



TECHNICAL GROUP

CSLF Closing the Technology Gaps Task Force

Discussion Note on Content, Scope and Process

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CSLF IS GOING GREEN*

CSLF CLOSING THE TECHNOLOGY GAPS TASK FORCE DISCUSSION NOTE ON CONTENT, SCOPE AND PROCESS

Note by the Secretariat

Background

At the 4th CSLF Ministerial Meeting, at Beijing, China in September 2011, the Technical Group approved a new multi-year Action Plan. “Technical Gaps Closure” is one of the twelve Actions that comprise the Action Plan, and Australia is leading a new Task Force that is focusing on identification and review of new updated critical technology gaps and opportunities for CO₂ capture transport, storage, and environmental monitoring and verification. This paper is an initial report from the Task Force Chair, Richard Aldous.

Action Requested

The Technical Group is requested to review the Task Force’s report.

* **Note:** This document is available only electronically. Please print it prior to the CSLF meeting if you need a hardcopy.

CSLF Closing the Technology Gaps Task Force

Discussion Note on Content, Scope and Process

Background

The meeting of the CSLF Technical Group (TG) in Bergen on June 12, 2012, confirmed the concept of a Closing the Technology Gaps Task Force (CTGTF). It was agreed that the task force would consist of the following members Australia, Korea, Norway, and the United States. The focus of the task force would be as set out in the documentation for that meeting (see Appendix 1). Names and contact details of the members representatives are as follows:

Australia - Richard Aldous (richard.aldous@co2crc.com.au)

USA - Darren Mollot (darren.mollot@hq.doe.gov)

Korea - Chang-Keun Yi (ckyi@kier.re.kr)

Norway - Lars Ingolf Eide (lie@rcn.no)

At the same meeting it was decided to revise the CSLF's Technology Roadmap (TRM) with a view to producing a short and concise document with focus on technological priorities and recommendations to policy and decision makers. The focus of this is to be on technology developments that are needed to enable large-scale deployment.

The proposed work of the CTGTF will be to undertake a comprehensive view of the key technologies in play around carbon capture and storage (CCS) and carbon capture, utilization and storage (CCUS) with a view to identify scientific and technology gaps and opportunities which have potential to significantly impact on CCS/CCUS demonstration and deployment. It is expected that this will inform the high level TRM and be a complementary document. Both documents are planned to be finalized for the Ministerial meeting scheduled for the fall of 2013.

The CTGTF will be responsible for the analysis and documentation of the technology gaps and opportunities.

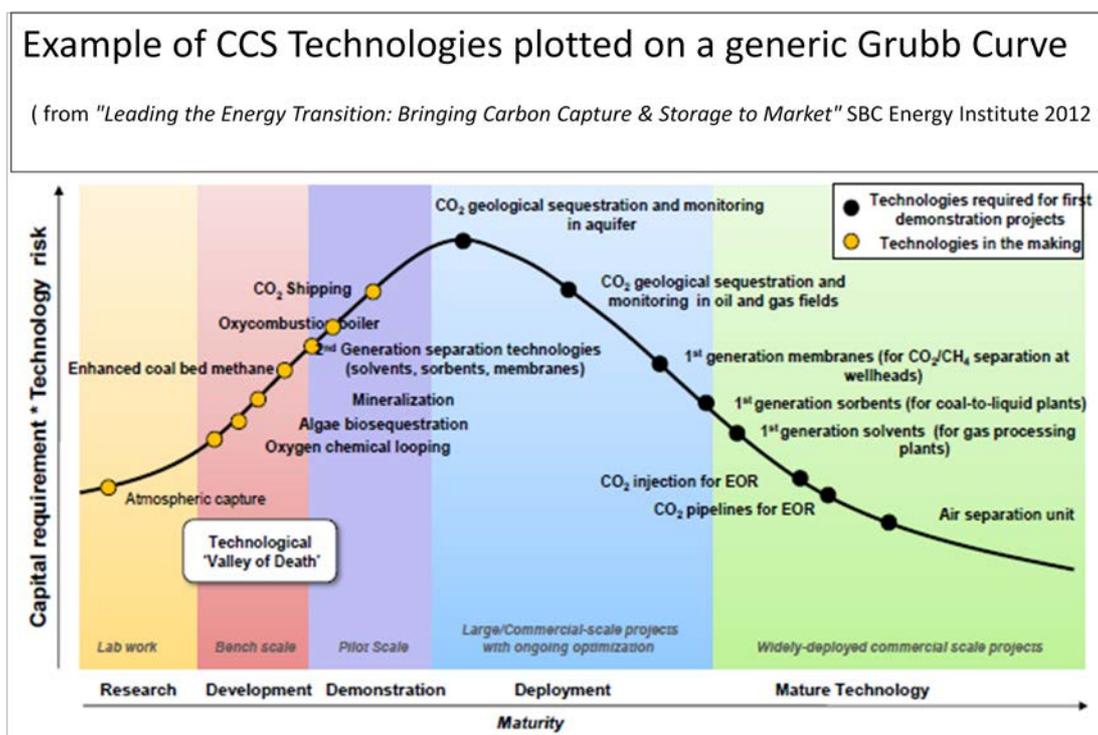
This document sets out for discussion and information a proposed methodology and approach for the CTGTF to follow in gathering and assessing information on technologies. It also provides a draft of the document structure envisaged for the final product.

