

ContainerPower Energy Solutions

Hydrogen energy storage cabinet design



Overview

Could a hydrogen-based energy storage system be a connection point?

As hydrogen has additional benefits outside of the electric grid, a hydrogen-based energy storage system could be the connection point to other energy sectors currently dominated by fossil fuels. However, challenges related to upfront costs for electrolyzers and fuel cells, hydrogen distribution, roundtrip efficiency, and safety remain.

Should energy storage systems be designed for hydrogen?

Systems need to be safely designed for the properties of hydrogen, but this should not stop planners from taking advantage of this uniquely flexible and scalable energy storage medium. Dr. Alexander Headley is currently a postdoctoral appointee in the Energy Storage Technology and Systems department at Sandia National Laboratories.

How efficient is hydrogen storage?

The roundtrip efficiency of hydrogen storage based on electrolysis and fuel cell systems is generally around 40%, meaning that approximately 40% of the energy used to produce hydrogen with electricity can be turned back into electricity.

What materials are used in a hydrogen storage system?

Solid materials such as metal hydrides are sometimes used. In these systems, a metal (M) absorbs hydrogen (H) to form a metal hydride (MH). Hydrogen can then be released by heating the MH as needed. These materials increase the volumetric energy density of the storage system even beyond that of liquid hydrogen.

Are hydrogen energy storage systems expensive?

Though the power components of a hydrogen energy storage system are more expensive than those of most other energy storage technologies, it is

relatively inexpensive to store large amounts of energy as hydrogen or in a hydrogen carrier material.

Is hydrogen a good energy carrier?

A preliminary study has estimated that hydrogen-based storage is less expensive than battery energy storage for storage durations greater than approximately 13-15 hours at current component prices . Other attributes make hydrogen an attractive energy carrier. Firstly, hydrogen can be used for many applications outside of the electric grid.

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