ELSTOR

A big impact on the climate







THE WORLD'S ENERGY SYSTEM IS CHANGING FAST

01

Oil, gas, and other fuel prices are increasing

02 Price for CO2 emission allowances is increasing

03 Volatility of electricity price is increasing

Increased generation of renewable energy Wind & solar electricity generation volume is increasing and cost decreasing

Rising cost of Non-renewable energy



Renewable energy's Generation is not a challenge anymore, but the **Storing** is

- Storing electricity with electrochemical batteries and releasing it back is not economically most feasible
- Prices of lithium and lithium batteries, as well as their lifetime and sustainability are a challenge



Steam is used widely

- Food industry
- Beverage industry
- Pharmaceutical industry
- Chemical industry
- Sawmills
- Cement mills
- Laundries
- And other

THE PROBLEM WITH INDUSTRIAL HEAT GENERATION

A large portion steam

01

Required temperatures are moderately high and can't be achieved with existing heat pumps

02

Volatile power needs of processes can't be always met with solid fuel boilers (e.g., biomass)

03

In many cases conventional fossil fuels have been only techno economical option

A large portion of industrial heat is generated as



WHAT WE DO?

Power-to-heat Thermal Energy Storages

PtH TES

For industrial heat and steam production





Founders:

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• Professor of Energy Efficiency (LUT University)

ABOUT ELSTOR

- Founded in **2017**
- Located in Lappeenranta

- Serial entrepreneur (Visedo, Axco
 - Motors etc.)



MAIN FEATURES



Multiple times **lower investment** to build than electrical battery storage systems in relation to storage capacity



Charging and discharging can be done **simultaneously**

((17))

Perfect fit to **demand response**



High energy density to store energy in compact space



Remote control, remote operation capability, and **autonomic operation**



High storage temperature (over 500 °C) and very **high efficiency of 95-97%**



ADDITIONAL FEATURES



Modular and serial manufactured design



Material selection done **sustainably** considering price, reusability and availability around the world



Lifetime of TES is basically **unlimited** – no chemical degradation inside



Hundreds of tons of CO_2 emission reduction with each unit



In steam application area in Finland only, potential for **over 1000 units** (would mean 1% of total CO₂ emissions)



Discharge power control area **0 – 100 %** and capable of reacting to variable power demands





Serial production Base Unit

Optimized for small and medium sized industry

Electricity

CHARGING

0.5 – 3.0 MW

 \rightarrow





<mark>Unit</mark> ed industry



DISCHARGING

max 2.0 MW 250 °C degree max 16 bar



INCREASING VOLATILITY IN ELECTRICITY PRICES

Average Elspot Day-ahead prices in Finland



= Hourly volatility inside a day is on a steep rise



If these low price hours could be stored the price of electricity would be very low, even in 2022

count

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●

HOURLY PRICES

2022 is exceptionally expensive year

However approximately 1600 most inexpensive hours are lower in cost than in 2018 or 2019

PROVEN SOLUTION







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