



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

**Date: 13 - 16 October, 2009**

**Time: 9:00 am to 5:30 pm**

**Exam: 1:00 pm to 5:00 pm, 16 October 2009**

**Venue: InnoCentre, 72 Tat Chee Avenue,  
Kowloon Tong, Kowloon**

**Course Code: CEM / 05 / HK**



**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 6,000 professionals serving industry, business and government throughout the U.S. and in 22 countries. **In particular, the contexts of the latest mandatory Building Energy Codes and the Energy Audit Guidelines in Hong Kong will be included in the course.**

**COMPREHENSIVE 4-DAY TRAINING PROGRAM FOR ENERGY MANAGERS**

**(prep: CEM Certification)**

This is the CEM course (same as the course held in USA) with the USA instructor traveled from the headquarters to Hong Kong. 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 [www.aeecenter.org/certification/cem](http://www.aeecenter.org/certification/cem).

**Course & Exam Fee:**

<b>A1: Ordinary Applicants:</b>	<b>US \$1,995.00</b>	<b>(HK \$15,600)</b>
<b>A2: Members of Supporters:</b>	<b>US \$1,895.00</b>	<b>(HK \$14,800)</b>
<b>A3: Members of HKAEE or AEE HKChapter:</b>	<b>US \$1,795.00</b>	<b>(HK \$14,000)</b>

**Exam only Price:**

<b>B1: Re-sit exam - Full Course taken previously:*</b>	<b>US \$ 230.00</b>	<b>(HK \$ 1,800)</b>
<b>B2: Re-sit exam - No Course taken previously:</b>	<b>US \$ 330.00</b>	<b>(HK \$ 2,600)</b>
<b>B3: First Time Exam:</b>	<b>US \$ 330.00</b>	<b>(HK \$ 2,600)</b>

\*B1 is for those who had taken the CEM course held in Hong Kong in the previous class but failed in the exam. [B1 students paid the US\$100 before]

Note: All the fees except B1 above include a non-refundable CEM application fee of US\$100.

**Supporting Organizations:**



**ASHRAE  
HK Chapter**



engineering success  
soe hong kong region  
香港工程師學會 香港分會

## ABOUT THE COURSE

This special in-depth four-day 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

**SCOTT C. DUNNING, Ph.D., P.E., C.E.M.**, is the Executive Director of the Advanced Manufacturing Center at the University of Maine where he leads energy assessments and production line development for industrial manufacturers. He was the founding director of the Industrial Assessment Center at the University of Maine where he directed over 200 audits of industrial facilities throughout New England. He previously served as a Program Manager at the U.S. Department of Energy where he assisted in management of the Industrial Assessment Center program and reported to the U.S. Congress regarding implementation efforts of the Energy Policy Act of 1992. He is a Professor of Electrical Engineering Technology at the University of Maine where he teaches courses in power systems analysis, energy conversion and engineering economics.

## COURSE OUTLINE

<p><b>THE NEED FOR ENERGY MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>● Building energy cost control</li> <li>● Utility DSM programs and deregulation: energy efficiency and peak demand reduction</li> <li>● Commercial business energy cost control</li> <li>● Industrial plant operation improvement               <ul style="list-style-type: none"> <li>- Reducing energy costs</li> <li>- Reducing environmental emissions</li> <li>- Improving product quality</li> <li>- Improving plant productivity</li> </ul> </li> </ul>	<p><b>ENERGY CODES AND STANDARDS</b></p> <ul style="list-style-type: none"> <li>● Building codes</li> <li>● ASHRAE standards (62, 15, 3, 90.1)</li> <li>● ASME, IEEE, and other standards</li> <li>● Federal legislation: NECPA, PURPA, NGPA, CAAA, NEPA of 1992</li> <li>● CFC replacements: Montreal Protocol, global climate change</li> <li>● National Energy Policy Act of 1992</li> </ul>	<p><b>INDOOR AIR QUALITY</b></p> <ul style="list-style-type: none"> <li>● Standards of care: ASHRAE Standard 62</li> <li>● Reasons for managing indoor air quality</li> <li>● Acceptable air quality</li> <li>● Ventilation rate procedure, Air quality procedure</li> <li>● Typical air contaminants: VOCs and bioaerosols</li> <li>● IAQ problems; CO<sub>2</sub> measurement and control</li> <li>● AEE Certified IAQ Professional requirements</li> </ul>
<p><b>CONDUCTING AN ENERGY AUDIT</b></p> <ul style="list-style-type: none"> <li>● Purpose of the energy audit</li> <li>● Facility description and data needs</li> <li>● Major systems in the facility</li> <li>● Data forms for recording information</li> <li>● Collecting the actual data</li> <li>● Identification of preliminary energy management opportunities</li> <li>● Energy audit reports</li> </ul>	<p><b>ELECTRIC RATE STRUCTURES</b></p> <ul style="list-style-type: none"> <li>● Short history of electric rates</li> <li>● The difference between power and energy</li> <li>● Electric meters</li> <li>● Components of electric rates</li> <li>● Example rate structures</li> <li>● Factors in controlling electric costs</li> <li>● Electric utility incentive programs</li> <li>● Special schedules (interruptible, TOU, real-time pricing)</li> </ul>	<p><b>BOILERS AND STEAM GENERATION</b></p> <ul style="list-style-type: none"> <li>● Basics of combustion systems: excess air control</li> <li>● Boiler efficiency improvement: blowdown management, condensate return, turbulators</li> <li>● Combustion controls</li> <li>● Waste heat recovery</li> <li>● Steam traps: purpose and testing</li> <li>● Process insulation</li> <li>● Example of boiler improvement</li> </ul>

