International Version
Sub-Sahara Africa

Association of Energy Engineers

Certified Energy Manager®
Training Program

A Certified Energy Manager (CEM®) is an individual who optimizes the energy performance of a facility, building, or industrial plant. The CEM is a systems integrator for electrical, mechanical, process, and building infrastructure, analyzing the optimum solutions to reduce energy consumption using a cost-effective approach. CEM's are often team leaders and help to develop and implement their organizations' energy management strategies.

What You Will Learn

– Learn energy management from a global perspective, but also understand applicable codes, standards, and policies for your region or country.
– Learn how systems and energy-saving technologies can be used throughout a building, such as HVAC, lighting, motors, boilers, energy storage, CHP, etc.
– Learn how energy management strategies and practices, such as energy audits, or M&V, can help identify energy savings and reduce costs.
– Understand the economic aspects of energy management that you need to know for procurement, supply, and project financing.

Who Should Attend?

This course is designed to help energy professionals, including energy managers, energy engineers, facility and business managers, industrial engineers, supply chain professionals, utility officials, consultants, contractors, financial officers, and energy service company professionals become more aware of and effective at identifying and implementing the best energy management strategies. This mix of energy professionals and the learning environment also provides attendees an excellent opportunity for peer-to-peer learning and networking.

At-a-Glance

» This training program prepares attendees to take the Certified Energy Manager® (CEM®) exam.
» This program is held over 5 days, with a voluntary exam on day 6.

Credits

» 6.6 AEE renewal credits for course
» 5 ECSA CPD credits for course
» 1 ECSA CPD credit for exam.

Key Takeaways

» Work through practical examples to demonstrate the topics and procedures covered.
» Review the various areas of the Body of Knowledge associated with AEE's certification exam.
» Discuss one-on-one with an instructor how to apply what you have learned to your business and applications to improve profitability.
» Leave with a course workbook that will become an invaluable desk reference.

Certification, exams and quality control by:

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Represented in Sub-Sahara Africa by iepa

CEM®

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About this Program
AEE's premium training program is recognized across industry for providing energy professionals a holistic "big-picture" view of energy management for non-residential buildings and facilities. Over five days, attendees learn everything they need to know to optimize systems to help reduce costs, improve profits, and increase occupant satisfaction.

Course Outline
– Why Energy Management is Important
– Energy Basics, Motors and Drives, Lighting Systems, HVAC Systems, Building Envelope
– Fuel Supply and Pricing
– Energy Audits and Instrumentation
– Codes and Standards
– High Performance Green Buildings
– Energy Accounting and Economics
– Electrical Power Systems
– Maintenance and Commissioning, Industrial Systems
– HVAC Systems
– Building Envelope
– Building Automation and Control Systems
– Thermal Energy Storage Systems
– Boiler and Steam Systems
– CHP Systems and Renewable Energy
– Energy Savings Performance Contracting
– Energy Savings Measurement and Verification

- ***Kenya: 9-14 November 2020 ONLINE***
- ***South Africa: 23-27 November 2020 ONLINE***
- ***Mauritius: 23-27 November 2020 IN-CLASS***
- ***Nigeria: 23-27 November 2020 ONLINE***

Certification Eligibility
The prerequisites to qualify for the certification process take into account the diverse education and experience applicants may have. Each candidate must meet the required criteria at

aeecenter.org/cem

CURRENT QUALIFICATION		EXPERIENCE
4-year engineering/architectural degree OR Pr.Eng, Registered Architect	PLUS	+3 years
4-year degree in technology, environmental science, physics or earth science		+4 years
3-year technical qualification		+6 years
4-year degree in business or business related		+5 years
4-year unrelated degree		+8 years
2-year associate degree		+8 years
NONE: no current qualification		+10 years
Current status of CEM		n/a
Current status of CBEP		n/a
Employment at company in related field		n/a
Years of work experience required - in addition to the current qualification - must be related to the certification discipline applied for.		

Our partners:

Registration through our partners:

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Our Instructors

The CEM live program is taught by multiple instructors, each with greater than 10 years of experience in the industry. They present the latest practices, strategies, and theories, while leading discussions in an open, interactive environment. You also spend valuable time connecting with and learning from other program attendees. In each topic covered, the instructors focus on the most "useful" and "proven" activities that an energy manager should pursue to improve profits.

Prof LJ Grobler
PhD Mechanical, Pr Eng, CEM®, CMVP®, DGCP®

Louis Lagrange
MSc Agricultural Engineering, CEM®, CEA®, CMVP®, CWEP®, CBEP®, CLEP®

Chris Mbori
MSc Energy Management, CEM®, CMVP®, CEA®, CWEP®, REP®, CRM®, CPCF®, ISO50001 Lead Certification

Albert Williams
B.Eng (Industrial), CEM®, CEA®, CMVP®, REP®, CIEP®, UNIDO Compressed Air Expert

Eustace Njeru
BSc Mechanical, CEM®, CMVP®

Lawrence Mangerere
BSc Mechanical, MBA, PE, CEM®, CMVP®

Olakunde Owoeye
B. Eng Electrical, CEM®, Mandela Washington Fellowship Sustainable Energy Development and Policy Train-The-Trainer Program

