

Feasibility Study of Using Nuclear Energy to Produce Hydrogen Fuel in Saudi Arabia

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Carbon emissions are a significant concern in today's society due to their contribution to air pollution and global warming. As the entire world looks for greener energy sources, hydrogen fuel cells show great potential for a more sustainable future. Even though Saudi Arabia is the one of the world's biggest exporters of crude oil, the Kingdom has developed its plan to reach carbon-neutrality following The Paris Agreement. Saudi Arabia has also developed its Saudi National Atomic Energy Project (SNAEP) and is looking towards adding nuclear power to their energy mix. Hydrogen can be produced by a variety of ways, and by understanding how it is produced and how it can be used as a clean energy source, a study on Saudi Arabia's ability to produce Hydrogen as part of its SNAEP can be performed to help the country archive several goals with one project, bringing the Kingdom closer to its 2030 vision. This paper begins by exploring the energy landscape in Saudi Arabia by studying the country's energy background, consumption, current sources, and challenges. Furthermore, it elaborates on different methods to produce hydrogen and how nuclear energy can be implemented to produce hydrogen. The feasibility study provides an economic assessment that compares the operation cost of producing hydrogen using different technologies and energy sources. Moreover, it sheds light on potential challenges in implementing these technologies in Saudi Arabia. It was found that implementing a high temperature electrolysis process that uses electricity from a nuclear power plant along with heat can lead to higher economic and technical efficiencies compared to other methods. Additionally, hydrogen production using nuclear power plants can supply extra revenue to the kingdom. Overall, this paper investigates the technical and economic feasibility of using nuclear energy to produce hydrogen in Saudi Arabia.

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