



Certified Energy Auditor

An Certification for Energy Efficiency Professionals.

CERTIFICATION SCHEME 2.0

Version No: 1.2
Effective Date: 2/1/2021



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, energy use analysis, data collection and analysis, economic analysis, lighting systems, HVAC systems, domestic hot water systems, motors and drives and compressed air systems, building envelope, building automation systems/process automation systems/energy management and control systems, alternative generation and storage and transport.



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Eligibility Requirements for Competence

Individuals applying for the CEA Certification Examination must attend an approved preparatory training course, meet the following education, and experience requirements, and complete a certification application.

Education and Experience Requirements

Education		Work Experience
4-year or Level 6 European Qualifying Framework (EQF) engineering/architectural degree* OR Professional Engineer (PE) OR Registered Architect (RA) OR Current status of Certified Energy Manager (CEM®)	and	3+ years related** experience
4-year or Level 6 EQF (non-engineering/architectural) degree*	and	4+ years related** experience
2-year or Level 5 EQF associate degree*	and	5+ years related** experience
None	and	10+ years related** experience

*or equivalent degree

**Related experience in energy auditing and/or participating in a team doing energy assessments.

Auditing and Safety Requirements

American National Standards Institute (ANSI) applicants must also meet the additional auditing and safety requirements.

- Participation in five commercial (non-residential) audits, with a minimum of two building types that are a minimum of 10,000 sq. ft. within the last three years.
- Two (2) hours of safety training within the last three years.

Interview Requirement

Entidad Nacional de Acreditación (ENAC) recognized applicants must also perform a 30-minute phone interview to answer questions and confirm information on the CEA application.

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.

Examination Requirements for Competence

To earn the CEA Certification, candidates must pass the certification examination. The competency requirements assessed are the following:

Certified Energy Auditor - Examination Blueprint

Body of Knowledge / Duties and Tasks (% Exam)	
1	Developing an Energy Audit Strategy & Plan (9-13%)
101	Plan an energy audit
102	Define required audit procedures
103	Define the project team
104	Determine appropriate audit level
105	Define pre-audit tasks
106	Define data & instrumentation required for energy analysis
107	Communicate procedures and data gathering
108	Identify operations and maintenance team and create pre-audit O&M interview questions
109	Define audit report format and requirements
110	Draft audit report / final audit report
111	Conduct audit follow-up
112	Support ISO 50001 Energy Management Systems
113	Understand industry standards (ASHRAE 211, ISO 50002)
114	Awareness of code, legal, industry-specific energy requirements

2	Energy Use Analysis (7-11%)
201	Define required energy usage & other information
202	Review rate classifications
203	Establish utility / costs baseline
204	Establish utility / energy usage baseline
205	Establish relevant variables, regression analysis, energy performance indicators
206	Analyze Energy Use Graphs
207	Facility benchmarking, targets, EUI, ECI, load factor & savings potential
208	Analyze & breakdown energy end use
209	Utilize balance point temperature
210	Perform analysis of fleet information

3	Data Collectiuon & Analysis (8-12%)
301	Define pre-site data collection
302	Collect pre-site data
303	Define on-site data collection
304	Collect on-site data
305	Determine EEMs to be evaluated/considered
306	Account for interactive effects of measures
307	Understand energy modelling methods (Ordinary Least Square = regression)

4	Economic Analysis (7-11%)
401	Review client financial decision-making criteria (Investment projects, The Need for Life Cycle Cost Analysis (LCCA), Capital Investment Characteristics)
402	Costing both O&M and capital EEMs
403	Understand financial calculations and results (Simple Payback Period (SPP), Net Present Value (NPV), Internal Rate of Return (IRR), Life Cycle Cost (LCC), Free Cash Flow (FCF), Saving to Investment Ratio (SIR) – Benefit cost Ratio (BCR), Analysis of projects with different life spans: Annual Value (AV), Replacement Chain Approach (RCA), Equivalent Annual Annuity (EAA)
404	Conduct economic analysis of transport options
405	Conduct What-if Analysis (Break-even Analysis, Sensitivity Analysis, Scenario Analysis)
406	Perform detailed financial analysis
407	Present results of analysis (Cash Flow Diagram, Revenues and Costs, Indirect Effects on Incremental Earnings)

