

2014 CSLF Technical Group Meeting

Seoul, Korea

March 25, 2014



Report from the Secretariat

**Richard Lynch
CSLF Secretariat**

Report from the Secretariat



- Secretariat Updates
- Report on CSLF Activities

Carbon Sequestration Leadership Forum (CSLF) Organization Chart



CSLF Activity Groups and Task Forces:

CSLF Policy Group

Capacity Building in Emerging Economies

Chair: Saudi Arabia

Financing Carbon Capture and Storage (CCS)

Chair: France

Policy Group Exploratory Committee

Chair: United States

- Communications
- Global Collaboration on Large-Scale CCS Projects
- Financing for CCS Projects
- Supporting Development for 2nd and 3rd Generation CCS Technologies
- Transitioning from CO₂-EOR to CCS

CSLF Technical Group

Reviewing Best Practices & Standards

Chair: Norway

PIRT

Chair: Australia

CO₂ Storage Efficiency in Deep Saline Aquifers

Chair: Canada

Technical Barriers and R&D Opportunities for Offshore, Sub-Seabed Geologic Storage of Carbon Dioxide *(proposed)*

Lead: United States

Policy Group-Exploratory Committee

- Communications
- Global Collaboration on Large-Scale CCS Projects
- Financing for CCS Projects
- Supporting Development of 2nd and 3rd Generation CCS Technologies
- Transitioning from CO₂-EOR to CCS

Secretariat Updates



1. 2014 CSLF Technology Workshop

- Session 1: Cost Reduction Strategies for CO₂ Capture
- Session 2: Examining Technology Pathways and Business Models for Scaling-up CCS

2. CSLF Finance Roundtable Paris on May 23, 2014

3. Upcoming Policy Group Meetings

- Estimated June, 2014 (*to be scheduled*)
- 4th Quarter 2014 (*to be scheduled*)

4. Policy Group Exploratory Committee

Petroleum Review

March 2014



Article on CSLF Ministerial Meeting



CARBON SEQUESTRATION

CCS collaboration

EOR

The next seven years are critically important for creating the conditions for carbon capture and storage (CCS) to be ready for large-scale deployment by the end of the decade. Richard Lynch and John Panek, Carbon Sequestration Leadership Forum (CSLF) Secretariat, outline the work of the CSLF, which is currently the only government-to-government multilateral organisation that focuses specifically on CCS issues.

This past decade has seen rapid development in the separation and capture of carbon dioxide (CO₂) for its transport, utilisation and long-term safe storage, utilising carbon capture and storage (CCS) technologies are now being advocated as one possible way toward stabilising the level of CO₂ in the earth's atmosphere. Currently, there are many organisations which are active working toward the development and promulgation of CCS. Some of them, such as the International Energy Agency's Greenhouse Gas Research Programme (IEA-GHG), research to study and evaluate technologies for reducing fossil fuel-derived CO₂ emissions. Others, such as the Institute for Global Energy Solutions (IGES), are working to hasten government CCS technology and deployment. There is a government-to-government multilateral organisation that is focused specifically on CCS – the Carbon Sequestration Leadership Forum (CSLF).

The CSLF was formed in June 2003 with the mission of identifying and addressing all technical- and policy-related issues relating to CCS. It is currently comprised of 23 members, including 22 countries and the European Commission, with membership open to nations that are significant producers or users of fossil fuel and that have a commitment to invest resources in research, development and demonstration activities to develop CCS technologies. In November 2013, at the 5th CSLF Ministerial Meeting, ministers endorsed CCS as one of the low carbon technology options critical to the global

quest to reduce greenhouse gas emissions, and that can significantly reduce CO₂ emissions from both coal and gas-fired power plants and a range of industrial processes including refineries, steel manufacturing, and cement and other manufacturing. The CSLF Ministers also stressed that the next seven years are critically important for creating the conditions for CCS to be ready for large-scale deployment by the end of the decade.

The 2013 CSLF Technology Roadmap (TRM) debuted at the Ministerial Meeting and one of its recommendations is that nations should work together to ensure that CCS remains a viable greenhouse-mitigation option. In particular, the 2013 TRM recommended that nations, either individually or in collaboration, implement large-scale CCS demonstration projects in a sufficient number to gain experience with first-generation projects, in a pilot-scale projects for CO₂ storage that can provide greater understanding of the storage medium. Looking forward, by the year 2030, TRM recommends that CO₂ capture technologies for power generation and industrial applications, with possible targets of 30% reduction of energy penalty, normalised capital, and operational and maintenance (O&M) costs compared to 2013 costs for first-generation technologies.

Moving forward
CCS has now advanced to the point where first-of-a-kind large-scale

demonstration projects, under public and corporate sponsorship, are moving forward. Enhanced oil recovery (EOR) is a key factor providing the economic impetus and momentum for some of these projects, and at the Ministerial Meeting the CSLF recognised that some of these large-scale EOR projects, such as the Kemper County Energy Facility, located near Meridian, Mississippi, will start commercial operation in 2014. This commercial operation will capture approximately 3.3 million tonnes of CO₂ from an integrated ethanol plant and will include pipeline transport of CO₂ approximately 60 miles to an oil field where it will be sold for EOR. The project will capture approximately 3.3 million tonnes of CO₂ from an integrated ethanol plant and will include pipeline transport of CO₂ approximately 60 miles to an oil field where it will be sold for EOR. The project will capture approximately 3.3 million tonnes of CO₂ from an integrated ethanol plant and will include pipeline transport of CO₂ approximately 60 miles to an oil field where it will be sold for EOR.

