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MEETING SUMMARY

Projects Interaction and Review Team (PIRT) Meeting
Abu Dhabi, United Arab Emirates
03 December 2017

Prepared by the CSLF Secretariat

LIST OF ATTENDEES

PIRT Active Members

Australia:	Andrew Barrett (Chair), Max Watson
Canada:	Eddy Chui, Mike Monea
China:	Jinfeng Ma
France:	Didier Bonifoly, Dominique Copin
Japan:	Ryozo Tanaka, Jiro Tanaka
Korea:	Chong-Kun Ryu, Chang-Kun Yi
Mexico:	Jazmin Mota
Netherlands:	Harry Schreurs
Norway:	Lars Ingolf Eide, Åse Slagtern (Technical Group Chair)
Saudi Arabia:	Ammar AlShehri
South Africa:	Nol Kamaiah, Landi Themba
United Kingdom:	Brian Allison
United States:	Mark Ackiewicz
IEAGHG:	Tim Dixon

Other CSLF Delegates

Romania:	Constantin Sava, Anghel Sorin
United Arab Emirates:	Fatma AlFalasi, Reshma Francy

CSLF Secretariat

Richard Lynch

Invited Speaker

Max Watson (CO₂CRC, Australia)

Observers

Japan:	Leandro Figueiredo (JANUS)
Norway:	Arne Graue (University of Bergen)
Saudi Arabia:	Robert Dibble (KAUST)
	Feraih Alenuzey (KACST)
United Kingdom:	Brendan Beck (Consultant to World Bank)
	Ceri Vincent (CO ₂ GeoNet)
United States:	Damien Beauchamp and Bill Brown (NET Power)
	John Harju and Ed Steadman (University of North Dakota Energy and Environmental Research Center)

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1. Welcome

PIRT Chairman Andrew Barrett welcomed participants to the 28th meeting of the PIRT and thanked the United Arab Emirates Ministry of Energy and Industry for hosting the meeting. Mr. Barrett stated that the agenda was a busy one that included review of one project nominated for CSLF recognition and a preview of the new 2017 CSLF Technology Roadmap (TRM). Additionally, there would be an update on possible future activities for the CSLF Technical Group and a review of recommended changes to the PIRT's Terms of Reference document.

2. Introduction of Meeting Attendees

PIRT meeting attendees introduced themselves. In all, fifteen CSLF delegations were represented at the meeting.

3. Adoption of Agenda

The draft agenda for the meeting, which had been prepared by the CSLF Secretariat, was adopted without change.

4. Approval of Meeting Summary from Tokyo PIRT Meeting

The Meeting Summary from the April 2017 PIRT meeting in Abu Dhabi was approved as final with no changes.

5. Report from CSLF Secretariat

Richard Lynch provided a brief two-part report from the Secretariat, which covered the status of CSLF-recognized projects and outcomes from the April 2017 PIRT meeting.

Concerning the portfolio of CSLF-recognized projects, Mr. Lynch stated that as of December 2017 there were 33 active projects and 20 completed projects spread out over five continents, though this would change based on outcomes from the current meeting. For the current meeting, one new project had been proposed for CSLF recognition.

Mr. Lynch reported the following outcomes from the Abu Dhabi meeting:

- The PIRT recommended approval by the Technical Group for three projects:
 - Al Reyadah CCUS Project
 - National Risk Assessment Partnership
 - Carbon Capture Simulation Initiative / Carbon Capture Simulation for Industry Impact
- A mostly-final draft of the TRM was completed and sent to CSLF delegations for review and comments.
- The PIRT's new project engagement initiative has produced useful information, but this is only a starting point.

There also had been two actions from the meeting (both of which were completed):

- A working group consisting of the PIRT Chair, Technical Group Chair, Communications Task Force Chair, and Secretariat was established to review the CSLF and PIRT Terms of Reference documents to clarify project qualifications for CSLF recognition.

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- The Secretariat was asked to revise the Project Engagement survey form to ask project sponsors why they had sought CSLF recognition and what benefits they expected from such recognition.

6. Preview of 2017 TRM

The TRM editor, Lars Ingolf Eide, gave a short presentation that previewed the new 2017 TRM. The Working Group for updating the TRM was chaired by Australia with representation from Norway, Canada, South Africa, the United Kingdom, the United States, the IEAGHG, and the CSLF Secretariat. In addition, there were contributions from several international experts on CCS. The overall approach was to refresh the structure and content of the 2013 TRM as needed, in order to keep the overall level of effort to a manageable level.

