Single-Family Energy Auditor Job Task Analysis

Heather Head and Chuck Kurnik
National Renewable Energy Laboratory

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Technical Report
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Table of Contents

1 Introduction

The National Renewable Energy Laboratory (NREL) is contracted by the U.S. Department of Energy (DOE) Weatherization Assistance Program (WAP) to develop and maintain the resources under the Guidelines for Home Energy Professionals (GHEP) project. The purpose of the GHEP project is to increase the quality of work conducted for residential energy retrofits in the United States through the WAP network and other residential retrofit programs, as described in the Council of Environmental Quality's (CEQ) *Recovery through Retrofit* October 2009 report. To meet the CEQs goal of "Establishing National Workforce Certifications and Training Standards," NREL was tasked with developing the GHEP resources that include the standard work specifications (SWS) and four advanced, competency-based home energy professionals (HEP) personnel certifications. From 2010 to 2011, NREL recruited more than 40 volunteer subject matter experts (SME) from the WAP network and the home performance industry to serve on committees to develop certification schemes and their requisite job task analysis (JTA) as the foundation of standardized certification and training programs.

As part of the GHEP strategy to increase the quality of work conducted for single-family, residential energy-efficiency retrofits, the HEP JTAs are used as the foundation for quality training programs and trainers. Just as the HEP certifications ensure qualified workers in the field, accredited training programs ensure that individuals receive the proper training to become certified Home Energy Professionals and to do the quality work that is defined in the SWS. DOE contracted with the Interstate Renewable Energy Council (IREC) to develop an accreditation for energy-efficiency training programs based on the four HEP JTAs. This accreditation is a third-party validation that an organization is qualified to teach the knowledge, skills, and abilities (KSA) outlined in the JTAs. This accredited training component of the GHEP project guarantees the existence and availability of high quality standardized training programs within the home energy upgrade industry. As of December 2017, 22 Weatherization Training Centers (WTC) held active IREC accreditations specific to the HEP certifications.

2 Definition of a Job Task Analysis

A Job Task Analysis is a foundation for any valid credentialing program and helps identify the core knowledge areas, critical work functions, and/or skills typically found across a representative sampling of current practitioners or job incumbent workers. Empirical results from a job analysis provide examinees and the public with a valid, reliable, fair, and realistic assessment that reflects the knowledge, skills, and abilities required to competently perform a job.

3 Background

In 2013, NREL completed the development of four single-family, full-scope, International Standard Organization (ISO) and International Electrotechnical Commission (IEC) 17024:2012 accredited HEP certifications for the specific job categories of Quality Control Inspector (QCI), Energy Auditor (EA), Crew Leader (CL), and Retrofit Installer Technician (RIT). Upon developing the ISO/IEC 17024:2012 schemes, NREL entered into a nonexclusive license with Building Performance Institute, Inc. (BPI) to manage and administer the four HEP certifications.

In 2014, the WAP implemented Weatherization Program Notice 15-4, Quality Work Plan (QWP) requiring that "(a)ll measures and incidental repairs performed on client homes must meet the specification, objectives, and desired outcomes outlined in the SWS...Quality Control Inspectors (QCI) working for, or contracted by, the WAP must possess the KSA in the National Renewable Energy Laboratory (NREL) Job Task Analysis (JTA) for Quality Control Inspectors…QCI competency is demonstrated by certification as a Home Energy Professional (HEP) Quality Control Inspector" (DOE, WPN 15-4 2014).

As of March 1, 2018, there are more than 200 certified EAs throughout the nation. In accordance with the certification industry and ISO/IEC 17024:2012 best practices, JTAs need to be reviewed and revised as necessary every 5–7 years to ensure that they align with current competencies needed on the job. The following section describes the process of revising the 2013 EA certification scheme and developing an improved 2018 EA certification program. Sections 6 and 7 provide the content of the revised 2018 EA certification JTA.

