CLEAN HYDROGEN PRODUCTION AND CARBON CAPTURE STORAGE AND UTILIZATION (CCS, CCUS)

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Bayou Bend CCS Project - Chevron & Talos & Equinor

- Bayou Bend is positioned to be one of the largest CCS solutions in the US for industrial emitters,
- Nearly 140,000 gross acres of pore space for permanent carbon dioxide (CO₂) sequestration and gross potential storage resources of more than 1 billion metric tons.

EOR
CCS or Enhanced gas recovery
CCS in Saline aquifer
Commercial-Scale CCS Projects

Petra Nova facility was designed to transport CO$_2$ captured from a coal-fired power plant located about 80 miles away for enhanced oil recovery at a mature oil field operated by Houston-based Hilcorp.

“Petra Nova proved that the employed technology works at commercial scale; however, the Petra Nova team encountered several challenges, as one would expect with any first-of-a-kind large-scale facility”.

- Power outages at the coal plant
- CO$_2$ pipeline shutdowns
- Bottlenecks at field facilities
- A Category 4 hurricane that impacted the entire region (2017)
CCS History & Challenges

- Terrell Natural Gas processing plant, Texas (1971)
- 50 years of CCS projects (Canada, Europe, The Middle East, Asia pacific). The United States leads with 12 projects, 17 new projects were announced in 2020, and a surge in new Class VI applications (~98) attributed to Inflation Reduction Act (IRA). 93% are planned for permanent storage (not EOR)

**Persisting challenges**
- Class VI Injection permit, lease attractive pore space, and pipeline
- Reduce project cost and improve efficiency for both capture and storage
- Safety and security of storage (site selection, injectivity, capacity estimate, caprock integrity, etc.)
- Modeling underground storage and accurate predictions over a long time storage project
- Innovation to improve project economics
- Pore space availability for CO₂, Natural Gas, and Hydrogen
- Construction equipment and labor cost increase
Large-Scale CCS Experiment and Simulation

FluidFlower Rig - Intended Geometry motivated by a Norwegian reservoir

CO₂ dissolved in water

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