Mr. Eide briefly described the main changes from the 2013 TRM:

- New time horizons are being used for medium- and long-term recommendations and targets (2025 and 2035 respectively, instead of the previous TRM's target dates of 2030 and 2050).
- The "Background" chapter was revised to reflect COP21 targets, and quantitative targets which meet the IEA 2°C scenario were used for CO₂ capture and storage.
- A new section was included on non-technical measures such as regulations, and there is expanded discussion on CCS, CCU, and CCUS. In the 2017 TRM, CCUS was defined as a subset of CCS.

Mr. Eide stated that the main finding of the 2017 TRM is that CCS has been proven to work and has been implemented in power and industrial settings. However, there needs to be a sense of urgency to drive any action. Also, substantial investment in CCS and other low-carbon technologies is needed to achieve the targets of the Paris Agreement. Main barriers to implementation are inadequate government investment and policy/support incentives as well as uncertainties and risk that are stifling private sector investment. Rapid deployment of CCS is critical in the industry and power sectors, and negative CO₂ emissions can be achieved by using a combination of biomass and CCS. Finally, costs and implementation risks can be reduced by developing industrial clusters and CO₂ transport and storage hubs.

Mr. Eide stated that there are many priority recommendations made by the TRM:

- Based on the Paris Agreement's 2°C scenario, governments and industry should work together to contribute to the COP21 targets by implementing sufficient large-scale projects in the power and industry sectors to achieve:
 - Long-term isolation from the atmosphere of at least 400 megatonnes (Mt) of CO₂ per year by 2025 (or have permanently captured and stored 1,800 Mt CO₂); and
 - Long-term isolation from the atmosphere of at least 2,400 Mt CO₂ per year by 2035 (or have permanently captured and stored 16,000 Mt CO₂).
- In order to achieve these goals, CSLF members recommend the following actions to CSLF Ministers:
 - Promote the value of CCS in achieving domestic energy goals and global climate goals;
 - Incentivize investments in CCS by developing and implementing policy frameworks;

- Facilitate innovative business models for CCS projects;
- Implement legal and regulatory frameworks for CCS;
- Facilitate CCS infrastructure development;
- Build trust and engage stakeholders through CCS public outreach and education;
- Leverage existing large-scale projects to promote knowledge exchange opportunities;
- Drive costs down along the entire CCS chain through R&D;
- Accelerate CCS in developing countries by funding storage appraisals and technology readiness assessments; and
- Facilitate implementation of CO₂ utilization.

Mr. Eide concluded his presentations by summarizing the TRM's key message to CSLF Ministers: Governments have a critical role in accelerating the deployment of CCS.

7. Recommended Updates to PIRT and CSLF Terms of Reference

Mr. Lynch provided background for this agenda item by stating that at the May 2017 CSLF Mid-Year Meeting, the CSLF Policy Group requested that the CSLF Technical Group and the CSLF Communications Task Force review and update CSLF project recognition procedures. The issue was that project recognition was described in both the CSLF Terms of Reference and the PIRT Terms of Reference, and the language in these documents did not agree with each other. In the months following the 2017 Mid-Year Meeting, a working group consisting of the Technical Group Chair and Vice Chairs, PIRT Chair, Communications Task Force Chair, and CSLF Secretariat extensively reviewed both Terms of Reference documents and recommended changes which fell into three categories: (a) updating project recognition procedures; (b) consistency with the CSLF Charter; and (c) other miscellaneous corrections and updates. Mr. Lynch stated that the result of the working group's efforts were marked up versions of both Terms of Reference documents, and that recommended changes to the CSLF Terms of Reference were to be addressed by the Policy Group at its meeting.

There was much ensuing discussion about the changes proposed for the PIRT Terms of Reference. In the end, the changes recommended by the working group were all accepted, but during the discussion other changes were proposed by Ryozo Tanaka, Dieter Bonjoly, and Harry Schreurs and these were also accepted. The Secretariat was asked to produce a new version of the document that incorporates all of the changes. (*Note: the revised PIRT Terms of Reference is appended to the end of this Summary.*)

8. Review and Approval of Project Proposed for CSLF-Recognition: CO₂CRC Otway Project Stage 3

Max Watson, representing project sponsor CO₂CRC, gave a technically detailed presentation about the Otway Stage 3 project. This is the third stage of a multistage CO₂ storage program, located in southwestern Victoria, Australia. The goal is to validate cost and operationally effective subsurface monitoring technologies to accelerate the implementation of commercial CCS projects. Specific objectives include developing and validating the concept of risk-based CO₂ monitoring and validation (M&V), assessing the application of innovative M&V techniques through trials against a small-scale CO₂ storage operation at the Otway research facility, and expanding the existing Otway facility such that field trials of various storage R&D are possible, including low invasive, cost-effective monitoring and migration management. An anticipated outcome is that this

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project will result in improved and less expensive M&V techniques which will be applicable to other onshore sites as well as sub-seabed CO₂ storage projects.