4 Energy Auditor Certification Scheme Revision Process

To improve the quality of residential retrofits and increase energy savings in the residential market through QCI training and certification, from 2013 to 2017 DOE collected feedback from the WAP network and the home performance industry on the successes and barriers to implementing the QCI certification program. The most frequently cited barriers regarded the QCI JTA, the major component of the certification scheme. The barriers described were that the QCI JTA included competencies that ranged from foundational to advanced, included interpersonal skills (or "soft skills"), and that the JTA did not demonstrate how the QCI certification required higher competency levels than the other HEP certifications. In practice, the QCI must inspect the work of the EA and the final installed measures of the RIT, yet this level of competency required of each job category was not clearly delineated from one job category to the next. Another major barrier to implementing the certifications was the management and administration time required of the major stakeholders and training and testing centers to maintain four full-scope certifications. The large range of competencies, the soft skills, and undefined competency levels made it difficult for WTCs to develop curriculum and the exam developers to develop questions that assessed the soft skills adequately.

To decrease the previously mentioned barriers and ensure that the contents of the QCI and EA JTA and certification scheme were current, aligned with best practice, and continued to adhere to the ISO/IEC 17024:2012 standard, the QCI and EA scheme committees engaged in the following tasks to review and update the QCI and EA certification schemes This included the JTA which is the major scheme component.

To identify the soft skills and foundational competencies and define the levels of KSAs required to successfully perform the tasks defined in the QCI and EA JTAs, DOE and NREL used the Department of Labor's (DOL) Competency Model Clearinghouse resources to develop a QCI and EA Competency Model. According to the DOL's competency model resources, foundational competencies include personal, academic, and workplace competencies common across all workers.[1] Please see the QCI and EA Competency Model for more information.

NREL held virtual meetings with the QCI and EA scheme committees in the fall of 2017 to identify and remove the foundational competencies in both the QCI and EA JTAs. Once the foundational competencies were removed, the scheme committees completed a high-level cross-walk of the QCI and EA JTAs domains and tasks, to identify and remove any obvious duplications. Because the QCI needs to inspect the work completed by the EA, it was determined that the QCI job category needs all the competencies of an EA but does not require enough competencies to justify a full-scope, ISO/IEC 17024:2012 accredited certification. The QCI's competencies included the competencies described in the EA, plus a smaller set of competencies specific to quality assurance work conducted by a QCI.

[1] A Guide For Developing Competency Models, Page 6 of https://www.careeronestop.org/CompetencyModel/Info_Documents/Guide-for-Developing-CompetencyModels.pdf

4.1 JTA Revision Process

In February 2017, NREL assembled a panel of 17 SMEs from the QCI and EA scheme committees for a three-day in-person meeting. The panel worked with Castle Worldwide, Inc., a certification and licensure design, development, and administrative services company, to develop new QCI and EA JTAs and certification scheme components. During the in-person meeting the panel went through the following process to revise the QCI JTA.

The first step in developing the new EA JTA was to evaluate the major responsibilities or duties (i.e., performance domains) characterizing the practice of an EA. As a group, panelists were asked to assess the currency and relevance of the domains and add, edit, or remove domains as needed. Additionally, the panel was instructed to remove any content that was the responsibility of a QCI. Next, the panel was asked to review and revise the task statements from the previous EA JTA. Tasks underwent revision to varying degrees.

The final major undertaking of the panel was to identify knowledge, skill, and ability statements for each of the tasks. At the conclusion of the meeting, panelists were asked to rate the task statements that were developed in the meeting on the scales of point in career, criticality, and frequency to identify the weighting of each task on the exam.

4.2 JTA Phase II: Validation Study

To corroborate the work of the panel, an online validation questionnaire consisting of two sections was designed and sent to current EA certification holders in July 2017. The first section asked respondents to rate each of the tasks on three rating scales: point in career, criticality, and frequency. The second section asked respondents to provide demographic information used to evaluate the representativeness of the respondents. The final task weighting from the validation process can be found in the exam blueprint in Section 7 of this report.

4.3 Results

During the in-person meeting and subsequent virtual meetings with all the QCI and EA scheme committee members, the committees continued to work on the necessary updates to the other certification scheme components. These included the prerequisite and recertification requirements, minimal competencies, job scope and descriptions, and other relevant aspects of the QCI and EA certification schemes.

