

ENHANCE
YOUR
OPERATIONS

CONTROL
YOUR
COST

EXPAND
YOUR CAREER
DEVELOPMENT

CEM[®] CERTIFIED ENERGY
MANAGER TRAINING

AEE[®]
North Carolina
Piedmont Chapter

The Certified Energy Manager (CEM) Credential Recognized Around the World

Comprehensive 5-Day CEM Training Program for Energy Professionals

Preparatory Course and Exam for the Certified Energy Manager

A comprehensive, detailed instructional program covering the full scope of technical, economic, and regulatory components of effective energy management

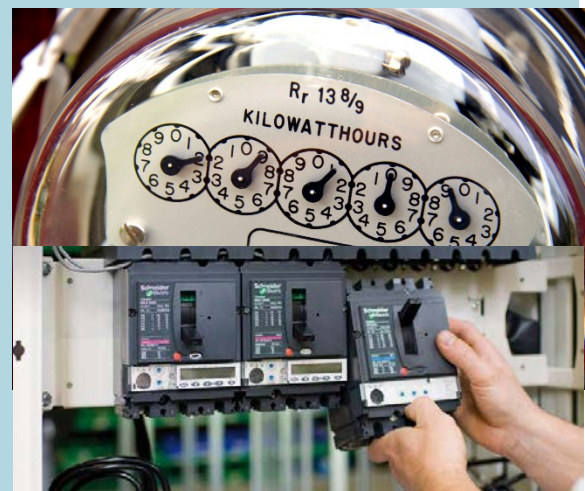
November 2 - November 6, 2015

University of North Carolina at Charlotte
Center City Building
320 E. 9th Street
Charlotte, NC 28202

Fees

AEE Member: \$ 1,750

Non-Member: \$ 1,995



For more information about the CEM Training Course visit

www.aee-ncpc.org

or contact Keith Pehl: kpehl@optimaengineering.com

AEE[®]
The Association of Energy Engineers

Leading the Energy Industry



North Carolina
Piedmont Chapter

The North Carolina Piedmont Chapter of AEE Welcomes YOU...

The ideal course for any professional seeking...

- *To become a good (or better) energy manager.*
- *To take and pass the CEM exam.*
- *To know what energy management can do for their company.*
- *To know what to expect from energy management consultants.*

ABOUT THE SEMINAR

This special 5-day course will empower you to “put it all together” and get the results your company expects. Comprehensive in scope, this program takes you systematically from the underlying fundamentals to the specific “how to’s.” This week-long program of instruction covers the specific techniques necessary to maximize your effectiveness as an energy manager, vice president of operations, or facilities manager. The optional Certified Energy Manager (CEM®) examination will be administered at the conclusion of this program.

WHY EARN THE CERTIFIED ENERGY MANAGER CERTIFICATION? **CEM**®

The CEM® provides a recognizable affirmation of demonstrated competencies in a wide range of energy related principles and practices. Professionals seeking the CEM® designation must meet a board approved list of pre-qualifications in experience in the field and/or prior educational achievements. This certification helps an individual distinguish themselves and helps them obtain their career objectives.

The CEM® is nearly universally accepted and recognized by a cross-section of institutions both public and private. **Certified Energy Managers** are now found engaged in all the various aspects of the energy industry including: major multi-national corporations, utilities, controls & performance contractors, federal, state and local governments, universities, industrial facilities, commercial buildings, big box retail chains, hospitals, school districts, local entrepreneurs and as well as consultants in the energy field. The Certified Energy Manager designation and program is widely accepted and promoted both in the **United States and internationally.**

COURSE OUTLINE

THE NEED FOR ENERGY MANAGEMENT

- Building energy cost control
- Utility DSM programs and deregulation —energy efficiency and peak demand reduction
- Commercial business energy cost control
- Industrial plant operation improvement
 - Reducing energy costs
 - Reducing environmental emissions
 - Improving product quality
 - Improving plant productivity

CONDUCTING AN ENERGY AUDIT

- Purpose of the energy audit
- Facility description and data needs
- Major systems in the facility
- Data forms for recording information
- Collecting the actual data
- Identification of preliminary energy management opportunities

ENERGY AUDIT INSTRUMENTATION

- The need for instrumentation
- Light level meters
- Electric meters – Voltages, current, power, energy, power factor
- Temperature-measuring instruments
- Combustion efficiency measurement
- Air flow and air leak measurement
- Thermography
- Data logging

ENERGY CODES AND STANDARDS

- ASHRAE standards (62, 15, 3, 90.1)
- ASME, IEEE, and other standards
- Federal legislation – NECPA, PURPA, NGPA, CAAA, NEPA of 1992
- CFC replacements – Montreal Protocol, Global Climate Change
- National Energy Policy Act of 2005
- Proposed tax incentives 2002

BUILDING ENERGY USE AND PERFORMANCE

- Fuel types and costs
- Energy content of fuels
- Energy conversion factors
- Building envelope
- Natural gas purchasing
- Retail wheeling of electricity
- Major building energy use systems

ENERGY ACCOUNTING IN BUILDINGS AND FACILITIES

- Energy use index, energy cost index
- Where energy is used in facilities
- Lighting and HVAC energy use
- ENERGY RATE STRUCTURES
- Identifying types of energy used
- Electric rates, gas rates
- Oil, coal, and other rates
- Steam and hot water rates
- Factors in controlling fuel costs
- Utility incentive programs

ELECTRIC RATE STRUCTURES

- Short history of electric rates
- The difference between power and energy
- Electric meters
- Components of electric rates
- Example rate structures
- Factors in controlling electric costs
- Electric utility incentive programs
- Special schedules (interruptible, TOU, real-time pricing)

ECONOMIC ANALYSIS OF ALTERNATIVE INVESTMENTS

- Economic decision analysis
- Simple economic measures
- The time value of money
- Present and future values
- Cost and benefit analysis
- After tax cash flows

ALTERNATIVE FINANCING

- Role of performance contracting
- Different sources (loans, stock sales, bonds, etc.)
- FEMP and alternative financing
- True lease, capital lease, bonds, etc.

