CEA Exam Prep Workshop

How to Prepare to Pass the Residential CEA Exam

Brian Selby
Selby Energy, Inc.

Energy Code Ace™
HELPING YOU PLAY YOUR CARDS RIGHT

SDGE A Sempra Energy utility®
SoCalGas A Sempra Energy utility®
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This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.

Presentation Schedule

Welcome

- Welcome
- Questions and Concerns
- About the Exam

Multiple-choice Exam

- Exam Structure
- Exam Competencies and Objectives
- Sample Questions

ACM Exam

- Exam Structure and Tips
- Modeling Demonstration and Practice
- Common Modeling Mistakes

Wrap-up

- Before the Exam
- During the Exam
- Q&A and Wrap Up

Session Ground Rules

Please:

- Silence your cell phones
- Respect the opinion of others
- Ask questions about preparing for the CEA exam
- Refrain from complaints about your experience taking an exam
- Help maintain focus
- Have fun!

What are your questions or concerns regarding residential CEA exam?

About CABEC

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CABEC's Mission

- Further technical expertise and ethics through certification
- Foster professional development through training, information, and peer exchange/networking
- Represent and enhance the stature of its members to the California Energy Commission and other political entities
- Encourage energy efficiency and regulatory compliance throughout the energy consulting industry

Value of becoming a CEA?

Recognized Professional

- Qualified for providing energy calculations under these programs:
  - Build It Green, Green Point Rated
  - California LEED for Homes
  - California Tax Credit Allocation Committee (CTCAC)
  - Low-Income Housing Tax Credit Program
  - Advanced Energy Rebuild (AER) Program
  - Reach Codes (jurisdictions vary)
- Measured and recognized skill in the energy field
- Membership privileges of a respected organization when a CABEC member

About the CEA Exam

Supported

The CA Investor Owned Utilities Statewide Codes & Standards team has supported the development and ongoing success of the CEA exam since 2010.

Developed

The exam development team is composed of testing and measurement experts and some of the top energy analysts in the state.

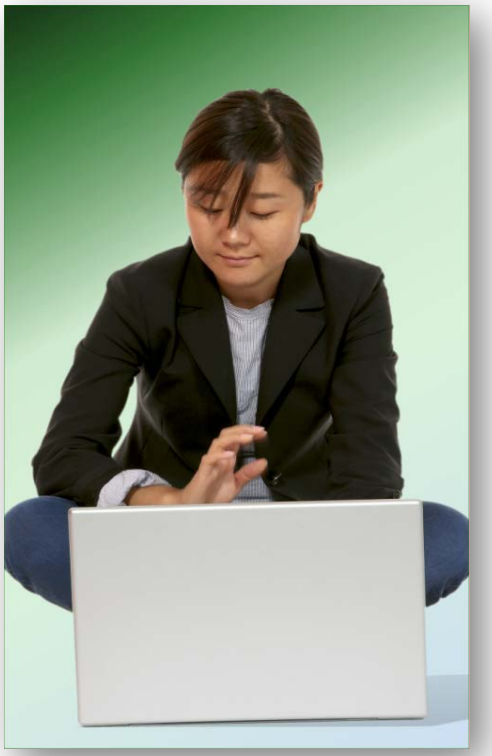
Tailored

The exam is designed to specifically reflect the skills and knowledge associated with qualified professionals in the energy consulting field.

Verified

The exam has been through rigorous alpha and beta tests, with fine-tuning based on detailed analysis of test results.

What should I bring?



* These also will be provided on a flash drive in PDF format

- Bring a picture identification (such as a driver's license).
- Bring a calculator that is not an app in your phone.
- Bring your own laptop (updated and with power cord) that can connect to WiFi and read a USB flash drive, pre-loaded with any CEC-approved Residential software.

  Make sure it is the most current version!

- You may bring hard copies of any materials you want to use, such as:
  - 2019 Building Energy Efficiency Standards
  - 2019 Compliance Manuals
  - 2019 ACM Reference Manuals
  - 2019 Reference Appendices
  - 2019 CalGreen - California Green Building Standards Code
  - Fact Sheet – What's New in 2019 Nonresidential Energy Code
  - Fact Sheet – What's New in 2019 Residential Energy Code

Ace Tools™

A variety of tools to help you identify the forms, installation techniques, and standards relevant to building projects in California.

