



Polar Night Energy's sand-based thermal storage system | Photo source [Polar Night Energy](#)

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## WORLD'S FIRST LARGE-SCALE SAND BATTERY GOES ONLINE

 AGRICULTURE & ENERGY

### Finnish researchers have developed the first fully working battery powered by sand – and it can store energy for months at a time

**Spotted:** Thanks to the war in Ukraine, and Finland's subsequent decision to join NATO, Russia has halted all gas and electricity supplies to the Nordic country. Finland gets most of its gas from Russia, so the country has had to rapidly ramp up its switch to renewable forms of energy. While the country can install new solar panels and wind turbines, these energy sources also present huge challenges, including how to keep the lights on during the long, dark winters, when there is no sun. A startup called Polar Night Energy may have the answer – and it's a surprising one.

While batteries are the obvious choice for energy storage, most large-scale battery storage systems are expensive, have a large physical footprint, and can only cope with a limited amount of excess power. However, a team of young Finnish engineers have just fired up the first commercial battery that uses sand, which they believe can solve many of the problems with battery storage. The battery, located in the town of Kankaanpää, is attached to the district heating system.

The battery is made of a four-metre by seven-metre steel container that contains hundreds of tonnes of sand. The sand is heated to a temperature of between 500 and 1,000 degrees Celsius using renewable electricity. The process uses resistive heating where hot air is generated and circulated in the sand using a heat exchanger. Using very little energy, the sand can be kept hot for months. When energy is needed, the battery discharges the hot air, which is used to warm water which is then pumped around homes, offices, and even the local swimming pool.

Markku Ylönen, co-founder of Polar Night Energy describes the sand battery as part of the smart and green energy transition, [saying](#), "Heat storages can significantly help to increase intermittent

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 towards combustion-free heat production.”

Sand batteries are just the latest innovative battery technology that is hoping to bridge the gap between generation and usage for renewable energy. Other innovations in this space recently covered by Springwise include using old [electric vehicle batteries](#) to store solar and wind energy, storing energy in heat and [compressed air](#), and a battery made using [carbon dioxide](#).

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### **Takeaway:**

In addition to the full-scale project in Kankaanpää, Polar Night also has a 3 megawatt-hour test pilot in Hiedanranta, Tampere, which is connected to a local district heating grid. However, while the sand battery provides up to 99 per cent efficiency when used to directly supply heating, the efficiency falls dramatically when the sand is used to return power to the electricity grid. The next challenge for Polar Night is to scale up the technology and use it to generate efficient electricity as well as heat. Despite the challenges, this appears to be an idea whose time has come — other research groups, including the [US National Renewable Energy Laboratory](#) are working on their own sand batteries.