A Basin-Scale View of Carbon Storage Plays in the Northern Gulf of Mexico

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ABSTRACT

Growing concerns about climate change are driving interest in atmospheric carbon mitigation, including renewable energy, improved efficiency and carbon capture and storage (CCS). CCS is the practice of capturing point-source CO_2 emissions (e.g., from power plants, steel mills, petrochemical refineries, etc.), separating them from the other flue gases and permanently sequestering them deep underground in current or depleted hydrocarbon fields or in saline reservoirs with robust seals. The technology is well understood and proven safe over decades of R&D and commercial deployment in CO_2–EOR operations. The challenge now is to scale sequestration to meet the requirements of climate change mitigation.

Although the geology is similar, exploring for carbon storage sites is significantly different from the hunt for hydrocarbons. First, the optimal pressure conditions for storage occur predominantly in a relatively narrow depth window between 1 km and roughly 3 km. Second, legacy wells create holes in the geologic seal and thus represent leakage risks that need to be avoided or assessed and possibly mitigated. Third, the geologic requirements for storage are far more flexible than for finding oil and gas—the real trick is not finding potential storage sites but identifying those with optimal cost-benefit.

Hydrocarbon exploration has often highlighted the value of basin-scale analysis, which creates a systems-scale perspective for explorers and enables a portfolio approach and assurance for investors. Although CCS is in its infancy, a basin-scale view offers similar potential advantages. We present new analysis of regional seismic lines that highlights a wide range of potential storage plays. These vary by geography and geology but the perhaps the most salient common factor is the potential for injecting in synclines. Stand-off from legacy well clusters and potentially thicker, less complicated sands creates new running room for storage, even in a densely drilled province like the northern Gulf of Mexico.

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