Ace it

Ace Training™

Targeted classroom and online training on Title 24, Part 6 and Title 20 addressing a variety of stakeholders and measures.

Ace it

Ace Resources™

Application Guides, Facts Sheets, Trigger Sheets and Checklists to help you understand how and when to comply with California's building and appliance energy efficiency standards.

Ace it

Completing CEA Qualifications

Now What?

- Attain or prove 100 points combined within these categories:
  - Must show experience as documentation author for a minimum of five projects
  - Further education or other professional certifications
  - OR… you are a CEA under a previous code cycle
- Continuing Education
  - 9 approved credits per calendar year
- Attend professional practices workshop, or are a CEA under a previous code cycle

Check Your Understanding

Which of the following resources may be used during the exam?

a. 2019 Energy Standards PDF saved on my computer.
b. Compliance modeling software installed on my computer.
c. The energycodeace.com website.
d. All of the above

Check Your Understanding

True or false, I'm not allowed to take the CEA exam until I meet all of the experience requirements?

a. True

b. False

c. I don't know

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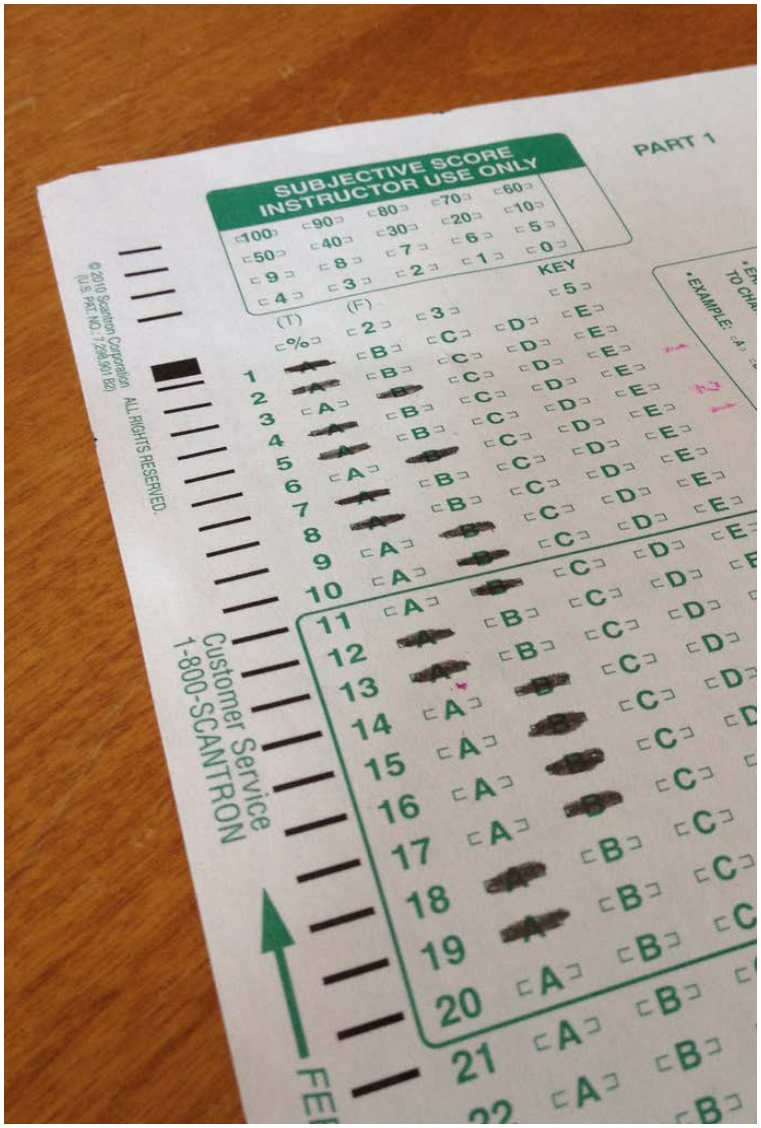
Multiple-Choice Exam Structure



