Certified Energy Auditor
Training Program

Energy Auditors undertake energy efficiency assessments of commercial and industrial facility’s energy systems. Their audits cover building occupancy, operations, maintenance, and code compliance. An auditor aims to provide their client with detailed survey results, risk mitigation analysis, implementation plans, and a final investment-grade analysis.

About This Program
This training program has been fully revised and updated for 2021. It is designed to provide attendees an in-depth and technical review of energy auditing. Over four days (exam on 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, how to analyze the results and deliver them to your client.

What You Will Learn
– Pre-audit requirements to ensure accurate data collection, measurement and verification
– What you need to know when conducting audits of building equipment and systems, such as lighting, pumps, motors, drives, HVAC, water systems, transportation, etc.
– The financial and economic aspects of an energy audit and how they can affect the bottom line for an organization.
– How to analyze utilities, and how energy demand, energy rates, energy accounting and performance contracting all affect an energy audit
– How to identify the “low-hanging fruit” that is ripe for energy conservation opportunities

At-a-Glance
» This training program prepares attendees to take the Certified Energy Auditor (CEA®) exam.
» This program is held over five days.
» You earn 3.2 CEU | 32 PDH | 6.4 AEE Credits for completing this program.

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 how to apply what you have learned to your business and applications.
» Leave with a course workbook that will become an invaluable desk reference.

Registration
Candidates should contact their local AEE approved training provider for information about available training programs, the certification application process, exam registration, and associated fees. To find your local training provider visit aeecenter.org/training
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Who Should Attend
The program is of most significant value to those undertaking or assessing energy auditing projects. Obtaining AEE’s CEA® certification provides international credibility among energy management, sustainable and clean energy communities. Attendees of this program have included existing energy professionals, energy engineers, energy managers, facilities managers, and energy consultants.

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

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.

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/cea

Global Training Programs
For a complete list of AEE training programs delivered globally visit education.aeecenter.org/global

Accreditation and Recognition
The Certified Energy Auditor (CEA®) accreditation is one of the most globally respected in the field of energy auditing. For a full list of organizations that have recognized or accredited the CEA® program visit aeecenter.org/cea
## 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 & Regulations)

### Energy Use Analysis
- Energy & Power
- Energy Units Conversion (Railroad Track Method)
- Point of Use (POU)
- Energy Rate Structure & 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 & Adjusting Consumption Baselines
- Regression Analysis

### Economic 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 & Analysis
- Measurement & Analysis Techniques
- Preparing for Field Visit (Pre-site Data)
  - Preassessment Interview & Preparation Activities
  - PCBEA Forms
  - Data Sources & Audit Level Tools
  - Onsite Data (Field Visit)
  - Operational Characteristics
  - Operating Conditions
  - Key Measurements
  - Instrumentation & Accuracy
  - Onsite Information Collection Summary
  - Safety Considerations
  - Metering & Sub-metering
- Data Analysis (Field Visit Review)
  - Interval Data (Load Profiles)
  - Regression Techniques
  - Whole Building Modeling
  - CUSUM Analysis
  - Energy Simulation (Modeling, Steps, Tools)

### Lighting Systems
- Energy Effective Lighting Design
- Lighting Survey
- Lighting System Types & Characteristics
- Lighting Maintenance Principles
- Recommendations & 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
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 & Psychrometrics
- Efficiency Calculations & 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 & IAQ Procedure
- Filtration Systems & Standards
- COVID-19 (Ventilation & Filtration)
- Performance Improvement Opportunities
- Filtration Standards
- Minimum Efficiency Reporting Value (MERV)

Building Automation & Energy Management Systems
- Controls & 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 & Water Conservation
- DHW/SHW Generation
- Calculation Concepts
- Water & Sewer Rates
- Water Auditing Steps
- Water Reduction Measures
- Water Management Planning

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

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