



International Certification Scheme 1.0

Scope

The Certified Energy Auditor (CEA) is an individual who evaluates and analyzes how energy is being used in a facility, identifies energy conservation opportunities and makes recommendations where consumption can be reduced or optimized.

Certified Energy Auditors demonstrate competency in the following areas that are included in the CEA Body of Knowledge to gain certification: developing an energy audit strategy and plan, utility analysis & renewable opportunities, data collection and economic analysis, lighting systems, HVAC systems and heating systems, motors & drives, compressed air systems, ventilation systems, domestic hot water systems, building envelope, and water conservation

Competencies

1. Know the techniques of energy optimization and its application to buildings and facilities, detecting and evaluating the opportunities for saving and improving energy efficiency.
2. Apply the principles of efficient use of energy.
3. Know the methods of analysis and management for the implementation of energy saving and efficiency measures to buildings and facilities.
4. Be able to perform an energy audit of buildings and facilities, obtaining a reliable knowledge of energy consumption to identify where and how energy is consumed and the factors that affect the different processes.
5. Ability to understand the operation of the different electric generation and distribution technologies applicable to the industrial sector.
6. Ability to perform energy analysis in buildings and facilities (calculation of yields, primary energy consumption, demands, etc.).
7. Ability to provide solutions and technological proposals to improve the efficiency in the energy consumption of a facility.
8. Apply knowledge of generation and distribution of heat or cold to buildings and facilities and building complexes.
9. Know and apply knowledge of basic sciences and technologies to the practice of Energy Engineering
10. To have the ability to analyze available data in an appropriate manner to determine the potential

opportunities that might exist across products, systems and processes and determine reasonable estimates of levels of energy improvement/ reduction that can be achieved

11. Know how to communicate the knowledge and conclusions, both orally, written and graphic, to specialized and non-specialized audiences in a clear and unambiguous way.
12. Possess learning skills that allow students to continue studying throughout their lives for their adequate professional development.
13. Ability to plan and manage time with given constraints
14. Know the regulations and applicable legislation in technical, safety, environmental and supranational national and local policies
15. Calculate an economic evaluation of the proposed improvement opportunities
16. To have the ability to communicate and interact with individuals and work as part of a team.

CEA Body of Knowledge/Job and Task Description

Body of Knowledge	Percent of Exam
Energy Audits and Instrumentation	19 – 21 %
Energy Fundamentals and Energy Accounting	12 – 14 %
Economic Analysis of Energy Conservation Measures; Financing Energy Projects; Performance Contracting; and Measurement and Verification	9 – 11 %
Building Systems, Lighting, HVAC, Chillers	14 – 16 %
Controls, Control Systems; Building Automation Systems; and Facility Electrical Systems	7 – 9 %
Motors and Drives	10 – 12 %
Boilers, Steam Systems, Compressed Air Systems, and Industrial Processes	7 – 9 %
Operations and Maintenance	14 – 16 %

Energy Audits and Instrumentation

- Analyze and Breakdown Energy End Use
- Define Pre-Audit Tasks
- Plan a Pre-Audit Interview
- Perform ASHRAE Level I and Level II Audits
- Perform Investment Grade Audits
- Define Data Required for Energy Analysis
- Identify Operation and Maintenance Team and Create Pre-Audit O&M Interview Questions
- Plan an Energy Audit
- Reporting Structure, Techniques for Report Writing, and Presenting the Report

- Select Appropriate Instrumentation

Energy Fundamentals and Energy Accounting

- Understand Energy and Power
- Analyze Energy Usage– Base Loads and Seasonal Loads
- Perform Unit Conversions
- Review Rate Classifications
- Establish Utility Cost Baseline
- Establish Utility Usage Baseline
- Verify Energy Bill Calculations
- Estimate Potential Savings
- Select Optimal Rate Options

Economic Analysis of Energy Conversion Measures; Financing Energy Projects; Performance Contracting; and Measurement and Verification

- Perform Detailed Energy Usage Analysis
- Perform Benchmarking Analysis
- Define Typical Savings and Improvements
- Implement Measurement and Verification
- Analyze Procurement Options: Alternative Financing, Incentives, Grants
- Establish Risk Evaluation and Mitigation
- Evaluate M&V Methods
- Calculate Energy Savings and Payback

Building Systems, Lighting, HVAC, Chillers

- Analyze Building Envelope
- Analyze Air Quality, Temperature, Lighting, Ventilation, Humidity
- Determine Efficiency / Efficacy of a Light Source
- Evaluate Lamp Lumen Depreciation
- Evaluate Ductwork and Fan Systems for Leaks, Insulation and/or Pressure Drop
- Understand HVAC Basics
- Identify Special Ventilation Code Requirements
- Audit & Determine Types of Ventilation Systems
- Audit & Determine Types of Chillers: Electric, Gas Driven, Absorbers
- Determine U and R Values
- Evaluate Efficiency of Walls, Roofs, Windows
- Evaluate Replacement of Low E Glass

Controls, Control Systems; Building Automation Systems; and Facility Electrical Systems

- Understanding Controls Systems for Building Services
- Determine Existing Control System and Performance
- Evaluate Ventilation Control Options
- Evaluate Facility Electrical Systems
- Check Power Factor & Correction

Motors and Drives

- Audit & Determine Types and Sizes of Motors
- Evaluate Appropriate Types of Motors
- Calculate Efficiencies of Motors and Drives
- Identify Billing Errors
- Understand Fan and Pump Laws
- Review Potential Energy Savings of Variable Frequency Drives

Boilers, Steam Systems, Compressed Air Systems, and Industrial Processes

- Audit & Determine Types of Boilers: Fire Tube, Water Tube, Cast Iron
- Audit & Determine Types of Furnaces: Electric, Gas, Condensing
- Evaluate Distribution Systems for Insulation, Pressure Drops, Leaks
- Identify Temperature Set Points
- Analyze Existing Compressed Air Conditions for Improvement Opportunities
- Calculate Efficiencies
- Evaluate Circulating Pumps
- Evaluate Energy Savings Opportunities for Heat Pump Water Heaters

Operations and Maintenance

- Evaluate Operations and Maintenance Changes
- Understand Operations and Maintenance for HVAC and Chiller Systems
- Understand ASHRAE 62.1 and IAQ
- Analyze Operations and Maintenance in Kitchen Areas
- Analyze Domestic Hot Water Systems
- Audit Water Use
- Evaluate Irrigation And Landscaping Installation and Efficiency