Multiple Choice

- 50 (full exam) multiple choice questions covering five competencies, or
- 30 (recertification exam) multiple choice questions covering new or changed objectives in five competencies
- Up to 4 hours allowed to complete this section during the morning portion
- Pass score is 70%

CEA Exam Competencies

1. **Energy Basics**
   Comprehend Key Residential Energy Efficiency Design Concepts and Issues
2. **Project Assessment**
   Conduct Initial Project Assessment and Determine How to Apply the 2019 Energy Standards
3. **Project Take-Offs**
   Gathering and organizing all necessary input data for energy modeling
4. **Modeling and Troubleshooting Results**
   Modeling the building with approved energy compliance software, and trouble-shooting when results do not make sense
5. **Energy Consulting**
   Consider recommendations for improving energy performance and comfort

Competency One

Energy Basics

Comprehend Key Residential Energy Efficiency Design Concepts and Issues

- Demonstrate knowledge of basic heat transfer, residential energy design measures, and how they relate to building energy performance metrics and code compliance

Ace Training™

Competency One

Comprehend Key Residential Energy Efficiency Design Concepts and Issues

Objectives 1: Describe methods of heat transfer and ways to maintain comfort conditions within living spaces; energy units.

Essential content in this objective may contain concepts such as:

- Definition of energy, 1st and 2nd Laws of Thermodynamics.
- Measurement terminology: Btu, Btu/hr, therm, watt, kW, kWh, cooling tons, pascal, TDV; Heat transfer: conductive, convective, and radiant; R-value vs. U-value.
- General comfort: temperature, humidity, air movement, air cleanliness, mean radiant temperature, evaporation.
- Psychrometrics: dry bulb, wet bulb, dew point, humidity, enthalpy; Sensible vs. latent heat.

Comprehend Key Residential Energy Efficiency Design Concepts and Issues

Objectives 2: Determine appropriate general methods for reducing building and end-use energy consumption through energy design and energy efficiency.

Essential content in this objective may contain concepts such as:

- Energy end use components regulated by the Standards or not: Space heating and cooling, water heating, pump and fan energy, lighting, renewables, sensitivity to Climate Zone, plug loads.
- Impact of building design features on energy end-use components.
- Impact of mechanical design features on energy end-use.
- Demand side management vs. on-site power generation.

Comprehend Key Residential Energy Efficiency Design Concepts and Issues

Objectives 3: Describe envelope design elements and explain how they affect energy design and efficiency.

Essential content in this objective may contain concepts such as:

- Building Orientation.
- Components of heating loads: convection and conduction losses through building envelope components. Components of cooling loads: convection, conduction, and solar heat gains through building envelope components.
- Construction assemblies.
- Thermal mass (principles of passive solar design).

Comprehend Key Residential Energy Efficiency Design Concepts and Issues

Objectives 4: Describe mechanical and water heating design elements and explain how they affect energy design and efficiency.

Essential content in this objective may contain concepts such as:

- Mechanical Systems, equipment types and efficiencies.
- HERS measures for space conditioning systems.
- Water heating system types and efficiencies, and distribution systems.
- HERS measures for domestic hot water systems.

Comprehend Key Residential Energy Efficiency Design Concepts and Issues

Objectives 5: Describe lighting design elements and explain how they affect energy design and efficiency.

Essential content in this objective may contain concepts such as:

- Luminaire Efficacy (e.g. classification of high efficacy, screw-based and recessed luminaires, JA8 compliance).
- Mandatory residential indoor and outdoor lighting controls (e.g. dimmers, vacancy sensors, indoor vs. outdoor controls).

Comprehend Key Residential Energy Efficiency Design Concepts and Issues

Objectives 6: Explain what common building energy performance metrics measure, and what factors are included in calculation of these metrics.