Outcome: After a discussion which clarified some of the details about the project, there was unanimous consensus by the PIRT to recommend approval of the CO₂CRC Otway Project Stage 3 by the Technical Group. Project nominators are Australia (lead), Canada, France, Mexico, Norway, Saudi Arabia, and the United Kingdom.

9. Update from Working Group on Evaluating Existing and New Ideas for Possible Future Technical Group Activities

At the 2017 CSLF Mid-Year Meeting, a working group (led by Norway) had been created by the Technical Group to appraise all unaddressed items in the Action Plan from 2015, propose new topics for appraisal, and review past task force reports to see if any updates are warranted.

The CSLF Technical Group Chair, Åse Slagtern, made a short presentation that summarized existing Technical Group activities and possible new ones in advance of a more detailed discussion during the next day's full Technical Group Meeting. There are currently four active task forces besides the PIRT: Improved Force Space Utilization (co-chaired by Australia and the United Kingdom), Bioenergy with CCS (chaired by the United States), Industrial CCS (chaired by France), and Onshore CO₂-EOR (chaired by Norway and which completed its activities in 2017). Ms. Slagtern stated that there are eleven other possible future actions, identified by the 2015 working group, but there had not yet been any consensus to form task forces around these possible actions. Additionally, there have been eleven other actions which were completed between 2006 and 2015 and have resulted in task force final reports.

The current working group chair, Lars Ingolf Eide, then described the process for developing and prioritizing a long list of future potential actions. In all, 24 potential new topics were included – eleven unaddressed items from 2015, eleven past task force topics (for possible updates), and two new proposals. The members of the working group then participated in a preference poll which resulted in a “final four” of highest ranked topics:

1. Hydrogen as a Tool to Decarbonize Industries (which was the clear winner)
2. Reviewing Best Practices and Standards for Geologic Monitoring and Storage of CO₂
3. CO₂ Capture by Mineralization
4. Global Scaling of CCS

Mr. Eide stated that for the proposed action on Hydrogen as a Tool to Decarbonize Industries, the working group had come up with several sub-topics that could be addressed: hydrogen production and use; hydrogen with CCS, synergies with renewables, life cycle costs and carbon footprint; and hydrogen value chain. Additionally, there are several existing activities and programs – in Europe, Japan, and the United States as well as with multinational energy companies such as Statoil, Gasunie, and Vattenfall Nuon – which could be mapped in a “Phase 0” of a new Technical Group task force. Ensuing discussion emphasized the need to make linkages with existing efforts that have already been funded and that this “mapping” effort needs to be accomplished before a new task force can effectively move forward. Since this is not a PIRT activity, further discussion was deferred until the next day's meeting of the full Technical Group.

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10. General Discussion and New Business

Mr. Eide suggested that the PIRT should find ways on how to measure CCUS progress in light of current TRM recommendations. He also suggested that, in the longer term, the PIRT could utilize expertise and learnings from CSLF-recognized projects as an input to future editions of the TRM. To that end, a small working group was organized to further explore the feasibility of doing this. Volunteers include Australia (Andrew Barrett), Canada (Mike Monea), Norway (Lars Ingolf Eide), the United Kingdom (Brian Allison), the United States (Mark Ackiewicz), the Technical Group Chair (Ase Slagtern), and the CSLF Secretariat (Richard Lynch).

11. Adjourn

Mr. Barrett thanked the attendees for their interactive participation, expressed his appreciation to the host United Arab Emirates Ministry of Energy and Industry, and adjourned the meeting.

Summary of Meeting Outcomes

- The PIRT has recommended approval by the Technical Group for the CO2CRC Otway Project Stage 3.
- The 2017 TRM is completed and has been launched.
- The PIRT's Terms of Reference document has been revised in order to update project recognition procedures, become consistent with the CSLF Charter, and fix other miscellaneous inaccuracies.
- A PIRT working group was organized to explore and suggest approaches for tracking follow-up and progress of the TRM recommendations. The group should also explore the feasibility of utilizing expertise and learnings from CSLF-recognized projects as input to future editions of the TRM.

