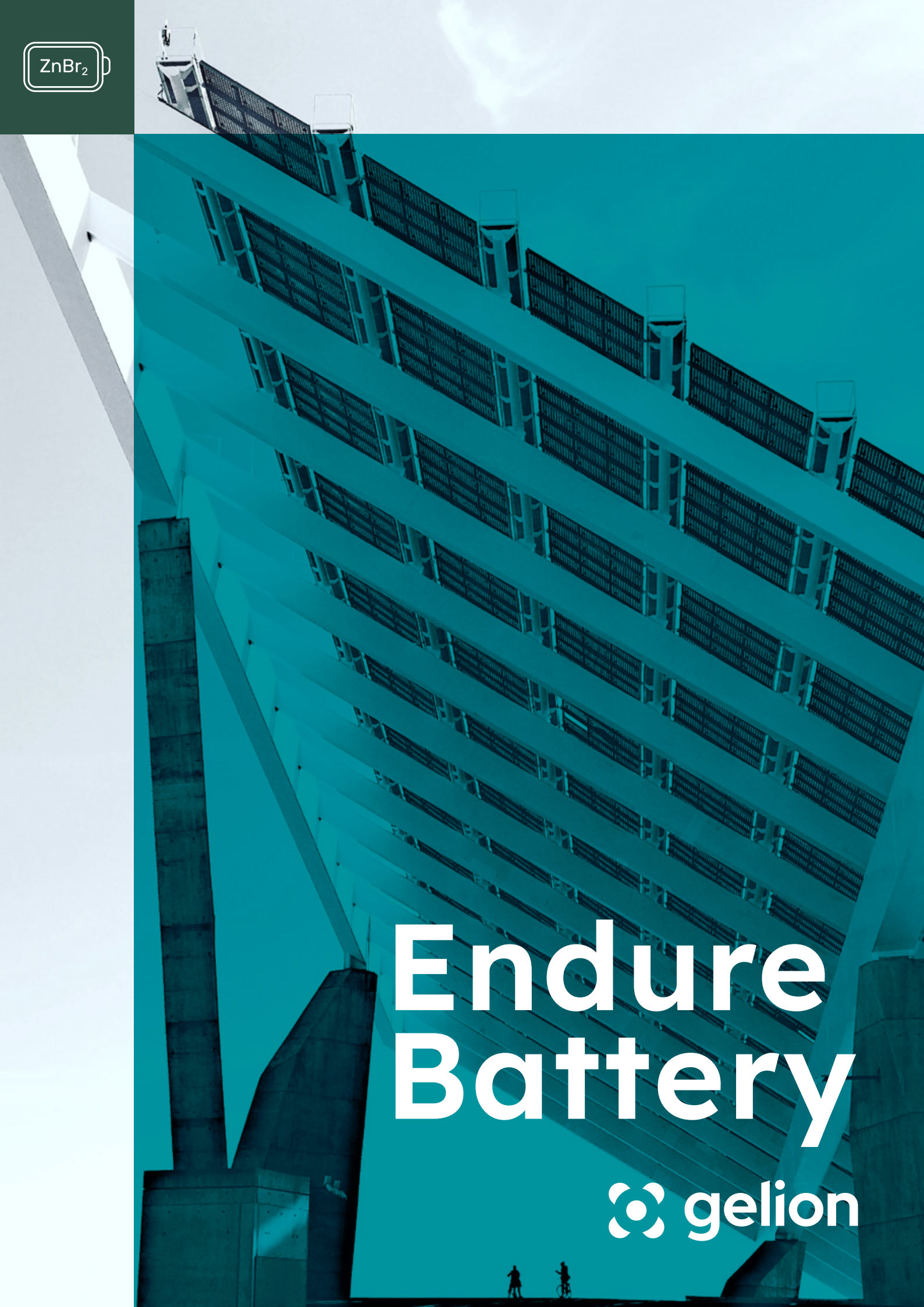
$ZnBr_2$



Endure Battery

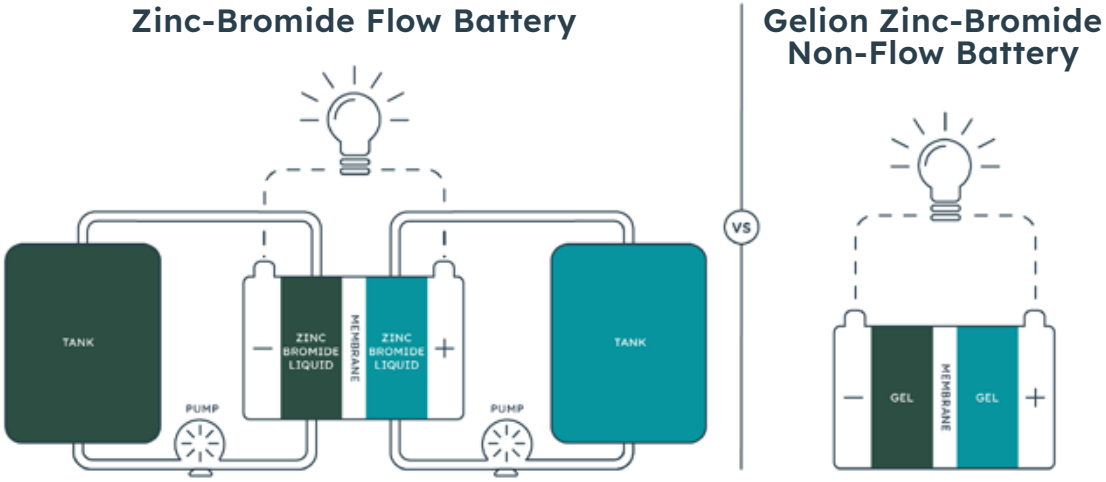
gelion

Endure Battery Technology

Founded in 2015, Gelion have developed the industry leading Zinc Bromide (ZnBr) battery technology that delivers a safe, cost-effective, long-life alternative to lithium-ion and lead acid (PbA) battery technologies.

