

ME24_14 - Enhancing Sustainable Hydrogen Production: The Role of Carbon Capture Storage in Transitioning from Blue to Green Hydrogen

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Abstract -The transition to a sustainable energy economy is pivotal in combating climate change, with hydrogen playing a crucial role as a clean energy carrier. This paper explores the integral function of Carbon Capture and Storage (CCS) in facilitating the production of blue hydrogen, thereby acting as an essential bridge to the economically and technologically more demanding green hydrogen. Through a detailed review of current CCS technologies, integrated within the steam methane reforming process, we evaluate the feasibility and environmental impacts of blue hydrogen production. Comparative analyses highlight the economic and environmental benefits of blue hydrogen, supported by case studies from existing facilities globally. This study also examines the role of government policies and technological advancements in shaping the future trajectory towards green hydrogen feasibility. Findings suggest that CCS not only significantly mitigates the carbon footprint associated with hydrogen production but also provides a viable pathway for scaling up hydrogen use in various sectors pending the maturation of green hydrogen technologies. The paper concludes with strategic recommendations for policymakers, industry stakeholders, and researchers to harness the full potential of CCS in hydrogen production, ensuring a smoother transition in the hydrogen economy.