Essential content in this objective may contain concepts such as:

- Site, Source, and TDV energy, Peak Demand.
- Energy cost factors and cost-effectiveness of energy measures.
- Energy Design Rating (EDR) NEW
  - EDR Index Score from 100 to 0
  - EDR compliance metric components: Efficiency EDR, Solar PV plus Flexibility EDR, and Total EDR

Comprehend Key Residential Energy Efficiency Design Concepts and Issues

Objectives 7: Describe renewable energy design elements and explain how they affect energy design and end-use energy consumption. NEW

Essential content in this objective may contain concepts such as:

- Solar Photovoltaic (PV) Systems. NEW
  - Battery storage NEW
- Solar Thermal Systems.

Sample Question

COMPLIANCE RESULTS	
01	Building Complies with Computer Performance
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.
03	This building incorporates one or more Special Features shown below

ENERGY USE SUMMARY				
04	05	06	07	08
Energy Use (kTDV/ft^2-yr)	Standard Design	Proposed Design	Compliance Margin	Percent Improvement
Space Heating	6.49	11.48	-4.99	-76.9%
Space Cooling	2.30	1.15	1.15	50.0%
IAQ Ventilation	1.16	1.16	0.00	0.0%
Water Heating	14.98	10.08	4.90	32.7%
Photovoltaic Offset	----	0.00	0.00	----
TOTAL	**24.93**	**23.87**	**1.06**	**4.3%**

A new home in climate zone 2 has a large number of windows (area is approximately 35 percent of the conditioned floor area). The energy use summary indicates a higher than standard heating energy use, while the cooling energy use is less than standard. The building is still in the design stage, and the owners have asked for recommendations to make the home more efficient. Other than reducing the amount of glass, what would be your recommendation for fenestration to address the negative space heating compliance margin?

a. Lower solar heat gain coefficient

b. Lower U-factor

c. Higher solar heat gain coefficient

d. Higher U-factor

Sample Question

A builder plans to construct a home in climate zone 12 that follows the Prescriptive Component Package requirements. Which duct location would provide the least amount of heat loss/gain through the ducts?

a. The ventilated attic

b. The roof

c. The conditioned space

d. The crawlspace

Where to find more information

Online Self-Study

- Residential and Nonresidential Energy Efficiency Concepts

Application Guides:

- Residential Envelope and Solar
- Residential HVAC and Plumbing
- Residential Lighting

Check Your Understanding

Where would I find information regarding mean radiant temperature and thermal comfort?

a. Residential and Nonresidential Energy Efficiency Concepts online self-study course

b. Residential Envelope and Solar Application Guide

c. ASHRAE Handbook Fundamentals

d. All of the above

Competency Two

Code Triggers

Conduct Initial Project Assessment and Determine How to Apply the 2019 California Building Energy Efficiency Standards

- Gather preliminary information from drawings, related documents, and the client to determine the nature and scope of the project; and determine how to apply the Standards in establishing the correct code requirements and the available energy compliance options.

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Competency Two

Conduct Initial Project Assessment and Determine How to Apply the 2019 California Building Energy Efficiency Standards

Objective 1: Explain scope and triggers for specified portions of the Title 24 Low-rise Residential Standards and the Federal and State Appliance Standards.

Essential content in this objective may contain concepts such as:

- Specific scope and triggers for low-rise residential buildings.
- Mandatory measures, Prescriptive and Performance approaches, Federal and State Appliance Standards.

Competency Two

Conduct Initial Project Assessment and Determine How to Apply the 2019 California Building Energy Efficiency Standards

Objective 2: Analyze information about a proposed project (e.g., drawings, related schedules and documents, information from client) to determine scope and key attributes.

Essential content in this objective may contain concepts such as:

- Project scope: new construction, addition, alteration, ADU, high rise vs. low rise, mixed use.
- Important building features (e.g. number of dwelling units, conditioned floor area, demising walls).
- Window/door schedule and mechanical schedule content.
- Site related information (e.g. front orientation and north arrow, site location, and climate zone).

Competency Two

Conduct Initial Project Assessment and Determine How to Apply the 2019 California Building Energy Efficiency Standards

Objective 3: Analyze proposed project information to determine which Standards apply, possible compliance options, strengths and weaknesses of compliance methods.

