



EUCI presents a course on:

# COMBINED CYCLE POWER PLANT FUNDAMENTALS

February 29 – March 1, 2012 • Hyatt Regency Houston • Houston, TX

## TESTIMONIAL FROM PAST ATTENDEE

**"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*



EUCI is authorized by IACET to offer 1.0 CEUs for this program.

February 29 – March 1, 2012

## 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

## IACET



EUCI has been approved as an

Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102. In obtaining this approval, EUCI has demonstrated that it complies with the ANSI/IACET Standards, which are widely recognized as standards of good practice internationally.

As a result of its Authorized Provider membership status, EUCI is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standards.

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### **Requirements for Successful Completion of Program**

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

### **Instructional Methods**

PowerPoint presentations, classroom discussions, and question-and-answer sessions will be used in this course.

February 29 – March 1, 2012

## PROGRAM AGENDA

### WEDNESDAY, FEBRUARY 29, 2012

**Registration and Continental Breakfast:**  
8:00 – 8:30 a.m.

**Course Timing:** 8:30 a.m. – 5:00 p.m.

**Group Luncheon:** 12:00 – 1:00 p.m.

#### 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

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

#### 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

### THURSDAY, MARCH 1, 2012

**Continental Breakfast:** 7:30 – 8:00 a.m.

**Course Timing:** 8:00 a.m. – 12:00 p.m.

#### 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

#### 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

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## INSTRUCTOR

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### **Carl R. Bozzuto, Member and Secretary Treasurer, Board of Directors of the Council of Industrial Boiler Owners**

Carl Bozzuto has more than 40 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 16 U.S. patents and membership in the American Institute of Chemical Engineers (AIChE), the Combustion Institute, and the American Society of Mechanical Engineers (ASME). He has authored more than 30 published technical papers and is 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.

**PROCEEDINGS**

The proceedings of the course will be published, and one copy will be distributed to each registrant at the course.

**EVENT LOCATION**

A room block has been reserved at the Hyatt Regency Houston, 1200 Louisiana Street, Houston, TX 77002, for the nights of February 26-29, 2012. Room rates are \$179, plus applicable tax. Call 713-654-1234 for reservations and mention the EUCL course to get the group rate. The cut-off date to receive the group rate is February 5, 2012, but as there are a limited number of rooms available at this rate, sometimes the room block will close sooner. **Please make your reservations early.**

**REGISTRATION INFORMATION**

**REMEMBER: EVERY FOURTH REGISTRANT IS FREE**

For instant registration, call (201) 871-0474 or fax the registration form to (253) 663-7224.

Register Three; Send Fourth Free!

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

All cancellations received on or before January 17, 2012, will be subject to a \$195 processing fee. Written cancellations received after this date will create a credit of the tuition (less processing fee) good toward any other EUCL event or publication. This credit will be good for six months. In case of event cancellation, Electric Utility Consultants' 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. EUCL reserves the right to alter this program without prior notice.

FIVE EASY WAYS TO REGISTER	
<b>One: CALL</b> (201) 871-0474	<b>Two: FAX</b> (253) 663-7224
<b>Three: E-MAIL</b> register@pmaconference.com	<b>Four: MAIL</b> PMA P.O. Box 2303 Falls Church, VA 22042
<b>Five: WEB SITE</b> www.pmaconference.com	

**PLEASE REGISTER THE FOLLOWING**

- Combined Cycle Power Plant Fundamentals, February 29-March 1, 2012: US \$1395  
**Early bird on or before February 17, 2012: US \$1195**
- Discounted registration fee for attending Coal Power Plant Fundamentals, February 27-28, 2012, and Combined Cycle Power Plant Fundamentals, February 29-March 1, 2012: US \$2295  
**Early bird on or before February 17, 2012: US \$2095**

**ENERGIZE WEEKLY**

EUCL's *Energize Weekly* e-mail newsletter compiles and reports on the latest news and trends in the energy industry. Newsletter recipients also receive a different, complimentary conference presentation every week on a relevant industry topic. The presentations are selected from a massive library of more than 1,000 current presentations that EUCL has gathered during its 25 years organizing conferences.

**Sign me up for *Energize Weekly***

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