



MEETING SUMMARY

Projects Interaction and Review Team (PIRT)

Riyadh, Saudi Arabia

01 November 2015

Prepared by the CSLF Secretariat

LIST OF ATTENDEES

PIRT Active Members

Australia:	Andrew Barrett (Acting Chair), Max Watson
Canada:	Eddy Chui, Mike Monea
China:	Xian Zhang
European Commission:	Jeroen Schuppers
France:	Didier Bonijoly, David Savary
Japan:	Ryozo Tanaka
Norway:	Trygve Riis
Saudi Arabia:	Hamoud Al-Otaibi
South Africa:	Tony SurrIDGE
United Kingdom:	Brian Allison, Philip Sharman
United States:	Mark Ackiewicz
GCCSI:	Victor Der
IEAGHG:	Tim Dixon

Other CSLF Delegates

Australia:	Josh Cosgrave
France:	Bernard Frois
Korea:	Chong Kul Ryu, Chang Keun Yi

CSLF Secretariat

Richard Lynch, Adam Wong

Invited Speakers

Australia:	Max Watson, Program Manager – CO ₂ Storage, CO ₂ CRC
Korea:	Chang Keun Yi, Director – Climate Change Research Division, Korea Institute of Energy Research (KIER)
Saudi Arabia:	Tidjani Niass, Chief Technologist – Carbon Management Division, Saudi Aramco Atieh Abu Raqabah, General Manager – Corporate Sustainability, Saudi Arabia Basic Industries Corp. (SABIC)
United States:	Nigel Jenvey, Chairman, CO ₂ Capture Project

Observers

Chinese Taipei:	Vincent S.N. Chen, Yi-Shun Chen, Shoung Ouyang
Czech Republic:	Pavel Kavina
Norway:	Åse Slagtern
Romania:	Mircea Toader
Saudi Arabia:	Saeed Al-Alloush, Alla Yousef Al-Amrey, Saleh Al-Ansari, Aied Al-Dosari, Abdelrahman Al-Gwaiz, Fahad Al-Holi, Abdulaziz Al-Jodai, Adel Al-Khalifah, Fouad Al-Saeedi, Fahad Al-Rashidi, Abdulrahman Al-Suhaibani, Ijaz Chaudhary, Zafar Chaudhry, Abdullah Ghabi, Ahmad Hasanain, Renato Hoogeveen, Abdullah Maghrabi, Muayad Matar, Shashidhara Math, Pieter Smeets, Shishir Tamotia, Abdullah Tawlah
United States:	Ed Dodge, Tip Meckel, Michael Moore, Barry Worthington
IEA:	Tristan Stanley

1. Welcome and Review of PIRT Functions

Acting PIRT Chairman Andrew Barrett introduced himself and welcomed participants to the 24th meeting of the PIRT. Mr. Barrett informed the PIRT members that he was replacing Clinton Foster, who had retired. Mr. Barrett stated that the current meeting would include several presentations from projects being nominated for CSLF recognition, and also a discussion on future PIRT activities including options for the next iteration of the CSLF Technology Roadmap (TRM).

2. Introduction of Meeting Attendees

PIRT meeting attendees introduced themselves. In all, twelve 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 with the addition of a presentation by the “Dry Solid Sorbent CO₂ Capture Project”, which had been nominated by Korea for CSLF recognition. This project had been proposed for CSLF recognition too near the PIRT meeting date for a normal review cycle, but PIRT Active Members agreed to allow the project to be reviewed at the current meeting.

4. Approval of Meeting Summary from Regina PIRT Meeting

The Meeting Summary from the June 2015 PIRT meeting in Regina was approved as final with no changes.

5. Report from CSLF Secretariat

Richard Lynch provided a multi-part report from the Secretariat, which covered the status of CSLF-recognized projects, PIRT consensuses from the June 2015 meeting in Regina, and the TRM Interim Report.

Concerning the portfolio of CSLF-recognized projects, Mr. Lynch stated that as of the October 2015 there were 29 active projects and 15 completed projects, spread out over

five continents. Recent changes include addition of the Jingbian Carbon Capture and Storage (CCS) Project, which was recognized by the CSLF at its June meeting in Regina, and successful completion of the CGS Europe Project, the CO₂CRC Otway Project Stage 1, and the CO₂ Capture Project, Phase 3. For the current meeting, five new projects have been nominated for CSLF recognition.

Mr. Lynch reported that there were two consensuses from the Regina meeting. The PIRT recommended approval by the Technical Group of the Jingbian CCS Project, and the PIRT will decide at the Riyadh meeting the format and frequency of future TRM updates.

