
**Solution for clean energy's big problem**

Polar Night Energy has built an industrial-scale Sand Battery for Loviisan Lämpö, a Finnish energy company. Located in Pornainen, Finland, the 1 MW thermal energy storage serves as the primary production plant of the local heating network.

**Heating Power** 1 MW
**Capacity** 100 MWh
**Client** Loviisan Lämpö
**Location** Pornainen, Finland
**Year** 2025
**Sector** Heating

**Industrial-scale Energy Storage**

Polar Night Energy delivered the Sand Battery to Loviisan Lämpö as a turnkey project. The Sand Battery is approximately 13 meters high and 15 meters wide. The purpose of the Sand Battery is to reduce carbon dioxide emissions of the district heating production in the Pornainen municipality and introduce a new flexible heat production technology.

The heating power of the Sand Battery is 1 MW, and it can store up to 100 MWh of thermal energy, making it about ten times larger than the Sand Battery in operation in Kankaanpää since 2022. This is a significant step in scaling up the Sand Battery technology.

*"With the Sand Battery, we can significantly reduce energy produced by combustion and completely eliminate the use of oil."* – Mikko Paajanen, CEO, Loviisan Lämpö

**Optimal Operation**

The Sand Battery is flexible in both its electricity usage and heat production. It is charged from the electric grid using optimized algorithms, minimizing electricity costs while meeting the client's heat demand. The thermal energy storage capacity corresponds to almost one-month heat demand in summer and a one-week demand in winter in Pornainen. The existing wood-chip power plant will remain in operation as a backup and peak-load facility.

**Participating in Reserve Markets**

The Sand Battery supports the growth of renewable energy and is designed to participate in reserve and balancing markets. This helps maintain grid stability as wind and solar power increase. Elisa, the leading Finnish telecom operator and an international digital services company, provides a solution that automatically optimizes the Sand Battery's charging and participation in the electricity reserve markets. The solution will bring significant savings and revenue to the customer.

*"Electricity markets have changed, and nowadays, price fluctuations are rapid, and electricity trading takes place in several marketplaces. It is no longer possible for humans to manage this complex system alone."* – Ville Väre, Director of Business Development, Elisa

**Towards Carbon-Neutral City**

The municipality of Pornainen, Southern Finland, is excited about the new heating method. It aligns with its goal of "Towards a Carbon-Neutral Pornainen." *"Our municipality welcomes all innovative development projects that reduce emissions in district heating operations and contribute to network expansion",* says Antti Kuusela, the Mayor of Pornainen. Many of the municipality's own buildings, including the Comprehensive School, town hall, and library, are connected to district heating.

**By-Product Replaces Virgin Material**

The Sand Battery in Pornainen is filled with crushed soapstone, a by-product of Tulikivi's heat-retaining fireplace production. Tulikivi is the market leader in heat retaining fireplaces in the world. A total of 2,000 tons of soapstone is used in the Sand Battery, equivalent to the weight of about a thousand soapstone fireplaces. It's a great example of the circular economy in action.

**Achieving Climate Goals**

Loviisan Lämpö is owned by CapMan, a pioneering investment company. CapMan's vision is to be the most responsible private assets investor in the Nordics. The Sand Battery is an excellent example of their commitment to reducing CapMan's carbon dioxide emissions and seeking solutions that lead the company towards net-zero emissions. *"Loviisan Lämpö's investment in the Sand Battery is a concrete step towards CapMan's climate goals",* says Sauli Antila, Investment Director of CapMan Infra.

