



# **Sand Battery and Thermal Energy Storage by Infinity Turbine**

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**<https://infinityturbine.com/sand-battery-tes.html>**

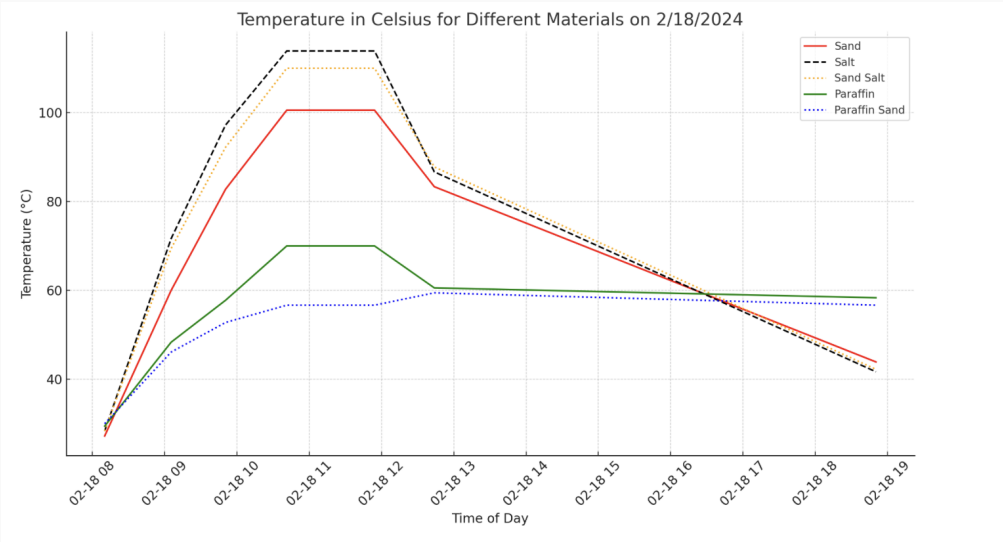
In the quest to find sustainable and efficient energy storage solutions, the concept of thermal energy storage (TES) using materials like sand, salt, and paraffin wax is gaining traction. Among these, the sand battery represents a groundbreaking approach to storing renewable energy, addressing the intermittency issues of wind and solar power sources.



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## Sand Battery

In the quest to find sustainable and efficient energy storage solutions, the concept of thermal energy storage (TES) using materials like sand, salt, and paraffin wax is gaining traction. Among these, the sand battery represents a groundbreaking approach to storing renewable energy, addressing the intermittency issues of wind and solar power sources.

The sand battery, a novel TES technology, utilizes the simple yet effective medium of sand to store heat. Developed by researchers and companies like Polar Night Energy in Finland, these systems can store massive amounts of thermal energy in heated silica sand, allowing for the storage of energy generated from renewable sources when supply exceeds demand. The world's first commercial sand battery in Kankaanpää, Western Finland, is a testament to this innovation, providing heat to local residential and commercial buildings through a district heating network. This system underscores the potential for sand batteries to contribute significantly to decarbonizing the energy sector.

Sand as a storage medium offers several advantages: it is inexpensive, abundant, and capable of storing heat at high temperatures (up to 600-1000 C) for long durations, making it an ideal candidate for large-scale, long-duration energy storage[3][4]. The ENDURING project by the National Renewable Energy Laboratory (NREL) in the U.S. exemplifies this, aiming to store up to 26,000 MWh of thermal energy in silica sand, heated via electricity from renewable sources.

Beyond sand, alternatives like salt and paraffin wax also hold promise for TES. Salt, particularly in the form of molten salt, is used in concentrated solar power plants for its high heat storage capacity and ability to store heat for extended periods. Paraffin wax, with its phase change properties, can absorb and release heat at consistent temperatures, making it suitable for smaller-scale applications like building heating and cooling systems.

Another innovative project in Italy, bGen by Brenmiller Energy, showcases the versatility of sand-based TES not just for heating but also for industrial processes and power generation, highlighting the adaptability of this technology across various sectors.

These developments indicate a significant shift towards more sustainable and efficient energy storage methods, essential for achieving a decarbonized energy grid. Sand and its alternatives offer a pathway to store renewable energy effectively, addressing the intermittency challenge and paving the way for a future where renewable energy can be utilized to its full potential, without the limitations posed by current storage technologies.

### References:

1. Polar Night Energy. What is a sand battery? Polarnightenergy.fi.
2. New Atlas. World's first commercial sand battery begins energy storage in Finland.
3. CleanTechnica. Using Hot Sand To Store Energy.
4. Popular Science. Silica sand is a new way to store renewable energy.
5. Energy Storage News. Sand-based battery thermal energy storage project in Italy.

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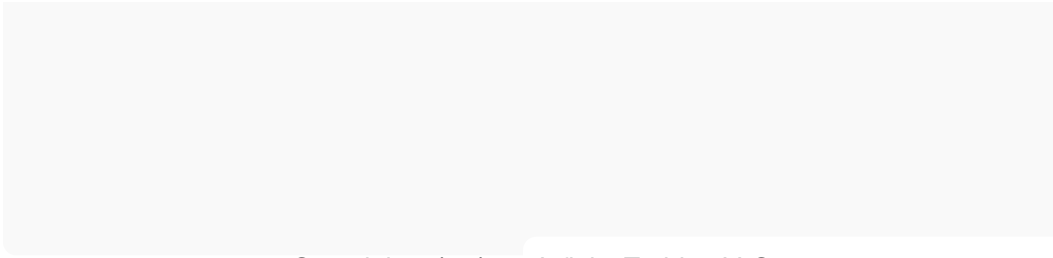
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