Concerning the draft TRM Interim Report, Mr. Lynch stated that this document is an outgrowth of the 2013 TRM which had been launched at the 5th CSLF Ministerial in 2013. An objective of the 2013 TRM was to answer three key questions:

- What is the current state of CCS technology and deployment, particularly in CSLF member countries?
- Where should CCS be by the year 2020 and beyond?
- What is needed to get to these advanced stages of development and deployment, while also addressing the different circumstances of developed and developing countries?

The 2013 TRM identified ten technology needs areas, and to gauge progress a template for gathering information about these ten areas was sent to representatives of many different research organizations which are working on carbon capture, utilization and storage (CCUS). Information gleaned from completed templates was used to prepare the initial draft of the TRM Interim Report, which was reviewed by the PIRT at its Regina meeting. It was decided that the initial draft inaccurately described progress in the ten technology needs areas, so a second survey was done to obtain viewpoints from world-class experts on technology readiness in the technology needs areas. The Secretariat then edited the new information into the final version of the report, which became a deliverable to the CSLF Ministers.

Mr. Lynch provided the following conclusions and recommendations from the TRM Interim Report:

- Except for a very few niche industrial sector applications, for 1st generation technologies, none of the ten technology needs areas perceived as progress being ‘fast moving’. Instead, ‘slow to moderate’ progress toward implementation was generally perceived, mainly because of existing policy and economic barriers.
- Technical readiness of first generation CCUS technologies were perceived, in general, as ready for large-scale commercial deployment.
- Concerning economic barriers, governments should urgently consider methods to assist stakeholders to significantly drive down the cost of CCUS deployment, since it is the stakeholders who will be making the majority of the financial investments.
- Concerning policy barriers, governments should review institutional regulatory policies to identify how these barriers to CCUS deployment may be reduced.
- Concerning technology barriers, stakeholders should increase their mechanisms for sharing best practices, particularly regarding communications, regulation and cost reduction, and pledge to engage in public-private partnerships to encourage

the development of additional demonstration projects and facilitate the development of CCUS projects internationally.

Mr. Lynch closed his presentation with the following messages to Ministers that were included in the report:

- Ministers should be champions of CCS. CCS should be a key component of any CO₂ emissions reduction strategy.
- Ministers should recognize the contribution that CCS can provide in terms of energy security.
- Ministers should understand that CCS deployment will create and preserve jobs.

6. Review and Approval of Project Proposed for CSLF-Recognition: CO₂ Capture Project, Phase 4

Nigel Jenvey, the Chairman of the CO₂ Capture Project, gave a presentation that described the 4th phase of the project. This is a multi-discipline project whose goal is to further increase understanding of existing, emerging, and breakthrough CO₂ capture technologies applied to oil and gas application scenarios (now including separation from natural gas), along with verification of safe and secure storage of CO₂ in the subsurface (now including utilization for enhanced oil recovery). The overall goal is to advance the technologies which will underpin the deployment of industrial-scale CO₂ capture and storage. Phase 4 of the project will extend through the year 2018 and includes four work streams: storage monitoring and verification; capture; policy & incentives; and communications.

Outcome: After a comprehensive discussion, there was unanimous consensus by the PIRT to recommend approval of the CO₂ Capture Project, Phase 4 by the Technical Group.

7. Review and Approval of Project Proposed for CSLF-Recognition: CO₂CRC Otway Project, Stage 2

Max Watson, representing project sponsor CO₂CRC, presented the 2nd stage of a multi-stage CO₂ storage program at the Otway Project, located in southwestern Victoria, Australia. The goal is to increase the knowledge base for CO₂ storage in geologic deep saline formations through seismic visualization of injected CO₂ migration and stabilization. Stage 2 of the overall project will extend into the year 2020 and will include sequestration of approx. 15,000 tonnes of CO₂. The injected plume will be observed from injection through to stabilization, to assist in the calibrating and validation of reservoir modelling's predictive capability. An anticipated outcome from the project will be improvement on methodologies for the characterization, injection and monitoring of CO₂ storage in deep saline formations.

Outcome: After a comprehensive discussion, there was unanimous consensus by the PIRT to recommend approval of the CO₂CRC Otway Project, Stage 2 by the Technical Group.

8. Review and Approval of Project Proposed for CSLF-Recognition: Oxy-Combustion of Heavy Liquid Fuels Project

Tidjani Niass, representing project sponsor Saudi Aramco, gave a presentation about its oxy-combustion project. This is a large pilot project (approx. 30-60 MW_{th} in scale), located in Dhahran, Saudi Arabia whose goals are to investigate the performance of oxy-fuel combustion technology when firing difficult-to-burn liquid fuels such as asphalt, and

to assess the operation and performance of the CO₂ capture unit of the project. The project will build on knowledge from a 15 MW_{th} oxy-combustion small pilot that was operated in the United States by Alstom. An anticipated outcome from the project will be identifying and overcoming scale-up and bottleneck issues as a step toward future commercialization of the technology.

