Contribution ID: **104** Type: **Poster Presentation (120m)**

Design of a 10 ton/day air liquefaction system for liquid air energy storage

Thursday 25 July 2024 14:00 (2 hours)

To achieve carbon neutrality, the contribution of renewable energy to electricity generation is growing. However, renewable energy sources may exhibit significant output fluctuations depending on weather conditions. As a result, there is a gradual rise in demand for high-capacity energy storage systems to ensure grid stability. The Liquid Air Energy Storage (LAES) system is an energy storage system that liquefies air using surplus electricity for storage and then, when power is needed, pressurizes and vaporizes the liquid air to generate electricity through power turbines. The energy storage by liquid air at ambient pressure is safe and eco-friendly. It enables a large amount of energy to be stored. In this study, a 10 ton/day air liquefaction system was designed as a pilot plant for liquid air energy storage. It is based on the Claude cycle with some variations for air liquefaction. A cold stream, which utilizes cold thermal energy recovered during a power generation process, is added to the cycle. The cold stream also branches out to improve cycle efficiency. The basic and detailed designs were performed for the cycle. Additionally, a cold box was designed for the liquefaction system. The design results, such as the process flow, system configurations, and details for the cold box, are presented and discussed in this study.

Acknowledgment
This research was supported by a grant of the Basic Research Program funded by the Korea Institute of Machinery and Materials (grant number : NK249E).

Submitters Country

Republic of Korea

Author: Dr IN, Sehwan (Korea Institute of Machinery and Materials)

Co-authors: Dr JEONG, Heechan (Korea Institute of Machinery and Materials); Dr LIM, Hyungsoo (Korea Institute of Machinery and Materials); Dr PARK, Junyoung (Korea Institute of Machinery and Materials); Dr KIM, Juwon (Korea Institute of Machinery and Materials); Dr PARK, Sehjin (Korea Institute of Machinery and Materials); Dr HONG, Yong-Ju (Korea Institute of Machinery and Materials)

Presenter: Dr IN, Sehwan (Korea Institute of Machinery and Materials)

Session Classification: Thu-Po-3.3

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