**Sustainable Solution for the Energy Transition**

**70%** reduction in GHG emissions. Cuts 160 t $CO_2e$ per year from the heating network's total emission.

**60%** less combustion of woodchips. The woodchip power plant will remain as a backup and peak-load facility.

**14** hectares of saved forest per year. The reduction in woodchip use helps preserve a significant area of forest.

**2 000** tons of soapstone. Storage medium is crushed soapstone, a by-product of fireplace manufacturing.

**80%** approximate round trip efficiency.

**Low** operation and maintenance costs.

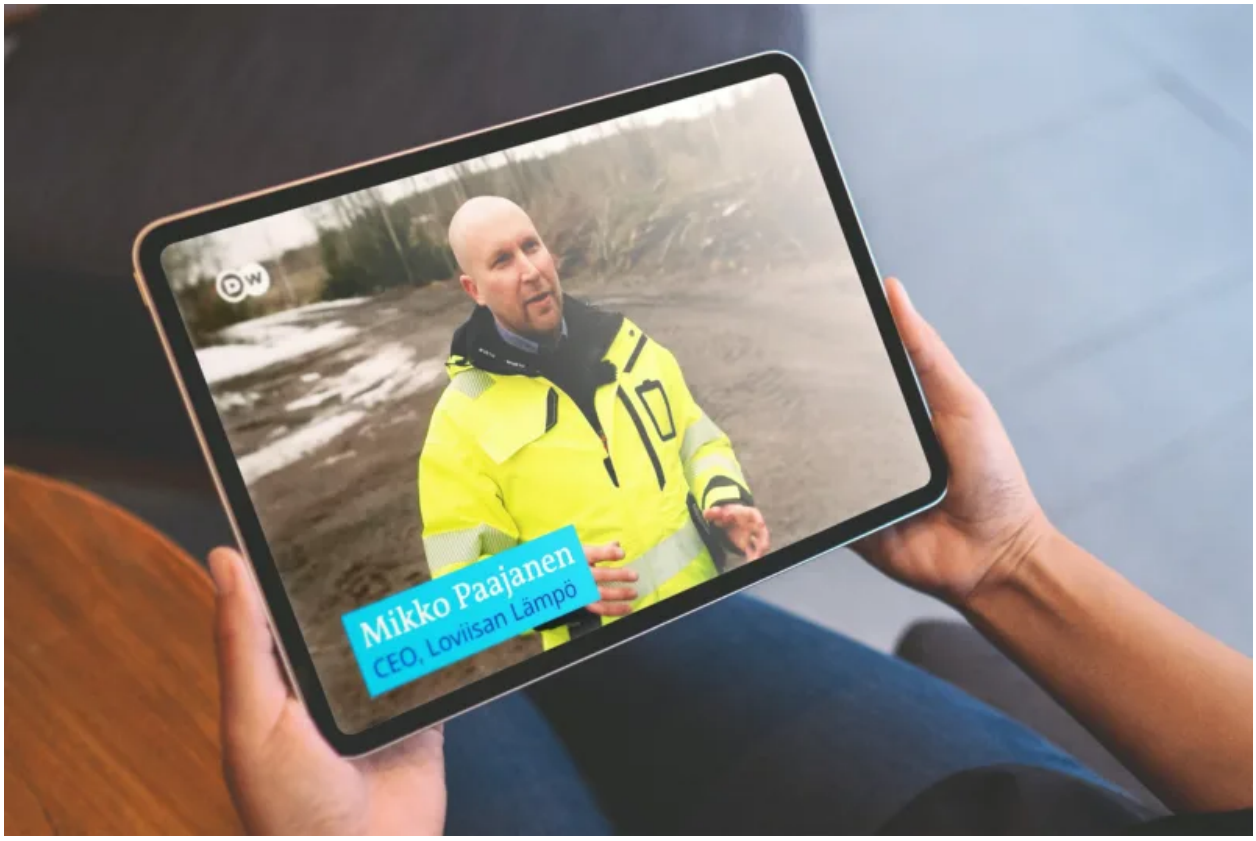
**400 °C** maximum storage temperature.

**Zero** toxic materials used.

**Sustainable.** The Sand Battery saves thousands of tons in GHG emissions annually, with zero toxic or harmful substances released.

**30+ years design life.** Our solution features a long system design life with uptime exceeding 8,000 hours per year.

**Profitable.** Charge the Sand Battery by using your own or grid electricity, primarily at low SPOT prices. Participate in frequency containment reserve markets for additional revenue.




**In the Media**

The Pornainen Sand Battery has attracted global attention since 2024. Here are three featured stories.

Euronews: ‘A very Finnish thing’: Big sand battery to store wind and solar energy using crushed soapstone

TNW: Startup secures €7.6M for sand battery that can heat a small town

Energy-Storage.News: Larger, 1MW/100MWh ‘Sand Battery’ set for commissioning in 2025

**About the Customer**

Loviisan Lämpö is a Finnish district heating company that supplies district heating to its customers in Loviisa, Pukkila, Pornainen, Pyhtää Siltakylä, Pyhtää village center, and Lappohja. Loviisan Lämpö is owned by CapMan Infra.

The project received support from Business Finland’s new technology energy aid.

Read more at https://polarnightenergy.com