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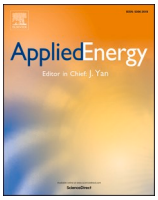

A general review of CO_2 sequestration in underground geological formations and assessment of depleted hydrocarbon reservoirs in the Niger Delta☆

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HIGHLIGHTS

- Niger Delta depleted oil/gas reservoir CO_2 capture, utilization & storage reviewed
- Potential issues relating to CO_2 sequestration and modeling in Niger Delta noted
- Appropriate CFD solution should combine static and dynamic model.
- Research gaps identified and future directions recommended.

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ABSTRACT

This paper investigates the viability of CO_2 storage in geological formations, including depleted hydrocarbon reservoirs applying 3-dimensional seismic and well data of the Niger Delta region as a case study for CO_2 sequestration, which represents an essential initiative for the reduction of greenhouse gas emissions. Different theoretical and experimental studies from literature on CO_2 sequestration in geological formations across the world, including the Niger Delta, are reviewed. The Niger Delta basin has a high potential for CO_2 sequestration, and this indication is shown through the review of research papers undertaken outside and within the basin, which reveal the presence of massive hydrocarbon fields, lateral continuity of reservoir, reservoir-seal pairs, faults, and traps, developed hydrocarbon fields, appropriate reservoir depth. The gaps identified from the review of various research studies are analyzed to form the basis of a future research investigation for capturing, removing, and storing CO_2 in depleted hydrocarbon reservoirs and other geological formations. The authors deduced that accurate injection pressure, rate, and depth estimation are critical factors for CO_2 sequestration and need to be thoroughly investigated.

1. Introduction

Carbon dioxide capture and sequestration are moderately considered fundamental and practical methods of reducing the release of anthropogenic greenhouse gases (GHGs) on the earth [1]. Proposals have been made to indicate that it is an instantly realizable and scientifically realistic method of decreasing CO_2 emissions [2] and has the prospect of making a significant decrease in carbon emissions from point sources [3]. The approach is associated with the capture of CO_2 from a stationary source, transportation through pipelines, introduction into, and storage in suitable underground geological structures in sedimentary basins (Fig. 1). The introduction of CO_2 into depleted hydrocarbon fields is an age-long integral part of the enhanced oil recovery (EOR) practice. CO_2 confinement in the geological media has been proven to be realizable. The main types of storage media are saline aquifers, depleted oil

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