



# Compressed air energy storage cost per kilowatt-hour





## Overview

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Compressed Air Storage Capex: BloombergNEF (BNEF) data from 2023-2024 highlights compressed air storage costs around \$293 per kilowatt-hour (kWh) of capacity in global averages, with some variation by geography and project scale.

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The costs of compressed air energy storage (CAES) compare favorably to other long-duration energy storage (LDES) technologies, often being among the least expensive options available, though several nuances apply depending on region, storage duration, and system specifics. Compressed Air Storage.

Our base case for Compressed Air Energy Storage costs require a 26c/kWh storage spread to generate a 10% IRR at a \$1,350/kW CAES facility, with 63% round-trip efficiency, charging and discharging 365 days per year. Our numbers are based on top-down project data and bottom up calculations, both for.

DOE's Energy Storage Grand Challenge supports detailed cost and performance analysis for a variety of energy storage technologies to accelerate their development and deployment. The U.S. Department of Energy's (DOE) Energy Storage Grand Challenge is a comprehensive program that seeks to accelerate.

A single CAES plant can store 100+ MWh – enough to power 10,000 homes for 10 hours – at \$150-\$200/kWh, significantly below many battery alternatives. China's Zhangjiakou CAES facility (2023) operates at \$160/kWh, leveraging abandoned salt caverns for air storage. In contrast, U.S. projects average.

The least expensive long-duration energy storage technologies are now cheaper than lithium-ion batteries for discharge durations longer than eight hours, according to a May 30 report from BloombergNEF. Fully installed systems' global average capex costs were \$232/kWh for thermal energy storage and.

Compressed Air Energy Storage (CAES) has emerged as one of the most promising large-scale energy storage technologies for balancing electricity supply and demand in modern power grids. Renewable energy sources such as wind and solar



power, despite their many benefits, are inherently intermittent. How much does compressed air energy storage cost?

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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.

How much does energy storage cost?

Cost data for most technology groups came from projects deployed globally between 2018 and 2024. At \$232/kWh, thermal energy storage was the cheapest technology group, followed by compressed air storage. At \$643/kWh, gravity storage had the highest average global capex cost, BNEF said.

Which energy storage technology groups can discharge for 6 hours?

BNEF examined seven energy storage technology groups that can discharge for durations of at least six hours, including compressed air, compressed gas, pumped hydro, thermal, gravity, flow batteries and lithium-ion batteries. Cost data for most technology groups came from projects deployed globally between 2018 and 2024.



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### [Compressed Air Energy Storage \(CAES\): A Comprehensive 2025 ...](#)

CAES offers a powerful means to store excess electricity by using it to compress air, which can be released and expanded through a turbine to generate electricity when the ...

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### [How do the costs of compressed air storage ...](#)

Compressed Air Storage Capex: BloombergNEF (BNEF) data from 2023-2024 highlights compressed air storage costs around \$293 per ...

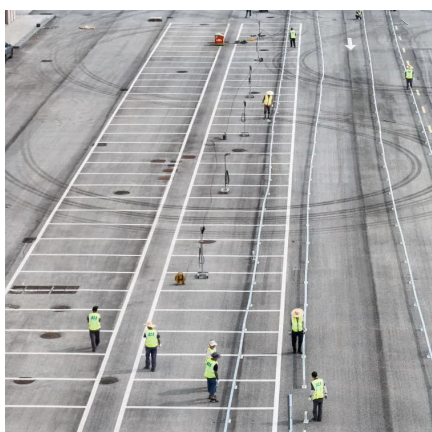
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### [Compressed Air Energy Storage Cost per kWh: A ...](#)

As renewable energy adoption surges globally, the compressed air energy storage cost per kWh has become a critical metric for grid operators and project developers.

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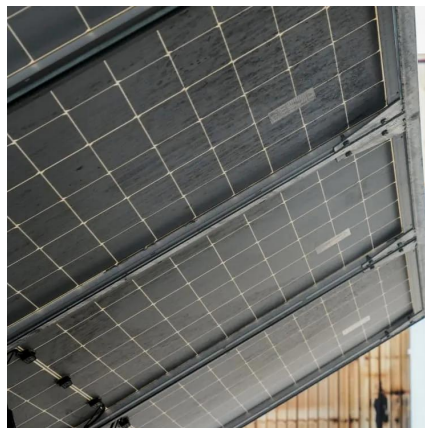


## [HOW DO I CALCULATE MY COMPRESSED AIR ENERGY COSTS](#)

Most compressed air energy storage systems addressed in literature are large-scale systems of above 100 MW. The average capital expenditure (capex) for CAES is about \$293 per kilowatt ...



