Contribution ID: **186** Type: **Poster Presentation (120m)**

An economic analysis of a coupled LAES system utilizing the regasification cold energy of liquid ethylene

Tuesday 23 July 2024 14:00 (2 hours)

Liquid air energy storage (LAES), characterized by high energy storage density, large-scale storage capacity, and rapid response time, emerges as a novel energy storage technology applicable to grid peaking and renewable energy saving. However, LAES lags behind other energy storage technologies in terms of system efficiency, primarily due to the internal cold energy deficit. To enhance system efficiency, the integration of external cold energy is crucial. Considering the significant waste of cold energy in the liquid ethylene (LE) regasification process, effective strategies for LE cold energy utilization are imperative. This study introduces an LAES-LE coupled system that utilizes LE cold energy: the storage and utilization of LE cold energy are facilitated by an intermediate cold-storage medium, and is used in the low-temperature compression of air and the following cooling process. Besides, waste heat is incorporated to provide the heat for air expansion. This study develops an economical model of the coupled LAES-LE system and investigates the influence of various parameters on the system's economic performance, including the temperature of the waste heat, the mass flow of the LE, and the varying peak-valley electricity prices.

Submitters Country

China

Authors: LI, Yihong (Key Laboratory of Cryogenic Science and Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences); FAN, Xiaoyu (Key Laboratory of Cryogenic Science and Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences); WANG, Zhikang (Key Laboratory of Cryogenic Science and Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences); LI, Junxian (Key Laboratory of Cryogenic Science and Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences); GAO, Zhaozhao (Key Laboratory of Cryogenic Science and Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences); JI, Wei (Zhonglv Zhongke Energy Storage Technology Co., Ltd.); CHEN, Liubiao (Key Laboratory of Cryogenic Science and Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences); WANG, Junjie (Key Laboratory of Cryogenic Science and Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences)

Presenter: LI, Yihong (Key Laboratory of Cryogenic Science and Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences)

Session Classification: Tue-Po-1.1

Track Classification: Tracks ICEC 29 Geneva 2024: ICEC 01: Large scale refrigeration and liquefaction