



CEM[®]

Certified Energy Manager Training Program Overview

Program Summary

Our Certified Energy Manager (CEM[®]) Training Program is designed for professionals who are dedicated to optimizing energy performance in facilities, buildings, campuses, or industrial plants. CEMs help organizations become more cost-competitive via a variety of techniques related to mechanical and industrial systems.

Accreditation & Recognition

With over 40 years of excellence, the Certified Energy Manager (CEM) accreditation is one of the most globally respected in the field of energy management. Since 1981, professionals from over 100 countries have participated in AEE's approved CEM training programs. For a full list of organizations that have recognized or accredited the CEM program visit www.aeecenter.org/cem

At-a-Glance

- This training program prepares you for the Certified Energy Manager (CEM) exam.
- This course is held over 5 days.
- You earn 3.3 CEU | 33 PDH | 6.6 AEE Credits for completing this program.

Other Program Highlights

- Practical Experience: Participate in activities that apply your learning to real-world energy management scenarios.
- Comprehensive Understanding: Gain a thorough overview of the knowledge areas covered in the AEE's CEM certification exam.
- Expert Guidance: Interact with industry professionals and subject matter experts who can help you understand practical applications of the concepts you learn.
- Valuable Resources: Receive a course workbook and reference materials to aid your learning and future application of energy management principles.

Registration

Candidates should visit the website for more information on available training courses, certification application process, exam registration, and associated fees. Visit www.aeecenter.org/training

What You Will Learn

After completing the Certified Energy Manager (CEM) Training Program you will have an advanced understanding of, and be able to apply, the following key principles:

- Energy Management on a Global Scale: codes, standards, and policies.
- Energy Saving Technologies: HVAC, Lighting, Motors, Boilers, Energy Storage, CHP, etc.
- Cost Reduction Strategies: Energy & Decarbonization Audits, M&V.
- Economic Sustainability: Procurement, Supply and Project

Who Should Attend

The CEM Training Program is ideal for all Professionals who want to enhance their knowledge in identifying and implementing the best energy management strategies. The targeted audience for this level of training includes energy managers, energy engineers, facility and business managers, sustainability/decarbonization professionals, industrial engineers, supply chain professionals, utility officials, consultants, contractors, financial officers, and energy service company professionals. This mix of professionals and the learning environment provides attendees an excellent opportunity for peer-to-peer learning and networking.

Course Outline

- Global Trends/Policy in Energy & Sustainability
- Why Energy Management is Important
- How to Present Energy Management Projects
- Energy Basics, Fuel Supply and Pricing
- Energy Audits and Instrumentation
- Decarbonization and GHG Accounting
- Codes and Standards
- High-Performance Green Buildings GHG Emissions Accounting
- Tax Benefits for Energy Projects
- Energy Accounting and Economics
- Tax Benefits
- Electrical Power Systems
- Motors and Drives
- Lighting Systems
- Operations, Maintenance and Commissioning
- HVAC Systems
- Building Envelope
- 3-3 Building Automation + Controls and Artificial Intelligence Systems
- Energy Storage Systems
- Boiler and Steam Systems
- Distributed Generation and Renewable Energy Systems
- Industrial Systems
- Energy Savings Performance Contracting
- Energy Savings Measurement and Verification

Our Instructors

Our expert instructors bring decades of experience in the energy industry to the classroom. They are Subject Matter Experts who not only deliver cutting-edge knowledge but also share real-world case studies and insights.

Through interactive discussions and practical exercises, you'll gain a deeper understanding of energy management principles and learn from the collective experience of your peers.

Certification Eligibility

The prerequisites to qualify for the certification process consider the diverse education and experience applicants may have. To be eligible for certification you must meet the required criteria – to know more visit

<https://www.aeecenter.org/certified-energy-manager/>

Global Training Partners

For a complete list of AEE training partners visit:

<https://www.aeecenter.org/aee-training/training-partners/>

Detailed Agenda

Day 1

Why Energy Management is Important, become aware of:

- Global trends on Energy, Economy, and Our Environment
- Sustainability, Electrification and Decarbonization
- 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
- Data Collection Technologies and Instruments Related to Energy Systems
- Data logging and Communication Technologies

Codes and Standards

- Scope of Relevant ASHRAE Standards (55.1, 90.1, 135, 189, 62.1, ISO 50001)

High-Performance Green Buildings

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

Special Tax Benefits

Day 2

Energy Accounting and Economics:

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

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

Operations, Maintenance and Commissioning

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

Detailed Agenda

Day 3

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

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

Decarbonization and GHG Accounting

- Useful Templates on the most common Decarbonization Strategies
- GHG Accounting Fundamentals
- Cost-Effective Approaches, including RECs and Offset Strategies

Day 4

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

CHP Systems and Renewable Energy (Combined Heat and Power)

- 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

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
- Guidelines and Measurement Methods
- M&V Terminology, Check Ups, and Determining Best Approaches for an ECM

Day 5

Open Q&A

Certification Exam