Association of Energy Engineers



Certified Energy Auditor
Training Program

The ideal candidate for the CEA Training Program is a professional who performs energy efficiency assessments of commercial and industrial facility's energy systems. Energy Auditors cover building occupancy, operations, maintenance, and code compliance; they provide best practices to their clients with detailed survey results, risk mitigation analysis, implementation plans, and a final investment-grade analysis.

About This Program

The Certified Energy Auditor (CEA) Training Program is designed to provide you with an in-depth and technical review of energy auditing. The duration of this program is four days culminating with an exam on the fifth day. Our professional instructors will guide you through the essential steps necessary to evaluate facility energy systems from preliminary surveys through ASHRAE® Level 3 Energy Audits and provide you with best practices for delivering results to your clients.

Learning Objectives

After the Certified Energy Auditor (CEA) Training Program, you will have a solid understanding of key principles and how to perform the following: Conduct pre-audit requirements, accurate data collection, measurements, and verification.

- Conduct audits of building equipment and systems for lighting, pumps, motors, drives, HVAC, water systems, transportation, and more.
- Articulate the financial and economic aspects of an energy audit and its effects on an organization.
- Audit and analyze utility energy demand, rates, accounting, and performance contracting.
- Identify and maximize energy conservation opportunities

At-a-Glance

» This training program prepares you for the Certified Energy Auditor (CEA) exam.

» This course is held over 5 days

» You earn 3.2 CEU | 32 PDH | 6.4 AEE Credits for completing this program.

Key Takeaways

» **Confidence!** You will participate in activities geared towards applying what you learned using practical examples that demonstrate your understanding of the topics and procedures covered.

» **Knowledge!** You will receive a high-level overview of the Body of Knowledge associated with AEE's certification exam.

» **Application!** You will interact with professionals and subject matter experts who can guide you through discussions on how to apply what you learned.

» **Resources!** You will receive a course workbook and ready reference materials.

Registration

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

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Who Should Attend

Earning the CEA designation from the Association of Energy Engineers (AEE) provides international credibility among energy management, sustainable, and clean energy communities. The ideal candidate for the Certified Energy Auditor (CEA) Training Program is someone who has responsibility or interest in assessing energy auditing projects: existing energy professionals, energy engineers, energy managers, facilities managers, and energy consultants.

Course Outline

- Developing an Energy Audit Strategy and Plan
- Energy use Analysis
- Data Collection and Analysis
- Economic Analysis
- Lighting Systems
- HVAC Part 1 – Systems
- HVAC Part 2 – Boilers
- HVAC Part 3 – Ventilation
- Domestic Hot Water and Water Conservation
- Motors, VFDs, and Compressors
- Building Envelope
- Building Automation and Energy Management Systems
- Alternative Generation and Energy Storage
- Energy in Transport

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 https://www.aeecenter.org/cea

Our Instructors

Each member of our team of professional instructors provides their own experience and focuses on specific areas essential to energy auditing. Their combined teaching and industry experience allows them to deliver information that is of the most relevance and practical value to attendees.



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



Chris Mbori
Msc. Energy Management, CEM®, CEA®, CMVP®, REP®, CAP®, CWEP®, PCF®, EEP®, CBCP® ISO50001 Lead Cer fica on



Louis Lagrange
Msc. Eng (Agricultural), CEM®, CEA®, CMVP®, CWEP®, CLEP®, BEP®

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Full Agenda

Developing an Energy Audit Strategy & Plan

- Energy Audit Goals & Purpose
- Avoiding Common Audit Shortcomings
- Successful Energy Audit Planning (4 Phases)
- QEA Role
- Complete Audit Process
- ASHRAE Audit Levels 1, 2, & 3
- Investment Grade Audits (IGA)
- ISO 50002. ISO 50001
- Communicating Audit Results to Clients
- Audit Project Team
- ASHRAE Standard 211 for Commercial Building Energy Audits
- Industry Specific Energy Requirements (Codes and Regulations)

