



## **TECHNICAL GROUP**

### **2013 CSLF Technology Roadmap Scoping Document**

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## CSLF IS GOING GREEN\*

### 2013 CSLF TECHNOLOGY ROADMAP SCOPING DOCUMENT

*Note by the Secretariat*

#### Background

At the June 2012 CSLF Technical Group meeting in Bergen, Norway, there was consensus that the Technical Group would not produce a 2012 CSLF Technology Roadmap (TRM) and instead focus its efforts and resources on a 2013 TRM that would be a deliverable at the 2013 CSLF Ministerial Meeting. This paper is a scoping document for the 2013 TRM that has been developed by Lars Ingolf Eide of Norway, with input from the CSLF Technical Group Chair, Vice Chairs, and Task Force Chairs.

#### Action Requested

The Technical Group is requested to review the scoping document.

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

# Technology Roadmap (TRM) 2013

## Discussion Note on Content, Scope and Process

### Background

At the meeting of the CSLF Technical Group (TG) in Bergen June 12, 2012, it was decided to revise the TRM. The consensus was that the new document should be short and concise, with focus on technological priorities and recommendations to policy and decision makers with the focus on technology developments that are needed to enable large-scale deployment rather than on scientific gaps. The new TRM should be finalized for the Ministerial meeting scheduled for the fall of 2013.

A steering committee (SC) that will be responsible for the preparation of the new TRM was set up, under the chairmanship of the Chair of the Technical Group. The Steering Committee will set the content of the TRM and will seek ways to have it produced in time for the 2013 CSLF ministerial meeting.

Many barriers to implementation of CCUS are political in nature. Thus, road-mapping CCUS may be considered as much an issue-oriented process as a technology-oriented process, but the availability of advanced technology is an important element of issue-oriented roadmaps. It is suggested that this update of the CSLF TRM will focus on technological solutions to identified barriers, including policy and public engagement issues, which should be included as background. However, the TRM should stay clear of policy issues.

Several roadmaps for CCS have been or will be published, including those by IEA and GCCSI. The CSLF TRM 2013 should, while being cognisant of roadmaps published by other organisations, focus on technology deployment issues, particularly those that affect the up-scaling of CSLF projects to commercial scale. It should inform governments, as the CSLF is the only government-level organization, as opposed to IEA and GCCSI, and recognise the differing circumstances and therefore pace of adoption between the developed and developing country members of the CSLF. Also, the CSLF TRM should focus on cross-cutting and overarching issues rather than on details of a range of specific technologies: integration of technologies in the CCUS value chain is essential.

CSLF has established several task forces to work on important issues. Task Force 1 deals with closing technology gaps. This task force will work in parallel to the TRM. It is important that ideas and technological trends surfaced by Task Force 1 are fed into and considered in the TRM.

### Scope

The scope for the TRM is described in the following.

#### 1. Objectives and Scope of TRM (½-¾ page)

The TRM should focus on the technology needs to enable large scale implementation of CCUS. Therefore, the needs must be identified. The objectives of the TRM should be to give answers to three simple questions, with focus on the third:

- a. What is the current status of CCUS technology and deployment today, particularly in the CSLF countries?
- b. Where should CCUS be by 2030?
- c. What is needed to get from point a) to point b), while at the same time addressing the different circumstances of developed and developing countries?

The TRM should cover CCUS in the power and industrial sectors, and CCS biomass (for negative CO<sub>2</sub> emissions) and any other major industrial CO<sub>2</sub> sources. Utilization in the early deployment stages, particularly in enhanced oil recovery, should be considered.

One objective of the TRM will be to guide governments in prioritizing technology activities in implementation of CCUS. Financial issues and cost for implementation on a scale to meet, e.g. the IEA BLUE Map scenario, are outside the scope of the CSLF TRM.

2. Vision and Target (½-¾ page)

Question b) above is about vision and targets. CSLF has not explicitly stated a vision or specific technology targets, but it has a Charter and Terms of Reference. These may be used to formulate agreed visions; alternatively, one can use, e.g., visions and goals from IEA (IEA BLUE Map scenario or the 2D scenario of Energy Technology Perspectives 2012) or G20, e.g., in terms of percentages or absolute numbers of emission reductions that should be achieved by CCUS by 2030, or in terms of number of large integrated projects (IEA BLUE Map scenario). The latter is the simplest and fastest solution.

