



TECHNICAL GROUP

Summary of the Report by the CSLF Task Force on Technical Challenges in the Transition from CO₂-EOR to CCS

Background

At the September 2011 CSLF Ministerial Meeting in Beijing, the Technical Group approved a new multi-year Action Plan to identify priorities and provide a structure and framework for conducting Technical Group efforts through 2016. To that end, a task force (led by Canada) was formed to address the “Technical Challenges for Conversion of CO₂-EOR to CCS” Action in the Plan. The task force mandate was to review, compile and report on technical challenges that may constitute a barrier to the broad use of CO₂ for EOR and to the conversion of CO₂-EOR operations to CCS operations. The final report of the task force has been issued. This paper is a summary of the findings of the task force.

Action Requested

The Technical Group is requested to review the summary of findings from the Technical Challenges for Conversion of CO₂-EOR to CCS Task Force.



Technical Challenges in the Conversion of CO₂-EOR Projects to CO₂ Storage Projects

Summary of the Report by the CSLF Task Force on Technical Challenges in the Transition from CO₂-EOR to CCS

Forty years of experience and more than 120 CO₂-EOR operations currently active in the world indicate that there is sufficient operational and regulatory experience for this technology to be considered as being mature, with an associated storage rate of 90-95 % of the purchased CO₂. Application of CO₂-EOR for CO₂ storage has a number of advantages:

- 1) It enables CCS technology improvement and cost reduction;
- 2) It improves the business case for CCS demonstration and early movers;
- 3) It supports the development of CO₂ transportation networks;
- 4) It may provide significant CO₂ storage capacity in the short-to-medium-term, particularly if residual oil zones (ROZ) are produced;
- 5) It enables knowledge transfer, bridging the experience gap and building and sustaining a skilled CCS workforce; and
- 6) It helps gaining public and policy-makers acceptance.

The current number of CO₂-EOR operations in the world is negligible compared with the number of oil pools in the world, and **the main reason CO₂-EOR is not applied on larger scale is the unavailability of high-purity CO₂ in the amounts and at the cost needed for this technology to be deployed on a large scale.** The potential for CO₂ storage and incremental oil recovery through CO₂-EOR is significant, particularly if residual oil zones (ROZ) and hybrid CO₂-EOR/CCS operations are considered. Besides the main impediment in the adoption and deployment of this technology mentioned above, **the absence of infrastructure to both capture the CO₂ and transport it from CO₂ sources to oil fields suitable for CO₂-EOR is also a key reason for the lack of large scale deployment of CO₂-EOR.**

There are a number of commonalities between CO₂-EOR and pure CO₂ storage operations, both at the operational and regulatory levels, which create a good basis for transitioning from CO₂-EOR to CO₂ storage in oil fields. However, currently there are a significant number of differences between the two types of operations that can be grouped in seven broad categories:

- 1) Operational, including CO₂ purity and quality;
- 2) Objectives and economics;
- 3) Supply and demand;
- 4) Legal and regulatory;
- 5) Assurance of well integrity;
- 6) Long term CO₂ monitoring requirements; and
- 7) Industry's experience.

There are no specific technological barriers or challenges *per se* in transitioning and converting a pure CO₂-EOR operation into a CO₂ storage operation. The main differences between the two types of operations stem from legal, regulatory and economic differences between the two. While the legal and regulatory framework for CO₂-EOR, where it is practiced, is well established, the legal and regulatory framework for CO₂ storage is being refined and is still evolving. Nevertheless, it is clear that CO₂ storage operations will likely require more monitoring and reporting 1) of a wider range of parameters, 2) outside the oil reservoir itself, and 3) on a wider area, and for a longer period of time than oil production. Because of this, pure CO₂ storage will impose additional costs on the operator. A challenge for CO₂-EOR operations which may, in the future, convert to CO₂ storage operations is the lack of baseline data for monitoring, besides wellhead and production monitoring, for which there is a wealth of data.

In order to facilitate the transition of a pure CO₂-EOR operation to CO₂ storage, operators and policy makers have to address a series of legal, regulatory and economic issues in the absence of which this transition can not take place. These should include:

1. Clarification of the policy and regulatory framework for CO₂ storage in oil reservoirs, including incidental and transitioned storage CO₂-EOR operations. This framework should take into account the significant differences between CO₂ storage in deep saline aquifers, which has been the focus of regulatory efforts to date, and CO₂ storage in oil and gas reservoirs, with particular attention to the special case of CO₂-EOR operations.
2. Clarification if CO₂-EOR operations transitioning to CO₂ storage operations should be tenured and permitted under mineral/oil & gas legislation or under CO₂ storage legislation.
3. Clarification of any long-term liability for CO₂ storage in CO₂-EOR operations that have transitioned to CO₂ storage, notwithstanding the CO₂ stored during the previous phase of pure CO₂-EOR.
4. Clarification of the monitoring and well status requirements for oil and gas reservoirs, particularly for CO₂-EOR, including baseline conditions for CO₂ storage.
5. Addressing the issue of jurisdictional responsibility for pure CO₂ storage in oil and gas reservoirs, both in regard to national-subnational jurisdiction in federal countries, and to organizational jurisdiction (environment versus development ministries/departments).
6. Examination of the need to assist with the economics, particularly the cost of CO₂ and the infrastructure to bring anthropogenic CO₂ to oil fields.

The Policy Group should take note of these issues and establish ways to address them within CSLF, and make appropriate recommendations to the governments of its members.