Essential content in this objective may contain concepts such as:

- Low-rise residential vs. high-rise residential, new construction, addition, alteration.
- Prescriptive vs. performance compliance options, all residential vs. mixed-use.

Competency Two

Conduct Initial Project Assessment and Determine How to Apply the 2019 California Building Energy Efficiency Standards

Objective 4: Review information about a proposed project (e.g., drawings, related schedules and documents, information from client) to determine key data about the building's envelope, mechanical and solar PV system components.

Essential content in this objective may contain concepts such as:

- Building orientation.
- Building component type, location, available fuel type, and specs.
- HVAC / Mechanical System(s) specs (e.g. equipment type and size, system zoning, duct location and R-value, IAQ and whole house fan).
- Water heater types, distribution and pipe insulation.
- Solar PV system specs. NEW
- Battery storage for PV specs, capacity (kWh) and controls.

Competency Two

Conduct Initial Project Assessment and Determine How to Apply the 2019 California Building Energy Efficiency Standards

Objective 5: Analyze proposed project information to determine if all data is correct and internally consistent, and whether relevant information is missing or incomplete.

Essential content in this objective may contain concepts such as:

- Correctly scaled/dimensioned drawings.
- Mechanical system efficiencies, water heater efficiencies.
- Existing conditions for an Existing + Addition + Alteration analysis.
- Inconsistencies within the drawings (e.g. windows shown in elevation not shown in plans or schedules).

Sample Question

When an existing split HVAC system is altered by replacing a furnace, are you required to replace the existing non-setback thermostat with a setback thermostat?

a. Yes, the existing non-setback thermostat must be replaced with a setback thermostat.

b. Yes, but only if the existing HVAC system has ducts in the attic space

c. No, the existing non-setback thermostat must be replaced only when the whole HVAC system is replaced.

d. No, if the existing HVAC system was installed prior to 1978

Ace Training™

Where to find more information

Online Self-Study

- Residential Standards & Technology for Building Envelope
- Residential Standards & Technology for HVAC
- Residential Standards & Technology for Water Heating
- Standards & Technology for Residential Lighting

Virtual Classroom

- Residential Standards for Energy Consultants

Resource Ace

- Residential Fact & Trigger Sheets

Check Your Understanding

Which sub-chapter in the 2019 Energy Standards contains mandatory insulation requirements specifically for low-rise residential buildings?

a. Sub-chapter 7
b. Sub-chapter 8
c. Sub-chapter 9
d. None of the above

Check Your Understanding

Which section in the 2019 Energy Standards includes requirements for the design and installation of all lighting systems, lighting controls, and equipment in low-rise residential multifamily dwelling units?

a. Section 110.9(e)
b. Section 130.0(b)
c. Section 140.6(a)
d. Section 150.0(k)

Competency Three

Project Assessment

Gathering and organizing all necessary input data for energy modeling

- Review drawings, specifications and information provided by the designer or client; gather, calculate and record all pertinent data to input into the energy modeling software.

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Competency Three

Gather, Calculate and Organize All Information Needed for Energy Modeling

Objective 1: Analyze a proposed project to determine pertinent data regarding HVAC systems and zones, including any HERS measures, to input into energy modeling software.

Essential content in this objective may contain concepts such as:

- Standard (typical) vs. special input values.
- How different systems serve different parts of the building, and strategies for modeling multiple HVAC systems.
- Assessment and verification of equipment efficiency data from CEC Appliance Efficiency Directory, AHRI Certification Directory, and/or other acceptable sources.
- Application of HERS verifications available for mechanical systems.
- The nature of plans, symbols, organization of plan sheets, location of data.
- Duct location and layout

Competency Three

Gather, Calculate and Organize All Information Needed for Energy Modeling

Objective 2: Analyze a proposed project to identify pertinent data regarding water heating system to input into energy modeling software.

