DRIVING SUSTAINABLE INNOVATION

MAGALDI®
DEPENDABLE ENERGY STORAGE

GREEN HEAT
FOR A DECARBONIZED PULP & PAPER INDUSTRY

Highly energy-intensive, in the Pulp and Paper industry about two-thirds of final energy goes to process heat, which is traditionally generated by natural gas boilers or biomass CHP plants - both of which expose mills to:

- High and volatile fuel costs
- Carbon taxes and tightening emissions regulations
- Operational risks linked to feedstock supply and ash handling.

The challenge is clear: **decarbonize steam generation** while maintaining operational **efficiency** and **profitability** in a fast-changing and sustainability-driven market.

Magaldi brings together deep technical expertise and a clear sustainability vision to support pulp and paper mills on their journey to net-zero.

MGTES
LONG-DURATION THERMAL BATTERY FOR PROCESS HEAT ELECTRIFICATION

MGTES (Magaldi Green Thermal Energy Storage) – the world's **first fluidized sand thermal battery** – offers pulp and paper mills a practical and scalable solution to replace combustion heat with **dispatchable**, **renewable-derived thermal energy**, available on demand and without direct emissions. The system converts renewable electricity - charged during low-cost/high-renewable hours - into heat, and delivers thermal energy up to 600 °C, enabling steam generation at the temperatures and pressures required by most papermaking processes.

A STRATEGIC LEVER

MGTES enables efficient, sustainable, and costeffective electrification of process heat.
By decarbonizing steam generation, paper mills can:

- Reduce fossil reliance and emissions
- Stabilize energy costs
- Enhance operational resilience
- Improve ESG performance
- Gain a lasting competitive edge in global markets increasingly shaped by sustainability standards.

BENEFITS AT A GLANCE

DECARBONIZATION & ESG VALUE

- Replace fossil steam with renewable-derived thermal energy
- Cut direct CO^2 emissions to near-zero when powered by green electricity
- Strengthen ESG profile and eligibility for incentives (ETS, national grants, White Certificates)

RELIABILITY & OPERATIONAL FLEXIBILITY

- Ensures a steady steam supply even when renewable generation fluctuates, preventing process disruptions.
- Offers scalable autonomy of up to 20 hours depending on the application. Autonomy is determined by the installed capacity and the state of charge (SoC).

COST SAVINGS & REVENUE GENERATION

- Long-term price stability by shifting energy consumption to off-peak renewable electricity
- Avoids exposure to volatile gas prices and carbon taxes
- Pairs with on-site PV or wind, maximizing self-consumption and reducing grid withdrawal
- Creates revenues by providing grid services (demand response, peak shaving, frequency regulation).

DURABILITY, RESPONSIVENESS & MODULARITY

- +30 years lifetime
- Designed for high cycling with no perceptible drop in performance under typical operating conditions
- Fast and flexible response to variable thermal loads thanks to simultaneous charge and discharge
- Scalable modules from 5 to >100 MWh thermal capacity, suitable for mills of any size

SAFETY & CIRCULARITY

- No fire or toxicity risks
- Fully recyclable materials, no hazardous waste

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