AEE Hong Kong Chapter
美國能源工程師學會香港分會

The Certified Energy Manager (CEM®) Program for Professional Certification

Course Code:	**CEM (GM)**
Hong Kong Date:	**9-11 November 2023**
Hong Kong Time:	**8:30 to 19:30 (on 9th and 10th)** **12:30-13:30 lunch break** **8:30 to 12:30 (on 11th)**
Exam Date:	**25th November 2023**
Exam Time:	**14:00-18:00**
Venue:	**Galaxy Macau**
Registration Deadline:	**30 October 2023**

THE MARK OF AN ENERGY PROFESSIONAL

Since its inception in 1981, the Certified Energy Manager (CEM®) credential has become widely accepted and used as a measure of professional accomplishment within the energy management field. It has gained industry-wide use as the standard for qualifying energy professionals both in the United States and worldwide. It is recognized by the U.S. Department of Energy, the Office of Federal Energy Management Programs (FEMP), and the U.S. Agency for International Development, as well as by numerous state energy offices, major utilities, corporations and energy service companies. By attaining the status of CEM, you will be joining an elite group of over 10,000 professionals serving industry, business and government throughout the U.S. and in 77 countries. **In particular, the contexts of the latest mandatory Energy Audit Guidelines in Hong Kong will be included in the course.**

COMPREHENSIVE TRAINING PROGRAM FOR ENERGY MANAGERS (prep: CEM Certification)

This is the CEM course (same as the course held in USA). Metric units will be taught in Hong Kong instead of Imperial units in USA. CEM certificates will be issued directly from Association of Energy Engineers (USA Headquarters) after passing the exam with eligibility conditions of experience and qualifications. To obtain further information on the CEM program, please visit the web site https://www.aeecenter.org/certification/cem-certified-energy-manager/

Course & Exam Fee	HKD	USD
A1: Course & Exam Fee	**9,000**	**1,200**

ABOUT THE COURSE

This special in-depth live "face-to-face" course is ideal for professionals who seek a more detailed program of instruction covering the technical, economic and regulatory aspects of effective energy management. The program provides detailed coverage of all of the 26 training sections specified for energy managers in the field, and offers a comprehensive learning and problem-solving forum for those who want a broader understanding of the latest energy cost reduction techniques and strategies.

INSTRUCTORS (Proposed only and may subject to change)

Ir Dr. Harry So has more than 30 years experiences in business and green technology management. Dr. So has been involved in major consulting and business analysis projects for both the private and public sectors. His clients include Casino, HKEX, HSBC, The World Bank, NTT Data Center, University of Macau, SHKP, Citibank and much more. Dr. So is currently leading the project team for the smart building and smart city solution in the digital twin, energy, and AI technology projects. He is also involving develop quality building infrastructures and technology systems for property developers, hotels, and commercial buildings in terms of BIM based digital twin projects and AI mathematical modeling.

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	**ENERGY CODES AND STANDARDS** ● Building codes ● 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 1992 ● ISO 50001 ● US DOE's SEP Program	**INDOOR AIR QUALITY** ● Standards of care: ASHRAE Standard 62 ● Reasons for managing indoor air quality ● Acceptable air quality ● Ventilation rate procedure, Air quality procedure ● Typical air contaminants; VOCs and bioaerosols ● IAQ problems; CO2 measurement and control ● AEE Certified IAQ Professional requirements
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 reports	**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,	**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

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- Example of boiler improvement

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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
- Ultrasonic leak detectors
- Data logging

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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, variable frequency drives, inlet and outlet vane control, etc.

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GREEN BUILDINGS

- Introduction to sustainability
- The USGBC and the LEED rating systems for new construction (NC) and existing building (EB)
- Summarization of the prerequisites and credits for LEED NC
- Summarization of the prerequisites and credits for LEED EB
- EPA ENERGY STAR Program and Portfolio Manager
- ASHRAE Green Guide
- Benefits to the community, owners, and occupants

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ENERGY ACCOUNTING IN BUILDINGS AND FACILITIES

- Energy use index, energy cost index
- Where energy is used in facilities
- Lighting and HVAC energy use

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MANAGEMENT

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

HVAC SYSTEM

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

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LIFE CYCLE COSTING

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

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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

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FUEL SUPPLY AND FUEL SWITCHING

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

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WASTE HEAT RECOVERY

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

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ALTERNATIVE FINANCING

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

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BUILDING COMMISSIONING

- What is commissioning-including new and existing buildings?
- The project team: roles and responsibilities
- New building commissioning: project phases
- Retro-commissioning, re-commissioning: project phase objectives
- Total and whole building commissioning
- Testing, adjusting, and balancing-verification, system by system
- Summary of applicable codes, organizations, guidelines: ASHRAE, USGBC LEED,
- SMACNA, BCA, AEE's CBCP Certification

