EUCI Presents a Course on:

NUCLEAR POWER PLANT OPERATIONS FUNDAMENTALS

29-30 March 2010 • Sheraton Brussels • Brussels, Belgium

AUTHORIZED IACET PROVIDER

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

Photo by: Thomas Anderson

OVERVIEW

The Nuclear Power Plant Operations Fundamentals course provides a detailed explanation of electrical generation and operations of these sophisticated facilities in the rejuvenated nuclear power industry. Nuclear power is having a renaissance due to a confluence of factors including global warming, the cost and supply reliability of oil, issues involving coal and greenhouse gases, and the safety record and superb operational performance of nuclear units. Those factors and improved political climates have resulted in many utilities investigating construction and operation of new nuclear power plants. Additionally, significant attention is being given to improving capacity, increasing efficiency, and extending the operating life of existing nuclear power plants. New technologies improving efficiency and safety are being introduced at a rapid rate. Understanding the technology and operations of a nuclear facility can assist employees and service providers, such as vendors, attorneys, and contractors, in comprehending the nuclear energy system and improve operations and support.

This course will review the status of nuclear power throughout Europe and the world. It addresses the events and forces that have influenced, and continue to influence, commercial nuclear power. To better understand how reactors generate power we will explore the nuclear force and binding energies and fissile vs. fertile nuclear materials. Pressurized and boiling water reactor systems design and operations will be discussed. Additional topics include the nuclear fuel cycle, the uranium enrichment and reprocessing controversies, radioactive wastes including spent nuclear fuel storage, spent fuel transportation, nuclear plant safety, and performance indicators demonstrating excellent operations. This course will help personnel involved in the nuclear energy industry to have a clear understanding of nuclear power plant operations and the challenges of tomorrow.

Topics include:

- Historical survey of nuclear power
- Basic nuclear physics
- Radioactivity and radiation protection
- Basic principle of nuclear reactor core operation
- Nuclear safety
- Designs and functions of PWRs and BWRs
- Generation III reactor designs and operations
- Balance – of – Plant considerations
- Generation IV reactors
- Nuclear power and the environment
- The nuclear fuel cycle: from uranium mining to spent fuel management, including re-processing
- Nuclear fuels storage and transportation
- Nuclear waste management
- Nuclear power in the world: status and prospects

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 their 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 with discussion and question and answer sessions will be used in this course.

WHO SHOULD ATTEND

- All new employees whose job requires a working knowledge of nuclear power
- Personnel in the energy industry that are newly assigned to nuclear generation
- Employees who need a job-related understanding of the design and operations of nuclear power plants
- Public affairs and public relations personnel who need an understanding of nuclear energy
- Executives and managers who require general instruction in nuclear power including nuclear plant designs, construction, operations, and the nuclear fuel cycle
- Managers and engineers with new responsibilities in nuclear power
- Suppliers and vendors involved in the procurement cycle for new and existing nuclear plants
- Attorneys and paralegals whose work is directly or indirectly involved with nuclear energy

LEARNING OUTCOMES

- Review the development of nuclear power and facts concerning nuclear commercial power development and non-proliferation
- Describe projected electrical consumption and the necessity of nuclear commercial power plants
- Examine basic nuclear physics and how nuclear reactors function
- Discuss the operations of boiling water and pressurized water reactors
- Identify the components of a nuclear power plant
- Describe the differences in Generation III and Generation IV reactor designs
- List a minimum of five Generation IV reactor types that are under consideration for development
- Recognize the key safety features in modern reactor technology
- Identify and discuss the components that make up the nuclear fuel cycle
- Recognize the critical issues of enrichment, radioactive wastes, spent nuclear fuel transportation, and proliferation concerns

INSTRUCTOR

Dominique Greneche
Dr. Greneche earned a PhD in nuclear physic from the University of Paris in 1973. He worked for the CEA (French Atomic Energy Commission) for 20 years on reactor physics, and particularly on high temperature reactors (HTR) and thorium cycles. After this important assignment, he managed safety assessment studies of nuclear waste facilities and final repositories at the French Institute of Nuclear Safety. Next, he was the adviser for nuclear affairs at the cabinet of the French "High Commissioner for Atomic Energy."

Dominique recently retired from AREVA NC, where he was Deputy Director for scientific and technical international development and International Expert. He is now working as a consultant to the nuclear industry with his own company, Nuclear Consulting.

Dr. Greneche is also Professor of Reactor Physics at several schools of engineering. He has authored more than 100 communications and articles and is a member of the Board of Directors of the American Nuclear Society.

PROGRAM AGENDA

MONDAY, 29 MARCH 2010

07:30 – 08:00 **Registration and Continental Breakfast**

08:00 – 10:00 **Welcome and Program Overview**

Nuclear Power Development
- The Nuclear Power Timeline
- The Origin of Nuclear Energy ($E = mc^2$)
- Comparison to Chemical Energy

Electricity Consumption and Demand
- Standard of Living and its Correlation to Electricity Consumption
- Projected Electricity Demand Growth
- Electric Generating Capability
- Generating Capability by Fuel Type
  - Coal, Nuclear, Gas, and Other
  - Most Recent Capability Addition by Fuel Type

Nuclear Power Status
- Worldwide – Current and Future
  - Nuclear Power Reactors Worldwide
  - Nuclear Plants Under Construction
  - Cost and Economics of Nuclear Power
  - Large Development Programs: China, India, and Russia Have Plans
  - New Comers: Nuclear Plants in the Oil Rich Middle East

10:00 – 10:15 **Morning Break**

10:15 – 12:00 **Nuclear Physics**
- The Nuclear Force
- Mass Defect and Binding Energy
- Fission versus Fusion
- Fission Energy
- Radioactivity
- Half-Life

