



# Sand batteries for clean energy

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Sand batteries represent an emerging approach to energy storage, particularly effective in harnessing and retaining energy from intermittent sources like solar and wind.

The physical properties of sand, such as its ability to store heat at high temperatures, make it an excellent medium for energy retention. This capacity is being leveraged by innovative technologies to create a more stable and reliable energy supply, as sand can efficiently accumulate and release heat as required.

The science behind sand batteries involves heating sand to high temperatures using surplus energy generated from renewable sources. This stored heat can then be converted back into energy when needed.

As National Renewable Energy Laboratory's (NREL) Patrick Davenport notes, "Sand and concrete silos with refractory insulation are very inexpensive materials that can lead to low-cost energy storage."

A few key players currently pioneering this technology include Polar Night Energy in Finland, which has implemented a sand battery for residential and commercial heating, and EnergyNest in Norway, which specializes in thermal energy storage using similar principles.

Using sand for energy storage offers multiple benefits: it is abundant, low-cost, eco-friendly, and can store heat for long periods. This makes sand an attractive option for enhancing the stability of renewable energy systems, and providing a reliable energy supply even during times of low sunlight or wind.

Sand battery technology is currently being tested and used in various projects worldwide, not only demonstrating the viability of sand as an energy storage solution but highlighting its potential scalability and integration into existing energy infrastructures.

Despite the potential, challenges remain. Developing and deploying sand battery technology on a large scale requires significant research and development efforts. So, the role of government and private investment is crucial in overcoming barriers and driving forward the innovation needed for the widespread adoption of this potentially game-changing battery technology.

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Polar Night Energy (PNE), a Finnish company, is leading the way in demonstrating that large power storage solutions need not be made using lithium. Instead, the company has turned to a widely available resource: sand. In 2022, the company revealed the world's first sand battery.

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As the world scales up renewable sources of energy in a bid to reduce its carbon emissions, storage of generated energy has been a new problem. Energy generation from the Sun and the wind is not a continuous process and the difference in power levels generated during peak and non-peak hours can be significant. Green utility companies are turning to large-scale battery storage solutions made using lithium and its derivatives to tide over these differences.

PN&#217;s solution turns to resistive heating to utilize the excess power generation during peak hours. The energy is used to heat air, which is then transferred to a tower of sand through a heat exchanger. Since the melting temperature of sand is hundreds of degrees Celsius, a tower of sand has a high potential for storing energy.

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