Essential content in this objective may contain concepts such as:

- Standard (typical) vs. special input values.
- Assessment and verification of equipment efficiency data from CEC Appliance Efficiency Directory, AHRI Certification Directory, NEEA Advanced Water Heater Specification Qualified Products List, and/or other acceptable sources.
- Distribution details: pipe location(s), insulation, pumps, and controls.
- Application of HERS verifications available for water heating systems.

Competency Three

Gather, Calculate and Organize All Information Needed for Energy Modeling

Objective 3: Organize and perform zone-by-zone area take-offs in accordance with the scope, type, and compliance approach for the project.

Essential content in this objective may contain concepts such as:

- How HVAC zoning applies to a project, including zone area take-offs of envelope measures and, if applicable, as New/Existing/Altered.
- Zone types: Conditioned, unconditioned, indirectly conditioned.
- Relevant geometric data from plans, sections, elevations.
- Fenestration NFRC values, or CEC default values, located within each zone.
- Shading conditions located within each zone.
- Assessment of the fenestration details between the floor plan, elevations, and window schedule.

Competency Three

Gather, Calculate and Organize All Information Needed for Energy Modeling

Objective 4: Analyze take-offs for a proposed project to identify any relevant information that is missing or inconsistent.

Essential content in this objective may contain concepts such as:

- Determining when data is missing or inconsistent within the plans, and must be confirmed by the designer, contractor or owner.
- Determining appropriate default or alternative systems/components when missing from the plans.
- Identify missing system information.
- Identify missing assembly information.
- Identify missing PV system information. NEW

Sample Question

What is the minimum required continuous ventilation rate for a three bedroom, 1,800 ft^2 single-family house located in climate zone 11?

a. 36 cfm

b. 62 cfm

c. 84 cfm

d. 102 cfm

$$CFM = 0.03*A_{floor} + 7.5\ (N_{br} + 1)$$

Where: A_{floor} = CFA, N_{br} = Number of bedrooms

$$0.03*1800 + 7.5\ (3 + 1) = 54+30$$

Answer: 84 CFM

Where to find more information

On-demand

- Code & Coffee - Residential Modeling Series
- Decoding Attics and Walls: Let's Talk 2016 High Performance Requirements

Virtual Classroom

- Residential Analyzing the CF1R

Resource Ace

- Residential Fact & Trigger Sheets

Check Your Understanding

Which of the following sources may be used to determine the minimum heating and cooling equipment efficiencies for a 5 ton packaged heat pump unit?

a. AHRI Directory of Certified Product Performance

b. Modernized Appliance Efficiency Database System (MAEDBS)

c. Title 20 Appliance Efficiency Regulations

d. All of the above

Competency Four

Modeling and Troubleshooting Results

Modeling a building with approved energy compliance software

- Determine an appropriate modeling approach, understand the limitations of the energy model, recognize minimum mandatory requirements, and evaluate compliance results based on input vs. report. Determine the source of error(s), if any.

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Competency Four

Model a Building with Approved Energy Compliance Software

Objective 1: Assess a proposed project to determine appropriate structure and organization of inputs to state-approved modeling software.

Essential content in this objective may contain concepts such as:

- Input zones.
- Geometries and areas.
- JA4 construction assemblies, High performance attics, Interior surfaces/demising walls/partition walls.
- Fenestration U-factors and SHGC values, fixed shading.
- Typical HVAC systems.
- Typical DHW systems.
- Prescriptive Solar PV systems. NEW

Competency Four

Model a Building with Approved Energy Compliance Software

Objective 2: Determine how the Standard Design sets the energy budget for a proposed building based on the modeled envelope, HVAC, water heating and PV system.

Essential content in this objective may contain concepts such as:

- Table 150.1-A and Table 150.1-B Standard Building Design and ACM Manual.
- Building envelope features: opaque surfaces.
- Building envelope features: fenestration.
- HVAC equipment and ducts.
- Water heating: type and sizing and controls.
- Third party verification of existing conditions.
- Solar PV system

NEW

Competency Four

Model a Building with Approved Energy Compliance Software

Objective 3: Evaluate the results of a building energy model to determine whether the results shown in reports and on screen are reasonable.

