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基于质量评估碳移除技术的气候效益

摘要

碳移除技术（Carbon Dioxide Removal, CDR）是实现《巴黎协定》气候目标战略中的重要组成部分，基于质量（即永久性、即时性、移除效率）评估 CDR 技术的气候效益有助于推进 CDR 技术的大规模开发和部署。本研究建立了一个定量评估 CDR 技术气候效益的框架，该框架全面评估了所选五种典型 CDR 技术的永久性、即时性和移除效率，从而得到最真实的 CDR 气候效益，帮助决策者或投资者进行技术选择。研究表明，EW 气候效益最高，其次是 DACCS，而 BC 气候效益最低；从效益成本比角度，AR 最好，DACCS 由于现阶段成本很高，不具备经济可行性。

关键词

碳移除技术；质量；气候效益；成本效益分析

Abstract

Carbon dioxide removal (CDR) technologies have become crucial for meeting the climate targets set in the Paris Agreement. Assessing the climate benefits of CDR technologies based on quality—permanence, timing, and removal efficiency—is essential for guiding their large-scale development and deployment. This study establishes a framework for quantitatively assessing the climate benefits of CDR technologies, which comprehensively evaluates the permanence, timing and removal efficiency of five selected typical CDR technologies. The framework obtains the true climate benefits of CDR technologies, assisting policymakers or investors in technology selection and promoting the large-scale deployment of CDR technologies. The results demonstrate that EW consistently shows the highest climate benefits, followed by DACCS, while BC exhibits the lowest climate benefits. In terms of economic feasibility, AR is the most favorable. Currently, DACCS is not economically feasible due to its high costs.

Keywords

Carbon dioxide removal technologies; Quality; Climate benefit; Cost-benefit analysis

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