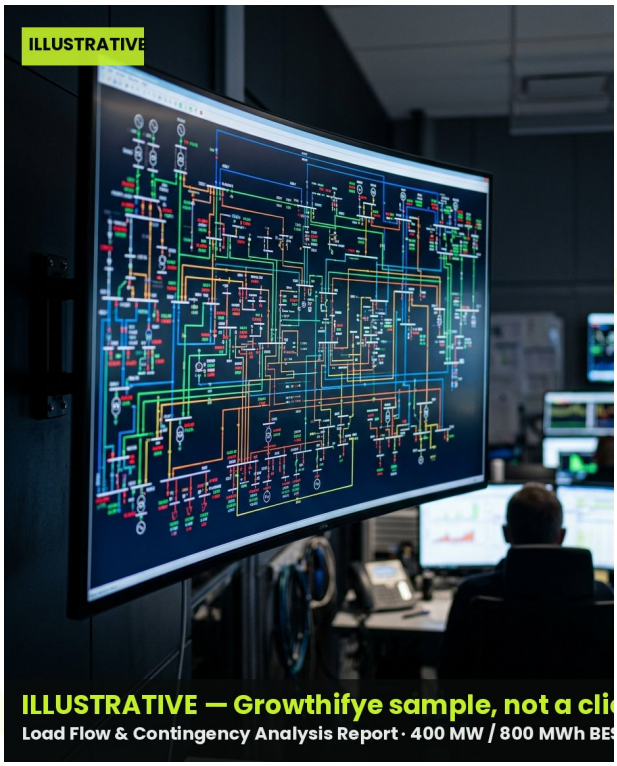
TRANSMISSION ENGINEERING · STEP 01 · SYSTEM STUDIES · REPORT

Load Flow & Contingency Analysis Report

Full load flow results for normal and N-1 contingency scenarios, with voltage profile and loading tables across all relevant buses.

Worked example (anonymised): Standalone BESS Evacuation Study · 400 MW / 800 MWh BESS · Western India. Grid-connected BESS tendered to a state DISCOM required a 220 kV evacuation scheme; system studies were used to confirm fault levels and stabilize voltage profiles at the point of interconnection.



Illustrative sample image

Sample excerpt · Bus Voltage Summary (Peak Injection Scenario)

Bus Name	Voltage (kV)	Voltage (p.u.)	Loading (%)	Remarks
POI 220kV Bus	225.4	1.025	68	Within limits
Substation A 220kV	223.1	1.014	72	Within limits
Substation B 132kV	134.8	1.021	81	Monitor under N-1
BESS Collector Bus	33.2	1.006	55	Within limits
Substation C 220kV	218.7	0.994	76	Within limits

Notes

- All values validated against CEA voltage regulation limits (±5%)
- N-1 scenario for Substation B line outage flagged for utility review

What happens in this step

1. Collect grid network data, existing substation configurations and utility planning codes for the study area
2. Build load flow model in PSS/E or ETAP covering normal, N-1 and peak/off-peak conditions
3. Run short circuit studies to size switchgear and confirm fault ride-through requirements
4. Perform transient and voltage stability analysis for renewable/BESS injection scenarios
5. Conduct harmonic analysis against IEEE 519 / CEA limits, sizing filters where required

6. Evaluate 2-3 evacuation scheme alternatives on cost, redundancy and approval timelines
7. Present findings to utility planning cell and finalize point of interconnection

Outcomes

- Utility-approved evacuation scheme with defined point of interconnection and voltage level
- Switchgear and protection ratings confirmed before procurement, avoiding costly rework
- Documented compliance with CEA/IEEE grid code limits supporting faster interconnection approval
- Reduced project risk for lenders through independently validated stability and power quality findings

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