

Title: Inter-seasonal energy storage system

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Summary: Grid-integrated seasonal energy storage can reshape seasonal fluctuations of variable and uncertain power generation by reducing energy curtailment, replacing peak generation capacity, and providing transmission benefits.

Why is seasonal energy storage important?

Energy storage at all timescales, including the seasonal scale, plays a pivotal role in enabling increased penetration levels of wind and solar photovoltaic energy sources in power systems.

What is inter-seasonal storage?

More specifically, inter-seasonal storage will probably be composed of a combination of PHS, compressed-air energy storage (CAES) and possibly geological hydrogen storage 8. CAES is currently the only other commercially mature technology for this application 9, and it is therefore crucial to assess its inter-seasonal storage potential.

Can grid-integrated energy storage reshape seasonal fluctuations?

Grid-integrated seasonal energy storage can reshape seasonal fluctuations of variable and uncertain power generation by reducing energy curtailment, replacing peak generation capacity, and providing transmission benefits.

Could compressed-air energy storage be a useful inter-seasonal storage resource?

Compressed-air energy storage could be a useful inter-seasonal storage resource to support highly renewable power systems. This study presents a modelling approach to assess the potential for such storage in porous rocks and, applying it to the UK, finds availability of up to 96 TWh in offshore saline aquifers.

How much does compressed-air energy storage cost in the UK?

This UK storage potential is achievable at costs in the range US\$0.42-4.71 kWh-1. Compressed-air energy storage could be a useful inter-seasonal storage resource to support highly renewable power systems.

How much energy can the UK store?

We find the potential storage capacity is equivalent to approximately 160% of the United Kingdom's electricity consumption for January and February 2017 (77-96 TWh), with a roundtrip energy efficiency of 54-59%. This UK storage potential is achievable at costs in the range US\$0.42-4.71 kWh-1.

With inter-seasonal thermal storage solar energy, we're doing exactly that - banking summer heat to warm

Inter-seasonal energy storage system

homes during winter's chill. This game-changing technology is rewriting the rules of ...

Our results show that PM-CAES is a potentially viable large-scale inter-seasonal electricity storage technology, crucial in power systems with ...

It examines four potential storage options - compressed air energy storage, vanadium and zinc flow battery and power to X (green hydrogen). As well as two technologies ...

These figures make PTESs the preferred systems for inter-seasonal storage in buildings, especially for small-scale heat networks. The technological maturity level reaches 9 ...

The study aims to investigate the utilization of CO₂ for aquifer thermal energy storage from the perspectives of energy storage and carbon sequestration, termed as CO₂ ...

To study the operational characteristics of inter-seasonal compressed air storage in aquifers, a coupled wellbore-reservoir 3D model of the whole subsurface system is built. The ...

This study presents a novel system configuration with an operational strategy guided by a simple control method that uses surplus photovoltaic electricity to power an inter ...

OCAES system with 24-hour storage duration is expected to cost \$61/kWh. Growth of intermittent offshore wind energy installations has led to a search for energy storage ...

Because of the intermittence and unreliability of solar radiation, a seasonal thermal energy storage system is needed to maximize the potential utiliz...

Considering the seasonal variability of renewable energy generation, we introduce borehole thermal energy storage (BTES) into the CCHP system, transforming the ground into ...

Seasonal thermal energy storage (STES) is defined as a system that stores thermal energy in the form of sensible heat during one seasonal period and allows for its reutilization during another ...

On Site Renewable Heat - Seasonal Heat Storage Interseasonal Heat Transfer provides sustainable energy using a new form of on site renewable energy that channels ...

Both of those are possible, and it's called inter-seasonal energy storage, or inter-seasonal heat transfer. The nearest example I'm aware of to me is Howe Dell primary school ...

As climate change accelerates, alongside rising energy demands and intermittent renewable resources, integrated energy systems urgently require strategies that achieve deep carbon ...

Ground-coupled heat pumps (GCHP) integrated with inter-seasonal underground thermal energy storage

systems are being investigated as an ...

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