Energy Use Analysis

- Energy and Power
- Energy Units Conversion (Railroad Track Method)
- Point of use (POU)
- Energy Rate Structure and Benchmarking (EUI, ECI)
- Rate Components
- Deregulated Service Areas
- Energy Cost Savings
- Facility Energy Consumption Analysis (Load Factor)
- Facility Energy Balancing (Top-Down / Bottom-Up), Degree Days (DD)
- Establishing and adjusting Consumption Baselines
- Regression Analysis

Economics Analysis

- Financial Decision Making
- Life Cycle Cost Analysis (LCCA)
- Capital Investment Project Components
- Time Value of Money (TVM)
- CFO Decision Rules (IRR, NPV, SPP, SIR)
- Project Uncertainty Assessment

Data Collection and Analysis

- Measurement and Analysis Techniques
- Preparing for Field Visit (Pre-Site Data)
  - Preassessment Interview and Preparation
  - Activities
    - PCBEA Forms
    - Data Sources and Audit Level Tools
    - Onsite Data (Field Visit)
    - Operational characteristics
    - Operating Conditions
    - Key Measurements
    - Onsite Information Collection Summary
    - Safety Considerations
    - Metering and Sub-Metering
  - Data Analysis (Field Visit Review)
    - Interval Data (Load Profiles)
    - Regression Techniques
  - Whole Building Modeling
    - CUSUM Analysis
    - nergy Simulation (Modeling, Steps, Tools)

Lighting Systems

- Energy Effective Lighting Design
- Lighting Survey
- Lighting System Types and Characteristics
- Lighting Maintenance Principles
- Recommendations and Calculations
- Energy Savings Potential
- Delivery Efficiency
- Identifying Energy Conservation Opportunities

Motors, VFDs, & Compressors

- Electrical Fundamentals
- Types of Motors & Energy Savings Measures
- Power Factor
- Variable Frequency Drives (VFDs)
- Air Compressors & Energy Savings Opportunities
- Fan Laws & Harmonics
- Energy Savings Calculations

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Building Envelope
- Key Terminology
- Thermal Weight
- Heat Transfer Mechanisms
- Thermal Resistance
- Heat Loss/Gain Calculations
- Insulation
- Seasonal Energy Loss/Gain
- Energy Savings Opportunities

HVAC Part 1 – Systems
- HVAC Systems & Equipment Classification
- Energy Efficiency Measures (EEMs)
- Thermal Environmental Conditions (ASHRAE Standard 55, Comfort Zones)
- Heat & Psychometrics
- Efficiency Calculations and Indices
- Affinity Laws
- Energy Savings Estimates

HVAC Part 2 – Boilers
- Overview & Boiler Types
- Combustion
- Seasonal vs. Combustion Efficiency
- Pipe Insulation Calculations
- Steam Traps & Leaks
- Boiler Efficiency Optimization Methods
- HVAC Part 3
- Ventilation
- ASHRAE Standard 62
- Outdoor Air Economizers
- Ventilation Rate and IAQ Procedure
- Filtration Systems and Standards
- COVID-19 (Ventilation and Filtration)
- Performance Improvement Opportunities
- Filtration Standards
- Minimum Efficiency Reporting Value (MERV)

Building Automation & Energy Management Systems
- Controls and Automation
- Building Management Systems (BMS)
- Building Automation Systems (BAS)
- Building Energy Information Systems (EIS)
- Designated Control/Operations Tasks
- Commissioning Recommendations
- Systems Maintenance
- Domestic Hot Water and Water Conservation
- DHW/SHW Generation
- Calculation Concepts
- Water & Sewer Rates
- Water Auditing Steps
- Water Reduction Measures
- Water Management Planning

Alternative Generation and Energy Storage
- Alternative Energy Generation Technologies
- Wind Turbines and Solar PV Panels
- Biomass, Hydro Power, and Geothermal Power
- Cogeneration (CHP) Opportunities
- Capacity Factor
- Energy Storage Methods

Energy in Transport
- Transportation Energy Use
- Road, Rail, Ship, and Air Transportation
- Transport System Efficiency
- Transport Energy Strategy
- Pipeline
- Idle Reduction Technologies
- Route Management
- Performance Indicators
- Mechanical Transport Systems

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IEPA is the proud Training Partner of the Association of Energy Engineers for the Sub-Saharan Africa Region:

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In Process: Cameroon, DRC

IEPA supports the following AEE Chapters: