

COAL POWER PLANT FUNDAMENTALS

August 15-16, 2017
EUCI Office Building Conference Center
4601 DTC Blvd, B-100
Denver, CO

RELATED EVENT:
OVER FIRE AIR FUNDAMENTALS
August 17, 2017 | Denver, CO



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

OVERVIEW

This general introductory course provides some basic engineering concepts needed to understand how a coal-fired power plant works, followed by a general overview of power plant layout and operating principles. All major systems in the power plant will be discussed, from coal handling to the switchyard. Relationships between power plant systems will be illustrated. The focus will be on simple presentation of complex engineering ideas, so attendees are not required to have engineering or scientific backgrounds to attend this seminar.

LEARNING OUTCOMES

- Identify how energy is released from fuel and how it is transformed into electrical energy by a power plant
- Discuss the basic principles of heat, work, and energy in the power cycle
- Review how the major equipment and subsystems in a power plant work and how they work together
- Analyze how certain factors can affect the performance and availability of a power plant
- Review the basic operating principles of a power plant
- Discuss how electricity is directed out of the power plant

WHO SHOULD ATTEND

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

“

“I am not an engineer or science person and Carl made the material very easy to understand.”

Director of Finance, Muscatine Power & Water

“

“Carl has a great wealth of experience and knowledge regarding the entire power plant and his personal stories are always interesting.”

Proposal Manager, Detroit Stoker

PROGRAM AGENDA

TUESDAY, AUGUST 15, 2017

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

8:30 am – 5:00 pm **Course Timing**

12:00 – 1:00 pm **Group Luncheon**

Introduction, Format, and Objectives

Primer

- Power plant concepts
 - o A simple power plant
- Basic energy conversion
 - o Transferring heat to steam energy
 - o Converting steam energy to mechanical energy
 - o Converting mechanical energy to electrical energy

Heat and Energy

- Properties of substances
 - o Mass, volume, and density
- Pressure and flow
 - o Units of pressure
 - o Pressure measurement
 - o Causes of flow and flow measurement
- Temperature and heat
- Forms of energy
 - o Potential and kinetic energy
 - o Internal energy
 - o PV energy
- Importance of temperature
- Work and heat in power plants
- The properties of water
 - o Phases - solid, liquid, and gas
 - o Change of phase
 - o Specific heat
 - o Effect of pressure
 - o Density
 - o Properties of steam
- Improving the basic power plant
 - o Containing heat
 - o Fuel delivery systems
 - o Combustion air
 - o Flue gas removal
 - o Steam drum and water walls
 - o Superheater
 - o Reheater
 - o Steam turbines
 - o Condensers
 - o Feedwater heaters



“Course covered all my objectives and provided the best combination of theoretical and practical concepts of the power plant operation.”

Staff Engineer, NV Energy

PROGRAM AGENDA

TUESDAY, AUGUST 15, 2017 (CONTINUED)

Combustion Basics

- How does fuel burn?
- Coal and natural gas combustion
- Heat losses during combustion
- Fuel preparation and handling for pulverized coal and cyclone furnaces
- Differences among coal, natural gas, and oil-fired furnaces
- Natural gas and oil ignition systems
- Hazards of handling and storing fuels

Handling of Combustion Air and Flue Gas

- Handling combustion air and gas
 - Types of fans and their applications
 - Control of fans
 - The combustion air path
- Air heaters and their operation
- The flue gas path
 - Furnace
 - Economizer
 - Scrubbers
 - Precipitators
 - Stack

Combustion Heat Transfer

- Modes of heat transfer
- Furnace heat transfer and temperature control
 - Pulverized fuel firing
 - Cyclone firing

Ash Removal

- Nature of ash
- Problems caused by ash accumulation
- Boiler designs for slag and ash removal
- Equipment for boiler cleaning
- Fly ash removal systems
- Ash conveyors
- Disposal

Furnace Explosions

- Causes, combustion vs. explosion
- Requirements for proper combustion
- Operating during emergencies

