

What is a membrane technology?

Provided by the Springer Nature SharedIt content-sharing initiative Membrane technologies with low environmental impacts and ease of use have a wide spectrum of applications, with the potential to provide more sustainable solutions in domains such as water, energy and pollution treatment.

What is liquid air energy storage?

Concluding remarks Liquid air energy storage (LAES) is becoming an attractive thermo-mechanical storage solution for decarbonization, with the advantages of no geological constraints, long lifetime (30-40 years), high energy density (120-200 kWh/m<sup>3</sup>), environment-friendly and flexible layout.

What are air-to-air membrane energy exchangers?

Air-to-air membrane energy exchangers (MEEs) have become a key component in technological advancements for near-zero-energy building and green building. MEEs recover both heat and moisture from the exhaust air transferring them to the incoming outdoor air through the inner membrane and reduce the energy consumption of the building ventilation.

How does membrane technology contribute to environmental objectives?

The goal is to contribute to environmental objectives by exploring the principles, mechanisms, advantages, and limitations of membrane technology. Noteworthy features include energy efficiency, selectivity, and minimal environmental footprint, distinguishing it from conventional methods.

What is a thermo-mechanical energy storage technology?

This work is concerned with LAES, which is a thermo-mechanical energy storage technology, and an alternative to PHES and conventional CAES technologies. Such a technology has several key advantages including high scalability, no geographical/geological constraints, cost-effectiveness, and multi-vector energy service provision.

Are membrane technologies a sustainable solution?

Nature Sustainability 5,1080-1091 (2022) Cite this article Membrane technologies with low environmental impacts and ease of use have a wide spectrum of applications, with the potential to provide more sustainable solutions in domains such as water, energy and pollution treatment.

Surprisingly, membrane processes, showing attractive performances for carbon capture from flue gases (Favre, 2007; Merkel et al., 2010), have not been investigated for DAC up to now. Except for a proof of ...

In remote areas, the direct integration of renewable energy with NF/RO membrane desalination technology, without the need for energy storage, is anticipated to bolster system robustness, ...

A molecular membrane that allows select ions to cross with almost no friction could significantly boost the performance of flow batteries, fuel cells, and other devices critical to the world's ...

Polysulfide-air redox flow batteries are an appealing energy storage technology but suffer from polysulfide crossover and the use of costly catalysts. Here, the authors report a ...

Potential integration of direct air capture with cryogenic- and distillation-based air separation and energy storage processes. Cryogenic gas separation processes separate mixtures by exploiting the condensation and desublimation ...

The potential for lithium-ion (Li-ion) batteries and supercapacitors (SCs) to overcome long-term (one day) and short-term (a few minutes) solar irradiance fluctuations with high-temporal ...

Membrane technology emerges as a transformative solution for global challenges, excelling in water treatment, gas purification, and waste recycling. This comprehensive review navigates the principles, advantages, challenges, ...

Capture of CO<sub>2</sub> from the air requires substantial amounts of energy. Here the authors report molten-carbonate membranes to concentrate CO<sub>2</sub> from 400 ppm input streams that exploit ambient energy in ...

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Liquid air energy storage (LAES) uses air as both the storage medium and working fluid, and it falls into the broad category of thermo-mechanical energy storage technologies. The LAES technology offers several ...