

COMBINED CYCLE POWER PLANT FUNDAMENTALS

January 29-30, 2018
The Inn at Opryland, A Gaylord Hotel
Nashville, TN

RELATED EVENTS:

**HEAT RECOVERY STEAM GENERATOR
(HRSG) FUNDAMENTALS**

January 31, 2018 | Nashville, TN

**SAFETY CONSIDERATIONS IN
COMBINED CYCLE PLANTS**

February 1, 2018 | Nashville, TN



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1.0 CEUs for the
course

OVERVIEW

Based on new challenges in the fossil fuel industry, combined cycle technology is a leading solution in improving efficiency and reducing emissions. Many organizations have considered or are considering the placement and development of new combined cycle plants. This course will explain how these plants operate and what the advantages are of moving into the combined cycle arena. The basics of the chemistry of heat and energy will be shown in order for participants to understand how plants function. All major components of the plant will be discussed and reviewed, including turbines, generators, and emission-control systems. Complete operation and maintenance of the combined cycle system will be discussed. Participants will complete the course with an understanding of how plants function efficiently, from the introduction of fuel into the plant to the generation and transmission of electricity.

LEARNING OUTCOMES

Attendees will review and discuss:

- The basic concepts of energy conversion, namely conversion of chemical energy to electricity
- The basic concepts of temperature, work, and heat in power plant operation
- The basic components of a combined cycle power plant and how they work together to produce energy
- The basics of fuel combustion and how fuels are prepared and combusted in a combustion turbine
- The basic components of a heat recovery steam generator and how they work together to produce steam energy
- The basic components of a steam turbine and how the turbine transforms steam energy from the heat recovery steam generator into mechanical energy
- The basic components of the electrical generator and how the generator transforms mechanical energy from the turbine into electrical energy
- The basic components of an electrical switchyard and how it works to transmit electrical energy into the electrical transmission and distribution systems outside of the power plant
- Operation and maintenance of a combined cycle plant

WHO SHOULD ATTEND

- New employees who work at or deal with combined cycle power plants
- Generation dispatchers who need a basic understanding of combined cycle power plant operation
- Regulators, communications staff, and others who need a basic understanding of combined cycle power plant operations
- Administrative or management support professionals who need a better understanding of combined cycle power plants to plan and implement projects
- Corporate accountants who desire a better understanding of combined cycle power plant operations and the factors that can affect operating costs
- Sales professionals who must understand combined cycle power plant operations to better serve customers



“This course gives you a good basis of what equipment is included in a combined cycle plant and how it works.”

B.D. Manager, Enerfab

AGENDA

MONDAY, JANUARY 29, 2018

8:00 – 8:30 am **Registration and Continental Breakfast**

8:30 am – 5:00 pm **Course Timing**

12:00 – 1:00 pm **Group Luncheon**

Power Plant Primer

- Power plant concepts
- Examples of power plants
- Basic energy concepts
- Heat and energy
- Work and heat in power plants

Chemistry

- First law of thermodynamics
- Input = output at steady state
- Natural gas combustion
- Stoichiometry
- Excess air
- Heating value

Combined Cycle Plant Equipment

- Basic plant equipment
- Combustion turbine
- HRSG
- Steam turbine
- Cycle efficiency
- Equipment arrangement

Gas Turbines

- Types
- How they work
- Applications
- Components
- Flow paths

Heat Recovery Steam Generator

- Description and functions of a heat recovery steam generator (HRSG)
- Types and configurations of HRSGs
- How an HRSG produces steam
- Components of an HRSG
- Design considerations
- Fabrication considerations



“I highly recommend this course to get a good overview of all major components of a combined cycle power plant.”

Business Development Manager, ABB Inc.



“If you need an in-depth review of the basic principles, operations, and equipment used at a combined-cycle power plant, this is the course. I came in knowing absolutely nothing; I left knowledgeable and better able to perform my job duties.”

Environmental Engineering Associate II, SC DHEC

AGENDA

MONDAY, JANUARY 29, 2018 (CONTINUED)

Steam Turbines

- Impulse and reaction turbines
- Turbine classifications, designations, and arrangements
- Technology advances
- Overview of steam turbine components
- Steam flow control
- Rotors
- Casings
- Bearings
- Blades
- Seals

Emissions Control

- Gas turbine emission pollutants
- Emissions control technologies and applications
- Dry low NOx burners
- Water injection
- Steam injection
- Frame and aeroderivative engines

TUESDAY, JANUARY 30, 2018

7:30 – 8:00 am

Continental Breakfast

8:00 am – 12:00 pm

Course Timing

Electrical Systems and Generators

- Example line diagrams
- VAR control
- Electrical equipment
- AC generators
- Switchgear
- Step-up transformers
- Emergency equipment

Balance of Plant Equipment

- Equipment in the cycle diagram
- Pumps
- Cooling systems
- Fuel supply
- Water supply
- Electrical supply
- Fire protection



“Excellent balance between elementary and advanced topics.”

Service Sales Engineer, Elliott



“This was the class that I was looking for at my job. It provides a comprehensive overview for professionals like me.”