5	Lighting Systems (6-8%)
501	Determine efficiency/efficacy of light source
502	Calculate replacement period given lamp lumen depreciation
503	Determine lamp & fixture types and characteristics
504	Evaluate lamp types & characteristics for replacement
505	Audit lighting control system
506	Calculate Lighting power density
507	Evaluate illumination levels
508	Evaluate daylight harvesting opportunities
509	Identify energy efficiency measures (EEMs)
510	Evaluate O&M characteristics and opportunities
511	Calculate energy savings



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6	Heating, Ventilation & Air Conditioning Systems (12-18%)
	HVAC
601	Evaluate and identify HVAC terminal units
602	Audit & determine types of HVAC systems
603	Determine existing HVAC efficiencies
604	Identify existing control strategies including locations of thermostats, scheduling of loads and occupants
605	Identify HVAC system components
606	Audit & determine types of chillers: electric, gas driven, absorbers
607	Identify piping arrangements for chilled water and or refrigerant systems
608	Audit & determine types of heat pump, chillers, or split system units
609	Examine filter performance and maintenance
610	Identify energy efficiency measures (EEMs)
611	Evaluate O&M characteristics and opportunities
612	Calculate energy savings
	Heating Systems
613	Audit & determine types of boilers: fire tube, water tube, cast iron & burners (atmospheric, power burners, modulating ...)
614	Audit & determine types of furnaces: electric, gas, pulse, condensing
615	Determine existing boiler efficiencies
616	Evaluate distribution systems, (ductwork and/or piping), for insulation, pressure drop, leaks and steam traps
617	Identify terminal units
618	Identify energy efficiency measures (EEMs)
619	Evaluate O&M characteristics and opportunities
620	Calculate energy savings
	Ventilation Systems
621	Audit & determine types of ventilation systems
622	Examine filters types classification and energy impacts
623	Determine ventilation requirements (code related)
624	Evaluate ventilation control options
625	Identify energy efficiency measures (EEMs)
626	Evaluate O&M characteristics and opportunities
627	Calculate energy savings

7 Domestic Hot Water Systems (5-7%)	
701	Audit & determine types of hot water systems
702	Calculate efficiencies
703	Identify temperature set points
704	Evaluate circulating systems
705	Identify energy efficiency measures (EEMs)
706	Evaluate O&M characteristics and opportunities
707	Calculate energy savings
	Water Conservation
708	Evaluate irrigation and landscaping installation and efficiency
709	Audit water use
710	Identify water efficiency measures
711	Evaluate O&M characteristics and opportunities
712	Calculate water savings

8 Motors and Drives & Compressed Air Systems (8-12%)	
	Motors and Drives
801	Understand electrical fundamentals (inductive & resistive loads, power factor)
802	Audit & determine types and sizes of motors
803	Evaluate appropriate types of motors
804	Determine operating characteristics of motors and drives
805	Calculate efficiencies of motors and drives
806	Review potential energy savings of variable frequency drives
807	Identify energy efficiency measures (EEMs)
808	Evaluate O&M characteristics and opportunities
809	Calculate energy savings
	Compressed Air Systems
810	Analyze existing conditions for improvement opportunities
811	Identify supply (Compressor types, operation, control, application, heat recovery)
812	Evaluate treatment & distribution (condensate, drying, filtering, storage, distribution)
813	Characterize demand (leaks, inappropriate use, artificial demand)
814	Identify energy efficiency measures (EEMs)
815	Evaluate O&M characteristics and opportunities
816	Calculate energy savings

9	Building Envelope (6-8%)
901	Determine R and U values
902	Evaluate efficiency of walls, roofs, windows
903	Evaluate replacement with alternative glass types
904	Audit building envelope infiltration
905	Determine thermal weight
906	Identify energy efficiency measures (EEMs)
907	Evaluate O&M characteristics and opportunities
908	Understand different energy estimating and modelling methods
909	Calculate energy savings

10	Building Automation Systems, Process Automation Systems, & Energy Management and Control Systems (6-8%)
1001	Understand energy saving control strategies
1002	Identify controls issues from EMS evaluation
1003	Understand which points exist and which should be added for particular EEMs
1004	Evaluate operator understanding and usage of systems
1005	Understand how to read trend logs and identify opportunities
1006	Understand accuracy of sensors and how to identify and handle questionable data before use
1007	Identify energy efficiency measures (EEMs)
1008	Evaluate O&M characteristics and opportunities
1009	Calculate energy savings

