
Load Forecasting Accuracy and Network Investment Decisions Training Course for Utility Leaders

3 – 7 October 2027
Muscat





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Programme Summary

Load forecasting accuracy and network investment decisions is the subject of this five-day training course for utility and network planning managers, ending in a forecast and investment pack for one network area. Demand on electricity networks is rising as electric vehicles and heat pumps move energy use onto the grid, yet investment is often approved on a single forecast that nobody has tested. The approach moves from demand drivers and data, through methods and error measures, to scenarios and network limits, then to reinforcement choices and a worked pack. Mars Training Centre UK delivers this programme in load forecasting accuracy and network investment decisions.

The Business Case

A forecast that is too low leaves a network short of capacity, while one that is too high ties up capital in assets that sit idle. Leaders who measure forecast error, compare scenarios and phase spending against clear trigger points can defend investment to boards and funders. They can also show why one reinforcement was chosen over another.

- Capital Efficiency: Improves as reinforcement is phased against tested scenarios instead of one forecast.
- Supply Headroom: Becomes visible when peak demand is mapped against substation and transformer limits.
- Forecast Credibility: Increases when error measures are reported and reviewed on a regular cycle.

Principles and Evidence Base

- Quantitative forecasting methods: Regression and time series approaches structure the method choices in Session 2.
- Delphi technique: This structured expert judgement method supports forecasts for large new loads in Session 2.
- MAPE and related error measures: Percentage error, weighted error and bias frame the accuracy testing in Sessions 2 and 5.
- Scenario planning: This established approach to uncertainty shapes the demand cases and investment triggers in Sessions 3 and 4.



Intended Participants

- Network planning managers who prepare demand forecasts and reinforcement proposals.
- Asset and investment leads who rank capital projects for grid upgrades.
- System operation managers who see where capacity and voltage limits bind.
- Finance and regulatory leads who review the case for network spending.

The programme serves electricity utilities, industrial estate operators, city authorities and renewable developers connecting to networks.

Learning Outcomes

1. Participants will be able to diagnose the demand drivers behind a load forecast and the data quality problems that distort it.
2. Participants will be able to evaluate forecast accuracy using percentage error, weighted error and bias.
3. Participants will be able to construct demand scenarios that include electric vehicles, heat pumps and distributed generation.
4. Participants will be able to prioritise substations, feeders and transformers by headroom under each scenario.
5. Participants will be able to compare reinforcement options on voltage, losses, configuration and cost.
6. Participants will be able to justify a phased investment case with trigger points to a finance committee.

Programme Structure

Day 1: Load Forecasting Foundations and Demand Drivers

What drives electricity demand, and which forecast horizons does the network need?

- Forecast Horizon and Purpose Map
- Demand Driver Tree for Electric Vehicles, Heat Pumps and Industry
- Historical Load Data Quality Checklist
- Weather and Economic Input Register
- Forecast Ownership and Governance Charter

Day 2: Forecasting Methods and Accuracy Measures

How is a forecast method chosen, and how is its error measured and reported?

- Regression and Time Series Method Selection
- Delphi Technique for Large New Loads
- MAPE and Weighted Error Measures
- Forecast Bias and Tracking Signal
- Cost of Forecast Error Table



Day 3: Scenarios, Peak Demand and Network Constraints

How do demand scenarios show where network capacity runs short?

- Scenario Planning for Demand Uncertainty
- Peak Demand Profile by Feeder
- Distributed Generation and Storage Adjustment
- Substation and Transformer Headroom Map
- Ambient Heat Rating Limits

Day 4: Reinforcement Options and Investment Decisions

Which reinforcement option is justified, and when should spending be triggered?

- Reinforcement Option Long List
- Voltage Drop and Network Loss Assessment
- Radial and Network Configuration Choices
- Capital Phasing and Option Value Table
- Investment Case and Trigger Point Register

Day 5: Applying Load Forecasting to One Network Area

Is the forecast and investment pack ready for a finance committee to approve?

- Applying the Session 1 Driver Tree to the Chosen Area
- Testing Session 2 Error Measures on Past Forecasts
- Checking the Session 3 Headroom Map Against Each Scenario
- Ranking the Session 4 Reinforcement Options
- Completing the Forecast and Investment Pack

Methodology

The programme is built around data workshops using an anonymised load dataset for one network area. Participants work in small teams to clean the data, fit simple methods, measure their error, build scenarios and rank reinforcement options, then defend their pack before a simulated finance committee. No programming is required.

- Suggested activity: Comparing two forecast methods on the same history and reporting their error.
- Suggested activity: Building three demand scenarios and mapping them against transformer headroom.
- Suggested activity: Phasing a reinforcement programme against trigger points.



Capstone Output

Each participant completes a forecast and investment pack for one network area. It contains a driver tree, a tested forecast with error measures, three demand scenarios, a headroom map, a ranked set of reinforcement options and a phased investment case. It is used to brief a finance committee and to set the review cycle for the forecast.

Frequently Asked Questions

Is load forecasting accuracy suitable for managers who do not build forecast models?

Yes. Load forecasting accuracy is set at managerial level and assumes responsibility for planning, investment or operations, not statistical programming or detailed network design.

Which methods does load forecasting accuracy rest on in this programme?

Load forecasting accuracy rests on regression and time series methods, the Delphi technique, error measures such as MAPE and forecast bias, and scenario planning for demand uncertainty.

How is the pack from network investment decisions used at work?

You use the pack from network investment decisions to brief a finance committee, set trigger points for reinforcement spending and schedule the next forecast review.

How does load forecasting differ from a power system protection course?

Load forecasting centres on demand, error and investment timing for network capacity, while a power system protection course centres on fault detection and relay coordination.