Through this effort, the QCI and EA scheme committees determined that a new model for the QCI and EA certifications was needed. With the EA job requiring many performance domains and tasks, the EA would remain a full-scope, accredited certification under the ISO/IEC 17024:2012 standard. However, because the EA competencies were required of QCIs, the EA would serve as a prerequisite to the QCI certification. Since the QCI JTA defined a smaller subset of competencies, the QCI credential did not require a full-scope, ISO/IEC 17024:2012 accredited credential and the concept of a microcredential was implemented for the QCI credential. The purpose of microcredentials is to assess a more specific or discrete set of knowledge and skills than a traditional, full scope certification. The microcredential concept fit the QCI certification program with the EA certification as a prerequisite to the QCI microcredential, as part of the HEP multicredential framework.

The following sections of this report are the results of the scheme committees' work toward improving the 2011 EA JTA, the major component of the certification program. The following sections include the scope of certification; the EA JTA content outline; performance domains, tasks, and KSAs; and the exam blueprint which provides the ideal percentage of exam questions that should be asked about each task.

5 Energy Auditor Job Scope and Description

The EA is an experienced professional who evaluates the health and safety issues, durability, comfort, and energy use of a residential building. The EA conducts advanced diagnostic tests, gathers and analyzes data, and creates models to draw conclusions and make recommendations to the client for improvements.

6 Energy Auditor Content Outline

6.1 DOMAIN I: Collection of Visual, Material, Dimensional, and Appliance Information about the Building for an Energy Audit

6.1.1 D1-Task 1: Document energy consumption.

Ability to:

- Obtain 12 months of client utility bills
- Obtain annual fuel delivery information (oil, propane, etc.).

Knowledge of:

- How to access utility information
- Utility bill components.

6.1.2 D1-Task 2: Document the building history.

Ability to:

- Determine the age of the original structure
- Determine the age of any additions or improvements
- Determine if the building has any historical significance.

Knowledge of:

- Where to access property record.

6.1.3 D1-Task 3: Conduct a physical/visual inspection.

Ability to:

- Identify holes, chimneys, gutters, vent pipes, soffits, fascia, peeling paint, foundation integrity, areas of infiltration and exfiltration, exhaust fan penetrations, accesses, crawl spaces, roof vents, land grading, shading, orientation of the building, and anomalies
- Identify pest/vermin infestations, evidence of leaking or water damage, and structural damage
- Identify hidden rooms or spaces
- Identify the exterior materials (e.g., vinyl, brick)
- Identify issues that would interfere with or prevent tests
- Identify potentially hazardous materials in the building
- Detect abnormalities by using all senses (e.g., unusual odors, sounds)
- Identify health and safety issues (e.g., clutter, bleach stored next to a furnace, asbestos-containing materials)
- Perform visual inspection of a vented combustion appliance venting configuration
- Identify a combustion appliance zone (CAZ)
- Visually inspect adjacent and/or connected buildings for issues that impact or could be impacted by the audited building

- Determine applicable codes and standards (e.g., ICC, NFPA).

Knowledge of:

- General construction
- Combustion appliance venting procedures
- Issues that pose a health and/or safety risk (e.g., clutter, bleach stored next to a furnace, animal feces, asbestos-containing materials, hazardous materials)
- Situations that pose a health and/or safety risk
- Sources of moisture
- OSHA safe work practices (e.g., confined spaces).

6.1.4 D1-Task 4: Collect health and safety data.

Ability to:

- Locate existing smoke/carbon monoxide alarms
- Determine age and functionality of smoke/carbon monoxide alarms
- Determine if smoke/carbon monoxide alarms are hardwired or battery-powered
- Verify that a clothes dryer is properly vented to the exterior
- Verify that all exhaust fans are properly vented to the exterior
- Identify any existence of hazardous materials/conditions
- Identify knob-and-tube wiring
- Identify moisture issues (e.g., standing water, condensation, plumbing leaks, mold)
- Identify potential electrical hazards (e.g., frayed wiring, open junction boxes, overloaded circuits)
- Identify suspected asbestos-containing materials
- Identify potential lead-based paint hazards
- Identify vented and unvented combustion appliances
- Identify a properly operating backdraft damper
- Identify conditions that promote radon infiltration
- Identify other potential indoor air quality hazards (e.g., volatile organic compounds).

