Combined Cycle Power Plant Fundamentals Training Course

17 – 21 January 2027
Muscat

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Ref: 984_174884 **Date:** 17 – 21 January 2027 **Location:** Muscat **Fees:** 6500 Euro

Overview

Combined Cycle Power Plant Fundamentals Training Course is a one-week foundation course for operators, maintenance technicians, junior engineers, utility staff, and new generation professionals who leave with a Combined Cycle Operating Map. Participants trace combined cycle power plant fundamentals through the gas turbine, heat recovery steam generator, steam turbine, condenser, and balance of plant, linking thermodynamics with safe sequences, performance, emissions, and coordinated troubleshooting. Agile Leaders Training Center provides foundation learning in combined-cycle plant operation.

Who Should Attend

- Personnel responsible for monitoring plant status, alarms, limits, and operating sequences
- Teams responsible for maintaining turbines, heat-recovery equipment, auxiliaries, and electrical interfaces
- Engineers responsible for reviewing process behavior, efficiency, output, and equipment condition
- Utility staff responsible for coordinating generation availability and operating requirements
- Professionals preparing to work with combined-cycle generation assets

The course assumes participants can read basic process information and follow site safety procedures; it leaves out detailed equipment design, control-system programming, and specialist overhaul work.

Departments and Industries

The course supports departments that operate, maintain, and coordinate thermal generation assets.

- Power generation operations and maintenance
- Utility engineering and dispatch coordination
- Industrial energy and cogeneration facilities
- Oil, gas, petrochemical, and process utilities
- Technical services, reliability, and performance teams

Learning Objectives

By the end of this course, participants will be able to:

- Apply combined-cycle process and thermodynamic vocabulary
- Analyze gas-turbine, HRSG, steam-cycle, and auxiliary interactions
- Use start-up and shutdown sequence maps
- Evaluate heat rate, output, emissions, and ambient effects
- Diagnose alarms through operating limits and causal evidence
- Build a coordinated troubleshooting and safety response map

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Course Agenda

Day 1: Plant Configuration and Energy Flow

- Combined-Cycle Topping and Bottoming Cycle Diagram
- Brayton and Rankine Cycle Relationship Map
- Gas-to-Electricity Energy Balance Worksheet
- Plant Equipment Boundary and Interface Matrix
- Process Measurement and Operating Variable Register

Day 2: Gas Turbine and Heat Recovery

- Gas Turbine Compressor-Combustor-Expander Flow Map
- Combustion Temperature and Emissions Control Logic
- HRSG Pressure-Level and Heat-Recovery Diagram
- Drum, Economizer, Evaporator, and Superheater Function Matrix
- Exhaust Temperature and Pinch-Point Performance Screen

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Day 3: Steam Cycle and Balance of Plant

- Steam Turbine Expansion and Extraction Pathway
- Condenser Vacuum and Cooling-System Cause Map
- Water-Steam Chemistry Interface Checklist
- Feedwater, Condensate, and Pump System Flow Diagram
- Electrical, Fuel, Air, and Auxiliary System Interface Register

Day 4: Operating Sequences, Performance, and Safety

- Cold, Warm, and Hot Start Sequence Map
- Normal Shutdown and Trip Response Decision Tree
- Heat Rate, Output, and Ambient Correction Worksheet
- Operating Limit, Alarm, and Interlock Response Matrix
- Energy Isolation and Process Hazard Review Checklist

Day 5: Integrated Practice and Troubleshooting

- Exercise on Combined-Cycle Energy Flow Reconstruction
- Exercise on Gas Turbine and HRSG Deviation Analysis
- Exercise on Steam-Cycle and Condenser Fault Isolation
- Exercise on Start-up Alarm and Performance Prioritization
- Capstone Exercise: Combined Cycle Operating Map

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Practical Exercises

The course uses suggested activities that connect plant indications with operating decisions.

- Suggested activity: trace energy and mass flow through a plant configuration diagram
- Suggested activity: interpret an alarm set using limits, interlocks, and process dependencies
- Suggested activity: compare heat-rate changes against load, ambient conditions, and equipment state
- Suggested activity: build a coordinated response map for an integrated plant deviation

FAQs

Who suits combined cycle power plant fundamentals training, and what does it assume?

Operators, technicians, junior engineers, utility staff, and new generation professionals suit the course. It assumes basic process-reading ability and familiarity with workplace safety procedures, without requiring prior combined-cycle specialization.

How does combined cycle power plant fundamentals differ from gas turbine maintenance training?

Combined-cycle fundamentals connect the gas turbine with the HRSG, steam turbine, condenser, auxiliaries, operating sequences, and performance. Gas turbine maintenance training concentrates more deeply on inspection, servicing, and repair of the gas-turbine package.

How does a combined cycle power plant generate more electricity from fuel?

A combined-cycle plant uses a gas turbine to generate power, then recovers hot exhaust energy in an HRSG to produce steam for a steam turbine. The second cycle converts heat that would otherwise leave with the exhaust.

What affects combined cycle plant heat rate and output?

Load, ambient temperature, compressor condition, firing conditions, HRSG heat transfer, steam conditions, condenser pressure, auxiliary consumption, and operating configuration affect heat rate and output. Trends require consistent boundaries and corrected comparisons.

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Why are start-up limits important in combined cycle plant operation?

Start-up limits manage thermal stress, pressure, temperature, chemistry, emissions, and equipment permissives while gas and steam systems come online. Sequence discipline helps personnel identify abnormal conditions before they propagate across connected equipment.

Conclusion

Participants leave with a Combined Cycle Operating Map linking equipment functions, energy flows, sequences, limits, performance indicators, safety controls, and troubleshooting evidence. The map changes isolated readings into a structured view of plant behavior. Teams can reuse it to coordinate monitoring, escalation, and first-line diagnosis before specialist intervention.