Cepi RENEWABLE RECYCLED RESPONSIBLE EUROPEAN

EASE European Association for Storage of Energy

Energy Efficiency Solutions Forum (EESF)

ENERGY STORAGE

Solutions for the decarbonisation of the pulp and paper industry

The pulp and paper sector is committed to achieving climate neutrality in Europe by 2050. This requires reducing emissions in our production processes by the implementation of energy-efficient technologies and the effective use of fossil-free energy sources.

Cepi's Energy Efficiency Solutions Forum (EESF) aims to accelerate the development and implementation of carbon-reducing technologies and solutions in our sector. We accomplish this by forging new partnerships and collaborating with developers and suppliers of energy efficiency technologies, as well as providers of fossil-free energy.

One of these technologies providing energy efficiency is Energy Storage.

How can energy storage help to decarbonise the paper production process and value chain?

- **Decrease dependence of fossil fuels:** store excess renewable energy generated during off-peak hours and supply it during peak demand periods.
- **Optimising electrified heating and cooling:** allow electrified industrial heating and cooling solutions to capitalise on off-peak pricing to reduce production costs.
- **Customised thermal energy needs:** different technologies allow for various heating capacities and utilities such as steam, process air, and hot water.
- **Waste heat recovery:** store and optimise thermal energy emitted by industrial processes to reuse in energy systems.
- **Cost savings and revenue generation:** Shift energy consumption to off-peak hours. Reduce peak demand to lower overall electricity costs and minimise the need for carbon-intensive backup power generation. Create revenues by providing grid services such as frequency regulation or capacity reserve.
- **Backup power and resilience:** ensure continuous production processes by serving as a reliable and renewable backup power source during grid outages or emergencies.

The market of energy storage technologies

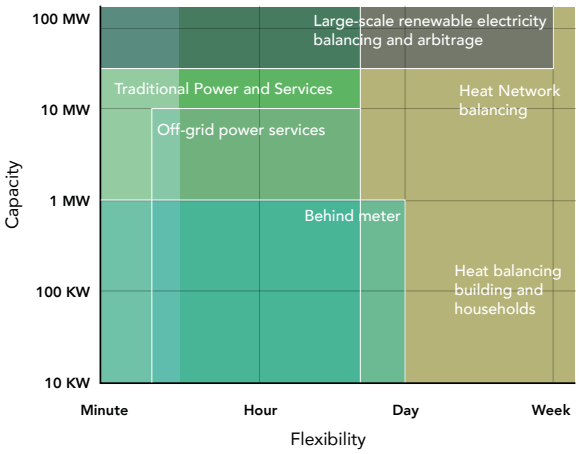
The uptake of energy storage solutions in the industrial sector is expected to increase in the coming years as industries seek to improve energy efficiency, reduce operational costs, and meet sustainability targets. Energy storage capacity in the industrial sector depends on the size and type of industries, technological advancements, and regulatory frameworks in different European countries.

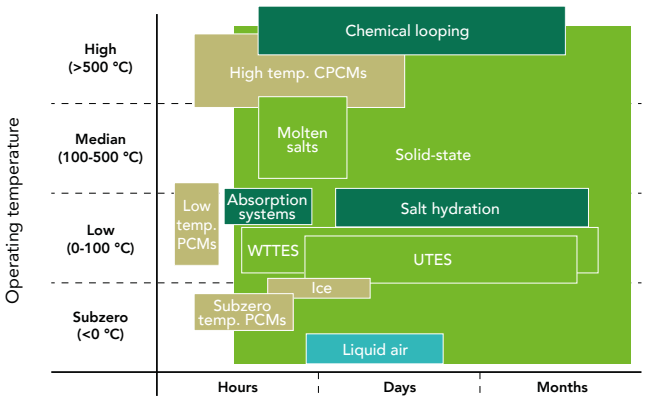
Business Models

- **Capital Investment:** Companies can invest in energy storage systems, expecting long-term cost savings, revenue generation, and resilience benefits over the system's lifespan.
- **Third-Party Ownership:** Third-party developers or energy service companies can finance, own, and operate energy storage systems on behalf of industrial customers under heat/power purchase agreements (HPAs/PPAs) or energy services agreements (ESAs).
- **Aggregated Services:** Companies can participate in aggregated energy storage projects or virtual power plants, pooling their resources with other energy users to provide grid services and earn revenue collectively.
- **Leasing and Financing:** Leasing arrangements or financing options allow companies to deploy energy storage systems with minimal upfront capital investment, paying for the system over time through lease payments or financing agreements.

What are the different forms of energy storage?

Energy storage devices are "charged" when they absorb energy and "discharge" when they deliver stored energy. Charging and discharging normally require conversion devices, for example to transform electrical energy (AC or DC) into a different form of chemical, electrochemical, electrical, mechanical, and thermal.

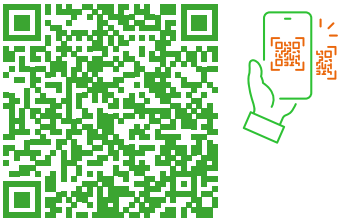




Thermal energy storage (TES) technologies can be classified into three major types: Sensible energy heat, Latent energy and Thermochemical heat. Storage duration can be extended based on overall system design and increased insulation.

- **WTTES** = Water Tank Thermal Energy Storage
- **UTES** = Underground Thermal Energy Storage
- **PCM** = Phase Change Materials

There are various ways to implement Thermal energy storage technologies. Detailed information can be found in the Policy Paper of EASE:



Case study for medium temperature industrial heat in a paper company

Thermal Energy Storage (TES) is delivered as Heat-as-a-Service (HaaS), with no investment by the customer, but paid per MWh heat consumed. An off-grid solar PV plant will be installed and connected to the TES to further lower the price of electricity. In this case, the total heat demand is 30 GWh/year and through the electrification and decarbonisation of the customer, 6667 tonnes of CO_2 emissions can be avoided and save the customer up to 25% per MWh of heat compared to natural gas.