Knowledge of:

- Proper locations for smoke/carbon monoxide alarms
- Venting requirements for appliances
- Conditions that signify or promote moisture problems
- Domestic water heater safety
- Electrical hazards
- Hazardous materials
- Heating system safety
- How to determine if knob-and-tube wiring is active
- Issues and hazards associated with asbestos-containing materials
- Issues and hazards associated with lead-based paint
- Manufactured home water heater regulations
- Rules and regulations pertaining to lead and asbestos-containing materials

- Smoke/carbon monoxide alarm operations.

6.1.5 D1-Task 5: Collect appliance and base load information.

Ability to:

- Collect household appliance tag data (e.g., refrigerator, dishwasher, dehumidifier)
- Collect heating/cooling appliance tag data and documentation
- Determine combustion appliance zone (CAZ) volume
- Identify appliance energy source(s)
- Collect water fixture flow rates
- Identify other components related to the HVAC appliances (e.g., expansion tanks, fill valves, remote compressors, smart thermostats)
- Identify other components related to the domestic water heater appliance (storage tanks, mixing valves, etc.)
- Identify safety features related to the HVAC and domestic water heater appliances
- Collect lighting data (e.g., type, fixtures, wattage, usage)
- Identify the number of occupants
- Determine client energy usage habits (e.g., A/V, computers)
- Look for additional usage sources (e.g., hot tubs, pool pumps, pool heaters, fish ponds, fountains)
- Collect electrical service information (e.g., size, brand)
- Identify base loads.

Knowledge of:

- Various appliance types and energy sources
- Codes and standards adopted by the authority having jurisdiction (e.g., NFPA 54)
- Domestic water heater components and operation
- Heating/cooling system operations
- Safety issues associated with domestic water heaters
- Water fixture operations and flow rates
- Domestic hot water heating technologies
- How occupant behavior affects energy consumption
- The definition of base load
- Utility bill analysis, including base load calculation.

6.1.6 D1-Task 6: Identify a conditioned building enclosure.

Ability to:

- Identify and record pertinent building dimensional data
- Determine conditioned, unconditioned, and unintentionally conditioned spaces
- Assess alignment of thermal and pressure boundaries.

Knowledge of:

- Pressure boundary identification

- Thermal boundary identification
- Various building components
- Proper pressure and thermal boundary alignment.

6.1.7 D1-Task 7: Collect mechanical ventilation data.

Ability to:

- Collect tag data for exhaust fans
- Determine the volume of the affected space
- Determine the type of control
- Determine the condition of the ventilation ductwork/piping (e.g., pitch, insulation, size, material, elbows, length of run, terminations).

Knowledge of:

- Controls and motors
- Types of ventilation
- Ventilation ductwork
- Ventilation standards and codes of authority having jurisdiction.

6.1.8 D1-Task 8: Identify building insulation (attic, walls, and foundation/subspace).

Ability to:

- Identify insulation type
- Measure insulation (e.g., thickness)
- Identify insulation condition and coverage
- Identify presence and placement of vapor retarder
- Identify the location of insulation (e.g., exposure, aligned with pressure and thermal boundaries).

Knowledge of:

- Building science
- Insulation effectiveness
- Insulation R-values
- Effective R-values
- Insulation placement
- OSHA safety requirements
- General thermography principles.

6.1.9 D1-Task 9: Collect attic data.

Ability to:

- Identify attic components (e.g., drop soffit, rafters, joists)
- Determine existing ventilation type and size (e.g., soffit, ridge, power ventilators)

- Identify heat sources (e.g., recessed lights, chimneys, flues, furnaces)
- Identify sources/signs of water damage
- Identify bypasses between attic and conditioned space
- Identify types and point(s) of access
- Identify potential electrical hazards
- Identify pest/vermin infestations
- Recognize potential structural integrity issues
- Identify a whole-house fan
- Determine attic uses
- Note the existence and effectiveness of radiant barriers
- Identify the existence of baffles.

