



## TECHNICAL GROUP

### Action Plan Status Report

#### 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. This Action Plan was updated at both the Washington meeting in November 2013 and the Seoul meeting in March 2014. Task forces were formed to address several of the actions in the Plan, while other actions have been deferred or canceled.

This paper is an update, prepared by the CSLF Secretariat, on the status of the Technical Group's Action Plan.

#### Action Requested

The Technical Group is requested to review the Action Plan status report.



## CSLF Technical Group Action Plan Status

(as of September 2014)

### COMPLETED ACTIONS

#### Technology Gaps Closure

**Action:** The Technical Group will identify and monitor key CCS technology gaps and related issues and recommend any R&D and demonstration activities that address these gaps and issues.

**Outcome:** Identification of all key technology gaps/issues and determination of the effectiveness of ongoing CCS RD&D for addressing these gaps/issues.

**Status:** Final Report has been issued. Key findings are:

- At a high level there are no major technology gaps. CCS technologies are ready and available, and are being deployed today.
- There are many contending capture technologies, in both current technologies and 2<sup>nd</sup> & 3<sup>rd</sup> generation technologies.
- Next generation technologies are vital for substantial cost reduction.
- However, there is no strong market pull for new technologies at the moment.
- There is a need to continue work towards low cost, high resolution MMV, particularly in the offshore environment.
- The lack of exploration for CO<sub>2</sub> storage sites is a significant barrier to rapid deployment of CCS and, thus, learning by doing.

#### Technical Challenges for Conversion of CO<sub>2</sub>-EOR to CCS

**Action:** The Technical Group will determine technical and economic aspects that can affect moving from enhanced oil recovery (EOR) to carbon storage.

**Outcome:** Identification of permitting, monitoring, and reporting requirements for CO<sub>2</sub> EOR applications that apply for CO<sub>2</sub> credits.

**Status:** Final Report has been issued. Task force key findings are:

- There is sufficient operational and regulatory experience for this technology to be considered as being mature, with an associated CO<sub>2</sub> storage rate of the purchased CO<sub>2</sub> greater than 90%.
- The main reason CO<sub>2</sub>-EOR is not applied on a large scale outside west Texas in the United States is the unavailability of high-purity CO<sub>2</sub> in the amounts and at the cost needed for this technology to be deployed on a large scale.

- The absence of infrastructure to both capture the CO<sub>2</sub> and transport it from CO<sub>2</sub> sources to oil fields suitable for CO<sub>2</sub>-EOR is also a key reason for the lack of large scale deployment of CO<sub>2</sub>-EOR.
- There are a number of commonalities between CO<sub>2</sub>-EOR and pure CO<sub>2</sub> storage operations, both at the operational and regulatory levels, which create a good basis for transitioning from CO<sub>2</sub>-EOR to CO<sub>2</sub> storage in oil fields.
- There are no specific technological barriers or challenges per se in transitioning and converting a pure CO<sub>2</sub>-EOR operation into a CO<sub>2</sub> storage operation. The main differences between the two types of operations stem from legal, regulatory and economic differences between the two.
- A challenge for CO<sub>2</sub>-EOR operations which may, in the future, convert to CO<sub>2</sub> storage operations is the lack of baseline data for monitoring, and generally monitoring requirements for CCS which are broader and more encompassing than for CO<sub>2</sub>-EOR.

### **CO<sub>2</sub> Utilization Options**

**Action:** The Technical Group will investigate CO<sub>2</sub> utilization options.

**Outcome:** Identification of most economically attractive CO<sub>2</sub> utilization options.

**Status:** Final report has been issued. Task force key findings are:

- A number of CO<sub>2</sub> utilization options are available which can serve as a mechanism for deployment and commercialization of CCS.
- EOR is the most near-term CO<sub>2</sub> utilization option. Non-EOR CO<sub>2</sub> utilization options are at varying degrees of commercial readiness and technical maturity.
- For mature non-EOR CO<sub>2</sub> utilization options, efforts should be on demonstration projects and on the use of non-traditional feedstocks or polygeneration concepts.
- Efforts that are focused on hydrocarbon recovery other than EOR should focus on field tests.
- Efforts that are in early R&D or pilot-scale stages should focus on addressing key techno-economic challenges, independent tests to verify the performance, and support of small and/or pilot-scale tests of first generation technologies and designs.
- More detailed technical, economic, and environmental analyses should be conducted on these options.

