String vs Centralized BESS: A Practical Comparison

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When you specify a battery energy storage system, one architectural decision quietly shapes the next 15 years of project returns: string vs centralized design. Here is a practical comparison for developers and investors.

What the terms mean

In a centralized BESS, many battery strings share one large central PCS on a common DC bus. In a string BESS, each battery string connects to its own modular PCS and operates independently on the DC side - one string, one management unit.

Availability

This is where the architectures diverge most. In a centralized system, a single battery fault or PCS failure takes the whole block offline. In a string system, a faulty string simply isolates itself: you lose a few percent of capacity, not the plant. Over a project lifetime, that difference in achievable availability translates directly into revenue.

Efficiency and degradation

Shared DC buses create circulating currents between strings with different states of charge, accelerating imbalance and degradation. String architecture eliminates cross-string currents entirely; each string is balanced and managed on its own, so usable capacity fades more slowly and more predictably.

O&M and safety

Centralized faults are complex to diagnose and repair at megawatt scale. String faults are serviced exactly like a single module - swap, recalibrate, done. Short-circuit currents stay small, and thermal events are physically contained within one string.

Cost

Centralized systems can be marginally cheaper on day-one hardware. String systems win on lifetime economics: higher availability, slower degradation, simpler maintenance and easier capacity expansion. For projects where revenue depends on uptime - which is to say, almost all of them - the string architecture's small upfront premium pays back many times over.

The bottom line: choose centralized only when first cost is the sole criterion. For bankable, long-term projects,

string architecture is the engineering answer - and it is the architecture at the core of every MARWELL SOLAR system.

Ready to discuss your project? Contact us: info@marwellsolar.com