Knowledge of:

- Attic components
- General construction terms
- Infiltration points
- Required clearance to combustibles
- Potential safety hazards in an attic (e.g., electrical hazards, nails, rafters, heat exposure)
- Signs of water damage
- Signs of pest/vermin infestations
- General thermography principles
- Ventilation requirements
- OSHA safety requirements (e.g., ladder usage, confined spaces).

6.1.10 D1-Task 10: Collect wall data.

Ability to:

- Identify wall types and components (e.g., interior, exterior)
- Identify framing method
- Identify wall orientation
- Identify sources and signs of any water damage
- Identify infiltration points
- Identify signs of pest/vermin infestation
- Identify upper stories
- Identify wall exposure.

Knowledge of:

- General construction
- Building science
- Infiltration points
- Typical wall framing and components
- Issues unique to framing methods (e.g., use of upper story band joists, angle bracing in post and beam framing)
- General thermography principles.

6.1.11 D1-Task 11: Collect window and door data.

Ability to:

- Identify window type (e.g., jalousie, awning, single-hung, double-hung)
- Identify window frame material
- Identify window glazing type (e.g., reflective, low-E)
- Identify exterior shading
- Identify window operation/leakiness
- Identify window orientation
- Identify general window conditions
- Identify door type and swing
- Identify condition of a door, including hardware, door sweep, seals, and operation
- Determine thermal characteristics of a door.

Knowledge of:

- Environmental Protection Agency (EPA) safety requirements
- Historical preservation requirements
- Window construction, components, and nomenclature
- Door components, hardware, and nomenclature
- Door construction
- Door operation and adjustments.

6.1.12 D1-Task 12: Collect foundation/subspace data.

Ability to:

- Identify foundation/subspace types (e.g., crawl space, basement, slab)
- Identify foundation materials
- Identify infiltration points
- Identify sources and signs of moisture
- Identify points of access
- Identify potential electrical hazards
- Identify signs of pest/vermin infestations
- Recognize potential structural integrity issues
- Identify special equipment (e.g., sump pumps).

Knowledge of:

- Building science
- Codes and standards adopted by the authority having jurisdiction
- Crawl space ventilation requirements
- Foundation construction materials and methods
- OSHA safety requirements
- Signs of structural hazards on foundations.

6.1.13 D1-Task 13: Collect roof data.

Ability to:

- Identify roof types (e.g., parapet, mansard, gambrel, gable)
- Identify roof conditions
- Identify roof color
- Identify roofing materials (e.g., underlayment, membrane, shingle, metal)
- Identify roof penetrations
- Identify roof debris (e.g., garbage, old air conditioners)
- Identify the presence and condition of roof drainage
- Determine the flashing condition
- Identify type and location of roof access
- Identify roof exposure and orientation
- Identify roof insulation (e.g., flat roof with no cavity and with rigid insulation)
- Determine roof pitch.

Knowledge of:

- Insulation materials and methods
- OSHA safety requirements
- Roofing construction methods
- Roofing materials.

6.2 DOMAIN II: Diagnostic Testing of the Dwelling Unit for an Energy Audit

6.2.1 D2-Task 1: Prepare the dwelling unit for the test(s).

Ability to:

- Determine the test(s) to be performed (e.g., blower door test, duct leakage test, combustion safety testing)
- Prepare the building and equipment for testing based upon industry protocols.

Knowledge of:

- Building diagnostic testing
- Building science
- Test protocols.

6.2.2 D2-Task 2: Test the electric appliances.

Ability to:

- Inspect appliances for test accessibility
- Follow the manufacturer’s guidelines for operation of the watt-hour meter
- Interpret data from a watt-hour meter
- Access wattage usage data in an up-to-date industry-accepted resource.

Knowledge of:

- Electric appliance metering
- Electric appliance safety.