WASTE HEAT RECOVERY

- Objectives: design criteria
- Types and maintenance of heat exchangers
- Recuperators; economizers

LIFE CYCLE COSTING

- Concept of life cycle costing
- Purchase costs vs. operating costs
- Example analyses
- Government standards — FEMP

COURSE OUTLINE

FUEL SUPPLY AND FUEL SWITCHING

- Alternative fuel choices
- Technology choices
 - HVAC systems, boilers, heaters, industrial processes
- Benefits of deregulation — electric, gas, and oil

ELECTRICAL ENERGY MANAGEMENT

- Peak load reduction
- Power factor improvement
- Energy management control systems
- Load management
- Harmonics and other power quality issues

LIGHTING

- Basics of lighting and current lighting technologies
- New lighting technologies
- Economic evaluation of example lighting improvements
- Lighting standards
- EPA Green Lights program
- T12, T8, T5 lamps
- Compact fluorescents
- HID, sulfur lamps

MOTORS AND ADJUSTABLE SPEED DRIVES

- How motors work
- High-efficiency motors
- Examples of cost-effective motor changes
- Use of adjustable speed drives
- Example of cost-effective ASD use
- Improved motor belts and drives
- Compressed air management
- Adjustable speed drive alternatives: eddy current clutches, permanent magnet clutches, variable frequency drives, inlet and outlet vane control, etc.

HVAC SYSTEM

- Types of HVAC systems and new technologies
- The vapor-compression cycle
- Air conditioning loads
- Chiller improvement example
- Control, thermal storage, absorption systems

INSULATION

- Types of insulation
- Heat flow calculations
- Economic levels of insulation
- Passive thermal energy
- Process insulation

CONTROLS AND ENERGY MANAGEMENT

- Night set back
- Optimum start/stop
- Enthalpy economizers
- Temperature resets
- PID controls, pneumatic controls
- Control characteristics
- DDC

▪ GREEN BUILDINGS, LEED®, AND ENERGY STAR

- Green buildings and sustainable design
- U.S. Green Buildings Council and LEED®
- LEED® certification: LEED®–NC, EB, CI, CS
- ASHRAE 90.1 Energy Cost Budget Method
- Energy and atmosphere, indoor environmental quality, water efficiency
- EPA and the ENERGY STAR program
- ENERGY STAR Building Label
- Energy performance ratings and profile manager

BOILERS AND STEAM GENERATION

- Basics of combustion systems
 - Excess air control
- Boiler efficiency improvement
 - Blowdown management, condensate return, turbulators
- Combustion controls
- Waste heat recovery
- Steam traps — purpose and testing
- Process insulation
- Example of boiler improvement

▪ COGENERATION (CHP)

- What is cogeneration
- Types of cogeneration cycles
- Examples of cost-effective use of cogen
- QF's and deregulation
- Use of waste for fuel
- Fuel cells, microturbines, etc.

▪ MAINTENANCE

- Maintenance management systems
- Monitoring for maintenance
- Infrared photography for maintenance
- Cost of:– Air, steam, gas leaks; uninsulated surfaces

ALTERNATIVE FINANCING

- Different financing methods
- Attributes of each method
- After-tax cash flow analysis

ABOUT THE INSTRUCTOR



Robert Scott Frazier, PhD, PE, CEM

Dr. Frazier is faculty member of the Biosystems and Agricultural Engineering School at Oklahoma State University. His specialty areas are: energy management, irrigation energy/water nexus, and renewable energy systems. His research areas include: bio-material energy, waste heat recovery and life cycle analysis. Dr. Frazier worked under Dr. Wayne Turner in the Oklahoma State University Industrial Assessment Center during his undergrad and Master's program. Dr. Frazier is also an instructor for the Association of Energy Engineers and conducts the AEE Certified Energy Manager training several times a year. Dr. Frazier has worked in the energy field for over 20 years and during that time has conducted over 400 commercial and industrial energy audits. He has also worked in the electric utility industry on the East Coast and is a Navy veteran.

REGISTRATION INFORMATION FOR CERTIFIED ENERGY MANAGER TRAINING

When: November 2-6, 2015 • M-TH 8-5, Friday 8-12

Where: University of North Carolina at Charlotte, Center City Building
320 E. 9th Street, Charlotte, NC 28202

Cost: AEE Member: \$ 1,750
Non-Member: \$ 1,995

Fee includes: Guide to Energy Management Textbook & Workbook
Proctored exam on fifth day of training (Friday 8 AM – 12 PM)
Cost of the CEM application and exam (\$400 value)
Break beverages and daily lunches

To Register: visit www.aee-ncpc.org
or contact Keith Pehl kpehl@optimaengineering.com

Registration and payment must be completed by October 15, 2015. For the Friday 11/06/15 exam, you must bring a hand calculator to the exam since the CEM test does not allow computers, tablets or cell phones to be used for calculations on the test. If the minimum number of attendees is not met, the seminar will be cancelled and fees refunded. If the class is held, the seminar fee is non---refundable.



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