Boiler Steam-Water Cycle

- Economizer
- Steam drum/downcomers
- Waterwalls
- Primary superheater
- Secondary superheater and reheater

PROGRAM AGENDA

TUESDAY, AUGUST 15, 2017 (CONTINUED)

Turbines

- Classifications
- A typical cycle
- Components
- Impulse and reaction turbines
- Steam seals
- Lube oil systems

Condenser

- Types and principles of operation
- Cooling water systems
- Condenser performance factors
- Condenser auxiliaries

Condensate and Feedwater Systems

- Flow cycle
- Feedwater heaters
- Low pressure
- Deaerator, high pressure
- Feedwater heater performance factors
- Boiler feed pumps

Review of Day 1 Material



“Course material was presented in an easy to understand format. I got what I expected from the course and would recommend it to anyone looking to enhance their understanding of power plants.”

RRR – Sales/Project
Manager, Powell - Delta
Unibus Division

WEDNESDAY, AUGUST 16, 2017

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

8:30 am – 12:00 pm **Course Timing**

Water Treatment

- The effects of untreated water on operations
 - o External treatment
- Clarifying filters and demineralizers
 - o Internal treatment

Pumps and Compressors

- Centrifugal pumps
 - o Theory of operation and principal parts
- Reciprocating and centrifugal air compressors
 - o Theory of operation and principal parts

Instrumentation

- Pressure
- Temperature
- Flow
- Water level
- Turbine supervisory
- Combustion
- Water analysis

PROGRAM AGENDA

WEDNESDAY, AUGUST 16, 2017 (CONTINUED)

Main Control Systems and Interlocks

- Control
 - o Feedwater
 - o Combustion
 - o Temperature
 - o Turbine
- Interlocks
 - o Boiler
 - o Turbine
 - o Electrical

Plant Operations

- Basic operating procedures and principles
- Emergency situations

Station Performance

- Measuring efficiency
- Heat rate
- Factors affecting heat rate

Power Plant Electrical Primer

- Basic electrical system concepts
- Simple generation and transmission concepts

Power Plant Alternating Current (AC) Generators

- Construction and operating principles of large AC generators
- Exciter systems

Power Plant Switchyards

- Power transformers
- Buses
- Bus ducts
- Disconnects
- Circuit breakers and switchgear

Review

- Summary of material covered
- Final questions and discussion

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).



“Very informational and helpful topics. I learned what I expected to learn, This will be very helpful when I manage a coal plant’s finances. It will not be just a whole bunch of numbers anymore. Thank you.”

Manager, Finance, Competitive Power Ventures

INSTRUCTIONAL METHODS

Power point and class discussion

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Participants must sign in/out each day, be in attendance for the entirety of the course

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 this 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.

EVENT LOCATION

EUCI Office Building Conference Center

4601 DTC Blvd, B-100
Denver, CO 80237

NEARBY HOTELS

Hyatt Regency Denver Tech Center

7800 E Tufts Ave
Denver, CO 80237
303-779-1234
0.3 miles away

Denver Marriott Tech Center

4900 S Syracuse St
Denver, CO 80237
303-779-1100
0.7 miles away

Hyatt Place Denver Tech Center

8300 E. Crescent Parkway
Greenwood Village, CO 80111
303-804-0700
0.9 miles away

REGISTRATION
to register [CLICK HERE](#) or

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

Please make checks payable to: "PMA"

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See Nearby Hotels on page 8

PLEASE REGISTER

- BOTH COAL POWER PLANT FUNDAMENTALS AND OVER FIRE AIR FUNDAMENTALS COURSES:**
 August 15-17, 2017 | Denver, CO: US \$1995,
 Early bird on or before July 28, 2017: US \$1795
- COAL POWER PLANT FUNDAMENTALS COURSE**
ONLY: August 15-16, 2017 | Denver, CO: US \$1395,
 Early bird on or before July 28, 2017: US \$1195

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?

Address

City State/Province Zip/Postal Code Country

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 July 14, 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.