

Geologic and economic criteria for siting clean-coal facilities in the Texas Gulf Coast, USA

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Abstract:

The Texas Gulf Coast (TGC) contains the greatest number of favorably co-located CO₂ sources and sinks in Texas that favor new potential clean-coal facilities. Areas in the TGC with clean-coal potential were delineated by mapping spatial linkages between coal- and lignite-bearing formations and geologic and infrastructure factors that include proximity to existing fields from mine-mouth power plants for enhanced oil recovery (EOR), length of new pipelines to transport CO₂ from new clean-coal facilities to either EOR fields or to brine formations for deep storage, proximity to centers of electric load, and depth to subsurface coal for enhanced coalbed methane recovery. Other factors include thickness of brine formations for deep storage of CO₂, groundwater and surface-water availability, and proximity to railroads for haulage of western U.S. coal feedstock. Geospatial analysis of maps portraying the distribution of these factors, together with data on volumes of oil recoverable from miscible CO₂ flooding of oil fields, indicates that optimal areas for new clean-coal sites in the TGC are in east and southeast Texas. CO₂ pipeline networks linking these sites to EOR fields are integral components of systems that can typically recover 5–50 million stock tank barrels from miscible CO₂ flooding from each EOR field. Many of these fields with EOR potential (for example, Neches, Long Lake, Conroe, and Livingston) have a great potential for stacked CO₂ storage, in which multiple reservoir zones can undergo EOR development and deeper zones in the field can accommodate excess CO₂ from EOR operations.

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