3. Assessment of present situation (2 pages)

Brief review of present situation for large-scale integrated projects (very brief summary of GCCSI report; more could be added in appendix). Focus should be on what is needed to overcome technological barriers to fully commercial implementation, as opposed to policy or financial barriers:

- Technology barriers such as integration, industrial applications and infrastructure. Details of specific technologies have been dealt with in several earlier TRM's. This TRM should mainly use references and appendices.
- Engagement from and fear amongst public related to safe storage and other HSE aspects
- Need to establish baseline parameters and monitoring to evaluate the fate of the injected CO<sub>2</sub>, particularly to address regulatory requirements and allay public concerns
- Incomplete implementation or lack of laws and regulations
- Lack of market pull, insufficient funding mechanisms (only as background, outside the scope of the TRM).
- Balancing of diverse interests – e.g. balancing the need to reduce GHG emissions with other environmental and public concerns, and economic development with environmental protection in developing countries.

4. Prioritized technology related RD&D activities (5 pages + graphs).

The updated TRM should focus on technological aspects that can contribute to elimination of technology barriers to large scale implementation of CCUS.

Examples are:

- Consistent methods for evaluating storage capacity (as opposed to storage resources) and global distribution of this capacity (important for policy makers);
- Application in the power generation sector (so far there is no large-scale demo project in this sector; only in the oil and gas sector)
- Industrial applications, where, again, no large-scale projects are being planned;
- Integration of CCUS in power systems retaining flexibility (should include retrofiting); CO<sub>2</sub> transportation infrastructure.
- Large scale storage demonstration projects to prove that monitoring works and that leaks can be prevented or detected;
- Remediation of or contingencies for leaks;
- Environmental, safety and health aspects along whole CCUS chain in a life cycle perspective.

Much can be said in graphical form. Examples of roadmap graphs are shown below.

5. Recommendations for Implementation; Actions (1-1½ pages + graphs)

This section should focus on recommendations for technology implementation, the necessary policy framework will be assumed in place.

6. Follow-up Plans (½-1 page)

- How to monitor progress
- Plans for updates

7. Appendices according to agreement, e.g.:

- Implementation status – large integrated projects
- Closing the technology gaps - more detailed technology status and needs
- Regulations
- A view to 2050 - what 3<sup>rd</sup> generation technologies do we need to be piloting in the 2020s getting ready for deployment beyond 2030

## The Process

The process to develop the CSLF TRM 2013 may be divided into the following phases and tasks:

Task 1: Agreement by the Steering Committee on this Discussion Document, and Scope and Table of Contents of the TRM.

This should include:

- a. Agreement on the scope and boundaries of the TRM (Chapter 1)
- b. Agreement on vision and targets (Chapter 2)

Task 2: Identification of means or ways to produce the TRM.

This task also includes allocation of resources necessary to perform the work with the TRM. These two tasks should be achieved prior to the CSLF meeting in Perth on October 24-26, 2012.

**Task 3: Development of TRM.**

This phase could include the following activities:

- a. Prepare status and assessment (Chapter 3)
- b. Prepare prioritized technology related RD&D activities (Chapter 4). This should be the responsibility of the SC (closing the gaps task force will feed into this process).
  - i. Identify and specify areas that will be the focus of the TRM
  - ii. Specify the drivers for the areas and the area targets
  - iii. Identify and recommend technology alternatives to be pursued, with time lines.
- c. Prepare recommendations for implementation (Chapter 5)
- d. Prepare follow-up plan (Chapter 6)
- e. Prepare draft report

In parallel to the above the closing the gaps task force will be prepared and will surface ideas and technological trends that could be considered in the road map.

**Task 4: Approval.**

This phase could include the following activities:

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

Suggested timeline:

Phase	Task/Activity	2012					2013										
		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
1	Boundaries and scope		→														
	Visions and targets		→														
2	Means to produce TRM		→														
3	Status and assessment				→												
	Prepare prioritized RD&D activities				→												
	Recommendations for implementation									→							
	Follow-up plans									→							
	Draft report									→							
4	Hearing, comments													→			
	Revision														→		
	Final report																✘

## List of Contents

Each of the numbered headlines below is intended to represent a chapter in the TRM.

1. Executive Summary (why, what, how)
2. Recommendations
3. Objectives and Scope of TRM (½-¾ page)
4. Vision and Target (½-¾ page)
5. Assessment of present situation (2 pages)
6. Prioritized technology related RD&D activities (5 pages + graphs)
7. Summary and Follow-up plans (1-2 pages)
8. Appendices

Note: In the final report it is suggested to have the Recommendations appear up front for the Ministers to see them without having to read the full document, whereas they are among the last topics to be worked out. Thus the order in the proposed list of content is different from the order in the scope.

## Organization:

The SC should take a more active role than just deciding on the content and supervising the work. This applies in particular to the suggested Tasks 1b (Chapter 2) and 3b (Chapter 4). One approach could be to have SC members submit written contributions to the identified areas in Tasks 3b, 3c and 3d and have one SC member function as editor and prepare the more straight forward parts of the TRM.