Proposed Methodology

The project is proposed to be an assessment of the status of technologies in CCS/CCUS with respect to their state of development and likely pathways going forward. Emphasis will be on technologies that are deemed likely to become commercial before 2030, but with a view to technologies emerging towards 2050.

It is proposed to:

- Prepare a table of all major technologies.
- Grade the technologies according to their state of development. The exact methodology for assessing the technologies as yet to be agreed but one option is a simple assessment of whether technologies are at laboratory scale, pilot scale, or at large scale demonstration stage with optimisation upside. Another option is a simplified version of the NASA system of technology readiness.
- Technologies will be plotted on a generic Grubb curve (see example below).
- Assess and comment on their likely development pathway and the costs required to get to large scale demonstration or into commercial use.
- Set out who is the owner of the technology.
- Rank technologies in terms of international urgency/ necessity to progress the technology because of its potential impact on effective low cost CCUS deployment (High / Medium / Low).
- General comments.



Draft high level structure of the CTG Document

The following outline is proposed for the final report.

1. Executive Summary
2. Introduction: Objectives and Scope

Why is it important to have a review of the technologies in CCUS.

The objective is to have an assessment of all the major technologies in CCS

- a. What is the current status of CCUS technology?
- b. Where are the technologies on the generic Grubb curve?
- c. Where will the technologies be in 2020-2030 (and possibly in 2050)?
- d. What are the recommendations on technologies with great promise and gaps in the technology landscape?

This can be used to guide governments in prioritizing their support for technology activities relating to the early and successful implementation of CCUS.

3. Methodology for assessing status of technologies

A description of the methodology used in the analysis. For example, spreadsheet of all technologies, international network of technologist having input into identifying and grading technologies. The use of assessment and presentation tools, e.g., Grubb Curves, NASA technology readiness system, etc.

4. Assessment of present situation

What are the major categories of technologies and how do they fit together. What is their role on the deployment of CCS technologies? Who is doing the work and how will it propagate internationally, i.e., what is the likely deployment and commercialisation pathway.

5. Analysis of the data

This section will draw out the key findings of the study.

The technologies that:

- a) are established and will keep developing /improving;
- b) can make a difference but which are still on the development pathway;
- c) possible breakthrough areas to watch; and
- d) promising technologies without a good development pathway or owner.

These will be discussed under each of the following headings:

- Capture
- Transport
- Subsurface
- MMV

6. Prioritized technology related RD&D activities

7. Recommendations for implementation

This section will focus on recommendations for technology implementation, and global collaboration and how we get more out of the global R&D portfolio. Given the opportunities and gaps, recommendations will be made to CSLF governments.

Appendices: These will include a spreadsheet of all technologies considered.

The process and timeline

The process will be divided into the following phases and tasks:

Task 1: Agreement by the task force steering committee on this discussion document, including the Scope and Table of Contents. Review and finalisation **at or before the meeting in Perth in October 2012**.

Task 2: Agreement on the methodology and division of work. **December 2012**
This may take more time and will follow the CSLF meeting in Perth on October 24-26, 2012. This task also includes allocation of resources necessary to perform the work with the TRM.

Task 3: Collection, collation and analysis of data. **March 2013**
This phase could include the following activities:

- a. Phone hook ups and integration of data
- b. Prepare status and assessment – CO₂ capture, storage, utilisation, transport, and MMV
- c. Prepare recommendations for implementation
- c. Prepare draft report

In parallel to the above the task force will be feeding information to the TRM Process, surface ideas and technological trends that could be considered in the TRM.

Task 4: Approval. **July 2013**

This phase could include the following activities:

- a. Hearing round with critique, comments and validation by CSLF TG members
- b. Revision
- c. Approval at Ministerial meeting fall 2013.

