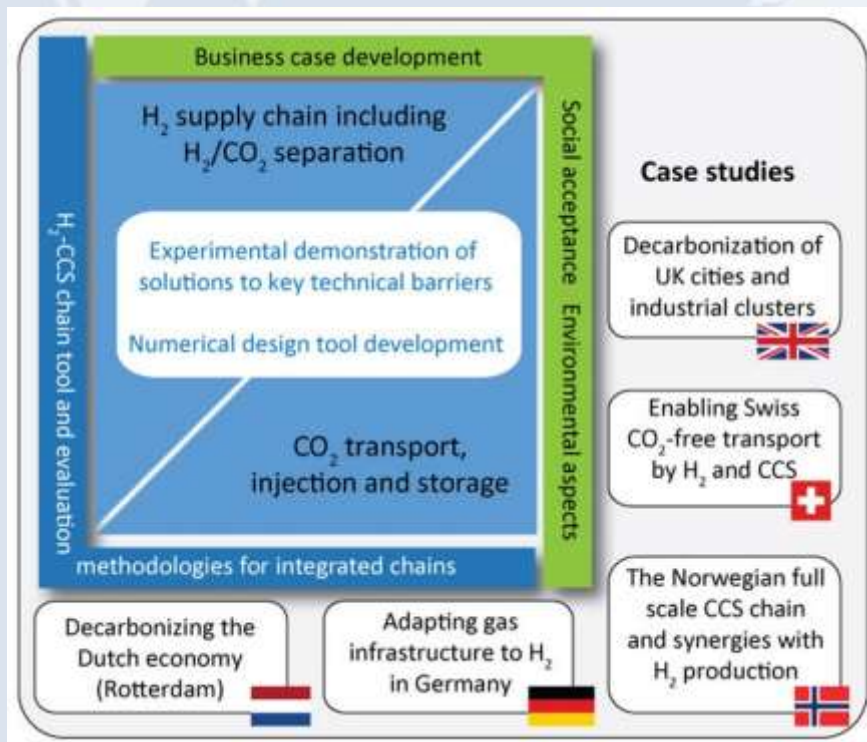


Several activities/programmes (please supplement)

- Europe: ACT Elegancy (Norway, UK, Germany, Netherlands, Germany)
- US H2@scale (much fuel cells but also H₂ from reforming w/CCS)
- Japan: Working Group on CO₂-Free Hydrogen Report
- Energy companies (Statoil/Nuon/Vattenfall/Gasunie)
- Numerous reports and papers, including technical reports from IEAGHG, IEA and Hydrogen Council
- **Map what these are doing before task force starts?**
- **Workshop, in cooperation with others??**



Elegancy – Enabling a low-carbon economy via hydrogen and CCS – an ACT project



The ELEGANCY project will provide three benefits:

- The decarbonization of heating and transport based on an existing fuel and infrastructure,
 - A commercial model for industrial CCS,
 - The opportunity to broaden public awareness of CCS.
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- Project duration: 31 August 2017– 31 August 2020
 - Total budget: about 15 MEUR
 - Funding: Norwegian, Dutch, German, UK and Swiss national funding agencies, the European Commission and industry
 - Number of partners: 22
 - Coordinator: SINTEF Energy Research



CO2 Capture and Storage by Mineralisation (1)

- Natural binding (permanent storage)
 - Slow -> long living cases
 - Business cases exist (bulk substitutes); walk path, greenery
 - Carbon price is no issue, product price is
 - Research ongoing around North Sea



CO2 Capture and Storage by Mineralisation (2)

- Accelerated binding (permanent storage):
 - Business cases: marketable products substituting natural products (partly): betony, paper, polymer
 - Both bulk products (kton CO2/yr) as niche ones (kg/batch)
 - Carbon price is a minor issue, product price regulates market
 - Exotherm process -> efficiency, combine with capture plant
 - International research ongoing and growing



CO2 Capture and Storage by Mineralisation (3)

- Dutch development, German cooperation:
 - Milled olivin + CO₂ at 100 bar/180C (15 – 60 min depending on particles) -> Green Mineral
- Building stone produce in smaller quantities by commercial building company (NL)
- Carbon8 project in the UK
- More coming, work for a CSLF Task Force!



Thank you for the attention!



Current Actions

- Offshore CO₂-EOR (*Task Force chair: Norway*) **COMPLETED IN 2017**
- Improved Pore Space Utilisation (*Task Force co-chairs: Australia and United Kingdom*)
- Bio-energy with CCS (*Task Force chair: United States*)
- CCS and Industry (*Task Force chair: France*)



Completed Actions

- Identifying Gaps in CO₂ Capture and Storage (Nov. 2006)
- Identifying Gaps in Monitoring and Verification of Geologic CO₂ Storage (Nov. 2006)
- Review and Identification of Standards for CO₂ Storage Capacity Estimation (Aug. 2005, June 2007, April 2008)
- Examine Risk Assessment Standards and Procedures (Oct. 2009, May 2012)
- Technical Challenges for Conversion of CO₂-EOR Projects to CO₂ Storage Projects (*Final Report in September 2013*)
- CCS Technology Opportunities and Gaps (*Final Report in October 2013*)
- CO₂ Utilization Options (*Final Report in October 2013*)
- Reviewing Best Practices and Standards for Geologic Storage and Monitoring of CO₂ (*Final Report in November 2014*)
- Review of CO₂ Storage Efficiency in Deep Saline Aquifers (*Final Report in June 2015*)
- Technical Barriers and R&D Opportunities for Offshore Sub-Seabed CO₂ Storage (*Final Report in September 2015*)
- Supporting Development of 2nd and 3rd Generation Carbon Capture Technologies (*Final Report in December 2015*)



Potential Actions from 2015

- Geo-steering and Pressure Management Techniques and Applications (*Note: Geo-Steering has been incorporated into Improved Pore Space Utilisation action.*)
- Advanced Manufacturing Techniques for CCS Technologies
- Dilute Stream / Direct Air Capture of CO₂
- Global Residual Oil Zone (ROZ) Analysis and Potential for Combined CO₂ Storage and EOR
- Study / Report on Environmental Analysis Projects throughout the World
- Update on Non-EOR CO₂ Utilization Options
- Ship Transport of CO₂
- Investigation into Inconsistencies in Definitions and Technology Classifications
- Global Scaling of CCS
- Compact CCS
- Capturing CO₂ from mobile application