

## A Comprehensive Study on CO<sub>2</sub> Capture and Storage: Advances in Technology and Environmental Impact Mitigation

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**Abstract :** This paper investigates the latest advancements in CO<sub>2</sub> capture and storage (CCS) technologies, which are vital for addressing the growing challenge of climate change. The study focuses on multiple techniques for CO<sub>2</sub> capture, including chemical absorption, membrane separation, and adsorption, analyzing their efficiency, scalability, and environmental impact. The research further explores geological storage options such as deep saline aquifers and depleted oil fields, providing insights into the challenges and opportunities presented by each method. This paper emphasizes the importance of integrating CCS with existing industrial processes to reduce greenhouse gas emissions effectively. It also discusses the economic and policy frameworks required to promote wider adoption of CCS technologies. The findings of this study offer a comprehensive view of the potential of CCS in achieving global climate goals, particularly in hard-to-abate sectors such as energy and manufacturing.

**Keywords :** CO<sub>2</sub> capture, carbon storage, climate change mitigation, carbon sequestration, environmental sustainability

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