6.2.3 D2-Task 3: Conduct indoor air quality tests.

Ability to:

- Measure levels of targeted indoor air pollutants (e.g., carbon monoxide, combustible gases)
- Determine if the reading exceeds any applicable action levels
- Identify need for further testing.

Knowledge of:

- Carbon monoxide exposure symptoms
- Industry standards relative to air quality (e.g., ASHRAE, EPA, NIOSH, OSHA)
- Effect of relative humidity on indoor air quality
- Source control of pollutants.

6.2.4 D2-Task 4: Determine the safety and efficiency of combustion appliances.

Ability to:

- Visually inspect the fuel supply lines
- Test for leakage in the fuel supply pipes (e.g., confirm with bubble solution)
- Perform combustion safety tests (e.g., combustion appliance zone [CAZ] test depressurization test, carbon monoxide test)
- Conduct combustion efficiency tests (e.g., oxygen, stack temperature, steady-state efficiency [SSE]).

Knowledge of:

- Building science
- Codes and standards adopted by the authority having jurisdiction
- Combustion efficiency test procedures (e.g., oxygen, stack temperature, steady-state efficiency [SSE])
- Fuel line leak testing techniques
- Heating system type (e.g., forced air heater, hydronic heater, steam heater, unit heater, space heater)
- Annual fuel utilization efficiency (AFUE) versus steady-state efficiency (SSE)
- Combustion safety test procedures
- Venting types, materials, methods, and safety issues (e.g., venting categories, NFPA)
- Greatest depressurization achievable (i.e., worst case).

6.2.5 D2-Task 5: Determine air leakage of the building envelope.

Ability to:

- Perform blower door tests
- Follow industry protocol for conducting blower door tests
- Perform zone pressure diagnostics (ZPD)
- Perform pressure pan tests
- Locate points of infiltration/exfiltration
- Identify air leakage locations based on infrared images.

Knowledge of:

- Advanced blower door diagnostics (e.g., zone pressure diagnostics, pressure pans)
- Blower door testing procedures (e.g., pressurization, depressurization)
- Blower door assembly and operation.

6.2.6 D2-Task 6: Determine the performance of HVAC distribution.

Ability to:

- Perform HVAC distribution tests
- Perform a forced air system distribution leakage test
- Measure room temperatures
- Measure the temperatures of the hydronic radiators
- Measure air flow (i.e., cubic feet per minute [CFM])
- Measure temperature rise across heat exchangers/cooling coils
- Measure static pressure
- Inspect hydronic distribution (e.g., high, low, valves)
- Measure room pressure differences for forced air systems
- Measure mechanical ventilation flow rates (e.g., exhaust fans, supply fans, balanced ventilation).

Knowledge of:

- HVAC distribution testing protocols
- HVAC terminology
- Manufacturer's specifications
- Distribution system design and materials
- Forced air systems
- Hydronic distribution
- Mechanical ventilation systems (e.g., exhaust, supply, balanced).

6.3 DOMAIN III: Evaluation of Collected Energy Audit Data to Determine the Scope of Work

6.3.1 D3-Task 1: Evaluate the health and safety data.

Ability to:

- Determine if there are potential health and safety concerns

- Determine if health and safety issues can be addressed through an energy-efficiency measure
- Determine the repair options.

Knowledge of:

- Special circumstances (e.g., mold, lead, asbestos-containing materials, radon)
- Construction repair methods.

6.3.2 D3-Task 2: Evaluate the durability/structural integrity of the building.

Ability to:

- Determine if there are potential durability/structural integrity issues
- Determine if the potential durability/structural integrity issues can be addressed through an energy-efficiency measure
- Determine if further evaluation is recommended.

Knowledge of:

- Building science.