Daily Agenda

Day 1

Why Energy Management is Important, become aware of:

- Global trends on Energy, Economy and Our Environment
- Non-Technical Drivers that Create the Need for Energy Projects
- Selling Points for Energy Projects

Energy Basics

- Energy Fundamentals
- Energy Conversion Factors and Application
- Comparing Energy vs. Power

Fuel Supply and Pricing

- Overview of Utility Rate Components
- Electric and Natural Gas Energy Procurement
- DSM and Demand Response
- Benchmarking Energy Information

Energy Audits and Instrumentation

- Energy Programs (ISO 50001, DOE and EPA Resources)
- Audit Strategies/Approaches
- Benchmarking, Level I, II, and III Audits (ASHRAE Standard 211-2018)
- Investment Grade Audits
- Reports
- Data Collection Technologies and Instruments Related to Energy Systems
- Data logging and Communication Technologies

Day 2

Codes and Standards

- Scope of Relevant ASHRAE Standards (55.1, 90.1, 135, 189, 62.1)
- How ASHRAE Standards Affect Green Energy and Federal Building Energy Codes
- Ability to Estimate Minimum Air Flow Requirements (Ventilation Rate Procedure)

High Performance Green Buildings

- Leadership for Energy and Environment Design (LEED) Program and Benefits
- Energy Star Program and Benefits

Energy Accounting and Economics

- Economic Analysis and Terminology
- Time Value of Money (TVM) Tables/Compound Interest Factors
- Calculate Key Financial Metrics: Net Preset Value, PV, Life Cycle Cost, IRR, SIR and Simple Payback

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Daily Agenda Continued

Electrical Power Systems
- Electrical Basics (DC/AC, Single and 3-Phase Power)
- Resistive and Inductive Loads, Power Factor
- Voltage Imbalance, Grounding and Harmonics
- Estimating Savings from Power Factor Improvement
- Important 3-phase Motor Equations and Estimating Power Consumption

Motors and Drives
- Savings Considerations: Lifecycle vs. First Cost for Installing Energy Efficient Motors/VSDs
- Motor Terminology and Performance Factors
- Load Factors and Ability to Estimate Motor Loads
- Centrifugal Devices: Fan/Affinity Laws
- Variable Volume Options and Frequency Drives (VFD)

Lighting Systems
- Lighting Retrofits: Evaluate and Identify Opportunities for High Energy Saving Potential
- Lighting Design Basics and Terminology
- How to Avoid Common Mistakes of Lighting Retrofits
- Practical Approaches to Audits and Upgrades

Day 3

Maintenance and Commissioning
- Useful Maintenance Technologies
- Basic Terminology and Common Maintenance Strategies
- Estimating Savings from Maintenance Activities (Compressed Air and Steam Leaks, Uninsulated Steam Lines, Group Relamping)

HVAC Systems
- Types and Functions of HVAC Systems
- Vapor Compression Cycle, COP, EER, SEER, IPLV
- HVAC Energy Efficiency Measures
- Distribution Systems
- Psychrometric Chart and Processes
- Sensible and Latent Heat Transfer Calculations

Building Envelope
- Conduction, Convection, Radiation, and Infiltration
- Conductivity, Conductance, and R Values
- Sources of Building Heat Gain/Loss (Solar Heat Gain Coefficient)
- Ability to Perform Seasonal Energy Consumption Calculations
- Degree Day Formula Use

Day 4

Building Automation and Control Systems
- Optimization and Safety for Various Energy-Related Systems
- PID Algorithms
- Basic Control Terminology
- Automation Systems Interoperability and IoT
- Current Technologies and Hardware and Energy Savings Strategies

Thermal Energy Storage Systems
- TES Terminology and Basic Designs
- Storage/Peak Shaving Strategies
- Storage Media Options
- Calculating Approximate Savings and Storage Size

Boiler and Steam Systems
- Water Tube, Fire Tube, and Condensing Boilers
- Saturated and Superheated Steam
- Estimate Combustion Efficiency
- Calculate Heat Flows and Enthalpy Values using Steam Tables
- Energy Savings: Blowdown Heat Recovery, Flash Steam Utilization, Economizers, and Air Preheating

Day 5

CHP Systems and Renewable Energy (Combined Heat and Power)
- Benefits of CPH Systems
- Calculating Basic Fuel Equation for CHP Systems
- Comparing CHP Fuel and Operating Costs vs. Utilities
- Comparing types of Renewable Energy and Storage Technologies

Industrial Systems
- Savings Estimates for Pumps, Compressed Air Systems and Waste Heat Recovery
- Pumps: Pump Curves and System Optimization Approaches
- Identifying Energy Waste Streams within Industrial Facilities

Energy Savings Performance Contracting and Measurement and Verification
- Financing/Performance Contracting (Cost of Delay vs. Financing Cost)
- 3rd Party Financing Options
- Performance Contracting Benefits vs. Risks
- EVO IPMVP Guidelines and Measurement Methods
- M&V Terminology, Check Ups, and Determining Best Approach for an ECM