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Status
CSLF TASK FORCE ON OFFSHORE CO$_2$-EOR

Enabling Large-scale CCS using Offshore CO$_2$ Utilization and Storage Infrastructure Developments

Lars Ingolf Eide, Norway
Technical Group Meeting
Abi Dhabi, United Arab Emirates
01 May, 2017

Purpose of Task Force

- The main purposes of the Task Force were to highlight

  – Main differences between offshore and onshore CO_2-EOR

  – Issues that are different between offshore CO_2-EOR and pure offshore CO_2 storage

  – Technical solutions that will benefit both pure offshore CO_2 storage and offshore CO_2-EOR.
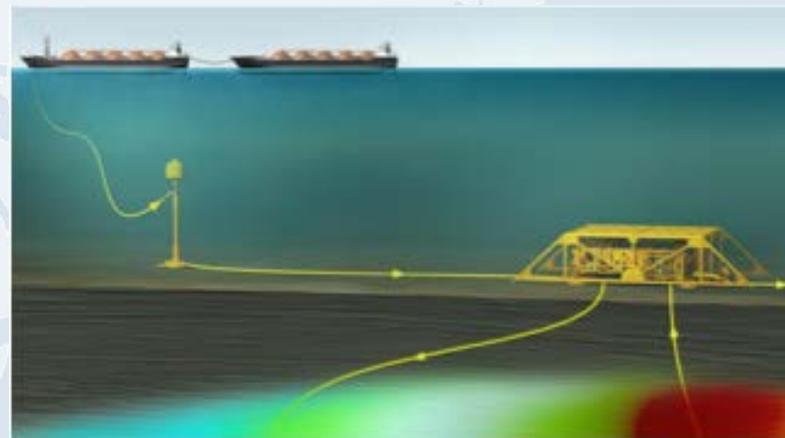
Courtesy: AkerSolutions

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Background

- **June 2015, Regina, Saskatchewan, Canada:**
  - Working group formed to develop additional Action Plan activities

- **November 2015, Riyadh, Saudi Arabia**
  - Offshore CO_2-EOR selected as topic for a new task force

Planned Timeline of the Task Force

- *November 2015: Task Force decided at Riyadh Meeting.*

- *March, 2016: Membership Established/Finalized.*

- *April 20, 2016: First informal meeting with limited attendance, Austin, Texas, USA*

- *June 28, 2016: Outline of Report Drafted and contributors established, CSLF Technical Group Meeting, London.*

- *October 04, 2016: Progress/Status report at CSLF Technical Group Meeting, Tokyo.*

- *Mid-January 2017: All chapters have initial text*

- *Spring 2017: First draft of report completed and presented at mid-year CSLF Technical Group Meeting*

- *Fall, 2017: Task Force Report finalized and report findings and conclusions to Technical Group at Ministerial meeting*

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Task Force Members and contributors

Member state	Persons
Brazil	Raphael Augusto Mello Vieira
Canada	David Ryan
IEAGHG	Tim Dixon
Mexico	Heron Gachuz Muro
Norway	Philip Ringrose, Sveinung Hagen, Bamshad Nazarian, Arne Graue, Pål Helge Nøkleby, Geir Inge Olsen, Zabia Elamin
USA	Susan Hovorka, Melissa Batum

Update from Tokyo meeting

- Held two teleconferences, 15 December 2016 and 02 March 2017

- Received and included all contributions

- Review by Task Force members

- Revision according to comments

- Final draft 30 March 2017

Report outline and structure (1)

Chapter title	Content
Introduction	Intro. of CSLF, motivation for doing offshore CO_2-EOR, TF mandate
Review of offshore CO_2-EOR storage	How CO2-EOR works, differencse onshore vs offshore and EOR vs storage, global potential, economics
Insights from Lula Project	Reservoir, development stratgey, materials, completin, production units/topside facilities, WAG pilot
Approaches for enabling offshore CO_2-EOR	Smart solutions, using late-life infrastucture, using isolated satellite projects, residual oil zone (ROZ), reservoir modelling and numerical simulation
Emerging technical solutions for offshore CO_2-EOR and storage	Topside solutions, subsea solutions, novel technologies, mobility control

Report outline and structure (2)

Chapter title	Content
Supply chain issues	Considerations, pipelines, ships, initiating new systems, case studies
Monitoring, verification and accounting for offshore CO_2-EOR	Roles and expectations, EOR vs storage, onshore vs offshore, transitiion from EOR to storage
Regulatory requirements for offshore CO_2 utilization and storage	Scene-setting, examples of national regulatory requirements, differences EOR and storage, regulations on transtition EOR to storage
Summary of barriers	
Recommendations for overcoming barriers	

Summary of barriers and recommendations (1)

Barrier	Recommendation
Access to sufficient and timely supply of CO_2.	**Increase the pace in deployment of CCS.** A prerequisite for offshore CO_2-EOR, needs attention at high political level. Slow deployment may lead to missed windows of opportunity for CO_2-EOR, as the effect of CO_2-EOR reduces with maturity. There are few, if any, developed sources of CO_2 close to the offshore fields amenable to CO_2-EOR.
	Start planning regional hubs and transportation infrastructures for CO_2. Building the networks will require significant up-front investments and the coordination of stakeholders, including industries, business sectors and authorities that will have to work together. The activities will include CO_2 capture at regional clusters of power and industrial plants, transportation of the CO_2 to hubs and to the individual receiving fields, and injection management.

Summary of barriers and recommendations (2)

Barrier	Recommendation
Lack of business models, also for offshore CO$_2$-EOR.	**Develop business models for offshore CO$_2$-EOR.** Establishing offshore CO$_2$ networks will create many interdependencies and commercial risks concerning both economics and liabilities. Risk- and cost-sharing will be needed. The literature has a few examples that provide some thoughts, but these need to be matured. The business models must include fiscal incentives, e.g. in term of taxes or tax rebates.
High investment costs, CAPEX and additional operational costs, OPEX; needs for modifications	**Support RD&D to develop new technologies.** CAPEX and OPEX are significant due to needed modifications and additional equipment on the platforms to separate CO$_2$ from the produced oil and gas and to make existing wells and pipes resistant to CO$_2$ corrosion. New technologies can reduce the need for modifications and new equipment, for example better mobility control or sub-surface separation systems. Use of existing pipelines may also be a way to keep investment costs down.

Summary of barriers and recommendations (3)

Barrier	Recommendation
Lack of regulatory requirements in many jurisdictions, e.g. on monitoring the CO_2 in the underground.	**Continue to develop regulations specific to offshore CO_2-EOR.** Regulations should include monitoring the CO_2 in the underground, both during and particularly after closure and guidelines for when the field transfers into a CO_2 storage site. While not being a barrier in itself, monitoring will require different considerations compared to offshore CO_2 storage and to onshore CO_2-EOR.

Next steps

- Polish document, e.g. with help from professional technical editor

- October 10, 2017: Final review by Task Force

- November 1, 2017: Final report submitted