

Optimization of hydrogen supply chain considering CO₂ reduction

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The global reduction agreement on greenhouse gas emission requires the expansion of energy use in renewable sources such as solar and wind power. Hydrogen-based energy system would potentially enable to store the surplus electricity generated from renewable energy and supply emission-free fuels. However, despite a huge investment in the construction of hydrogen infrastructure, production of hydrogen depends on fossil fuel-based technologies so far due to economic feasibility. Since government policies on the CO₂ emission and support of hydrogen technology highly affect the cost and optimal pathway of hydrogen, study of hydrogen supply chain with regard to emission target, CO₂ tax, and subsidies on renewable energy is important to predict future hydrogen infrastructure system. In this study, we provide the optimization model of the hydrogen supply chain with carbon capture, utilization, and storage (CCUS) technology and evaluate the energy and emission constraint policies which change the optimal configuration of the supply chain.