APPENDIX 1

CSLF Technical Group Action Plan, 2011-2016

Note: the final scope of the plan will be determined by the task force members

Task Force for Action Plan1: Closing the Technology Gaps

The Carbon Sequestration Leadership Forum (CSLF) has had a significant focus on encouraging and facilitating research, development, demonstration and deployment of effective, low-cost CO₂ capture and storage (CCS) technologies. If CCS is going to be applied broadly, at large scale, it is essential that the technology is refined to deliver safe, low-cost, efficient storage in a wide range of situations. As a contribution to the global effort on CCS the CSLF will focus attention on the gaps and opportunities associated with the technology, with a view to speeding up the technology delivery at a global level and getting more focus on the critical gaps and opportunities that can make a significant difference by 2025.

As the global effort on CCS moves increasingly to large scale demonstration, there is an increasing amount of effort going into research and development and an increased number of governments and companies tackling pilots and demonstrations. This is complimented by a growing offering of technology and technology support for CCS. On the capture side the traditional amine capture technology is being installed or planned on large projects. A number of Original Equipment Manufacturers (OEMs) have developed their own technologies and are offering either enhancements on the amine technologies or new technologies, particularly insolvents.

On the transport and storage side, global experience and knowledge is growing. The decades of experience in enhanced oil recovery, combined with many project-years operating experience in carbon storage projects such as Sleipner, Snøhvit, and In Salah as well as the exploration and planning work that has been undertaken for projects such as Gorgon, Boundary Dam, ROAD, Decatur, etc. represent a substantial body of global knowledge. Research institutions around the world and their associated demonstration projects have also built a strong basis in the science and subsurface engineering.

It is clear however that, despite the efforts and developments in capture, storage and monitoring and verification to date, driving down the costs is still an overriding imperative. This can only be achieved by developing and refining more efficient technology and integrating the learning that comes from deployment in pilot and demonstration facilities around the world.

Mandate

At the CSLF meetings in Beijing, China (September 19-23, 2011) the CSLF Technical Group agreed that the Secretariat should circulate, by the end of the first week of October, a listing of the twelve actions of its five years Action Plan to Technical Group delegates with the request that that each CSLF Member provide a ranking by priority of importance. Delegates were asked to respond within three weeks and the results were then compiled by the Secretariat. Results from this survey were used to decide which actions to undertake immediately and which ones to defer. The Secretariat was also asked to solicit ideas for additional actions from the delegates.

Specifically, the prioritized actions of the five-year plan include Action Plan 1: Technology gaps. The formation of a task force to implement Action Plan 1 was proposed.

Membership

Australia has agreed to lead or co-lead the task force. Membership of this task force is open to CSLF member countries and interested parties. *[Note: those interested in participating on the task force as a member or co-lead should contact the CSLF Secretariat or Dr. Richard Aldous of CO2CRC, Australia (raldous@co2crc.com.au)]*

Outcome

The outcome of the Technology Gaps Task Force will be the identification and review of new updated critical technology gaps and opportunities for capture transport, storage and environmental monitoring and verification. The identification of the significant gaps and opportunities should be of interest to governments, companies and researchers and technology developers around the world. It may be of particular value to those organizations looking to foster international collaboration and optimization of the technology effort.

Action and Scope

To obtain this outcome, the task force will identify and review the spectrum of technologies and emergent technologies, looking for any critical gaps but also identifying the opportunities to substantially reduce costs and get better operational and environmental outcomes.

Suggested approach:

1. Identify 2-3 participants interested in each of
 - a. Capture technologies
 - b. Transport technologies
 - c. Storage(sub surface issues and MMV) technologies
 - d. Environment monitoring, including submarine monitoring technologies
2. Define an agreed process to assemble information using an agreed standardized template on each major aspect or sub element for each of the above technology areas, for example:
 - a. Technology dimension: e.g., Adsorbent technologies or new solvents ,etc.
 - b. Current status of technology: Advanced technology developments only (e.g., already at pilot scale as a minimum).
 - c. Who are the main players in this area.
 - d. Technology shortfalls gaps risks and opportunities associated with the technology
 - e. Potential for a major breakthrough deliverable to market by 2025, (high, medium, low).
 - f. Potential for a deliverable cost reduction in the next 10 years stated as percentage improvement against of a benchmark CCUS system.
 - g. Estimated cost to deliver improvement or cover gap.
 - h. Collaboration potential.
3. Synthesize data from the above into a report to be delivered by June each alternate year starting in 2013.
4. The reports will set out high level gaps and opportunities, with recommendations on how the global technology development pathway could be sped up or enhanced to further drive down costs and get better outcomes.