

Environmental assessment requirements for air energy storage power generation projects

Can a small compressed air energy storage system integrate with a renewable power plant?

Assessment of design and operating parameters for a small compressed air energy storage system integrated with a stand-alone renewable power plant. *Journal of Energy Storage* 4, 135-144. energy storage technology cost and performance assessment. *Energy*, 2020. (2019). Inter-seasonal compressed-air energy storage using saline aquifers.

What is compressed air energy storage?

Compressed air energy storage (CAES) is one of the many energy storage options that can store electric energy in the form of potential energy (compressed air) and can be deployed near central power plants or distribution centers. In response to demand, the stored energy can be discharged by expanding the stored air with a turboexpander generator.

What is adiabatic compressed air energy storage (a-CAES)?

The adiabatic compressed air energy storage (A-CAES) system has been proposed to improve the efficiency of the CAES plants and has attracted considerable attention in recent years due to its advantages including no fossil fuel consumption, low cost, fast start-up, and a significant partial load capacity.

Are there any commercial compressed air energy storage facilities?

ACCEPTED MANUSCRIPT ... Sobolik et al., 2019; Tarkowski, 2019). In particular, three commercial compressed-air energy storage (CAES) facilities currently exist in Germany, the USA, and Canada, each exploiting salt caverns (Kim et al., 2023).

Is depth a concern for DR-CAES energy storage?

Depth is not a concern: the entry pressure, and higher associated well costs. The authors suggest that grid-scale storage would require $\approx 15\text{--}215\text{ m}$ for 150 - 200 MWh provided over 8 - 10 hours. CAES. Similar to PA-CAES, the energy storage capacity of DR-CAES will depend on the air volume that aggregate mass flow capacity (Allen et al., 1983).

What are the different types of compressed air energy storage (CAES)?

ACCEPTED MANUSCRIPT Figure 1. Various options for compressed air energy storage (CAES). PA-CAES: Porous Aquifer-CAES, DR-CAES: Depleted Reservoir CAES, CW-CAES: Cased Wellbore-CAES. Note: this figure is not scaled. Figure 2. A sealed mine adit as a potential pressure vessel. Note - CA: compressed air, RC: reinforced

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This Environmental Assessment (EA) presents information on the potential impacts associated with DOE guaranteeing a loan to the Applicant and covers the construction and operation of the completed Project.

The transition towards renewable energy sources necessitates accurate monitoring of environmental parameters to estimate power generation from renewable energy systems. The rapid integration of renewable energy sources into the power grid has necessitated the development of efficient monitoring systems to optimise power generation and enhance ...

Compressed air energy storage (CAES) systems are a proven mature storage technology for large-scale grid applications. Given the increased awareness of climate change, the environmental impacts of energy storage technologies need to be evaluated. Life cycle assessment (LCA) is the tool most widely used to evaluate the environmental ...

Finding one storage method to meet all of the requirements for surplus renewable electricity storage (low cost, long lifetime, high efficiency and low environmental impact) is challenging. Based on the amount of energy that can be stored, PHES, CAES and P2G are categorised as large-scale energy storage technologies (Persson et al. 2014).

The focus of this review paper is to deliver a general overview of current CAES technology (diabatic, adiabatic, and isothermal CAES), storage requirements, site selection, and design...

Method. Most wind energy projects in Canada are assessed at a provincial or territorial level - exceptions would include offshore projects or projects located in a national park or protected wildlife area (e.g. migratory bird sanctuary, marine protected area), under the federal Impact Assessment Act. Previous research has examined different aspects of the effectiveness ...

The transition to renewable energy sources is vital for meeting the problems posed by climate change and depleting fossil fuel stocks. A potential approach to improve the effectiveness, dependability, and sustainability of power production systems is renewable energy hybridization, which involves the combination of various renewable energy sources and ...

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The results show that in the full electric case study Li-ion battery environmentally outperform LAES due to (1) the higher round trip efficiency and (2) the significantly high environmental impact of the diathermic oil utilized by LAES, accounting for 92 % of the manufacture and disposal phase.

Certain modifications to a waste management project may not have environmental assessment requirements but will be required to follow other existing approval procedures related to that modification (e.g., Environmental Protection Act - Part V; Ontario Water Resources Act). These modifications include: a modification to a routine activity that ...

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With excellent storage duration, capacity, and power, compressed air energy storage systems enable the integration of renewable energy into future electrical grids. There has been a significant limit to the adoption rate of CAES due to its reliance on underground formations for storage. This paper presents an updated review of the CAES, which ...

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In this paper, two benchmarking insights are provided: a) A bench-mark analysis of CAES systems and projects, with their location, evaluation, costs (when disclosed), the status of the project, and other criteria; b) Benchmarking of ES regulatory framework aiming to understand better the current ES policies, their development and implementation...

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