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 is designed to provide attendees an in-depth and technical review of energy auditing. Over three days, 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, 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 3 days.
» You earn 2.2 CEU | 22 PDH | 4.4 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
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
– Energy Auditing Overview (Industrial and Residential)
– ASHRAE® Level I Walk-through Audit
– AHRAE® Type II & III Audits
– Auditing Tools and Software
– Investment Grade Audits
– Calculations to Determine Usage
– Building Envelopes
– Energy Conservation Measures
– Energy Fundamentals and Power Factor
– Facility Systems and Lighting
– HVAC and Chillers
– Motors, Drives and Driven Loads
– Boilers, Compressed Air and Industrial Processes
– Domestic Hot Water and Service Hot Water
– Water Efficiency and Conservation
– Operations and Maintenance Considerations
– Project Financing
– Audit Reports

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
Daily Agenda

Day 1

Energy Audit Fundamentals
- Facility Energy Usage Audits
- Conversion Factors (Fuel Systems Comparison)
- Complete Audit Process Overview
- Preliminary Energy Use Analysis
- Conversion Factors
- Building Simulations to Approximate EEM Savings
- Calculations to determine Energy Cost Index (ECI)
- ASHRAE Level I, II, & III Audit Requirements
- Investment Grade Audits (ESPC)
- Industrial Audits
- Audit Report Formatting
- M&V Methods to Verify Savings
- Safety & Instrumentation
- Metering

Utility Analysis
- Energy and Power Defined and Measured
- Electrical Rates and Basic Components
- Types of Meters
- Deregulated Utility Service Areas
- Typical Rates and Schedules
- Commercial Demand Rates
- ASHRAE Standard 211 Rate Requirements
- Power Factor
- Voltage Level Charge
- Calculating Energy Cost Savings (ASHRAE Section 5.4.7.5)
- Gas Rates, Types of Schedules and Bill Components
- Energy Accounting: Tracking Energy Use/Costs, Detect Usage Changes, Billing Errors, etc.

Building Envelope
- The Structures and Equipment Keeping Indoor/Outdoor Environments Separate
- Heat Flow: Conduction, Convection, Radiation
- Wall and Insulation Resistance
- Roofs
- Thermal Emissivity
- Radiant Barrier
- Windows and Ratings
- Solar Heat Gain Coefficient (SHGC) & Solar Heat Gain Factor (SHGF)
- Infiltration
- Heating and Cooling Degree Days
- Seasonal Energy Flow

Lighting Systems
- Lighting Terms
- Lighting Efficacy
- System Efficiency
- Lighting Quality Considerations
- Color Rendering Index (CRI)
- Correlated Color Temperature (CCT)
- Glare: Visual Comfort Probability (VCP) and Uniform Glare Rating (UGR)
- Electronic Ballast
- Light Sources
- Average Rated Life (LED and Non-LEDs),
- Lighting Maintenance Principles, Lamp Lumen Depreciation (LLD), Lumen Maintenance Curves, lighting controls
- Occupancy Sensors
- Daylighting

Continued on next page...
Daily Agenda Continued

Day 2

Commercial Air Conditioning
- Properties of Air
- Vapor Compression Cycle
- Air Conditioner Efficiencies
- Efficiency measures and conversions
- Air Conditioning Types
- Compressor Types
- Piping Arrangements
- Energy Saving Recommendations and Opportunities
- When to Consider Thermal Energy Storage

Ventilation
- Functions of Ventilation Systems
- ASHRAE Ventilation Air Standards
- Types of Ventilation
- Energy Conservation Measures

Heating
- Boilers & Steam Systems, Types of Boilers
- Furnaces (Electric and Gas)
- Radiant Heat
- Heat Pumps
- Delivered Cost of Fuel, Fuel Comparisons
- Heating System Efficiency
- Combustion Efficiency Testing
- Steam System Energy Maintenance

Day 3

Motors and Air Compressors
- Types of Motors
- Alternating Current
- Three Phase AC Systems
- Motor Load Factor Determination
- Power Factor
- Rewinds
- Variable Frequency Drives
- Motor Efficiency
- Compressed Air
- Energy Saving Opportunities

Domestic Hot Water (DHW) & Service Hot Water (SHW)
- DHW Generation Options
- Electric Storage Operational Factors
- Gas Storage Operational Factors
- Point of Use
- Solar Heating
- Distribution System
- How DHW/SHW is Used (What to Observe)
- Efficiency Improvement Opportunities
- Calculation Components, Basic Computation

Water Conservation and Efficiency Topics
- Benefits of Water Conservation Versus Efficiency
- Water Management/ENERGY STAR Guidelines for Energy Management Basic Steps
- Water Use Audits, Data Collection
- Common Water Use Rate Structures & Reductions
- Leak Detections and Repairs, Equipment and Fixtures, Sanitary Fixtures and Equipment, Commercial Kitchens.
- Outdoor Water Use: Landscape and Irrigation, Swimming Pools, & Mechanical Systems.