Essential content in this objective may contain concepts such as:

- Where to find information on the CF1R.
- Reasonable TDV energy per square foot for Standard and Proposed designs.
- Reasonable EDR Compliance Metrics.
- Reasonable energy use distribution for different energy uses in Standard and Proposed designs.

Competency Four

Model a Building with Approved Energy Compliance Software

Objective 4: Compare the Certificate of Compliance (CF1R) and other relevant compliance forms to known or listed project information (e.g., drawings, schedules and other data from client) to determine any modeling or data entry errors.

Essential content in this objective may contain concepts such as:

- General Info, Compliance Results, Energy Design Rating, Energy Use Summary, Required Special Features, HERS Feature Summary.
- Building Features Information, Zone Information, Windows/Doors, Overhangs/Sidefins, Opaque Surface Constructions, Floors, HERS QII.
- Water Heating Systems, Space Conditioning Systems, IAQ (Indoor Air Quality) Fans, HERS Verifications.
- HVAC Heating & Cooling Loads Summary analysis.
- Solar PV system features, system output, azimuth, tilt, battery storage and controls

NEW

Competency Four

Model a Building with Approved Energy Compliance Software

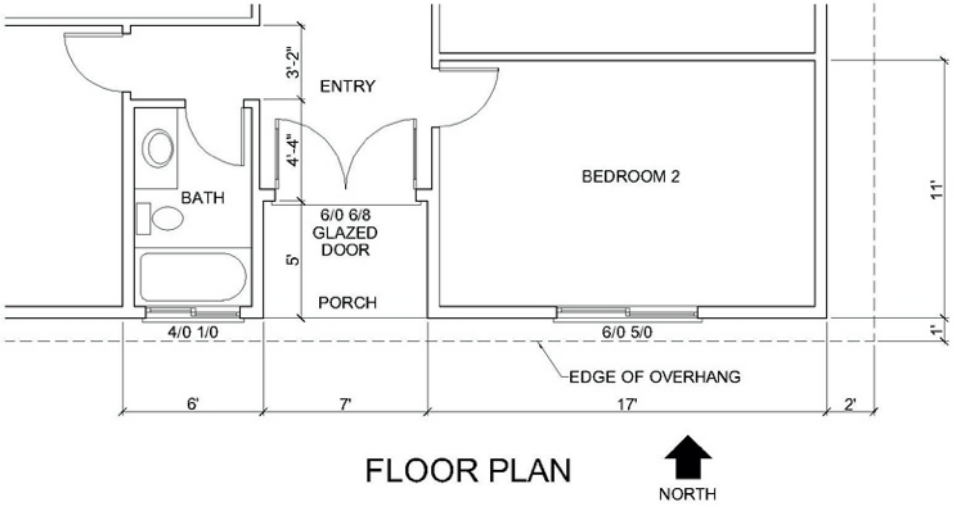
Objective 5: Identify the mandatory envelope, mechanical, water heating and lighting measures that apply to a given project modeled using the Performance Approach.

Essential content in this objective may contain concepts such as:

- Building Envelope mandatory measures.
- Space Conditioning, ducts and fans mandatory measures.
- Water Heating and hot water distribution mandatory measures.
- Lighting mandatory measures.

Sample Question

Based on the provided floor plan, which of the following correctly describes the permanent shading features on the south-facing 6/0 6/8 glazed door?



a. Overhang: 6′ depth. Left side-fin: 5′ depth, 0.25′ away from the side of the door. Right side-fin: 5′ depth, 0.25′ away from the side of the door.

b. Overhang: 7′ depth. Left side-fin: 5′ depth, 0.25′ away from the side of the door. Right side-fin: 5′ depth, 0.25′ away from the side of the door.

c. Left side-fin: 5′ depth, 0.25′ away from the side of the door. Right side-fin: 5′ depth, 0.25′ away from the side of the window.

d. Overhang: 6′ depth. Left side-din: 6′ depth, 0.5′ away from the side of the door. Right side-fin: 6′ depth, 0.5′ away from the side of the door.

