

How much does a supercapacitor cost per kWh?

While lithium-ion batteries dominate headlines, supercapacitor cost per kWh has emerged as a critical metric for industries demanding rapid charge-discharge cycles and extreme durability. In 2023, the average supercapacitor energy storage system ranged between \$3,000-\$5,000 per kWh- significantly higher than traditional batteries.

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In 2023, the average supercapacitor energy storage system ranged between \$3,000-\$5,000 per kWh- significantly higher than traditional batteries. But why does this gap exist, and when will it close? Unlike batteries that rely on chemical reactions, supercapacitors store energy electrostatically.

Why are supercapacitors more expensive than batteries?

High capital cost and low energy density of supercapacitors make the unit cost of energy stored (kWh) more expensive than alternatives such as batteries. Their attributes make them attractive for uses in which frequent small charges/discharges are required (e.g., ensuring power quality or providing frequency regulation).

What are supercapacitors & how do they work?

Supercapacitors are developed within a small industry relative to other types of energy storage, such as batteries. Lithium-ion batteries have become the dominant storage technology for most grid applications through significant investment in innovation and scale-up of deployment, as well as the corresponding increased power densities at less cost.

The global supercapacitors market size was valued at USD 2.75 billion in 2024 and is estimated to grow from USD 3.24 billion in 2025 to reach USD 12.21 billion by 2033, growing at a CAGR ...

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Comparison Tool Compare energy storage types Operational Lifetime (Years) Cycles per Year Life Cycles
9125 Duration Hours .1.2.3.4.5.7511.523456810 Battery Type ...

If you're researching energy storage for renewables, electric vehicles, or industrial applications, you've likely asked: "How much does a supercapacitor energy storage system ...

What is a supercapacitor? A supercapacitor is a high-capacity capacitor with capacitance values much higher than other capacitors (but lower voltage limits) that bridge the gap between ...

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This technology represents a fierce competitor to lithium ion batteries and could potentially replace the lithium batteries in the future. Monaghan compared the cost for this type of ...

It can be observed from Table 4 that the cost per kWh of all the supercapacitor families is very high compared with that of Li-ion batteries of USD 132/kWh in 2021, as mentioned in [51].

The Department of Energy released its cost analysis for 11 technologies one day before announcing several funding and innovation opportunities for long-duration storage ...

Cost and performance metrics for individual technologies track the following to provide an overall cost of ownership for each technology: cost to procure, install, and connect an energy storage ...

This whitepaper will provide a discussion of the practical capital expenditure (CapEx) and OpEx outlooks for current VRLA, lithium-ion (Li-ion), flywheel and supercapacitor ...

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This article provides an analysis of energy storage cost and key factors to consider. It discusses the importance of energy storage costs in ...

Clearly this means the cost per unit energy stored in these devices will have a critical impact on the EV market. Bloomberg New Energy Finance reports that the cost per ...

After obtaining the battery and SC cost per kWh, the associated cost with the ESS is also increased by 10% to account for operation and maintenance as well as power converter ...

Hence a supercapacitor system earns a 10% IRR if it charges a 6c/kWh spread and charges/discharges around 30,000 times per year. If say, 5-10%, of the electricity in a power ...

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