Energy Storage in Belgium and Europe: Market Growth, Innovations, and Strategic Developments

Introduction

Stefan Louis is an energy storage consultancy based in Antwerp, Belgium, with decades of hands-on experience in battery technology and energy management. Growing up in a family-run battery business founded in 1981, he built deep expertise in energy storage, conversion, and management. Over his career, Stefan has helped customers design and manufacture battery systems for various applications, translating technical innovations into practical energy solutions.

This blend of industrial heritage and modern consultancy puts Stefan at the nexus of tradition and innovation in energy storage. He has witnessed the progression from legacy lead-acid batteries to today's high-performance lithium-ion systems, and now to emerging technologies like sodium-ion and solid-state batteries.

Belgium's Energy Storage Market Growth (2023–2030) vs. European Trends

Belgium's energy storage market is experiencing rapid growth, outpacing many of its European counterparts. System operator Elia's capacity auctions have contracted 1.1 GW of new battery storage to be in place by 2028-2029. Industry analysis indicates over 2 GW of battery projects are currently in development. By 2030, Belgium's total installed storage capacity is projected to reach roughly 3–4 GW, implying a compound annual growth rate on the order of 30%, positioning Belgium as one of Europe's fastest-growing storage markets.

Europe as a whole shows strong growth, though with variations across countries. Much of Europe's storage expansion is driven by behind-the-meter installations: residential batteries are expected to remain the largest source of demand, led by Germany and Italy, followed by markets like Austria, Switzerland, Belgium, Sweden, Spain, and the UK.

The aggressive growth of Belgium's energy storage capacity is fueled by policy support and market opportunity. Belgium benefits from a favorable regulatory regime for storage, and lucrative balancing markets make battery investments financially attractive. Broadly, Europe's energy storage deployment is on a robust upward trajectory as renewable energy penetration rises, but Belgium's growth rate suggests it is leveraging its specific market design and policy tools effectively.

Strategic Positioning of Key Players

GIGA Storage Belgium: GIGA Storage is constructing the Green Turtle battery park in Dilsen-Stokkem, a 700 MW / 2,800 MWh installation. Strategically located adjacent to a new 380 kV substation of Elia, the battery park will directly reinforce the high-voltage grid. GIGA Storage's ambition extends beyond this single project, with a goal of achieving 5 GW of installed storage capacity by 2030.

TotalEnergies: TotalEnergies is actively expanding into the battery storage sector as part of its transition from oil & gas into renewables. It is investing heavily in battery projects to complement its growing renewable energy portfolio. Its strategy is vertically integrated, owning battery manufacturer Saft, and is horizontally integrated with renewable assets, positioning itself to offer clean firm power.

ABEE (Avesta Battery & Energy Engineering): ABEE focuses on covering all aspects of the battery value chain, from R&D and cell production to battery pack systems and recycling. It is establishing a gigafactory in Bulgaria for solid-state battery production and a facility in North Macedonia for Battery Management Systems production.

Role of Large-Scale Projects in Belgium's Energy Infrastructure

Large-scale energy storage projects like Green Turtle are becoming cornerstones of Belgium's energy transition. Their key benefits include:

- Grid Stability and Reliability
- Renewable Energy Integration
- Displacement of Fossil Peakers
- Capacity and Resource Adequacy
- Flexibility for Future Needs

Big projects like Green Turtle act as strategic assets that bolster grid resilience, enable higher renewable penetration, and reduce reliance on imported fossil energy.

Innovations in Energy Storage Technologies: Solid-State and Flow Batteries

Solid-State Batteries: These batteries use a solid electrolyte, offering significantly higher energy density, improved safety, and longer cycle life. Commercialization is expected around 2028-2030.

Sodium-ion Batteries (SIBs): Emerging as a promising alternative to lithium-ion, SIBs use abundant sodium instead of lithium. While they typically offer lower energy density compared to lithium-ion batteries, SIBs promise lower costs, improved safety, and enhanced performance at low temperatures. They are especially attractive for stationary storage and low-cost mobility solutions.

Flow Batteries: These batteries store energy in liquid electrolytes and excel in longevity, making them ideal for long-duration storage. They are particularly suitable for applications requiring heavy cycling and long-term operation.

Comparison Table:

Battery Technology	Status (2025)	Energy Density	Cycle Life	Key Advantages	Challenges
Conventional Li-ion	Mature	150–250 Wh/kg	2,000–5,000 cycles	High efficiency, well-established supply chain	Reliance on critical minerals, degradation over life
Solid-State Battery	In development	300–500 Wh/kg (potential)	Projected >10,000 cycles	High energy density,	Interface stability, manufacturing scalability

				improved safety	
Sodium-ion Battery (SIBs)	Early commercial deployment	100–160 Wh/kg	2,000–4,000 cycles	Abundant materials, lower cost, good safety	Lower energy density, early-stage scaling
Vanadium Flow Battery	Commercial for stationary use	Low	15,000+ cycles	Long duration capability, extreme longevity	Large footprint, higher upfront cost

Thermal Energy Storage as an Alternative: The ENERGYNEST–Avery Dennison Project

The ENERGYNEST project at Avery Dennison's plant in Turnhout showcases thermal energy storage as a viable alternative. The project uses concentrated solar thermal collectors to heat a thermal oil fluid, which is then stored in ENERGYNEST's modular ThermalBattery™. The system can supply 100% of the factory's heat demand during sunny periods and significantly reduce reliance on natural gas.

Thermal storage is particularly cost-effective for long-duration energy needs where heat, rather than electricity, is the end-use. It complements battery storage by addressing different segments of energy demand.

Investor Considerations – A Critical Question to Ask

Critical Question: "What is your long-term strategy to remain profitable and technologically relevant in the face of rapid advancements and competition in the energy storage sector?"

This question targets key areas such as technology risk, competitive differentiation, and market adaptability. It helps assess whether a company has a forward-looking, resilient strategy that can sustain profitability and relevance as the energy storage landscape evolves, within the current political trend for localisation including the upstream supply chain.