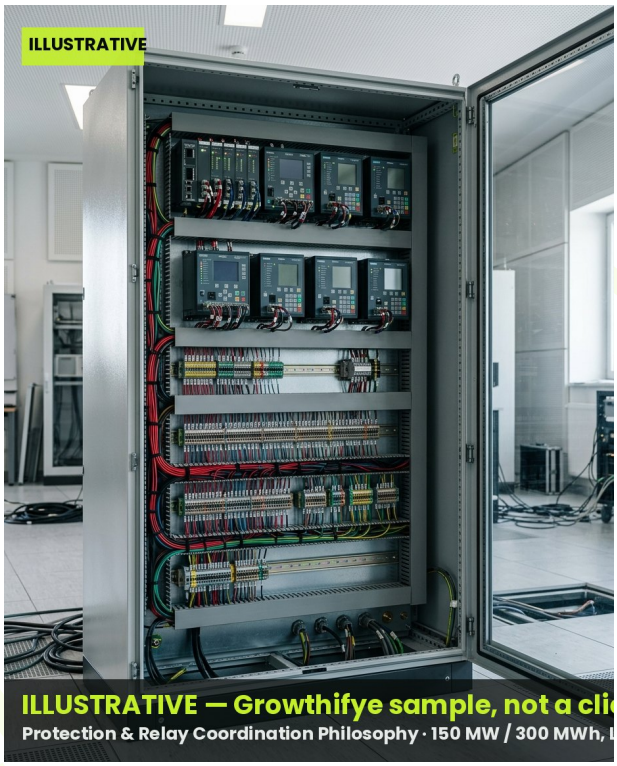
RE & STORAGE ADVISORY · STEP 03 · DETAILED ENGINEERING · REPORT

Protection & Relay Coordination Philosophy

Defines relay schemes, coordination curves, arc-flash boundaries and settings for BESS, transformer and interconnection protection.

Worked example (anonymised): Example: Standalone BESS Detailed Engineering · 150 MW / 300 MWh, LFP-based, 33 kV collection · Western India. Illustrative intra-state open-access BESS project requiring 132 kV interconnection studies, protection philosophy and procurement-ready EPC tender documents.



Illustrative sample image

Sample excerpt · Protection Scheme Summary (Extract)

Zone	Protection Function	Relay Type	Setting Basis	Coordination Time
PCS Block	Overcurrent (50/51)	Numerical IED	1.25x rated current	0.2 s
Transformer	Differential (87T)	Numerical IED	Slope 25-40%	Instantaneous
132 kV Line	Distance (21)	Numerical IED	Zone 1: 80% line	0-0.1 s
Battery DC Bus	Ground Fault (64)	DC monitor	5 mA sensitivity	Alarm + trip
Busbar	Differential (87B)	Numerical IED	Restrained diff.	Instantaneous

Notes

- Arc-flash study included per applicable IEEE/IS practice for O&M; safety labelling
- Settings validated against short-circuit study results before EPC issuance

What happens in this step

1. Develop electrical SLDs for AC/DC architecture, PCS/inverter blocks, MV collection, and interconnection switchyard
2. Prepare general arrangement and cable/trench layouts for BESS containers, PCS skids, transformers and control room
3. Define protection philosophy: relay coordination, arc-flash study, differential/distance protection settings

4. Run grid studies — load flow, short-circuit, transient stability, harmonic and voltage-ride-through per CEA/STU requirements
5. Draft technical specifications and BoQ for PCS, batteries/modules, transformers, switchgear, SCADA and civil works
6. Coordinate with STU/CTU and DISCOM for connectivity/LTA approval and interconnection agreement inputs
7. Compile a bid-ready procurement dossier with drawings, specs and evaluation criteria for EPC tendering

Outcomes

• A procurement-ready engineering package accepted by EPC bidders and lenders without major clarification rounds
• Grid-connection studies aligned with STU/CTU requirements, reducing connectivity approval delays
• Protection and safety philosophy validated ahead of equipment ordering, minimising rework risk
• Clear BoQ and specifications enabling like-for-like EPC bid comparison and faster contract award

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