In Canada, the Alberta Carbon Trunk Line Project will collect CO₂ from two industrial sources to fertilizer plant and oil sands upgrading facilities in Alberta's industrial heartland and transport it via a 240-km pipeline to a central Alberta hydrocarbon reservoir in EOR projects for utilization and storage for a capacity of 1.4 million tonnes of CO₂ at 5.5 million tonnes of CO₂ per annum. The pipeline is designed to stimulate EOR development throughout central and southern Alberta. The pipeline network is clearing land in February 2013 and is expected to start operations in 2015. When in full operation, this will be the world's largest CCS project in terms of capacity.

In Saudi Arabia, the Uthmaniyah CO₂-EOR Demonstration Project, located in the Eastern Province of Saudi Arabia, will capture and store approximately 800,000 tonnes of CO₂ from a natural gas production and processing facility, and will include a 70-km pipeline to the Uthmaniyah field. The objectives of the project are the determination of optimal oil recovery (beyond water flooding), estimation of sequestered CO₂, addressing the risks and uncertainties involved (including migration of CO₂ within the reservoir, and identifying operational concerns), and identifying large- and commercial-scale projects which have been recognised by the CSLF over the past decade as addressing technology gaps or other-

Report on CSLF Action Plan



- Completed Actions (3)
- Ongoing Actions (3)
- Proposed Actions (7)

Completed Actions



Title	Action	Status
Technology Gaps Closure	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.	Final report has been issued.
Technical Challenges for Conversion of CO ₂ -EOR to CCS	The Technical Group will determine the economic aspects that can affect moving from EOR to carbon storage.	Final report has been issued.
CO ₂ Utilization Options	The Technical Group will investigate CO ₂ utilization options.	Final report has been issued.

Ongoing Actions



Title	Action	Status
Best-Practice Knowledge Sharing	The Technical Group will facilitate the sharing of knowledge, information, and lessons learned from CSLF-recognized projects and other CCS RD&D.	Activity has been assigned to PIRT and the Technical Group is holding workshops featuring CSLF-recognized projects.
Reviewing Best Practices and Standards for Geologic Storage and Monitoring of CO ₂	The Technical Group will identify and review standard for CO ₂ storage and monitoring.	Task force has been active since June 2012. Reports for 2012 and 2013 have been issued.
Review of CO ₂ Storage Efficiency in Deep Saline Aquifers	The Technical Group will recommend the proper storage efficiency coefficients to be used when estimating CO ₂ storage capacity.	New task force has been active since November 2013 and will build on previous task force and published literature.

Proposed Actions



Title	Action	Status
Technical Barriers and R&D Opportunities for Offshore, Sub-Seabed Geologic Storage of CO ₂	The Technical Group will provide an assessment of the status of global offshore CO ₂ storage potential (including potential for offshore EOR).	Proposed new task forces. Background paper has been drafted.
Energy Penalty Reduction	The Technical Group will identify technological progress and any new research needs for reducing the energy penalty for CCS, both for traditional CO ₂ capture processes and new breakthrough technologies.	United Kingdom was asked to be lead and to report to the Technical Group on feasibility for activity in this area. Projected new task force would build on results from the United Kingdom's Cost Reduction Task Force.

Proposed Actions



Title	Action	Status
CCS with Industrial Emissions Sources	The Technical Group will document the progress and application of CCS for industrial emissions sources and will identify demonstration opportunities for CSLF Members.	South Africa was asked to be lead (with support from the United States and IEA GHG) and to report to the Technical Group on feasibility for activity in this area. Projected new task force would build on the Clean Energy Ministerial/IEA report that has been issued.
CO ₂ Compression and Transport	The Technical Group will review technologies and assess pipeline standard for CO ₂ transport	Japan was asked to be lead and to report to the Technical Group on feasibility for activity in this area.

Proposed Actions



Title	Action	Status
Competition of CCS with Other Resources	The Technical Group will examine criteria for assessing competing development priorities between CCS and other economic resources.	France was asked to lead and to report to the Technical Group on feasibility for activity in this area.
Life Cycle Assessment and Environmental Footprint of CCS	The Technical Group will identify and review methodologies for LCA for CCS.	Norway was asked to lead (with support from the United States and the IEA GHG) and to report to the Technical Group on feasibility for activity in this area.

Proposed Actions



Title	Action	Status
Carbon-neutral and Carbon-negative CCS	The Technical Group will investigate technical challenges in use of CCS with power plants that utilize biomass (either pure or co-fired, to determine a pathway toward carbon-neutral or carbon-negative functionality.	United Kingdom was asked to be lead (with possible support from the Netherland and the IEA GHG) and to report to the Technical Group on feasibility for activity in this area.

Energy Ministers

