



Evolving Power Generation: Gas
Turbines, Co-Generation, Combined
Cycle, Wind, & Solar



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Introduction

This power generation, gas turbines, and renewables program provides a detailed understanding of steam power plants, gas turbines, cogeneration, combined-cycle plants, and wind and solar power generating plants. Components such as compressors, gas and steam turbines, heat recovery steam generators, deaerators, condensers, lubricating systems, instrumentation, control systems, transformers, and generators are covered.

The design, selection considerations, operation, maintenance, and economics of cogeneration plants, combined cycles and emission limits, reliability, monitoring, and governing systems will also be covered. The significant improvements made to cogeneration, combined-cycle plants, and wind and solar power generating plants during the last two decades will also be explained.

Understanding Power Generation, Gas Turbines, and Renewables

This power generation course encompasses a comprehensive study of the advancements and technologies in the field of energy production, specifically focusing on gas turbines, cogeneration systems, combined cycle plants, and renewable energy sources such as wind and solar power. As a central part of the curriculum, attendees can partake in a gas turbine training conference or a gas turbine certification program.

Participants can achieve a gas turbine certification through this power generation, gas turbines, and renewables conference, signifying their expertise and understanding of these complex systems. Additional certifications, such as power generation certification, may also be pursued to validate further the individual's proficiency in the broader scope of energy production technology.

Throughout the power generation, gas turbines, and renewables program, a particular emphasis is placed on cogeneration advantages and the intricacies of the cogeneration steam turbine. Discussions will include the operation of combined cycle power generation systems, the mechanics behind combined cycle gas turbines, and the efficiency of combined cycle cogeneration. The curriculum power generation, gas turbines, and renewables conference dives deep into the particulars of combined cycle generation and the technological nuances of a combined cycle power generation system.

Moreover, the power generation, gas turbines, and renewables course presents a unique opportunity to examine combined solar and wind systems, highlighting the benefits and challenges associated with wind and solar combined systems. The ultimate goal is to deliver a well-rounded, informed perspective on modern power generation practices and the future of the energy sector.

Targeted Groups

- Power Station Operators, Technicians, Engineers, and Managers.
- Electrical and Mechanical Engineers have different competency levels.
- Project Engineers and Project Managers.
- Power station maintenance crew.

Conference Objectives

By the end of this power generation training conference, participants will be able to:

- Learn about the components and subsystems of various types of gas turbines, steam power plants, cogeneration, combined-cycle plants, wind turbines and generators, wind turbine farms, and solar power generation.
- Examine the advantages, applications, performance, and economics of cogeneration, combined-cycle plants, wind turbines and generators, wind turbine farms, and solar power generation.
- Learn about various equipment, including compressors, turbines, governing systems, combustors, deaerators, feedwater heaters, transformers, generators and auxiliaries, wind turbines and generators, wind turbine farms, and solar power generating plants.
- Discover the maintenance required for gas turbines, steam power plants, combined cycles, generators, wind turbines, and wind turbine farms to minimize operating costs and maximize efficiency, reliability, and longevity.
- Learn about the monitoring and control of environmental emissions.
- Increase knowledge of predictive and preventive maintenance, reliability, and testing.
- Gain a thorough understanding of the selection considerations and applications of cogeneration, combined-cycle plants, wind turbines and generators, wind turbine farms, and solar power generation.

Targeted Competencies

Upon the end of this power generation training conference, target competencies will be able to:

- Power generation theory.
- Understand power plant types and their features.
- Learn about industrial plants, processes, and control measures.
- Understand thermal, gas, and diesel power plant operations and selection criteria.
- Learn about the fundamentals of electric machines, drives, and control devices.

Conference Content

Unit 1: Steam Power Plants

- Review of thermodynamics principles.
- Steam power plants.
- The fire-tube boiler.
- The water-tube boiler.
- The steam drum.
- Superheaters and reheaters.
- Steam turbines.
- Reheaters.
- Condensers.
- Feedwater heaters.
- Learn about efficiency and heat rate.
- Supercritical plants.
- Cogeneration plants.
- Arrangement of cogeneration plants.
- Economics of cogeneration plants.

Unit 2: Steam Turbines and Auxiliaries

- Turbine types.
- Compound turbines.
- Turbine control systems.
- Steam turbine maintenance.
- Understand steam generators, heat exchangers, and condensers.
- Power station performance monitoring.
- The turbine governing systems.
- Steam chests and valves.
- Turbine protective devices.
- Turbine instrumentation.
- Lubrication systems.
- Gland sealing system.
- Understand frequently asked questions about turbine-generator balancing, vibration analysis, and maintenance.
- Features enhance the reliability and maintainability of steam turbines.

Unit 3: Gas Turbines and Compressors

- Gas turbine fundamentals.
- Overview of gas turbines.
- Gas turbine Design.
- Gas turbine calculations.
- Gas turbine compressors.
- Combined cycles.
- Single-shaft combined cycle power generating plants.
- Learn about economic and technical considerations for combined cycle performance enhancement options.
- Dynamic compressors technology.
- Overview of compressors auxiliaries, off-design performance, stall, and surge.
- Overview of centrifugal compressors - components, performance characteristics, balancing, surge prevention systems, and testing.
- Dynamic compressors performance.
- Compressor seal systems.
- Learn about dry seals, advanced sealing mechanisms, and magnetic bearings.

Unit 4: Cogeneration Plants, Wind, and Solar Power Generation

- Learn about applications of cogeneration and combined cycle plants.
- Selection considers combined cycles and cogeneration plants.
- Cogeneration application considerations.
- Learn about the University of Toronto's central steam, cogeneration, and district heating plant.
- Understand the economics of combined cycle cogeneration plants.
- Wind power generation.
- Economics of wind power.
- Wind power turbine generators - brushless double-feed generators.
- What is solar power?
- Solar photovoltaic technologies.
- Economics of solar power systems.

Unit 5: Transformers and Generators

- Fundamentals of electric systems.
- Introduction to machinery principles.
- Transformers.
- Transformers components and maintenance.
- AC machine fundamentals.
- Synchronous generators.
- Understand generator components, auxiliaries, and excitation.
- Understand generator testing, inspection, and maintenance.