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COURSE BROCHURE

Generation and Transmission Adequacy Assessment Training Course

28 February – 4 March 2027
Muscat

Generation and Transmission Adequacy Assessment Training Course

Ref: 2662_101454 **Date:** 28 February – 4 March 2027 **Location:** Muscat **Fees:** 6500 GBP

Generation and Transmission Adequacy Assessment is a 1-week training course for power system planners and network reliability engineers who must show whether installed capacity and transmission corridors can meet demand at an acceptable risk of shortfall, ending with a network reliability assessment they can defend. Rising peak demand, retiring thermal units and weather-dependent output make that question harder every planning cycle. Jupiter Prime Training delivers this course on adequacy assessment.

Why Generation and Transmission Adequacy Assessment Matters Now

Three forces shape adequacy work today. Variable wind and solar output changes when shortfalls occur, shifting risk from the annual peak to evening ramps and calm winter weeks. Ageing transformers, cables and overhead lines raise forced outage rates just as new interconnections take years to consent. An organisation that measures adequacy well builds the right assets; one that measures it badly either overbuilds or accepts unplanned load shedding. The course rests on established probabilistic reliability methods.

Who Gains Most from Generation and Transmission Adequacy Assessment

- Specialists who model future demand and capacity for long-term expansion studies
- Engineers who set transmission reinforcement needs from contingency studies
- Analysts who collect component failure and repair records for reliability models
- Operations planners who schedule maintenance outages against reserve margins
- Asset strategists who rank investments by their effect on supply risk

Utility planning departments and independent transmission owners gain most when planners, outage analysts and asset strategists attend together.

Generation and Transmission Adequacy Assessment Capabilities

Participants move from deterministic reserve rules to quantified shortfall risk.

- Calculate loss of load expectation and expected unserved energy for a generation fleet — reserve margin targets set by planning managers
- Build capacity outage probability tables from unit forced outage rates — fleet retirement and replacement decisions
- Test transmission corridors against single and double contingencies — reinforcement scope agreed with system operators
- Assess composite generation and transmission risk with sequential simulation — joint expansion plans for boards
- Specify component outage data collection and validation rules — model credibility for auditors and regulators
- Weigh reinforcement options by the cost of avoided unserved energy — capital budget ranking by asset owners

Key Generation and Transmission Adequacy Assessment Terms

- Loss of load expectation — the expected number of hours or days in a period when available capacity falls below demand.
- Expected unserved energy — the average quantity of demand, in energy terms, that cannot be supplied over a study period.
- Forced outage rate — the probability that a unit or line is unavailable because of an unplanned failure when it is needed.
- Capacity outage probability table — possible capacity losses with the probability of each.
- Effective load carrying capability — the extra demand a new resource can serve while keeping the same reliability level.
- Value of lost load — the worth consumers place on avoiding one unit of interrupted energy.

Generation and Transmission Adequacy Assessment Day by Day

Day 1: Adequacy Context and Risk Measures

- Deterministic Reserve Margins Versus Probabilistic Risk — Choosing the Planning Criterion
- Loss of Load Expectation and Probability — Setting Acceptable Shortfall Levels
- Expected Unserved Energy and Frequency Measures — Reporting Risk to Executives
- Demand Profiles and Weather Years — Selecting Representative Study Conditions
- Variable Renewable Output Patterns — Locating Shifting Hours of System Stress

Day 2: Generation Fleet Adequacy Models

- Two-State and Multi-State Unit Models — Representing Partial Derating Realistically
- Capacity Outage Probability Tables — Combining Units Into Fleet Risk
- Planned Maintenance Scheduling Effects — Protecting Reserves During Outage Seasons
- Effective Load Carrying Capability of Wind, Solar and Storage — Crediting New Resources
- Interconnection Assistance Modelling — Valuing Imports From Neighbouring Areas

Day 3: Transmission and Composite Reliability

- Single and Double Contingency Screening — Identifying Overloaded Corridors and Weak Nodes
- Load Flow Based Contingency Ranking — Prioritising Studies Within Limited Time
- Common-Mode and Weather-Related Line Outages — Testing Correlated Failure Assumptions
- Sequential Chronological Simulation — Estimating Composite Generation and Transmission Risk
- Bus-Level Reliability Indices — Showing Which Substations Carry Most Risk

Day 4: Outage Data and Investment Choices

- Component Failure and Repair Records — Building Credible Outage Statistics
- Data Validation and Small-Sample Uncertainty — Bounding Confidence in Indices
- Value of Lost Load Estimation — Pricing Reliability for Customer Groups
- Cost-Benefit Ranking of Reinforcements — Comparing Lines, Storage and Demand Response
- Sensitivity and Scenario Testing — Stress-Testing Plans Against Demand Growth

Day 5: Practising the Network Reliability Assessment

- Study Scope and Reliability Criterion Statement — Applying Day 1 Risk Measures
- Fleet and Corridor Model Assembly — Applying Generation and Transmission Methods
- Outage Data Set and Assumption Log — Applying Validation Rules
- Reinforcement Option Ranking Table — Applying Cost-Benefit Methods to Results
- Network Reliability Assessment Report — Presenting Findings for Planning Approval

Applying Generation and Transmission Adequacy Assessment After the Course

- Rebuild the capacity outage probability table for the current fleet and compare its loss of load expectation with current reserves.
- Run a contingency screen on the three most loaded corridors and rank reinforcements by reduced expected unserved energy.

Generation and Transmission Adequacy Assessment Questions FAQ

What is generation and transmission adequacy assessment and why does it matter now?

It is the probabilistic measurement of whether capacity and network corridors can meet demand at an acceptable shortfall risk. It matters now because variable output and ageing assets make fixed reserve rules unreliable.

Which roles gain most from generation and transmission adequacy assessment?

Expansion planners, transmission reinforcement engineers, outage data analysts, maintenance schedulers and asset strategists gain most. You benefit most if you set reserve margins or reinforcement scope.

How does generation and transmission adequacy assessment differ from a power quality or plant efficiency course?

Adequacy assessment asks whether enough capacity and corridor strength exist to serve demand over years. Power quality and efficiency courses study waveforms and losses, not shortfall probability.

What do you bring back from generation and transmission adequacy assessment?

You bring back a structured network reliability assessment with a stated criterion, fleet and corridor models, a validated outage data set and a ranked list of reinforcements.

Generation and Transmission Adequacy Assessment: The Way Forward

The network reliability assessment first informs the reserve margin and reinforcement list in the next expansion plan. Planning managers, system operators and investment committees use it to agree which assets proceed. After its first use, revisit the outage data and weather years, because both drift as storage and demand response grow.