

Can cold energy be used in the air separation process?

One of the most promising ways to use the cold energy contained in LNG is to incorporate it into the air separation process (ASP) in order to increase the operation's effectiveness. This literature review aims to provide an overview of the recent research on the cold utilization of LNG integrated with the air separation process.

What are the advantages of LNG cold air separation process?

The energy consumption of the process is decreased by about 38.5% compared to a conventional cryogenic air separation process due to LNG cold energy utilizing and integrating with oxy-fuel power generation sub-cycle. 4.

How can a cryogenic air separation unit save energy?

Liu et al. proposed an external compression ASU with energy storage, saving 5.13 % of the power cost. Wang et al. introduced a cryogenic distillation method air separation unit with liquid air energy storage, storing waste nitrogen to store cold energy with a payback period of only 3.25-6.72 years.

What is the energy consumption of air separation process with LNG cold recovery?

It is shown that the energy consumption for the proposed air separation process with LNG cold recovery is about 38.5% lower compared for a conventional cryogenic air separation process. The energy and exergy efficiencies increase by 59.4% and 67.1%, respectively. 1. Introduction

What is a cryogenic air separation process based on internal recovery?

Conclusions A cryogenic air separation process based on internal recovery with LNG cold energy utilization and an oxy-fuel closed cycle for power generation is introduced and successfully analyzed. High purity liquid nitrogen and oxygen are the products of the process.

What is a novel cryogenic air separation process with LNG (liquefied natural gas)?

A novel cryogenic air separation process is introduced. Cold energy of LNG (liquefied natural gas) is used as refrigeration source. Heat integration maximizes the process heat recovery. A novel cryogenic air separation process with LNG (liquefied natural gas) cold energy utilization that produces liquid nitrogen and oxygen is proposed and analyzed.

A novel system of liquid air energy storage with LNG cold energy and industrial waste heat: Thermodynamic and economic analysis: Aftercoolers in LAES; ... achieving 0.252 ...

The existing ways for recovering LNG cold energy involve electricity generation, air separation, refrigerated storage, liquid carbon dioxide, air conditioning, and refrigeration [17]. ...

Cold energy storage processes enable the utilization of the nonstorable LNG cold energy by converting it into

other forms of cold energy, which can be stored for longer periods. ...

In the early stage of industrial air separation, broadly speaking two methods of liquefaction air separation are employed: separation using electrical energy alone, and ...

The heat transfer curve between air and LNG during the energy storage process can be seen from Fig. 16, the temperature of LNG rises from  $-159.64\text{ }^{\circ}\text{C}$  to  $-88.31\text{ }^{\circ}\text{C}$  in the heat transfer ...

Liquid air energy storage (LAES) is a promising technology for large-scale energy storage applications, particularly for integrating renewable energy sources. While standalone ...

Liquid air energy storage (LAES) can be a solution to the volatility and intermittency of renewable energy sources due to its high energy density, flexibility of ...

As policy and financial supports, Japan's cold energy utilization enterprises could gain obviously economic profits. At present, Tokyo Bay had already become the industrial ...

Utmost substance recovery and utilization for integrated technology of air separation unit and liquid air energy storage and its saving benefits. Author links open overlay ...

Among large-scale energy storage technologies, the cryogenic energy storage technology (CES) is a kind of energy storage technology that converts electric energy into cold ...

The objective of this research on the cold utilisation of LNG integrated with air separation processes is to investigate the feasibility of using the cold energy contained in LNG ...

On the basis of the above analysis, an external-compression air separation unit with energy storage (ECAS-ES) is proposed, which combines ASU and LAES. This paper ...

During the regasification process, cryogenic LNG has a huge opportunity for cold energy recovery. An innovative air separation process that is integrated with the cold utilization ...

In order to resolve the problems of the current air separation process such as the complex process, cumbersome operation and high operating costs, a novel air separation ...

A fraction of the intermediate-pressure air (PA-1) is drawn from the first stage of the booster (C5), cooled, and then introduced into the expander (T2) to provide sufficient cold ...

A novel air separation unit with energy storage and generation and its energy efficiency and economy analysis. Author links open overlay panel Xiufen He a, Yunong Liu a, ...

High-grade liquid air cold energy recovered for air separation processes. Energy storage method with scale effect on ASU cost saving and peak load shifting. Air separation ...

Using renewable energy to replace fossil energy is essential to reducing carbon emissions [5]. However, the intermittency and instability of renewable energy present severe ...

Due to the low operating temperature of air separation units (from  $-170^{\circ}\text{C}$  to  $-190^{\circ}\text{C}$ ), which is closer to the LNG temperature than other options, supplying parts of the cold ...

LNG cold energy can be used for power generation, air separation, liquefaction of  $\text{CO}_2$ , production of dry ice, cold storage and rapid cooling, district cooling and other ...

Regarding the regasification site, various processes have been developed to recover the wasted LNG cold energy for applications such as power generation [10], cold ...

LAES-ASU leverages liquid oxygen for cold energy storage, optimizing processes to minimize air separation unit power consumption during peak hours, thereby substantially ...

Using the cold energy in LNG in air separation can be cost-effective and environmentally beneficial since it can reduce the large number of electrically-driven ...

One of the solutions to utilizing liquefied natural gas (LNG) cold energy at import terminals is supplying it to an air separation unit (ASU), ...

Performance analysis and multi-objective optimization for an integrated air separation, power generation, refrigeration and ice thermal storage system based on the LNG ...

Liquid air energy storage (LAES), as a form of Carnot battery, encompasses components such as pumps, compressors, expanders, turbines, and heat exchangers [7] s ...

While regasification process, cryogenic LNG has a great potential for cold energy recovery. This cold energy can be used in various applications such as power generation, ...

There are many energy storage technologies suitable for renewable energy applications, each based on different physical principles and exhibiting different performance ...

Compared to compressed air energy storage, liquid air energy storage has a larger storage capacity and no geographic constraints owing to the high density of liquid air. In order ...

In the thermal storage, the LNG cold energy is recovered by means of PCMs. In this paper, various types of PCMs having different phase change temperatures are evaluated. ...

Products Equipment Installation, Cryogenic Equipment, Industrial Gas and Cryogenic Technology Research Institute "Four Plates" and "4+1" Model of General Machinery. A number of products ...

It has long been recognized that this "cold energy" is a valuable energy resource and its utilization can ... Air liquefaction and cryogenic air separation 22 Power generation 23 ...

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