### Supporting Organizations:



**ASHRAE  
HK Chapter**



**BSOMES**



(Hong Kong Branch)  
能源學會(香港分會)



engineering success  
soe hong kong region  
香港工程師學會 香港分會

<p><b>ENERGY AUDIT INSTRUMENTATION</b></p> <ul style="list-style-type: none"> <li>● The need for instrumentation</li> <li>● Light level meters</li> <li>● Electric meters: voltages, current, power, energy, power factor</li> <li>● Temperature-measuring instruments</li> <li>● Combustion efficiency measurement</li> <li>● Air flow and air leak measurement</li> <li>● Thermography</li> <li>● Ultrasonic leak detectors</li> <li>● Data logging</li> </ul>	<p><b>MOTORS AND ADJUSTABLE SPEED DRIVES</b></p> <ul style="list-style-type: none"> <li>● How motors work</li> <li>● High-efficiency motors</li> <li>● Examples of cost-effective motor changes</li> <li>● Use of adjustable speed drives</li> <li>● Example of cost-effective ASD use</li> <li>● Improved motor belts and drives</li> <li>● Compressed air management</li> <li>● Adjustable speed drive alternatives: eddy current clutches, variable frequency drives, inlet and outlet vane control, etc.</li> </ul>	<p><b>GREEN BUILDINGS</b></p> <ul style="list-style-type: none"> <li>● Introduction to sustainability</li> <li>● The USGBC and the LEED rating systems for new construction (NC) and existing building (EB)</li> <li>● Summarization of the prerequisites and credits for LEED NC</li> <li>● Summarization of the prerequisites and credits for LEED EB</li> <li>● EPA ENERGY STAR Program and Portfolio Manager</li> <li>● ASHRAE Green Guide</li> <li>● Benefits to the community, owners, and occupants</li> </ul>
<p><b>ENERGY ACCOUNTING IN BUILDINGS AND FACILITIES</b></p> <ul style="list-style-type: none"> <li>● Energy use index, energy cost index</li> <li>● Where energy is used in facilities</li> <li>● Lighting and HVAC energy use</li> </ul>	<p><b>MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>● Peak load reduction</li> <li>● Power factor improvement</li> <li>● Energy management control systems</li> <li>● Load management</li> <li>● Harmonics and other power quality issues</li> </ul>	<p><b>LIFE CYCLE COSTING</b></p> <ul style="list-style-type: none"> <li>● Concept of life cycle costing</li> <li>● Purchase costs vs. operating costs</li> <li>● Example analyses</li> <li>● Government standards: FEMP</li> </ul>
<p><b>ENERGY RATE STRUCTURES</b></p> <ul style="list-style-type: none"> <li>● Identifying types of energy used</li> <li>● Electric rates, gas rates</li> <li>● Oil, coal, and other rates</li> <li>● Steam and hot water rates</li> <li>● Factors in controlling fuel costs</li> <li>● Utility incentive programs</li> </ul>	<p><b>HVAC SYSTEM</b></p> <ul style="list-style-type: none"> <li>● Types of HVAC systems and new technologies</li> <li>● The vapor-compression cycle</li> <li>● COPs and EERs</li> <li>● Air conditioning loads</li> <li>● Chiller improvement example</li> <li>● Control, thermal storage, absorption systems</li> </ul>	<p><b>FUEL SUPPLY AND FUEL SWITCHING</b></p> <ul style="list-style-type: none"> <li>● Alternative fuel choices</li> <li>● Technology choices: HVAC systems, boilers, heaters, industrial processes</li> <li>● Benefits of deregulation: electric and gas</li> </ul>
<p><b>WASTE HEAT RECOVERY</b></p> <ul style="list-style-type: none"> <li>● Objectives: design criteria</li> <li>● Types and maintenance of heat exchangers</li> <li>● Recuperators; economizers</li> </ul>	<p><b>ALTERNATIVE FINANCING</b></p> <ul style="list-style-type: none"> <li>● Different financing methods</li> <li>● Attributes of each method</li> <li>● After-tax cash flow analysis</li> </ul>	

