Screening and Identifying High-Suitability Offshore CCUS Storage Areas in the Gulf of Mexico Using a Multi-Criteria Evaluation Approach

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Abstract

Continued research into reservoir characterization and offshore CO2 transportation and infrastructure assets are needed to facilitate the development of safe and successful carbon capture, utilization, and storage (CCUS) projects. Due to the cost and time constraints associated with a detailed site characterization it is necessary to screen and identify viable candidate sites for more detailed analysis. It is therefore critical to have systematic methods to identify the most promising areas for more detailed investigations to reduce impacts from subjective decision processes. A multi-criteria evaluation methodology that incorporates quantitative data with qualitative expert opinion was integrated into a decision-making framework to screen the Gulf of Mexico (GOM) outer continental shelf (OCS) for ideal CO2 storage and EOR sites. The criteria relate to the overall selection, development, and operation of a CCUS project, including favorable geologic characteristics, logistics, and potential risks. Data was compiled for fourteen criteria from several publicly available geographic information system layers and aggregated over 2,568 spatially-balanced points across the study area using the NETL-developed Cumulative Spatial Impact Layers (CSIL) GIS tool. CSIL provides a summation of criteria values from disparate GIS layers at a high spatial resolution to capture small variations within the data. Criterion are scored relative to their perceived importance to given modeled scenarios- the output of which highlights the site/regions with the greatest CO2 storage potential in the GOM OCS under that scenario condition. The methodology presented is highly flexible and allows for changes in valuation to express the importance of any given criteria in a given scenario. The method

considers both technical and non-technical factors impacting the CCUS decision making process with the capacity to efficiently assess higher-priority sites for future field projects that would be most conducive to successful CCUS implementation. Areas ranked as being highly ideal for CO2 storage are located along the Louisiana shelf, while those with the highest EOR potential are positioned along the Texas coastline and the Mississippi River Delta. Sites ideal for geologic storage are in shallow waters and positioned near existing pipeline. EOR sites rank highest when existing oil fields with high residual oil saturations coincide with the locations of multi-purpose platforms.

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