Extent to Which CO₂ Utilization Technologies May Incentivize CCUS Deployment

At the request of the U.S. Secretary of Energy, Ernest Moniz, the National Coal Council examined how EOR and other CO₂ utilization opportunities could incentivize the deployment of carbon capture, utilization and storage (CCUS) technologies. The main findings included:

- U.S. law currently favors geologic storage/utilization technologies; non-geologic CO₂ uses must demonstrate that they are as effective as geologic storage.
- Timing of U.S. and international climate goals point towards the use of CO₂ utilization technologies that are either already commercialized or near commercialization.
- There is a misalignment of needs between industries who would utilize CO₂ and the power sector.
- CCUS technology deployments face a host of unresolved impediments that are unlikely to be mitigated by market demand for CO₂ alone in any near- to intermediate-term scenario.
- With the exception of geological utilization under appropriate circumstances, CO₂ utilization is unlikely by itself to incentivize CCUS technologies.
- CO₂-EOR – including production and storage activities in residual oil zones (ROZ) – remains the CO₂ utilization technology with the greatest potential to incentivize CCUS.

The key recommendations included:

- A regulatory based, incentive and tax compliant framework that provides a well-defined no-regrets economic calculus that limits the loss-of-capital to the investment community in FOAK (first-of-a-kind) CCUS projects should be developed.
- Monetary, regulatory and policy investments in CO₂ utilization technologies should be roughly prioritized from geologic to non-geologic, with exceptions made if non-geologic technologies are found to be as effective as geologic storage. Assessments should include in all CO₂-dependent products a full life-cycle CO₂ accounting of the displacement of current fossil sources of captured CO₂ by those that utilize CO₂ capture from fossil resources.
- Coordinate State and Federal regulations to provide flexibility to accommodate an acceptable and broad range of potential commercial constructs (among CO₂ producers, intermediaries, investors and ultimate users of the users of CO₂). Each party should be responsible in a well-defined chain-of-custody, with clearly defined MRV requirements and shared and definitive ultimate economic responsibilities for subsequent CO₂ releases.

Monetary, regulatory and policy investments in the following CO₂ utilization and storage technologies, in descending order, are most likely to incentivize the deployment of CCUS technologies:

Current CO₂-EOR
“State-of-the-art” CO₂-EOR
Other geologic uses
Saline storage
Non-geologic uses with effective storage*
Non-geologic uses without effective storage*

*“Effective” storage is defined as being deemed to be as effective as geological storage

While often mentioned as an opportunity, applying CO₂ utilization through conversion – i.e., non-geologic options – would be challenging, especially in the power sector where potential CO₂ users may not be ideally aligned with the regulatory compliance requirements of the power industry. This is because technology developers focused on CO₂ utilization through conversion are likely to require a return on investment in a time frame considered relatively short by the power industry. An owner of a CO₂-emitting facility must consider whether a CO₂ user may discontinue the project due to bankruptcy, market changes or other reasons, leaving the facility owner without a viable regulatory compliance strategy. Thus, even if CO₂ utilization is an option, a backup plan for storage may also be necessary.

With the exception of CO₂-EOR, the following hurdles must be overcome for CO₂ utilization to incentivize CCUS:

- Cost of capture is too high for many large-scale utilization options
- The market and/or raw material are often insufficient compared to CO₂ emissions
- Nearly all non-geologic CO₂ utilization technologies are not yet commercial
- The required geographic subsurface and/or infrastructure are often not available
- Legal and regulatory framework around CO₂ storage presents challenges

Despite these barriers, further investments in CO₂ utilization technologies should be undertaken. On a case-by-case basis deployment of a CO₂ utilization technology may hold promise for turning an uneconomic project into an economic one.