**Supporting Organizations:**



**ASHRAE  
HK Chapter**



**BSOMES**



(Hong Kong Branch)  
能源學會(香港分會)



**BUSINESS ENVIRONMENT COUNCIL**  
商界環保協會



engineering success  
soe hong kong region  
香港工程師學會 香港分會

<p><b>BUILDING COMMISSIONING</b></p> <ul style="list-style-type: none"> <li>● What is commissioning-including new and existing buildings?</li> <li>● The project team: roles and responsibilities</li> <li>● New building commissioning: project phases</li> <li>● Retro-commissioning, re-commissioning: project phase objectives</li> <li>● Total and whole building commissioning</li> <li>● Testing, adjusting, and balancing-verification, system by system</li> <li>● Summary of applicable codes, organizations, guidelines: ASHRAE, USGBC LEED,</li> <li>● SMACNA, BCA, AEE's CBCP Certification</li> </ul>	<p><b>BUILDING ENERGY USE AND PERFORMANCE</b></p> <ul style="list-style-type: none"> <li>● Fuel types and costs</li> <li>● Energy content of fuels</li> <li>● Energy conversion factors</li> <li>● Building envelope</li> <li>● Natural gas purchasing</li> <li>● Retail wheeling of electricity</li> <li>● Major building energy use systems</li> </ul>	<p><b>ECONOMIC ANALYSIS OF ALTERNATIVE INVESTMENTS</b></p> <ul style="list-style-type: none"> <li>● Economic decision analysis</li> <li>● Simple economic measures</li> <li>● The time value of money</li> <li>● Present and future values</li> <li>● Cost and benefit analysis</li> <li>● Rate of return</li> <li>● Life cycle costing</li> <li>● After tax cash flows</li> </ul>
<p><b>HONG KONG PRACTICE (NEW)</b></p> <ul style="list-style-type: none"> <li>● Mandatory Building Energy Codes (BEC) from the Hong Kong SAR Government</li> <li>● Energy Audit Guidelines</li> <li>● Most efficiency practice in Hong Kong</li> <li>● Regulations and Limitations</li> <li>● Carbon Auditing (CAP course)</li> <li>● Indoor Air Quality (CIAQP course)</li> <li>● Building Commissioning (CBCP course)</li> </ul>	<p><b>LIGHTING</b></p> <ul style="list-style-type: none"> <li>● Basics of lighting and current lighting technologies</li> <li>● New lighting technologies</li> <li>● Economic evaluation of example lighting improvements</li> <li>● Lighting standards</li> <li>● EPA Green Lights program</li> <li>● T12, T8, T5 lamps</li> <li>● Compact fluorescents</li> <li>● HID, sulfur lamps</li> </ul>	<p><b>CONTROLS AND ENERGY MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>● Night set back</li> <li>● Optimum start/stop</li> <li>● Enthalpy economizers</li> <li>● Temperature resets</li> <li>● PID controls, pneumatic controls</li> <li>● Control characteristics</li> <li>● BACNET and LONworks; TCP/IP; GUIs</li> </ul> <p>DDC</p>
<p><b>WASTE HEAT RECOVERY</b></p> <ul style="list-style-type: none"> <li>● Objectives: design criteria</li> <li>● Types and maintenance of heat exchangers</li> <li>● Recuperators; economizers</li> </ul>	<p><b>COGENERATION (CHP)</b></p> <ul style="list-style-type: none"> <li>● What is cogeneration</li> <li>● Types of cogeneration cycles</li> <li>● Examples of cost-effective use of cogeneration</li> <li>● QF and deregulation</li> <li>● Use of waste for fuel</li> </ul>	<p><b>MAINTENANCE</b></p> <ul style="list-style-type: none"> <li>● Maintenance management systems</li> <li>● Monitoring for maintenance</li> <li>● Infrared photography for maintenance</li> <li>● Cost of: Air, steam, gas leaks; un-insulated surfaces</li> <li>●</li> </ul>
<p><b>INSULATION</b></p> <ul style="list-style-type: none"> <li>● Types of insulation</li> <li>● Heat flow calculations</li> <li>● Economic levels of insulation</li> <li>● Passive thermal energy</li> <li>● Where the action is?</li> </ul>		