11	Alternative Generation & Storage (4-6%)
1101	Know the different alternative energy technologies
1102	Understand the different renewable and storage energy technologies, sites, and their costs
1103	Determine technical and economic implications of integrating renewable and energy storage
1104	Identify subsidies and incentives associated with alt generation or energy storage
1105	Evaluate opportunities (first cut potential) in energy storage, thermal and electrical storage, and demand response
1106	Evaluate opportunities (first cut potential) for use of alternative generation, cogeneration, and renewable energy source

12	Transport (3-5%)
1201	Understand types/modes of transport (road, rail, ship, air), public transport vs. private transport
1202	Understand type of vehicles, transport sectors - options available and fuel costs (Primarily Road)
1203	Understand vehicle operation, impacts on fuel consumption, training & awareness (All modes)
1204	Understand maintenance & cost of vehicle maintenance - for different fuels (Road transport only)
1205	Understand planning and logistics, route management, fleet management, getting most benefit from the journey
1206	Evaluate data collection, energy performance Indicators, benchmarking for transport
1207	Utilize energy estimating and modelling methods, vehicle specification data vs. real life figures
1208	Understand vehicle improvements opportunities (under vehicle dampers, remove roof racks etc.)
1209	Understand information management, vehicle monitoring systems (The M&T of transport), monitoring driver performance

Examination Specifications

The examination will follow the specifications outlined in the examination blueprint and will include 100 multiple-choice graded questions in accordance with the percent of exam range for each task and 20 additional multiple-choice non-graded test questions.

Code of Ethics

Codes of Practice are found in the Code of Ethics for Energy Auditors V1.0 dated September 8, 2015, available at www.aeecenter.org/CEACodeofEthics.

Recertification Requirements

A CEA must accumulate ten professional credits every three years and submit a completed Renewal Form to AEE to remain certified. Professional credits for recertification can be accumulated at any time within the three-year period. Detailed explanation of activities applicable as credits for certification renewal available at www.aeecenter.org/certification/renewal.

Activities for CEA Renewal Credits

Continued employment in energy auditing activities:

- 2 credits per year for ANSI certificants
- 1 credit per year for non-ANSI certificants

Continuing education credits / professional activities (seminars or conferences) including but not limited to auditing, IAQ, and health & safety:

- 2 credits per 1 CEU, 10 PHD, college credit hour or 10 contract hours for training

Awards presented and/or papers published involving energy auditing:

- 2 credits each

Membership in a professional engineering society (non-ANSI certificants only)

- 1 credit per year

Certified Professionals who do not acquire sufficient CEA renewal credits to be recertified on the recertification date will be dropped from active certifications and notified in writing of suspension from using the CEA designation. They will also no longer be listed as a CEA in our directory of actively practicing CEAs. A lapsed CEA must resubmit to the certification process and successfully meet the criteria for certification by personal data information and examination. Another option for certified professionals with the exception of ENAC recognized CEAs is to acquire make-up credits at a cumulative total equal to 3.5 per year for every year since date of expiration. This option is available one-time only. Certifications that have lapsed more than three renewal cycles must retake the CEA exam.

An active CEA, upon retiring and/or and reaching the age of sixty-five, can be designated as "CEA – Retired," will no longer be required to pay renewal fees, and will no longer be listed in our directory of actively practicing CEAs. No further reporting is necessary except to notify AEE of meeting the age requirement by sending a copy of the retired CEA's Driver's License.

Recognitions



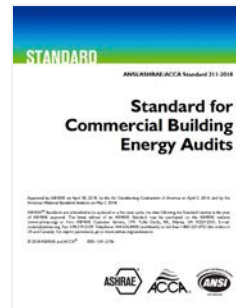
The CEA certification program is accredited by the American National Standards Institute (ANSI) based on the International Standard ANSI/ISO/IEC 17024. ANSI Standard 17024 is well-recognized within the industry as the highest standard in personnel certification accreditation.



The CEA certification program in Spain is accredited by Entidad Nacional de Acreditación (ENAC) based on the international standard UNE-IN/ISO/IEC 17024. ENAC is the agency appointed by the government to operate in Spain as the only National Accreditation Body, pursuant to Regulation (EU) No 765/2008 that regulates the functioning of accreditation in Europe.



The CEA program is recognized by the Better Buildings Workforce Guidelines. The CEA is recommended in U.S DOE's Guide to Energy Audits as Request for Qualifications (RFQ) requirement for consultants and firms that have expertise and experience in the field of energy efficiency upgrades to buildings and building equipment.



The CEA certification meets the criteria of an energy auditor and is qualified to do work under the ASHRAE Standard 211-2018 for Commercial Building Energy Audits.

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