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

ECONOMIC ANALYSIS OF ALTERNATIVE INVESTMENTS

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

HONG KONG PRACTICE (NEW)

- Mandatory Building Energy Codes (BEC) from the Hong Kong SAR Government
- Energy Audit Guidelines
- Most efficiency practice in Hong Kong
- Regulations and Limitations
- Carbon Auditing (CAP course)
- Indoor Air Quality (CIAQP course)
- Building Commissioning (CBCP course)

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

CONTROLS AND ENERGY MANAGEMENT

- Night set back
- Optimum start/stop
- Enthalpy economizers
- Temperature resets
- PID controls, pneumatic controls
- Control characteristics
- BACNET and LONworks; TCP/IP; GUIs DDC

WASTE HEAT RECOVERY

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

INSULATION

- Types of insulation
- Heat flow calculations
- Economic levels of insulation
- Passive thermal energy
- Where the action is?

COGENERATION (CHP)

- What is cogeneration
- Types of cogeneration cycles
- Examples of cost-effective use of cogeneration
- QF and deregulation
- Use of waste for fuel
- Renewable Energy Technologies

MAINTENANCE

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

Examination Requirement

All CEM candidates must satisfactorily complete a **four-hour** written open-book exam which contains 130 multiple choice questions, proctored by an approved exam administrator. Of the following seventeen (16) sections of the exam, candidates must complete at a minimum of eleven, including those indicated as **Required**. Only the first 11 sections that are marked (by the student) will be scored by the exam grading system.

1. Energy Accounting and Economics - **Required**
2. Energy Audits and Instrumentation - **Required**
3. Electrical Systems
4. HVAC Systems
5. Motors and Drives
6. Industrial Systems
7. Building Envelope
8. Cogeneration and CHP Systems
9. Energy Procurement
10. Building Automation and Control Systems
11. Green Buildings, LEED & Energy Star
12. Thermal Energy Storage Systems
13. Lighting
14. Boiler and Steam Systems
15. Maintenance & Commissioning
16. Alternative Financing

Eligibility

The prerequisites to qualify for the certification process have been designed to take into account the possible diversity of education and practical experience an individual may have. However each CEM candidate must meet one of the following criteria with the pass of exam:

- An **engineering degree and/or R.P.E. and/or P.E.**,
  with at least ***three (3)*** years experience in energy engineering or energy management.
- A **science or business degree**,
  with at least **four (4) years or *five (5)*** years experience respectively in energy engineering or energy management.
- A two-year **technical diploma or certificate**,
  with ***eight (8)*** years experience in energy engineering or energy management.
- ***Ten (10)*** years or more **verified experience** in energy engineering or energy management.
  (Note: Letters of reference and verification of employment must be submitted.)
  Evidence of years of experience must be submitted for CEM status application after passing the exam.

Application forms will be distributed the students after the course/exam for the CEM certification.

Conditions

1. All candidates should complete the Google Forms for registration and pay for seat confirmation.
2. Every effort will keep the course date unchanged. However, all candidates will be informed well in advance should there be any change of course date due to venue booking and other reasons.
3. The course contents may subject to change in accordance with the instructor(s).
4. The organizer reserves the right to cancel the course should there be insufficient candidates or other reasons. Course fee will then be refunded 100%.
5. All exam passed candidates will enjoy 1-year free AEE membership and a CEM certificates if he/she fulfils the above eligibility requirement.
6. When the course is confirmed, a workbook materials link for download will be forwarded to you for your own print out for the course and exam usage.

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The Certified Energy Manager (CEM®) Program for Professional Certification

Course Code: CEM (GM)

Registration

Course Registration Deadline: 30th October 2023

(First come first served, application may early close if class size reaches 30)

To register, please click here complete the application form.

Payment Method

If you are in Hong Kong, you can select one of the followings payment methods: --
Direct deposit or ATM transfer to

"**AEE Hong Kong Chapter Limited" HSBC Account no. 614-054229-838.**

(Before you upload the bank slip through a google form. Please make sure to write down your full name on the bank slip and the file name is your **FULL name**)

If you are oversea candidates, we accept U.S. dollars ONLY and select one of the followings payment methods: --

All bank charges must be paid by the candidates

Direct Deposit to "**AEE Hong Kong Chapter Limited" HSBC Account no. 614-054229-838.**

Telegraphic Transfer (If you pay by Telegraphic Transfer, please contact Fiona aeefiona@gmail.com for bank account information and proper procedures.

If you have any questions regarding the payment method or registration, please do not hesitate to contact Fiona via email at aeefiona@gmail.com or WhatsApp at 852 9211 2547