Development and Application of Hydrogen Electrolysis Technologies

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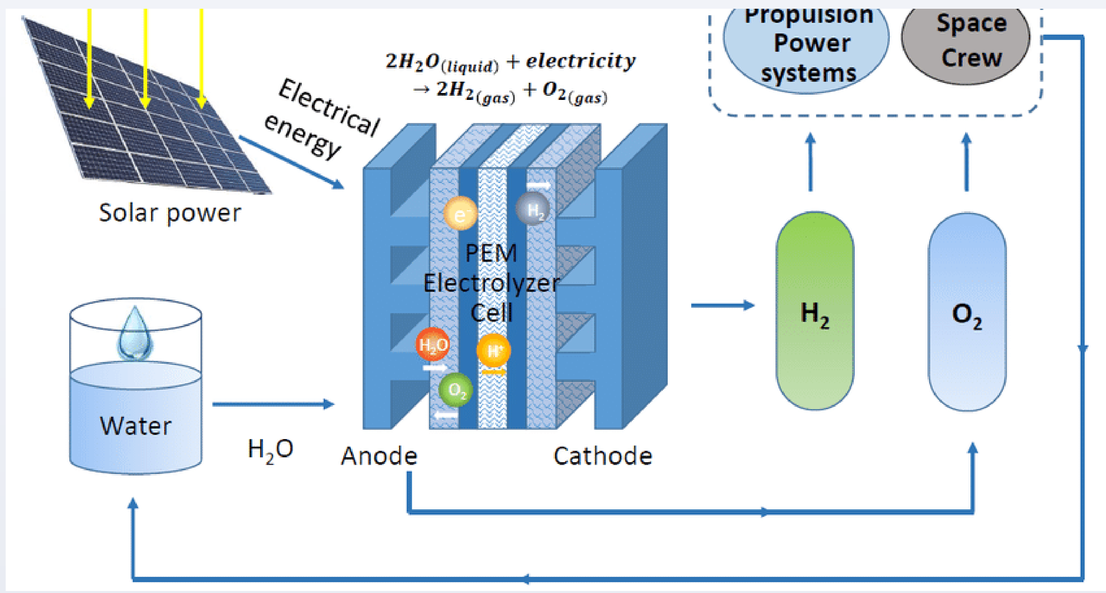
This project aims to explore the potential of hydrogen as a clean energy source and its utilization in power plants, specifically focusing on the use of green hydrogen and its blending with natural gas. The project addresses the need for sustainable energy solutions to mitigate climate change and achieve the objectives outlined in the Green Deal.

Examining global examples of using hydrogen in gas turbines and pilot studies provides insights into the technical feasibility and potential benefits of incorporating hydrogen as a fuel in power generation. Understanding these examples contributes to identifying successful implementations and best practices.

This project seeks to explore viable solutions for clean energy generation, with a specific focus on harnessing the potential of hydrogen in power plants. By delving into topics such as the Green Deal, green hydrogen, hydrogen utilization in gas turbines, blending hydrogen with natural gas, infrastructure calculations, and comparative analysis of hydrogen production methods, we aim to gain a comprehensive understanding of the opportunities and challenges associated with integrating hydrogen into the energy landscape. Through extensive research and analysis, this project seeks to provide valuable insights and recommendations that can inform policymakers, industry stakeholders, and researchers working towards a cleaner and more sustainable energy transition.



Electrolyzers, particularly Proton Exchange Membrane (PEM) electrolyzers, are innovative devices that play a crucial role in the production of hydrogen through electrolysis. PEM electrolyzers utilize a solid polymer electrolyte membrane, typically made of a proton-conducting polymer, to facilitate the separation of water into hydrogen and oxygen gases. By applying an electrical current, the PEM electrolyzer induces a redox reaction, where water molecules are split into their constituent elements. This technology offers numerous advantages, such as high energy efficiency, rapid response time, and compact size, making PEM electrolyzers a promising solution for renewable hydrogen generation and storage, with applications ranging from transportation to energy storage systems. Throughout this study, focused on the methods by which hydrogen energy is produced.

Making infrastructure-related calculations using data from power plants, such as EnerjiSA, is crucial for planning and implementing green hydrogen projects. These calculations consider factors such as cost, capacity, and size of green hydrogen production from different energy sources like wind and solar. These calculations aid in designing efficient and sustainable green hydrogen production systems. The project has highlighted the significance of the Green Deal, the potential of green hydrogen, the examples of hydrogen in gas turbines and pilot studies, the studies on hydrogen and natural gas blending, and the importance of infrastructure-related calculations. The project's logical next steps involve scaling up green hydrogen production, technological advancements, policy development, collaborations, and market integration to drive the transition to a sustainable and decarbonized energy future.

- European Commision
- IEA
- IICEC
- EEX
- Reuters