**Supporting Organizations:**



**ASHRAE**  
HK Chapter



**BSOMES**



(Hong Kong Branch)  
能源學會(香港分會)



**BUSINESS ENVIRONMENT COUNCIL**  
商界環保協會



engineering success  
soe hong kong region  
營運工程師學會 香港分會

## Examination Requirement

All CEM candidates must satisfactorily complete a **four-hour** written open-book exam which contains 140 multiple choice questions, proctored by an approved exam administrator. Of the following seventeen (17) sections of the exam, candidates must complete at a minimum of eleven, including those indicated as **Required**. The first 11 sections answered will be marked if more than 11 sections answered.

- |                                                             |                                             |
|-------------------------------------------------------------|---------------------------------------------|
| 1. Codes & Standards & Indoor Air Quality - <b>Required</b> | 10. Energy Procurement                      |
| 2. Energy Accounting and Economics - <b>Required</b>        | 11. Building Automation and Control Systems |
| 3. Energy Audits and Instrumentation - <b>Required</b>      | 12. Green Buildings, LEED & Energy Star     |
| 4. Electrical Systems                                       | 13. Thermal Energy Storage Systems          |
| 5. HVAC Systems                                             | 14. Lighting                                |
| 6. Motors and Drives                                        | 15. Boiler and Steam Systems                |
| 7. Industrial Systems                                       | 16. Maintenance & Commissioning             |
| 8. Building Envelope                                        | 17. Alternative Financing                   |
| 9. Cogeneration and CHP Systems                             |                                             |

## 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 **five (5)** years experience 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 firstly fax the form for registration and issue cheque for final 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 criteria.

## Supporting Organizations:



ASHRAE  
HK Chapter



BSOMES



(Hong Kong Branch)  
能源學會(香港分會)



engineering success  
soe hong kong region  
香港工程師學會 香港分會

< REPLY SLIP >

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

Course Code: CEM / 05 / HK

### Registration

**Deadline: 6 Oct 2009 (First come first serve, application may close if class size reaches 40)**

To register, please complete the reply slip and fax to (852) 2372 0490 or email to may@creativegp.com and then mail to below to secure seat with your crossed cheque payable to:

**“AEE Hong Kong Chapter”**

c/o Creative Consulting Group Inc.

Room 1106-8, 11/F, CC Wu Building, 302-8 Hennessy Road, Wanchai, Hong Kong.

Attention: Ms May Cheung (Tel: 2372 0090)

### Course Enquiry

Dr Leonard Chow, AEE Authorized Course Certification Administrator in Hong Kong.

Tel: 2566 3397, leonardchow@ispl.com.hk

<b>Course &amp; Exam Fee:</b>	<b>Fee</b>
<b>A1: Ordinary Applicants</b>	<b>HK \$15,600</b>
<b>A2: Members of Supporters</b>	<b>HK \$14,800</b>
<b>A3: Members of HKAEE or AEE HK Chapter</b>	<b>HK \$14,000</b>
<b>B1: Re-sit exam - Full Course taken previously</b>	<b>HK \$ 1,800</b>
<b>B2: Re-sit exam - No Course taken previously</b>	<b>HK \$ 2,600</b>
<b>B3: First Time Exam</b>	<b>HK \$ 2,600</b>

A1: \_\_\_\_\_, A2: \_\_\_\_\_, A3: \_\_\_\_\_ B1: \_\_\_\_\_, B2: \_\_\_\_\_ or B3: \_\_\_\_\_ (Tick as appropriate)

Given Name: \_\_\_\_\_ Family Name: (Ir/Mr/Ms) \_\_\_\_\_

Company Name: \_\_\_\_\_ Position Title: \_\_\_\_\_

Company Address: \_\_\_\_\_

Contact Phone: (Office/Mobile): \_\_\_\_\_ Company Fax #: \_\_\_\_\_

Email Address: \_\_\_\_\_

Institution: \_\_\_\_\_ Membership No: \_\_\_\_\_

Cheque no.: \_\_\_\_\_ Amount (HK\$): \_\_\_\_\_

Supporting  
Organizations:



ASHRAE  
HK Chapter



BSOMES



(Hong Kong Branch)  
能源學會(香港分會)



engineering success  
soe hong kong region  
香港工程師學會 香港分會