Lessons Learned and Best Practices from Managing CCS/CCUS Projects

Jared Walker

1Battelle, Columbus, Ohio, USA

Abstract:

In many ways a carbon capture and storage (CCS) or a carbon capture utilization and storage (CCUS) project is similar to an oil and gas (O&G) project, yet there are also many details that are quite different. This paper summarizes the experience gained from managing all three types of projects. The technicalities of working under the distinct regulations, the diverse drivers for each business, and the planning are just some of the ways these projects differ. Each project needs specific guidance and management and it is important that the management team is experienced in the project it is assigned to. The best practices and lessons learned on each type of project can be used to improve planning and operation. This paper shows the differences, similarities, best practices, and lessons learned from a number of diverse projects from around the globe in differing political, environmental and regulatory atmospheres with the hope that these insights can be applied to future projects and help drive success in the CCS and CCUS industry.

One of the primary differences between CCS/CCUS projects and typical oil and gas is the economic drivers and framework under which each works. The traditional O&G project is driven by the most efficient use of resources to retrieve the most oil and gas from the reservoir. If CO2 is used during an enhanced oil recovery (EOR) operation it is treated as a commodity and cost. As little as possible is used per recovered barrel of oil in order to maximize profitability. For pure CCS projects the driver is to store as much CO2 as possible while maximizing use of pore space, monitoring techniques, and capture / compression costs. At the end of a EOR field’s life, with the correct motivation, the operations will be altered to resemble more closely CCS operations. This change will occur when the incentive for storing CO2 is greater than the cost for purchasing new CO2 for future operations. The CCS project is also driven by a robust risk management plan that is followed and updated throughout the project lifecycle.

Other drivers include uncertainty and risk management. The risk profile associated with a traditional O&G more closely resembles that of CCUS, while that of CCS has additional concerns of public perception, pore space rights, political environment, etc. Addressing these risks and concerns is a key differentiator between O&G and CCS and one that has been addressed in many ways in different projects.

The regulatory environment is very different between the two entities as well. O&G has rules set forth after years of refinement and that are well known. CCS is under new regulations that are oft
times restrictive and prescriptive in nature. Complying with these new regulations is often very costly. These regulations include guidance on monitoring, verification, and accounting practices employed during a project.

Large O&G companies are often split into teams: exploration, appraisal, development and production. These teams are each focused on their area of expertise and the integration between the teams is often minimal. On a CCS project all teams (e.g. geologic, geomechanical, economic, public outreach, project management, monitoring) are involved from the initial concept through to the project close out. They work together through basin analysis, modeling, data gathering, site selection, drilling, injection, monitoring and close out. This process takes a strong yet broad project team.

Some other areas of best practices and lessons learned include preparation and planning, communications, stakeholder management, procurement, site and third-party management, operations, MMV (monitoring, measurement and verification), project management, risk management, and financial management.

CCS and CCUS are still in their infancy as commercial industries. Being first in any endeavor or new business comes with its own set of challenges and a steep learning curve. This steep learning curve is accompanied by best practices and lessons learned (at times through trial and error). Not all lessons learned would have changed the outcome of the project, but they would have created less stress and possibly would have helped the project run smoother and more efficiently. This paper is also meant to share the experiences, both positive and negative, related to the planning, preparation, construction and operation of a CCS/CCUS and O&G project. It is hoped that sharing this knowledge will lead to more efficient operations at future CCS sites helping other avoid the pitfalls that affected these projects and build on the knowledge and experience gained.

By acknowledging the differences between CCS, CCUS and O&G projects and applying the best practices and lessons learned from different projects on a global scale, future CCS and CCUS projects can benefit and have a better chance at successful outcomes.