

26 Februari 2025

Energy Of The Future : Thermische opslag



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INDUSTRY DECARBONISATION JOURNEY

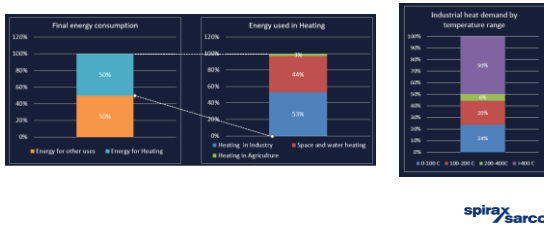
(STEAMBATTERY)
Decarbonising Steam Generation
Through adaptable thermal energy storage

Steam, a vital thermal energy transfer fluid for today and for a sustainable industrial future.

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EXPERTISE | SOLUTIONS | SUSTAINABILITY

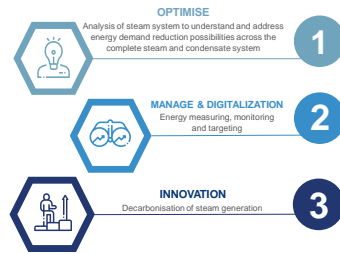
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HEATING & INDUSTRY & steam



3

Roadmap to Net Zero



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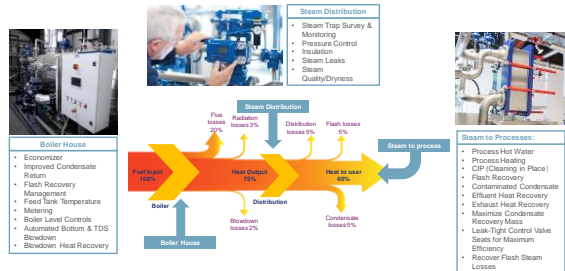
OPTIMIZATION

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OPTIMIZATION

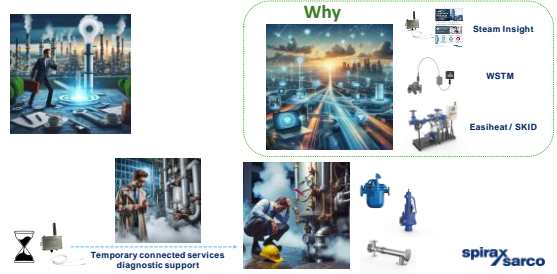


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Why do we want to connect Steam Equipment ?



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DIGITALIZATION

"We cannot improve what we can't measure"

- ▶ Allows for enhanced services when managing plant
- ▶ Encompasses sensing, connectivity, **visualization and insight**
- ▶ **Continuous monitoring** to maximize plant efficiency
- ▶ **Improves maintenance** outcomes by increasing ability for first time fix
- ▶ Increase up-time with timely improvements during scheduled down-time



spirax sarco

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Flowmeters: everything starts with correct measurement...



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Standardized dashboard + customization



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Steam is central to the industry decarbonization journey

3 INNOVATION

Industries and organizations are recognizing steam as the Natural Technology that fits with their sustainability agendas. With new steam generation technologies, we are on a path towards carbon-free steam generation.

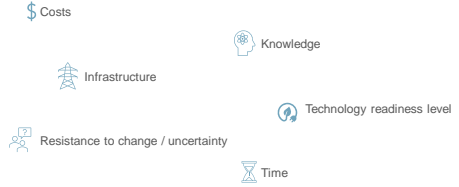
> Technologies for low-carbon steam generation:

- Electrification
- Biofuels
- Green Hydrogen
- Solar thermal
- Geothermal
- CCUS



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INNOVATION
Implementation challenges



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INNOVATION – ELECTRIFICATION
Opportunities

