



Polar night energy solar system

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Polar Night Energy's Sand Battery is a large-scale, high-temperature thermal ...

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Finnish startup Polar Night Energy and local Finnish utility Vatajankoski have together built the world's first commercial sand-based, high-temperature heat storage system that can be powered by solar and wind.

Polar Night Energy's heat storage system is a 23-foot-tall steel container filled with 100 tons of sand. (Polar Night Energy uses the lowest grade of sand that isn't used in construction.) Hot air blown through pipes heats the sand in the steel container by resistive heating.

The sand is able to store heat at around 500-600C (932-1,112F) for months, so power generated in the summer can be used to heat homes in the winter. Polar Night Energy says it has 100 kW of heating power and 8 MWh of energy capacity. Here's how it's meant to work with renewables:

This first sand battery, which is in the town of Kankaanpää, is connected directly to the grid and runs when the electricity is cheapest - that's usually when renewables are powering it. It's also next to a data center, which produces waste heat that is pumped into the sand battery. In the future, the energy-storage silo can and should be directly connected to wind or solar sources of power.

When energy prices are higher, the sand storage system discharges heat that warms water for Vatajankoski's district heating system. The water is then pumped around homes, offices, and the town's swimming pool.

This innovation is a part of the smart and green energy transition. Heat storage can significantly help to increase [the presence of] renewables in the electrical grid. At the same time we can prime the waste heat to usable level to heat a city. This is a logical step toward combustion-free heat production.

The US National Renewable Energy Laboratory is investigating sand's potential for energy storage, but the Finns got there first. Polar Night Energy is in talks with other local utilities and is planning to raise more funding to expand.

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