Actions

- The CSLF Secretariat will produce a new version of the PIRT Terms of Reference which incorporates the agreed changes. (*Note: the new version is appended below.*)



Terms of Reference

Revised 03 December 2017

CSLF Projects Interaction and Review Team (PIRT)

Background

One of the main instruments to help the CSLF achieve its goals is through the recognition of projects. Learnings from CSLF-recognized projects are key elements to knowledge sharing which will ultimately assist in the acceleration of the deployment of carbon capture, utilization and storage (CCUS) technologies. It is therefore of major importance to have appropriate mechanisms within the CSLF for the recognition, assessment and dissemination of projects and their results for the benefit of the CSLF and its Members. To meet this need the CSLF has created an advisory body, the PIRT, which reports to the CSLF Technical Group.

PIRT Functions

The PIRT has the following functions:

- Assess projects proposed for recognition by the CSLF in accordance with the project selection criteria developed by the PIRT. Based on this assessment make recommendations to the Technical Group on whether a project should be accepted for recognition by the CSLF.
- Review the CSLF project portfolio of recognized projects and identify synergies, complementarities and gaps, providing feedback to the Technical Group
- Recommend where it would be appropriate to have CSLF-recognized projects.
- Foster enhanced international collaboration for CSLF-recognized projects.
- Ensure a framework for periodically reporting to the Technical Group on the progress within CSLF projects.
- Organize periodic events to facilitate the exchange of experience and views on issues of common interest among CSLF projects and provide feedback to the CSLF.
- Manage technical knowledge sharing activities with other organizations and with CSLF-recognized projects.
- Perform other tasks which may be assigned to it by the CSLF Technical Group.
- Provide input for further revisions of the CSLF Technology Roadmap (TRM) and respond to the recommended priority actions identified in the TRM.

Membership of the PIRT

The PIRT consists of:

- A core group of Active Members comprising Delegates to the Technical Group, or as nominated by a CSLF Member country. Active Members will be required to participate in the operation of the PIRT.
- An ad-hoc group of Stakeholders comprising representatives from CSLF recognized projects. (note: per Section 3.2 (e) of the CSLF Terms of Reference and Procedures, the Technical Group may designate resource persons).

The PIRT chair will rotate on an *ad hoc* basis and be approved by the Technical Group.

Projects for CSLF Recognition

All projects proposed for recognition by the CSLF shall be evaluated via a CSLF Project Submission Form. The CSLF Project Submission Form shall request from project sponsors the type and quantity of information that will allow the project to be adequately evaluated by the PIRT. The PIRT has the responsibility of keeping the Project Submission Form updated in terms of information being requested from project sponsors.

Additionally:

- Projects seeking CSLF recognition will be considered on their technical merit.
- Projects proposed for CSLF recognition must contribute to the overall CSLF goal to “accelerate the research, development, demonstration, and commercial deployment of improved cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term safe storage or utilization”.
 - There is no restriction on project type to be recognized as long as the project meets the criteria listed below.
 - Learnings from similar projects through time will demonstrate progress in CCUS.
- Projects proposed for CSLF recognition must meet at least one of the following criteria.
 - An integrated CCUS project with a capture, storage, and verification component and a transport mechanism for CO₂.
 - Demonstration at pilot- or commercial-scale of new or new applications of technologies in at least one part of the CCUS chain.
 - Demonstration of safe geological storage of CO₂ at pilot- or commercial-scale.
 - Demonstration of a toolkit which accelerates the demonstration and/or deployment of CCUS.

Operation and Procedures of the PIRT

- The PIRT will establish its operational procedures.
- The PIRT should meet as necessary, often before Technical Group meetings, and use electronic communications wherever possible. The PIRT will coordinate with the Technical Group on the agenda and timing of its meetings.
- The TRM will provide guidance for the continuing work program of the PIRT.

Project Recognition

- Completed Project Submission Forms shall be circulated to Active Members by the CSLF Secretariat.
- No later than ten days prior to PIRT meetings, Members are asked to submit a free-text comment, either supporting or identifying issues for discussion on any project proposed for CSLF recognition.
- At PIRT meetings or via proxy through the PIRT Chair, individual country representatives will be required to comment on projects proposed for CSLF recognition.
- Recommendations of the PIRT should be reached by consensus with one vote per member country only.

Information Update and Workshops

- The PIRT shall define a process for interaction with CSLF-recognized projects which includes and describes benefits of project recognition to the project sponsor as well as the CSLF. Project engagement will be done by the PIRT every two years, or in years where there is a Ministerial Meeting; the PIRT will assist in ensuring information is sent to the Secretariat.
- The PIRT will assist in facilitating workshops based on technical themes and technical presentations in Technical Group meetings as required.
- As required, the PIRT will draw on external relevant CCUS expertise.