Gelion's Endure battery is packaged similarly to PbA batteries, enabling Gelion to keep its costs down by taking advantage of this global, established and low cost manufacturing ecosystem.

Endure's patented gel enables a unique non-flow battery design for its ZnBr chemistry. This maximises the battery's safety and enables its low cost attributes, negating some of the burdens associated with conventional flow batteries including high manufacturing cost, additional capex, maintenance and other mechanical systems. In addition, Endure's unique Battery Management System (BMS) performs proactive conditioning cycles that significantly extend battery life compared with other technologies.



Endure is targeted at stationary energy storage applications. Its levelised cost of energy storage (LCOES) is maximised by the battery's low fade capability even at high temperatures, which is a fundamental issue for other battery technologies. It has many additional advantages including the ability to daily cycle at 100% depth of discharge (DoD) and operate at temperatures up to 50°C, without requiring costly air-conditioning systems. The battery is abuse tolerant; it can be discharged to zero Volts repeatedly without harming its performance, making it ideal for off-grid unmanaged environments.

$ZnBr_2$

Battery Safety & Recyclability

Gelion's patented gel acts as a fire retardant making the battery virtually incombustible; meaning that thermal runaway is not an issue for the Endure battery. When fully discharged, the battery's electrolyte is a benign aqueous salt, posing minimal risk to people and the environment. When charged, the battery contains Zinc and an inherently stabilized form of Bromine, obtained by its interaction with our proprietary gel. Importantly, the battery is fully recyclable at end-of-life, with its primary materials being plastics, carbons and salt-water.

Product Highlights

Low cost, globally available materials; Zinc salts, polymers and carbons

Simple, low cost manufacturing, leveraging Global PbA ecosystem

Long battery life expectancy > 5000 cycles at 100% depth of discharge (DoD) with low fade, even at high temperatures

High fire safety, gel acts as a fire-retardant and fully recyclable via conventional methods

Can be discharged to zero Volts, for increased safety and high tolerance in unmanaged systems

Highly competitive levelised cost of energy storage (LCOES)

Wide operating temperature range of 0-50°C, operating safely without requiring air-conditioning

Applications & Markets

- Endure is an energy storage battery suited for daily cycling and energy shifting applications.
- Markets include off-grid installations for agriculture, mining, communities, and networks; grid connected commercial and industrial, solar farms and utilities.
- Initial use-cases include energy storage for solar PV lighting, water pumping, desalination and retrofits of solar PV-only systems, followed by scaled up systems for larger off-grid and grid connected deployments.

Endure Battery Explained

Why is it so special?

Gelion has transformed the Zinc Bromide (ZnBr) battery technology from a complex flow-battery to a conventional non-flow lead acid (PbA) type architecture. Its chemistry is now deployed in a self-contained, consumer-friendly package which is more economical to manufacture and scale, whilst retaining all the operational benefits of the ZnBr chemistry.

Gelion's solution to dendrites, gassing and modest reaction kinetics is not flow chemistry. Our solution can be found in our unique electrolyte gel which, when placed into an optimised electrode geometry, tightly controls the chemical and electrochemical battery processes.

Over 4000 cycles have been achieved in some manifestations, trickle charging is possible and the electrolyte gel can be tuned to show close to no fade over many hundreds of cycles, even at continuously high temperature.

Key to the Endure technology is its ability to fully discharge to zero volts, an important asset for stability, deep discharge cycling and energy shifting applications. This attribute also greatly improves electrical safety as transport, installation and maintenance can all be performed with the battery carrying no electrical potential. Additionally, this enables the battery to chemically "reset" during a full discharge, resulting in reduced or no capacity fade and maintenance requirements (this is especially attractive for remote locations). Such 'conditioning' may take place at monthly intervals or longer, despite daily cycling. The Endure battery can also be stored at full discharge for extended periods, remaining fully functional and available for recharge to resume normal operation.

Other benefits of Gelion's unique ZnBr technology include:

- high fire safety;
- the use of abundant active materials; and
- its ease of recyclability.

Its fire safety is due to the element Bromine, which is commonly used in fire retardant materials. When used in a battery, the battery itself becomes a flame retardant. Even though the Bromine generated during charging is highly reactive (giving the battery its power), it is rendered safe by being encapsulated within a molecular sponge, while remaining accessible to the energy storage process.

Once discharged, the battery electrolyte can be handled as easily as any other concentrated salty solution, enabling cells to be disassembled readily via a conventional grinding process, and its materials can be reclaimed as battery feedstock, or recycled. Gelion expects that its batteries will be among the safest to operate and simplest to recycle once reaching end-of-life.

Endure Competitive Advantages

Long-life with Low Fade

Improving life-time and levelized cost of energy storage (LCOES).

Robust & Abuse Tolerant

Can be discharged to zero Volts without harming the battery's performance; ideal for unmanaged or seasonal systems. Delivers 100% DoD capability.

Recyclable

A fully recyclable battery that is easily dismantled, safe and more environmentally sustainable, while at the same time reducing its end-of-life disposal costs.

Safe & High Temperature Tolerant

Gelion's ZnBr chemistry acts as a fire retardant, with no thermal runaway. It can operate at high temperatures, where safety and resilience are high priority requirements.

gelion

inspired energy

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Leading the charge to our clean energy future