

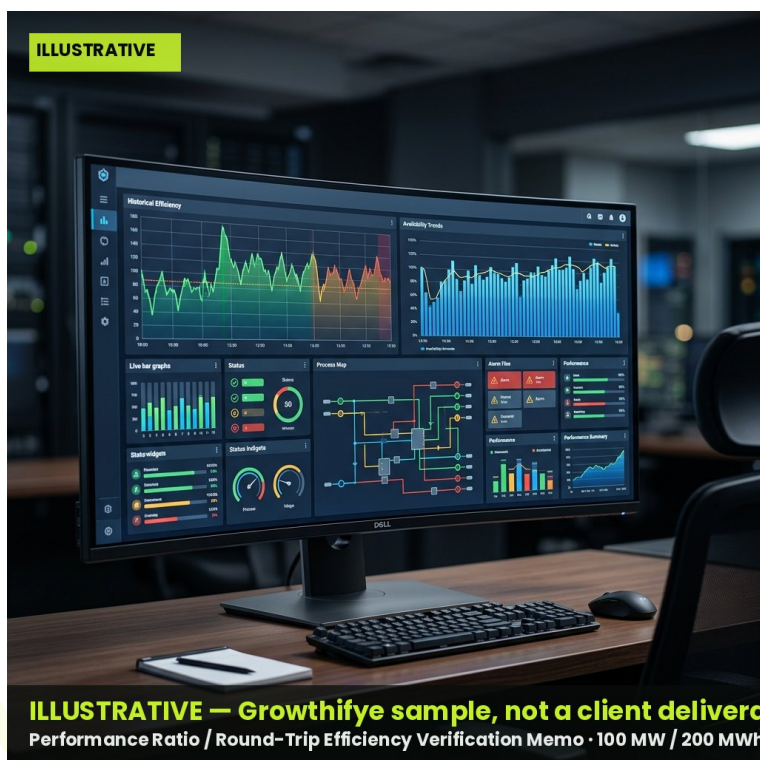


EPC · STEP 04 · COMMISSION & HAND OVER · MEMO

Performance Ratio / Round-Trip Efficiency Verification Memo

Independent calculation of PR (solar) or RTE and availability (BESS) over a defined test window, benchmarked against EPC contract guarantees.

Worked example (anonymised): Standalone BESS Commissioning Programme · 100 MW / 200 MWh, 33 kV collector, LFP chemistry · Western India. Grid-connected standalone BESS under a state DISCOM tender, requiring CEA grid-code compliance testing and round-trip efficiency verification before COD certification.



Illustrative sample image

Sample excerpt · RTE & Availability Verification (Illustrative)

Metric	Contract Guarantee	Test Window	Measured	Status
Round-trip efficiency (AC-AC)	≥ 86%	72-hour cycle test	87.4%	Meets guarantee
System availability	≥ 97%	30-day monitoring	98.1%	Meets guarantee
Auxiliary consumption	≤ 2.5% of throughput	30-day monitoring	2.2%	Meets guarantee
State-of-charge drift	< 1%/day at idle	7-day idle test	0.6%/day	Meets guarantee

Notes

- Calculations use calibrated revenue-grade meters, not OEM telemetry alone
- Shortfalls against guarantee trigger liquidated damages clause review with EPC contractor

What happens in this step

1. Pre-commissioning checklist review: protection relay settings, earthing continuity, cable megger/HiPot results signed off before energisation



2. Sequential energisation of feeders/strings/PCS skids with cold and hot commissioning logs maintained per equipment
3. Grid-code compliance testing: LVRT/HVRT, frequency response, reactive power (Q-V) capability, harmonics (THD) as per CEA/CERC and state DISCOM protocols
4. Performance ratio (solar) or round-trip efficiency and availability (BESS) verification against EPC contract guarantee thresholds using calibrated meters
5. Joint inspection with DISCOM/STU and third-party test agency for provisional and final grid connectivity approval
6. As-built drawing reconciliation, punch-list closure, and O&M; manual compilation with spares/warranty registers
7. Formal handover pack issued to asset owner and O&M; team with training walkthrough

Outcomes

- Grid-code compliance certification enabling provisional/final DISCOM connectivity approval
- Independently verified performance metrics protecting owner against underperformance risk
- Complete, audit-ready documentation reducing insurance, lender and O&M; handover friction
- Clean punch-list closure minimising post-COD warranty disputes with EPC contractor

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