

TSO-Grade, Market-Ready BESS: Grid engineering meets trading savvy optimisation

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TSO-ALIGNED PRINCIPLES FOR FUTURE-PROOF BESS INTEGRATION

Storage is becoming essential for system stability, but TSOs, regulators, and investors still face three challenges: neutrality, bankability, and operability. This white paper outlines a harmonised, vendor-agnostic framework to design, connect, and operate BESS assets that strengthen the grid and generate sustained market value.

OUR APPROACH

Vendor-agnostic. Regulator-ready.
Built for cross-border markets.
TSOs require solutions that uphold neutrality, system stability, and market efficiency. Developers and investors require bankable certainty. Our BESS ecosystem integrates both through:

- TSO-grade modelling across grid and market timeframes
- Bankable, standardised outputs suitable for investment committees
- Harmonised frameworks that reduce uncertainty across jurisdictions
- Alignment with evolving EU, UK, and MENA rules for battery participation

This white paper outlines how to design, engineer, and operate BESS assets that respect system constraints while maximising market value.



A HARMONISED END-TO-END BESS OFFERING

Our service pillars reflect the full lifecycle of storage — from policy design to analytics and operations.

Making storage bankable and grid-neutral

- Grid access & tariff design (locational/temporal, congestion relief)
- Market integration: FCR/FFR, aFRR/mFRR, black-start
- Storage grid codes, neutrality & cost-recovery guardrails
- Interconnection & Queue Management:
 - Non-firm/flexible access
 - Standardised 2h/4h/8h profiles
 - Background-fleet diversity
 - Curtailment & settlement options

Techno-economics that drive decisions

- LCOS, IRR, multi-duty-cycle sensitivities
- Revenue stacking (wholesale, ancillary, imbalance)
- Duration choice & hybrid PV/Wind + Storage
- Portfolio optimisation: value-at-risk vs degradation

From model to metal.

- Connection request studies (profiles, fleet diversity)
- Load-flow & stability studies linked to dispatch
- Specifications, EPC tendering, FAT/SAT
- Protection, controls (EMS/DERMS), telemetry & compliance

A HARMONISED END-TO-END BESS OFFERING

Safe, compliant, on time.

- Project & construction management
- Grid-compliant commissioning (telemetry + EMS)
- Safety, risk, permitting
- As-built documentation & handover

Performance that pays.

- Dispatch optimisation & imbalance strategy
- Battery Health Index, RCM, Maximo integration
- Warranty alignment, repowering, lifecycle extension
- Second-life & sustainability reporting

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Models trusted by traders and TSOs.

- Forecasting & empirical imbalance models (e.g., Simplify 2.0)
- Trading & flexibility platforms (e.g., MPX)
- Duration curves, simultaneity, DA/ID/balancing correlations
- Documentation & capability transfer



ENABLING THE NEXT GENERATION OF GRID STORAGE

True TSO-grade storage requires the intersection of policy, engineering, and markets. Batteries that are merely installed will not be enough. They must be dispatchable, compliant, optimised, and bankably integrated into the power system.

With a harmonised suite of modelling, engineering, and operational services, this white paper outlines a framework for delivering storage assets that support system stability while unlocking sustained market value.



ABOUT ELIA GRID INTERNATIONAL

Elia Grid International (EGI) is a global engineering consultancy company specialised in complex power system challenges. With multidisciplinary team of experts, EGI offers strategic, technical and regulatory advice in all fields related to power transmission. EGI is an agile partner and trusted advisor of decision makers on managing the complexities of energy transition. Successfully delivering projects in over 20 countries, EGI has 7 regional offices across the globe, employs over 75 experts.

EGI is part of Elia Group (EBR:ELI), one of Europe's top five transmission system operators and a key player in the European energy market and interconnected electricity system. With the support of two major European Grid Operators, EGI combines innovative and prove expertise with the hands-on experience. Elia Group is also an industry-renowned specialist in building interconnectors and integrating renewable energy generation.

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