Basic Principles of Nuclear Reactors
- The Chain Reaction
- Criticality and Reactivity
- Fast and Slow Neutrons: The Slowing Down of Neutrons
- Fuel Evolution and Fuel Management
- Temperature Effects
- Reactor Kinetics and Control

12:00 – 13:00 **Group Luncheon**

PROGRAM AGENDA

MONDAY, 29 MARCH 2010 (CONTINUED)

13:00 – 14:45

Nuclear Safety
- Basic Principles
- Defense in Depth
- Probabilistic Approach
- Safety Records of Nuclear Power Plants, the INES system
- Safety Authorities and Regulations

Pressurized Water Reactors
- Design
- Reactor Coolant System
- Reactor Pressure Vessel
- Steam Generation
- Nuclear Fuel and Refueling
- Balance – of – Plant

Boiling Water Reactors
- Design
- Reactor Coolant System
- Reactor Pressure Vessel
- Steam Generation
- Nuclear Fuel and Refueling
- Balance – of – Plant

14:45 – 15:00 **Afternoon Break**

15:00 – 17:00

Generation III and Generation IV Designs
- Generation III
  - Evolutionary Improvements
  - Passive Safety Systems
  - Balance – of – Plant
- Generation IV
  - Enhanced Safety
  - Minimal Waste Generation
  - Minimal Natural Resource Consumption
  - Proliferation Resistant
  - Highly Economic
  - The 6 Systems Selected

PROGRAM AGENDA

TUESDAY, 30 MARCH 2010

08:00 – 08:30 **Continental Breakfast**

08:30 – 10:15 **Alternative Fuels and Power Sources**

- Uranium
- Plutonium
- Thorium

The Front End of the Nuclear Fuel Cycle

- Overview
- Uranium Ore
- Uranium Conversion
- Uranium Enrichment
  - o Gaseous Diffusion
  - o Gas Centrifuge
  - o Megatons-to-Megawatts Programs
- Fuel Fabrication
- Nuclear Fuel Costs

10:15 – 10:30 **Morning Break**

10:30 – 12:00 **Radioactive Waste**

- Low Level Radioactive Waste
- As Low As Reasonably Achievable
- High Level Radioactive Waste
- Used Nuclear Fuel Storage

The Back End of the Nuclear Fuel Cycle

- Reprocessing
- Used Nuclear Fuel Transportation
- Used Nuclear Fuel Storage

The Future for Nuclear Power

- The Political Environment
- Regulatory Approaches
- Rebuilding the Nuclear Industry Infrastructure
- Non Proliferation Issues

12:00 **Closing and Open Forum for Questions**

PROCEEDINGS

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

COURSE LOCATION

A room block has been reserved at the Sheraton Brussels, Place Rogier 3, 1210 Brussels, Belgium, for the nights of 28 – 29 March 2010. Room rates are 179€ for a single, plus applicable tax. Call (32) 2 224 3111 for reservations and mention the EUCI course to get the group rate. Make your reservations prior to 28 February 2010. There are a limited number of rooms available at the course rate. **Please make your reservations early.**

VISAS

Delegates requiring Visas should request a Visa invitation letter from EUCI at the time of registering for the event, ensuring sufficient time is left for applications to be completed. Delegates are responsible for contacting the relevant/appropriate embassy themselves. EUCI can do nothing further to assist in this process. At the time of registering for the event, contact Anjali Schulte for your Visa letter: aschulte@euci.com.

EVENT FEES

The event fee includes entry to the training sessions and training materials. However, fees do not include delegate travel or accommodations. All credit card orders are processed at that day's £/€/$ exchange rate at the time the transaction goes through. Payment is required before the start of the course. PLEASE NOTE: Credit card details will be necessary if your booking is made less then 10 days prior to the start of the course, or if your invoice remains unpaid at the start of the event. Where funds have not been received in advance, delegates will be required to supply credit card details at registration in order to gain entry to the training event. This credit card will be charged onsite and current exchange rates and bank charges will apply.

REGISTRATION INFORMATION

REMEMBER, EVERY 4TH REGISTRANT IS FREE
For instant registration, call (201) 871-0474 or fax the Registration Form to (253) 663-7224.

Register 3, Send 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.

All cancellations received on or before 26 February 2010 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 EUCI conference or publication. This credit will be good for six months. In case of conference cancellation, Electric Utility Consultants' liability is limited to refund of the conference registration fee only. For more information regarding administrative policies such as complaints and refunds, please contact our offices at (201) 871-0474.

EUCI reserves the right to alter this program without prior notice.

MAIL DIRECTLY TO:
The Power Marketing Association (PMA)
P.O. Box 2303
Falls Church, VA 22042

Phone: (201) 871-0474
Fax: (253) 663-7224

PLEASE REGISTER THE FOLLOWING

☐ Nuclear Power Plant Operations Fundamentals,
29-30 March 2010, 895€ plus VAT (21%)
Early Bird on or Before 19 March 2010, 795€ plus VAT (21%)

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When you sign up for "Energize Weekly" you will receive a new conference presentation each week via email on a relevant industry topic. The presentations are selected from a massive library of over 1000 current presentations that EUCI has gathered during its 22 years organizing conferences.

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(Direct email, Colleague, Speaker(s), etc.)

_____

Name _____ Job Title _____

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Address _____ City _____ State _____ Zip _____

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Visa and MC cards have a 3 digit code on the signature panel on the back of the card, following the account number. American Express cards have a 4 digit code on the front of the card, above the card number.

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Or enclosed is a check for $ _____ to cover _____ registrations.

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