6.3.3 D3-Task 3: Evaluate the HVAC system.

Ability to:

- Evaluate the HVAC system for health and safety concerns (e.g., suspected asbestos-containing materials)
- Evaluate HVAC sizing for potential replacement or upgrades (e.g., post shell retrofit)
- Evaluate the distribution (e.g., add trunk lines, radiators, to rooms as needed)
- Evaluate fuel switching options
- Evaluate the need to clean and tune versus replace
- Evaluate the need for and supply of combustion air
- Evaluate the HVAC system for other issues that lead to replacement or upgrades (e.g., condition, age, efficiency)
- Identify duct sealing/insulation and pipe insulation opportunities.

Knowledge of:

- Air Conditioning Contractors of America (ACCA) manuals
- Heating/cooling system operations
- HVAC load calculations
- HVAC system repair, replacement, or upgrade options
- Maximum allowable duct leakage
- Safety requirements (e.g., NFPA, AHJ).

6.3.4 D3-Task 4: Evaluate the mechanical ventilation.

Ability to:

- Compare measured flow with ventilation requirements
- Determine the mechanical ventilation needs (e.g., repairs, replacements, additions, make-up air)
- Determine the type of controls needed
- Calculate the building ventilation requirements.

Knowledge of:

- Ventilation standards (e.g., ASHRAE, AHJ)
- Mechanical ventilation controls
- Ventilation strategies
- Ventilation ducting design.

6.3.5 D3-Task 5: Evaluate energy use.

Ability to:

- Determine if replacements or upgrades will reduce energy consumption
- Analyze utility bills and fuel usage, and calculate base loads.

Knowledge of:

- Codes and standards adopted by the authority having jurisdiction
- Components of base loads (e.g., lighting, electronics, domestic hot water, appliances)
- Base load calculation
- Base load reduction strategies.

6.3.6 D3-Task 6: Evaluate the foundation/subspace.

Ability to:

- Determine if repairs are needed (e.g., plumbing, floors)
- Determine if additional insulation and/or air sealing is needed
- Determine the proper location for insulation and/or air sealing (e.g., floor, walls, sills, perimeter, cantilever floor)
- Determine the type of insulation materials to be added
- Calculate if adequate ventilation exists or should be added
- Determine a moisture management strategy (e.g., site drain, vapor barrier).

Knowledge of:

- Building science
- Codes and standards adopted by the authority having jurisdiction
- Foundation construction techniques
- Foundation crawl space ventilation
- Foundation/subspace insulation
- Foundation/subspace types
- Types and locations for vapor barriers.

6.3.7 D3-Task 7: Evaluate the walls.

Ability to:

- Determine if repairs are needed
- Determine if insulation opportunities exist
- Determine if air sealing opportunities exist
- Identify the type of insulation materials to be added
- Determine the square footage of the area to be insulated
- Determine if the pressure boundary and thermal boundary align
- Determine if the vapor retarder is appropriately placed
- Determine if band joists insulation and/or air sealing opportunities exist (i.e., upper stories)
- Determine the impact of potential health and safety issues (e.g., lead-based paint, asbestos-containing materials, electrical hazards, moisture)
- Determine a moisture management strategy (e.g., drainage, flashing).

Knowledge of:

- EPA and DOE lead and asbestos standards
- Building science
- Codes and standards adopted by the authority having jurisdiction
- Insulation types and appropriateness
- Pressure and thermal boundaries
- Typical wall structures
- Vapor retarder in walls.

6.3.8 D3-Task 8: Evaluate the attic.

Ability to:

- Evaluate if repairs are needed
- Determine if insulation opportunities exist
- Determine if air sealing opportunities exist
- Determine if the pressure boundary and thermal boundary align
- Determine if the vapor retarder is appropriately placed
- Determine if additional attic ventilation is required
- Determine if additional access is required
- Determine the impact of potential health and safety issues (e.g., heat sources, asbestos-containing materials, electrical hazards, moisture).

Knowledge of:

- Attic construction and materials
- Attic fire hazards
- Attic insulation and air sealing strategies
- Attic ventilation standards
- Building science

- Codes and standards adopted by the authority having jurisdiction
- Pressure and thermal boundaries
- Moisture management
- Preparation for attic insulation and air sealing
- Area-weighted average R-value.

