2014 CSLF Technology Workshop

Summary and Key Messages from Session 1: Cost Reduction Strategies for CO_2 Capture

The session was chaired by Philip Sharman (United Kingdom) and Mark Ackiewicz (United States).

Panelists were:

1. Frank Morton, Southern Company Services, United States
2. Chong Kul Ryu, KEPCO Research Institute, Korea
3. Edward Steadman, EERC, United States
4. Lars Ingolf Eide, Research Council of Norway

Main Takeaways from the Session

A. Technological innovation in the field of carbon capture is important and critical to the commercial deployment of carbon capture and storage (CCS). There are many carbon separation and capture technologies (e.g., solvents, sorbents, membranes, oxy-combustion, chemical looping, etc.) that are being developed, with some technologies currently being tested in demonstration projects, others that are being tested in small and large pilot-scale tests, and others at the laboratory and bench-scale. This wide range of options is appropriate at this time to drive down costs and improve energy efficiency and have options available for various industries and applications. There is an expectation however that consolidation of these options will occur at some point in the future.

B. There has been a growing emphasis on transitioning advanced capture technologies from lab-scale to pilot-scale over the last five years. Technology scale-up is seen as a critical step to cost reductions and technology validation of carbon capture, particularly for second and third generation technologies. Scale-up is also seen as one of the most challenging aspects of technology development. It is time-consuming and challenging, often taking decades for transitioning from lab to commercial deployment. The number of scale-up steps also poses a challenge, requiring several orders of magnitude (e.g., 1 MW pilot to 10 MW pilot to 100 MW demonstration). While computer simulations and modeling are important, can have an impact in cost and time reduction, and need to continue, there is no substitute for the experience and knowledge gained through real-world testing. Pilot- and demonstration-scale testing plays a critical role in addressing key technical and operational risks and to verify economics at scale. Additionally, pilot- and demonstration-scale testing is important in understanding the dynamics of new capture technologies and their interactions with power plant components and technologies.

C. While technology development and innovation is important, it must be rooted in having clearly defined targets and metrics to help drive sound RD&D investment decisions. The

experience of technologies deployed in other industrial sectors (e.g., gas processing) can help in the investment and decision-making process. Sharing knowledge and best practices and comparative tests is valuable to technology development and scale-up.

D. There are several key considerations that surround the "business" and strategy of carbon capture RD&D. First is to actually have a clear strategy and understanding the role carbon capture has in the context of the whole CCS system/value chain. Consideration and understanding the end-use of carbon dioxide and the role utilization options such as enhanced oil recovery play in cost reduction strategies is necessary. There is a need to have viable business models for cost effective deployment of carbon capture. "Market pull" mechanisms are just as important as "technology push" efforts.

E. Collaboration is also essential and there are several different levels of collaboration. There is the interdisciplinary collaboration that is necessary for the development of advanced capture technologies. For example, chemistry, process engineering, and equipment design all play an important role in optimizing different capture approaches. Collaboration is also need among capture, transport, and storage components along the CCS value chain to ensure system optimization (i.e., balance flow rates and capture rates). International collaboration is also important to communicate knowledge, lessons learned, and best practices to ensure success. Capacity building is important as is the need to retain expertise.

F. There must be continued and sustained support not just for capture R&D but for CCS as a whole, including pilots and demonstration projects. Continuity of support is critical, particularly for demonstration projects which are large, complex, multi-year endeavors requiring significant financial, human, and technical resources.