*ICCES, 2025, vol.33, no.1*

Tech Science Press

DOI: 10.32604/icces.2025.010823

**PROCEEDINGS**

# Techno-Economic Analysis of Offshore Hydrogen Energy Storage and Transportation Based on Levelized Cost

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**ABSTRACT**

Hydrogen production from offshore wind power is an effective means to address the challenges of wind power grid integration and has emerged as a focal point in the development and research of offshore wind energy in recent years. However, the current state of hydrogen storage and transportation technologies for offshore applications lacks comprehensive economic analysis. This study aims to provide a thorough economic evaluation of these technologies by considering both fixed investment costs and operational and maintenance costs. A levelized cost model is employed to analyze four offshore hydrogen storage and transportation schemes: gas hydrogen shipping, liquid hydrogen shipping, solid-state hydrogen shipping, and existing pipeline hydrogen blending transportation. Using a 300MW offshore wind-to-hydrogen platform as a case study, the economic feasibility of each scheme is assessed and compared at different offshore distances (50, 100, and 150 km). Additionally, a sensitivity analysis is conducted to identify the impact of key cost factors. The results indicate that gas hydrogen shipping is the most economical scheme for short distances ($\leqslant$50 km), with a levelized cost of 2.55~3.88 CNY/kg. For long distances (>100 km) with continuous and stable hydrogen supply requirements, existing pipeline hydrogen blending transportation emerges as the most cost-effective solution. The sensitivity analysis further reveals that electricity costs significantly influence the economic viability of each scheme, with sensitivity ratios (SR) of 32.47%, 54.14%, 79.26%, and 91.58%, respectively. When the electricity price decreases by 20%, the cost of solid-hydrogen shipping decreases by 9%, while the cost of the gas hydrogen shipping decreases by only 0.95%. This study provides a quantitative basis for decision-making in the selection of optimal offshore hydrogen storage and transportation schemes.

**KEYWORDS**

Offshore wind power; offshore hydrogen storage and transportation; economic analysis; levelized cost; sensitivity analysis

**Funding Statement:** This study is supported by the National Science Foundation of China (No. 52372311), the "Open bidding for selecting the best candidates" Project of Fujian Province (No. 2023H0054) and the Science and Technology Plan Project of State Administration for Market Regulation (No. 2023MK123).

**Conflicts of Interest:** The author(s) declare(s) no conflicts of interest to report regarding the present study.