



Hydrogen storage in depleted offshore gas fields in Brazil: Potential and implications for energy security



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HIGHLIGHTS

- Offshore natural gas fields in Brazil are suitable for hydrogen storage.
- Depleted offshore gas fields can store around 5483 TWh worth of hydrogen.
- Two main offshore storage clusters exist in the Southeast and Northeast of Brazil.
- Fossil fuel dependence in Brazil can be reduced through hydrogen use and storage.
- Large-scale hydrogen storage can contribute to Brazil's energy security.

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ABSTRACT

This article estimates the potential of using depleted offshore gas fields in Brazil for hydrogen storage and the effects this may have in terms of energy security. Brazil is starting to invest in producing green hydrogen associated with offshore wind energy generation. This initiative has stimulated the search for suitable locations to store hydrogen, including in depleted offshore gas reservoirs. The methodology used in this paper allows for identifying which of the 85 assessed depleted offshore gas fields are the most suitable for hydrogen storage and evaluating the storage capacity of the selected fields. In addition, a wind speed analysis is made to investigate possible locations for prospective wind energy generation projects that can accommodate green hydrogen production. As our main result, we find that the selected depleted offshore gas fields have the potential to store around 5483 TWh worth of hydrogen. This amount is equivalent to about 10 times the total annual electricity consumption in Brazil. Hence, Brazil can comfortably leverage its offshore wind potential in connection with hydrogen production to enhance the energy security of its electricity supply. Considering that to date primarily natural gas has been used as the main source of energy security in Brazil and that its share in the electricity sector has significantly increased over the last decade, the combination of hydrogen storage and renewable energy such as offshore wind power has the potential to provide a resilient and decarbonised electricity system in the country. Furthermore,

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