Grid Storage Economics

Where batteries beat pumped hydro, and where they don't

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Two mature storage technologies

- Lithium-ion battery storage: fast to deploy, falling cost curve
- Pumped hydro: decades of operating history, site-constrained
- Both compete for the same grid-balancing contracts today

Levelised cost by duration

Short duration (1–4h)

- Batteries win on capex
- Response time under one second

Long duration (8h+)

- Pumped hydro wins on $/kWh
- Batteries need cost-per-cycle to keep falling

Regional cost comparison

Region	Battery ($/kWh)	Pumped hydro ($/kWh)
Nordics	210	95
Iberia	180	140
Texas	165	—

Texas has no economical pumped-hydro sites, which explains its battery-only build-out despite otherwise-average costs.

Where this goes next

1. Battery cost-per-cycle keeps falling roughly 12% a year
2. Long-duration chemistries (iron-air, flow batteries) are the real threat to pumped hydro's niche
3. Permitting timelines, not technology cost, now gate most new pumped-hydro projects

Thank you