SHORT COURSE ANNOUNCEMENT

"Emissions Control and Performance Improvement for Coal-Fired Power Plants"

May 20 & 21, 2014 at Lehigh University, Bethlehem, PA
Wood Dining Room, Iacocca Hall
111 Research Drive, Mountaintop Campus

Course Description

This intensive two-day course focuses on options for reducing boiler emissions, with particular emphasis on the MATS and CAIR/CSAPR regulations for Hg, NO_x, SO_2 and ozone control, and for improving heat rate. The instructors will share their first-hand experience through case studies which span decades of projects dedicated to performance optimization and emissions control with coal-fired boilers as well as recent advancements in control techniques for air toxics. Each participant will receive a comprehensive set of course notes.

Course Instructors

The course instructors are Drs. Carlos Romero and Edward Levy. Dr. Romero is Principal Research Scientist and Director of the Energy Research Center at Lehigh University. Dr. Levy is Professor Emeritus of Mechanical Engineering at Lehigh and the previous Director of the ERC. Between them, the two instructors have close to 50 years of experience with the thermal aspects of power generation and energy conversion, with an emphasis on emissions control and performance optimization of coal-fired power plants.

Who Should Attend

This course is designed for generating company engineers and engineering managers who need to make decisions about:

- **Emissions Control**
- **MATS Compliance**
- **Heat Rate Improvement Options**
- **Equipment Maintenance**

13.0 PDH's or 1.3 CEU's will be awarded for attendance at this course.

PROGRAM: DAY ONE

- **Registration and continental breakfast from 8:00 a.m. to 9:30 a.m.**

- 9:30 a.m. course begins
- Introduction to Heat Rate
  - Heat Rate Definitions
  - Design and Physical Phenomena Affecting Performance and Emissions
  - Link between Heat Rate and CO_2
- Factors Affecting Unit Performance
  - Boilers and Auxiliaries
  - Steam Turbine Cycle
- Heat Rate Measurement Methods
  - Description of Methods
  - Measurement Accuracy

- **LUNCHEON**

- Fuel Variability; Ash Deposition and Control
  - Effects of Fuel Properties on Slagging and Fouling
  - Effects of Boiler Control Settings
  - Sootblowing
- Pulverizers and Coal Pipes
  - Pulverizer Performance
  - Coal Pipe Imbalances
- Air Preheaters
  - Principles of Operation
  - Cold End Fouling
- Introduction to Boiler Emissions and MATS Regulations
- NO_x Formation and Control (Low NO_x Burners, OFA, Combustion Tuning, SCR, SNCR)
  - Formation Mechanisms
  - Control Techniques

- **COCKTAIL RECEPTION immediately following this session.**

PROGRAM: DAY TWO

- **Continental breakfast from 7:00 to 8:00 a.m.**

- NO_x Formation and Control (Low NO_x Burners, OFA, Combustion Tuning, SCR, SNCR) cont'd
- Process Optimization (NO_x, HR, Hg, Slagging, etc.)
    - NO_x
    - Heat Rate
    - Mercury
    - Slagging
- SO_2, SO_3 and Acid Gas Control (WFGD, Spray Dryers, DSI)
    - Wet FGD's
    - Spray Dryers
    - Dry Sorbent Injection

- **LUNCHEON**

- Mercury Emissions Control
  Chemistry of Mercury Formation
  Control Technologies

- Particulate Matter Control and Non-mercury HAPS Control

- **PROGRAM ENDS AT 3:00 P.M.**

COST (All dining services and course notes are included in the cost.)

- **ELP* member employees: early bird $950; after 4/20/14, $1,050**
- **Non-ELP member attendees: early bird $1,175; after 4/20/14, $1,275**

*Energy Liaison Program

LODGING AND TRANSPORTATION: visit our website: www.lehigh.edu/energy and click on the "visitor" tab for lodging and transportation suggestions and directions.

FOR MORE INFORMATION: CONTACT Vincent Magnotta, Manager, Research Program Development and Director, Energy Liaison Program, at 610-758-4545 or vlm288@lehigh.edu

TO REGISTER: **You can register by mail, fax, e-mail or telephone. Ursla Levy is the contact person for all methods of registration. Contact her at 610-758-4542 or ur01@lehigh.edu or this mailing address: Lehigh University, Energy Research Center, 117 ATLSS Drive, Bethlehem, PA 18015.**

REGISTRATION FORM
"EMISSIONS CONTROL AND PERFORMANCE IMPROVEMENT FOR COAL-FIRED POWER PLANTS"
MAY 20 AND 21, 2014 AT LEHIGH UNIVERSITY

Name:_____Title:_____

Organization:_____ E-mail: _____

Address:_____

Telephone:_____

Check one: __ my check is enclosed; payable to Lehigh University

__ I am registering by e-mail or fax and my check will follow

__ I am paying by credit card
__Visa__ Mastercard __America Express

Name on card_____

Account number_____

Billing Address_____

Expiration date_____

ABOUT THE ENERGY RESEARCH CENTER

Director's Message

There is an important need to address the complex challenges associated with increased energy demand, and how energy is generated, transmitted, stored and used in the US and around the world. Scientific research and technological development play an important role in addressing those challenges. It is most likely that the future energy matrix scenario for the US will involve contributions from fossil fuel, renewables and nuclear energy. Coal will continue to be an abundant low-cost source of fuel for US electric generating power plants, with a forecasting share of 40% of the power supply. The Lehigh University Energy Research Center (ERC) was established to pursue fundamental and applied research, technological developments, and demonstration projects for the power generation industry, and for the efficient and cleaner use of energy. The Energy Research Center also serves as a liaison, within The P.C. Rossin College of Engineering and Applied Science, for research and development, education and outreach, and to foster government/ industry/academia partnership development across a broad spectrum of energy topics.

Our Mission

The Energy Research Center's mission is to continue being a leader in working with federal, state and local agencies, energy businesses, technology developers/suppliers, the research community and academic institutions to solve energy problems. The Energy Research Center accomplishes this mission by: being committed to innovative research and development, recognizing the important link between energy and the environment, bringing together faculty within Lehigh University working on energy-related research, fostering partnerships between government, industry and researchers, providing funding, research and training opportunities to university students, and promoting international collaboration.

History and Overview

The Energy Research Center was founded as a multidisciplinary activity involving faculty and students from departments in the P.C. Rossin College of Engineering and Applied Science, the College of Arts and Sciences and the College of Business and Economics as well as dedicated professionals. The ERC was founded by Edward K. Levy, Sc.D., a professor in the Department of Mechanical Engineering and Mechanics, in 1973 to act as a focal point for energy research and to help faculty and staff respond to research opportunities and new developments. The staff and associated faculty of the ERC participate in many aspects of energy research dealing with energy conversion, power generation and environmental control. Projects cover the spectrum from fundamental engineering and science issues to applied research topics. Research within the ERC is supported by contracts and grants from government and industry. In 1978, the ERC created the Energy Liaison Program (ELP) which has particularly close ties with industry. Through the ELP, Center personnel and member companies participate in short term, quick turn-around consulting and problem solving activities. As part of its educational effort, the Energy Research Center sponsors short courses, workshops and seminars related to energy topics.