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[Energy Storage Cost and Performance Database](#)

Additional storage technologies will be added as representative cost and performance metrics are verified. The interactive figure below presents results on the total installed ESS cost ranges by ...

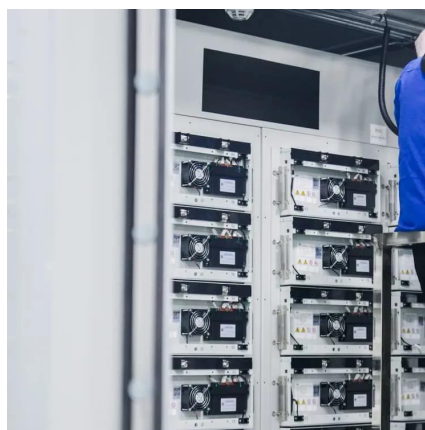
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## Compressed air seesaw energy storage: A solution for long-term

Compressed air seesaw energy storage is a cheap alternative for storing compressed air because it does not require large, pressurized tanks or sand cavers. It is ...

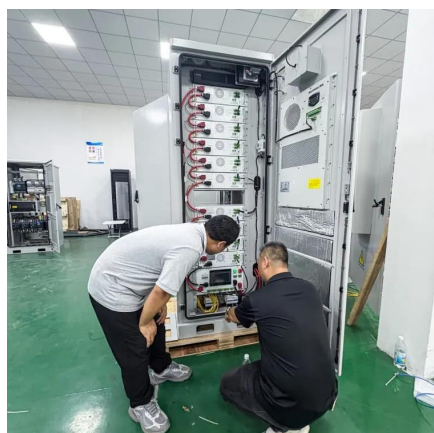
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## Technology Strategy Assessment



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 ...

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### Thermal and compressed air storage cheaper than lithium-ion ...

Fully installed systems' global average capex costs were \$232/kWh for thermal energy storage and \$293/kWh for compressed air storage, compared with \$304/kWh for four ...

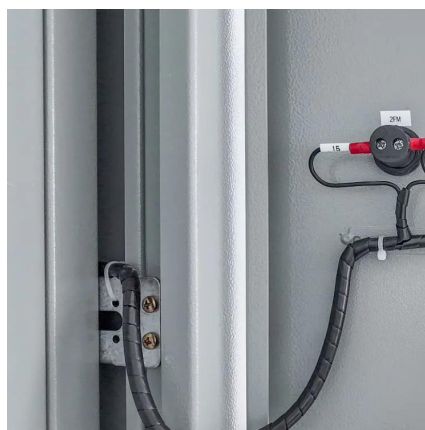
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### Thermal and Compressed Air Storage Now Cheaper for Long ...

Long-Duration Energy Storage (LDES) technologies are achieving commercial cost-competitiveness against lithium-ion for multi-hour discharge, a critical development for a ...

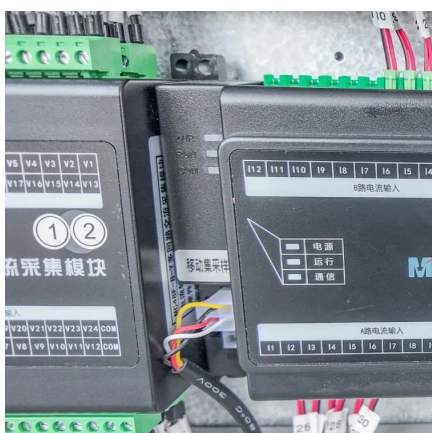
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### Compressed Air Energy Storage Costs?

Compressed Air Energy Storage costs 26c/kWh as a storage spread to generate a 10% IRR at a \$1,350/kW CAES facility, with 63% efficiency.

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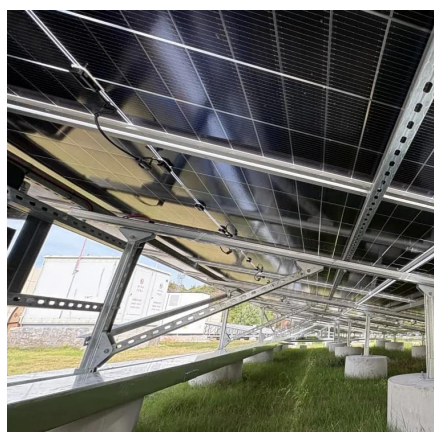
### How do the costs of compressed air



## storage compare to other ...

Compressed Air Storage Capex: BloombergNEF (BNEF) data from 2023-2024 highlights compressed air storage costs around \$293 per kilowatt-hour (kWh) of capacity in ...

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## [Compressed Air Energy Storage \(CAES\): A](#)

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