Environmental Specialist, SMUD

AGENDA

TUESDAY, JANUARY 30, 2018 (CONTINUED)

Water Treatment, Instrumentation, and Controls

- Water treatment systems
- Instrumentation
- Main control systems and interlocks

Maintenance

- Gas turbine maintenance
- Steam turbine maintenance
- Generator maintenance

Operations

- Gas turbine operations
- Steam turbine operations
- Generator operations

Review



“Insightful course, accelerated learning, and easily comprehended.”

Senior Program Engineer, Ambre Energy

INSTRUCTOR



Carl R. Bozzuto

Honorary Member, The Council of Industrial Boiler Owners

Carl Bozzuto has nearly 50 years of experience in combustion and boiler operations and research. He began his career as a research engineer, senior project engineer, manager, and director for Combustion Engineering Inc. Carl was named vice president of process technology for the company, where he was responsible for the development and commercialization of new boiler and power plant technologies, including advanced cycles, ultra-supercritical boilers, alternative working fluids, fluid bed boilers, plant integration, and other plant component technology. Serving recently as vice president of technology for the Power Environment Sector at Alstom Power Inc., he was responsible for the development and implementation of new technology for boiler and environmental products on a worldwide basis. Bozzuto holds 18 U.S. patents and membership in the American Institute of Chemical Engineers (AIChE), the Combustion Institute, the Source Evaluation Society, and the American Society of Mechanical Engineers (ASME). He has authored more than 30 published technical papers and was editor-in-chief of the textbook Clean Combustion Technologies, published by Alstom Power in 2009. Bozzuto has earned Bachelor of Science and Master of Science degrees in chemical engineering from the Massachusetts Institute of Technology and a Master of Science degree in management from the Hartford Graduate Center (RPI).



“I found the Combined Cycle Power Plant Fundamentals course informative, interesting, and practical.”

Project Manager - Power, BHPB Iron Ore

INSTRUCTIONAL METHODS

This program will use PowerPoint Presentations, group discussions as well as active participation.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Participants must sign in/out each day and be in attendance for the entirety of the course to be eligible for continuing education credit.

EVENT LOCATION

A room block has been reserved at the The Inn at Opryland, A Gaylord Hotel, 2401 Music Valley Drive, Nashville, TN 37214, for the nights of January 28 - 31, 2018. Room rates are \$151 plus applicable tax. Call **1-615-889-0800** for reservations and mention the EUCI event to get the group rate. The cutoff date to receive the group rate is December 31, 2017 but as there are a limited number of rooms available at this rate, the room block may close sooner. ***Please make your reservations early.***

IACET CREDITS



EUCI has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET). In obtaining this accreditation, EUCI has demonstrated that it complies with the ANSI/IACET Standard which is recognized internationally as a standard of good practice. As a result of their Authorized Provider status, EUCI is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard.

EUCI is authorized by IACET to offer 1.0 CEUs for the course

REGISTER 3, SEND THE 4TH FREE

Any organization wishing to send multiple attendees to this course may send 1 FREE for every 3 delegates registered. **Please note that all registrations must be made at the same time to qualify.**

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PLEASE SELECT

- SPECIAL RATE FOR 3 COURSES: COMBINED CYCLE POWER PLANT FUNDAMENTALS, HEAT RECOVERY STEAM GENERATOR (HRSG) FUNDAMENTALS AND SAFETY CONSIDERATIONS IN COMBINED CYCLE PLANTS**
JANUARY 29 - FEBRUARY 1, 2018, US \$2595
EARLY BIRD on or before JANUARY 12, 2018: US \$2395
- BOTH COMBINED CYCLE POWER PLANT FUNDAMENTALS AND HEAT RECOVERY STEAM GENERATOR (HRSG) FUNDAMENTALS COURSES:** JANUARY 29-31, 2018: US \$1995
EARLY BIRD on or before JANUARY 12, 2018: US \$1795
- COMBINED CYCLE POWER PLANT FUNDAMENTALS COURSE ONLY:** JANUARY 29-30, 2018: US \$1395
EARLY BIRD on or before JANUARY 12, 2018: US \$1195

REGISTRATION
to register [CLICK HERE](#) or

Call: 201 871 0474
fax: 253 663 7224
email: [register@pmaconference.com/](mailto:register@pmaconference.com)
web: <http://pmaconference.com/>
Mail: POB 2303 Falls Church Va 22042

How did you hear about this event? (direct e-mail, colleague, speaker(s), etc.)

Print Name Job Title

Company

What name do you prefer on your name badge?

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Phone Email

List any dietary or accessibility needs here

CREDIT CARD INFORMATION

Name on Card Billing Address

Account Number Billing City Billing State

Exp. Date Security Code (last 3 digits on the back of Visa and MC or 4 digits on front of AmEx) Billing Zip Code/Postal Code

OR Enclosed is a check for \$ _____ to cover _____ registrations.

Substitutions & Cancellations

Your registration may be transferred to a member of your organization up to 24 hours in advance of the event. Cancellations must be received on or before December 29, 2017 in order to be refunded and will be subject to a US \$195.00 processing fee per registrant. No refunds will be made after this date. Cancellations received after this date will create a credit of the tuition (less processing fee) good toward any other EUCI event. This credit will be good for six months from the cancellation date. In the event of non-attendance, all registration fees will be forfeited. In case of course cancellation, EUCI's liability is limited to refund of the event registration fee only. For more information regarding administrative policies, such as complaints and refunds, please contact our offices at (201) 871-0474.