

The characteristics of electrolyzers and fuel cells are demonstrated with experimental data and the deployments of hydrogen for energy storage, power-to-gas, co- and tri-generation and transportation are investigated using examples from worldwide projects.

In this paper, we summarize the production, application, and storage of hydrogen energy in high proportion of renewable energy systems and explore the prospects and challenges of hydrogen energy storage in power systems.

There are several uses for hydrogen, including energy storage, power generation, industrial production and fuel for fuel cell vehicles. Hence, hydrogen production from green energy sources is essential to meet sustainable energy targets (SETs) as the globe attempts to move to a low-carbon economy.

Hydrogen is used in power systems, transportation, hydrocarbon and ammonia production, and metallurgical industries. Overall, combining electrolysis-generated hydrogen with hydrogen storage in underground porous media such as geological reservoirs and salt caverns is well suited for shifting excess off-peak energy to meet dispatchable on-peak ...

A hydrogen energy storage system requires (i) a power-to-hydrogen unit (electrolyzers), that converts electric power to hydrogen, (ii) a hydrogen conditioning process (compression or liquefaction), (iii) a hydrogen storage system, and (iv) a hydrogen-to-power unit (e.g., fuel cells or hydrogen fired gas turbines).

This paper comprehensively describes the advantages and disadvantages of hydrogen energy in modern power systems, for its production, storage, and applications. The paper first reviews the advantages of hydrogen energy and then systematically discusses the technology of electric hydrogen production with modern power systems.

This review covers the applications of hydrogen technology in petroleum refining, chemical and metrological production, hydrogen fuel cell electric vehicles (HFCEVs), backup power generation, and its use in transportation, space, and aeronautics.

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