### **Reviewing Best Practices and Standards for Geologic Storage and Monitoring of CO<sub>2</sub>**

**Action:** The Technical Group will identify and review standards for CO<sub>2</sub> storage and monitoring.

**Outcome:** Identification of best practices and standards for storage and monitoring of injected CO<sub>2</sub>. The application of such standards should inform CO<sub>2</sub> crediting mechanisms.

**Status:** Reports for Years 2012 and 2013 have been issued. Findings of the task force will be archived at the CSLF website. The task force was discontinued in part because other organizations such as the European Commission’s CO<sub>2</sub> GeoNet Project and the ISO TC265 committee on CCS may be planning similar activities.

## **ONGOING ACTIONS**

### **Best-Practice Knowledge Sharing**

**Action:** The Technical Group will facilitate the sharing of knowledge, information, and lessons learned from CSLF-recognized projects and other CCS RD&D.

**Outcome:** Development of interactive references for assisting next-generation commercial CCS projects, which will include links with other CCS entities.

**Status:** Activity has been assigned to Projects Interaction and Review Team (*led by Australia*). A linkage has been established with Global CCS Institute’s low emissions technology website, decarboni.se, which now includes CSLF projects and reports. Also, Technical Group is holding annual technology workshops featuring representatives of CSLF-recognized projects.

### **Review of CO<sub>2</sub> Storage Efficiency in Deep Saline Aquifers**

**Action:** The Technical Group will recommend the proper storage efficiency coefficients to be used when estimating CO<sub>2</sub> storage capacity, based on the scale of the assessment, geological characteristics and other parameters of the storage operation.

**Outcome:** Identification of guidelines for use of appropriate CO<sub>2</sub> storage efficiency coefficients that can be used by governments and industry in the assessment of CO<sub>2</sub> storage resource and in site selection for CO<sub>2</sub> storage.

**Status:** The CSLF Task Force for Review and Identification of Standards for CO<sub>2</sub> Storage Capacity Estimation published reports in 2005, 2007, and 2008 before concluding its work. A task force (*led by Canada*) has been active since November 2013 and will build on results from the previous task force and published literature since then.

### **Offshore CO<sub>2</sub> Storage**

**Action:** The Technical Group will provide a current assessment on the status of the global sub-seabed CO<sub>2</sub> storage potential, including potential for offshore EOR.

**Outcome:** Identification of technical barriers and challenges to sub-seabed CO<sub>2</sub> storage as well as RD&D opportunities. Also, identification of any potential opportunities for global collaboration. A previously-proposed Action on “CO<sub>2</sub> Compression and Transport” is being incorporated into this Action.

**Status:** A new task force (*led by the United States*) has been active since March 2014 and expects to have a progress report at the 2014 CSLF Annual Meeting and the draft of a final report by the time of the mid-year 2015 CSLF Meeting.

## **PROPOSED ACTIONS**

### **Energy Penalty Reduction**

- Action:** The Technical Group will identify technological progress and any new research needs for reducing the energy penalty for CCS, both for traditional CO<sub>2</sub> capture processes and new breakthrough technologies.
- Outcome:** Identification of opportunities for process improvements and increased efficiency from experiences of “early mover” projects.
- Status:** United Kingdom was asked to be the lead concerning this item and to report to the Technical Group on feasibility for activity in this area. Possible new task force would build on results from the United Kingdom’s Cost Reduction Task Force. A final decision on whether to form a task force in this area will be made at the 2014 CSLF Annual Meeting.

### **CCS with Industrial Emissions Sources**

- Action:** The Technical Group will document the progress and application of CCS for industrial emissions sources and will identify demonstration opportunities for CSLF Members.
- Outcome:** Identification of opportunities for CCS with industrial sources. Identification and attempted resolution of technology-related issues (including integration) unique to this type of application.
- Status:** South Africa was asked to be the lead concerning this item (with support from the United States and the IEA GHG) and to report to the Technical Group on feasibility for activity in this area. Possible new task force would build on the Clean Energy Ministerial / IEA report that has been issued. A final decision on whether to form a task force in this area will be made at the 2014 CSLF Annual Meeting.