- ▶ **Low CO₂ steam** production using increasingly decarbonised electrical grid supplies
- ▶ Clean operation with **no chimneys, fuel lines or storage tanks**
- ▶ **Highly efficient operation with no flue losses**
- ▶ Used for the generation of **clean or plant steam**
- ▶ Can utilise power from **on-site renewables** such as wind or solar PV
- ▶ **Precise temperature control** and quick ramp-up
- ▶ **High TRL (already proven)** for most of the electrification technologies



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INNOVATION – ELECTRIFICATION
Challenges

- ▶ Although **Infrastructure for electrification** is better placed than other decarbonisation options, it will have to **expand significantly** to support transport, commercial and industrial needs.
- ▶ Although participation of renewables in the grid is increasing, a **great proportion of electricity generation is still based on fossil fuels**.
- ▶ Increased inclusion of renewables to the grid will mean **greater energy storage capabilities** will be required.
- ▶ **Electricity is more expensive** than fossil fuels.



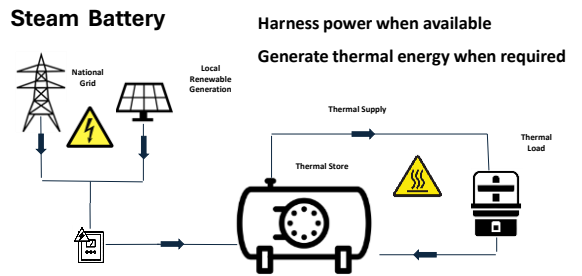
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SteamBattery™
Sustainable thermal storage and steam generation

- Electric Steam ACCU



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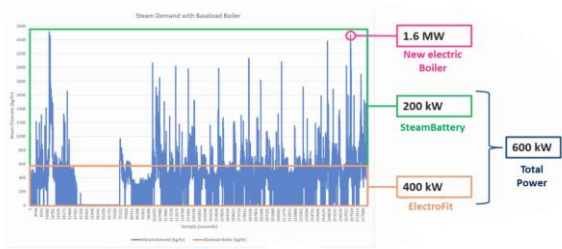
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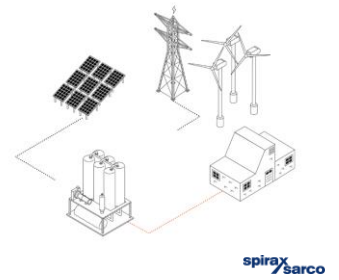


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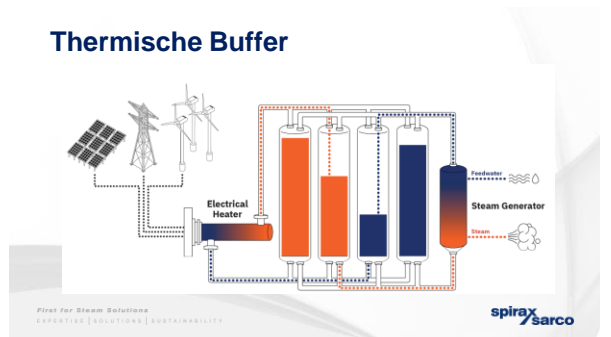
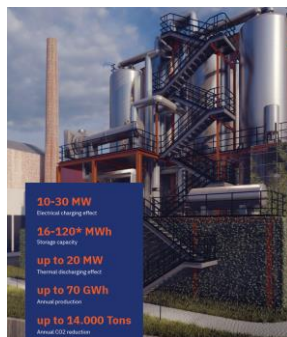


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Heatcube: Thermal Energy Storage Solution

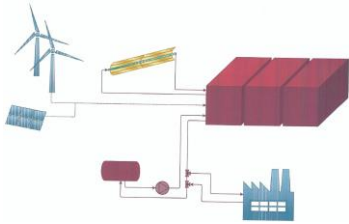


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Thermische Buffer



Medium (vloeibaar – vast – gasvormig)

- Water/stoom (H₂O)
- Waterstof (H₂)
- Magnetiet
- Steenslag
- Gesmolten zout
- Metalen
- ...



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