6.3.9 D3-Task 9: Evaluate the doors and windows.

Ability to:

- Determine if repairs are needed
- Evaluate the condition of and/or need for storm doors and windows (e.g., closers)
- Evaluate door and window components and performance
- Determine if insulation opportunities exist
- Determine if air sealing opportunities exist
- Determine the impact of potential health and safety issues (e.g., lead-based paint, asbestos-containing materials, moisture).

Knowledge of:

- Codes and standards adopted by the authority having jurisdiction
- Building science
- Framing structures and processes
- Door types
- Window components
- Door and window glazing
- Window types.

6.3.10 D3-Task 10: Use energy modeling software.

Ability to:

- Determine pertinent modeling data
- Analyze the output from the software
- Produce a cost and savings report.

Knowledge of:

- Basic construction terms
- Building science
- Energy modeling software principles.

6.3.11 D3-Task 11: Generate the recommended work scope.

Ability to:

- Determine the recommended health and safety measures
- Determine the recommended building durability measures
- Determine the recommended energy conservation measures

- Determine the economics of recommended measures (e.g., savings to investment ratio [SIR], return on investment [ROI])
- Anticipate health and safety impacts from recommended retrofit measures
- Specify measures to ensure thermal and pressure boundary integrity and alignment
- Assemble work specifications.

Knowledge of:

- Building science
- Codes and standards adopted by the authority having jurisdiction
- Construction practices, techniques, and terminology
- Energy modeling software
- Cost-benefit analysis
- Program rules and standards
- Funding or financing mechanisms for energy-efficiency upgrades.

Skill in:

- Cost estimating.

7 Energy Auditor Exams Blueprint

Domain and Tasks	% Written	% Field
DOMAIN 1: Collection of Visual, Material, Dimensional, and Appliance Information about the Building for an Energy Audit	42.8%	66.7%
Task 1: Document energy consumption	2.2%	N/A
Task 2: Document the building history	3.0%	N/A
Task 3: Conduct a physical/visual inspection	4.5%	7.9%
Task 4: Collect health and safety data	4.7%	8.3%
Task 5: Collect appliance and base load information.	3.2%	5.6%
Task 6: Identify a conditioned building enclosure	3.2%	5.6%
Task 7: Collect mechanical ventilation data	3.2%	5.7%
Task 8: Identify building insulation (attic, walls, and foundation/subspace)	3.2%	5.6%
Task 9: Collect attic data	3.8%	6.7%
Task 10: Collect wall data	3.1%	5.5%
Task 11: Collect window and door data	2.5%	4.5%
Task 12: Collect foundation/subspace data	3.5%	6.2%
Task 13: Collect roof data	2.9%	5.2%
DOMAIN 2: Diagnostic Testing of the Dwelling Unit for an Energy Audit	20.8%	33.3%
Task 1: Prepare the dwelling unit for the test(s)	3.9%	6.9%
Task 2: Test the electric appliances	2.1%	N/A
Task 3: Conduct indoor air quality tests	4.5%	8.0%
Task 4: Determine the safety and efficiency of combustion appliances	4.7%	8.3%
Task 5: Determine air leakage of the building envelope	3.0%	5.3%
Task 6: Determine the performance of HVAC distribution	2.7%	4.7%
DOMAIN 3: Evaluation of Collected Energy Audit Data to Determine the Scope of Work	36.4%	N/A
Task 1: Evaluate the health and safety data	4.4%	N/A
Task 2: Evaluate the durability/structural integrity of the building	3.6%	N/A
Task 3: Evaluate the HVAC system	3.5%	N/A
Task 4: Evaluate the mechanical ventilation	3.3%	N/A
Task 5: Evaluate energy use	2.4%	N/A
Task 6: Evaluate the foundation/subspace	3.2%	N/A
Task 7: Evaluate the walls	3.4%	N/A
Task 8: Evaluate the attic	3.7%	N/A
Task 9: Evaluate the doors and windows	2.9%	N/A

Task 10: Use energy modeling software	2.5%	N/A
Task 11: Generate the recommended work scope	3.5%	N/A

Note: Percentages were rounded to the nearest tenth of a percent.