Outcome: After a comprehensive discussion, there was unanimous consensus by the PIRT to recommend approval of the Oxy-Combustion of Heavy Liquid Fuels Project by the Technical Group.

9. Review and Approval of Project Proposed for CSLF-Recognition: Carbon Capture and Utilization Project / CO₂ Network Project

Atieh Abu Raqabah, representing project sponsor SABIC, gave a presentation about its carbon capture and utilization project. This is a large-scale CO₂ utilization project, including approx. 25 kilometers of pipeline infrastructure, which captures and purifies CO₂ from an existing ethylene glycol production facility located in Jubail, Saudi Arabia. More than 1,500 tonnes of CO₂ per day will be captured and transported via pipeline, for utilization mainly as a feedstock for production of methanol, urea, oxy-alcohols, and polycarbonates. Food-grade CO₂ is also a product, and the CO₂ pipeline network can be further expanded as opportunities present themselves.

Outcome: After a comprehensive discussion, there was unanimous consensus by the PIRT to recommend approval of the Carbon Capture and Utilization Project / CO₂ Network Project by the Technical Group.

10. Review and Approval of Project Proposed for CSLF-Recognition: Dry Solid Sorbent CO₂ Capture Project

Chang Keun Yi, representing project sponsor KIER, gave a presentation about its CO₂ capture project. This is a pilot-scale project, located in southern Korea, which is demonstrating capture of CO₂ from a 10 MW_e power plant flue gas slipstream, using a potassium carbonate-based solid sorbent. The overall goal is to demonstrate the feasibility of dry solid sorbent capture while improving the economics (target: US\$40 per tonne CO₂ captured). The project will extend through most of the year 2017. There will be 180 days continuous operation each year with capture of approx. 200 tonnes CO₂ per day at more than 95% CO₂ purity.

Outcome: After a comprehensive discussion, there was unanimous consensus by the PIRT to recommend approval of the Dry Solid Sorbent CO₂ Capture Project by the Technical Group.

11. Future PIRT Activities

Mr. Barrett stated that future PIRT activities mostly fall into three main categories: review of projects proposed for CSLF recognition, planning for future technology workshops, and updating the TRM. Concerning future workshops, Ryoza Tanaka noted that Japan is planning to host the 2016 Annual Meeting, including a workshop, and expressed his thought that at least part of the workshop should highlight Japan's CCS activities and include presentations by several Japanese speakers. Mark Ackiewicz proposed that it would be useful for a workshop to take a retrospective look at completed projects, with a focus on challenges and lessons learned. And Tim Dixon recommended that knowledge sharing be a central theme for all future workshops.

Concerning future updates to the TRM, Mr. Lynch stated that there were three main options for 2016: do a complete revision of the 2013 TRM, do another Interim Report, or do nothing. Philip Sharman suggested that there probably was not a near-term need for either an overall revision or a new Interim Report, as the current Interim Report shows that the 2013 TRM is still a good document that has not significantly aged. Trygve Riis agreed, but stated that the PIRT should not wait until the end of 2016 to decide on what comes next. Mr. Riis suggested that, during 2016, the PIRT determine a template for a 2017 TRM in terms of format and desired content. After further brief discussion there was general agreement on this approach. To that end, Mr. Barrett stated that the PIRT will recommend that the Technical Group assign a working group that will formulate process and structure for future TRM activities.

12. Open Discussion and New Business

Mr. Lynch noted that the name of this task force includes the words ‘projects interaction’ and inquired if more should be done to better engage the sponsors of projects in the CSLF portfolio. Mr. Sharman responded that the PIRT is already actively engaged through workshops and from soliciting their input to the TRM. Mr. Ackiewicz agreed, but suggested that the PIRT could still use a more proactive approach starting with determining what specific information it needs from project sponsors. No action was proposed, though this may be taken up again at a future PIRT meeting.

13. Adjourn

Mr. Barrett thanked the attendees for their participation, expressed his appreciation to Saudi Arabia for hosting the 6th CSLF Ministerial, and adjourned the meeting.

Summary of Consensuses

- The PIRT recommends approval by the Technical Group for the CO₂ Capture Project – Phase 3.
- The PIRT recommends approval by the Technical Group for the CO₂CRC Otway Project Stage 2.
- The PIRT recommends approval by the Technical Group for the Oxy-Combustion of Heavy Liquid Fuels Project.
- The PIRT recommends approval by the Technical Group for the Carbon Capture and Utilization Project / CO₂ Network Project.
- The PIRT recommends approval by the Technical Group for the Dry Solid Sorbent CO₂ Capture Project.
- The PIRT recommends that the Technical Group assign a working group to formulate process and structure for future revisions of the TRM.