

A study on the scheme of cold energy recovery for compensating liquefaction in liquid hydrogen energy storage

Tuesday 23 July 2024 14:00 (2 hours)

As a recognized low-carbon clean energy, hydrogen energy is an important part of the global energy transformation. In the vigorously developed hydrogen energy industry chain of production-storage-transportation-use, cryogenic liquid hydrogen has gradually become an effective means to realize large-scale application of hydrogen energy and long-distance, large-capacity and long-term energy storage, with the advantages of high storage density, low transportation cost and low working pressure. From the perspective of thermodynamics, low temperature energy storage technology has higher energy quality. However, in the application of pressurization and gasification, a large amount of high-quality cold energy is wasted, so its recovery and utilization must be considered. In this paper, the technical route of cold energy recovery and compensation back to precooling or other temperature zones in the liquefier by cold storage is put forward, and the significant improvement of system efficiency and economy is analyzed. The contribution to several different liquefaction devices and the different recovery methods of sensible heat and latent heat are compared. At the same time, the operation strategy coupled with renewable energy hydrogen production is planned, in order to match and stabilize the fluctuation, cut the peak and fill the valley more reasonably in time and space. It provides more new idea for a more perfect, diversified and efficient hydrogen energy utilization industry chain.

Submitters Country

China

Authors: ZHANG, Zhaoxue (Technical Institute of Physics and Chemistry, Chinese Academy of Sciences); WANG, Bingming

Co-authors: GONG, Linghui (Technical Institute of Physics and Chemistry, Chinese Academy of Sciences); LI, ZhengYu (Technical Institute of Physics and Chemistry,CAS); WANG, qian (Zhongshan Institute of Advanced Cryogenic Technology); WANG, Zhiping (Zhongshan Institute of Advanced Cryogenic Technology)

Presenter: WANG, Bingming

Session Classification: Tue-Po-1.6

Track Classification: Tracks ICEC 29 Geneva 2024: ICEC 06: Cryogenic applications: hydrogen and LNG systems