Sample Question

You are working on an existing plus addition plus alteration analysis for a 650 ft2 addition to an existing 1,450 ft2 house in climate zone 3. The existing home was built in 1990 with what were then minimum prescriptive water heating and furnace efficiencies. The existing furnace system remains, but the original (existing) water heater is being replaced with a new tankless gas water heater. For extra compliance credit, the homeowner has selected HERS verification of the existing water heater efficiency.

ENERGY USE SUMMARY				
04	**05**	**06**	**07**	**08**
Energy Use (kTDV/ft^2-yr)	Standard Design	Proposed Design	Compliance Margin	Percent Improvement
Space Heating	31.25	28.78	2.47	7.9%
Space Cooling	2.02	2.16	-0.14	-6.9%
IAQ Ventilation	1.12	1.12	0.00	0.0%
Water Heating	14.14	14.14	0.00	0.0%
Photovoltaic Offset	----	0.00	0.00	----
TOTAL	**48.53**	**46.20**	**2.33**	4.8%

Which statement best describes the results for this project shown above?

a. The water heating was modeled incorrectly; the results are not as expected.

b. The water heating was modeled correctly; the results are as expected.

c. It is not possible to know whether the water heating change is modeled correctly.

d. HERS verification of the existing water heater is not allowed.

Where to find more information

On-demand

- Code & Coffee - Residential Modeling Series

Virtual Classroom

- Residential Modeling
- Residential Analyzing the CF1R
- Residential Modeling Tips

Traditional Classroom

- Beginning EnergyPro – Residential
- Advanced EnergyPro - Residential
- Intro CBECC-Res Modeling
- Advanced CBECC-Res Modeling

Check Your Understanding

Where would you find the performance approach Standard Design for an interior demising wall assembly U-factor for a single-family home in climate zone 4?

a. Residential Compliance Manual, Section 3.5.4 Wall Insulation

b. Residential ACM Reference Manual, Section 2.3.2 Construction Assemblies

c. Table 150.1-A – Prescriptive Component Package

d. All of the above

Competency Five

Energy Consulting

Consider recommendations for improving energy performance and comfort

- Use the knowledge of the project design and climate zone to make recommendations for improving energy performance to meet or exceed code.

Ace Training™

Competency Five

Consider Recommendations for Improving Energy Performance and Comfort

Objective 1: Evaluate the energy model for a proposed project to determine recommendations for improving envelope design to meet or exceed code.

Essential content in this objective may contain concepts such as:

- Areas of greatest potential for envelope design improvement with respect to total energy budget, conduction, convection and radiation.
- Wall, ceiling, and floor assembly U-factors, Insulation type and R-values, QII, advanced framing.
- Windows, doors, skylights, shading, orientation.
- Roof and attic design.

Competency Five

Consider Recommendations for Improving Energy Performance and Comfort

Objective 2: Evaluate the energy model for a proposed project to determine recommendations for improving HVAC and water heating systems to meet or exceed code.

Essential content in this objective may contain concepts such as:

- Areas of greatest potential for HVAC equipment design improvement.
- Areas of greatest potential for HVAC distribution design improvement.
- Areas of greatest potential for DHW equipment design improvement.
- Areas of greatest potential for DHW distribution design improvement.

Competency Five

Consider Recommendations for Improving Energy Performance and Comfort

Objective 3: For a given project, determine applicable HERS measures, the HERS registration and verification process, and the Installation Certificates and other documentation that must be completed after permit issuance.

Essential content in this objective may contain concepts such as:

- Optional vs. mandatory HERS measures.
- HVAC measures which require HERS field verification and diagnostic testing.
- DHW measures which require HERS field verification and diagnostic testing.
- Envelope measures which require HERS field verification and diagnostic testing.
- HERS providers, HERS raters and document registration.

Competency Five

Consider Recommendations for Improving Energy Performance and Comfort

Objective 4: Describe the general characteristics and requirements of local Tier 1 energy codes, various utility incentives, tax credits and other energy programs; and energy-related calculation methods other than the Title 24 performance approach.

Essential content in this objective may contain concepts such as:

- CEA certification requirements for funded incentive programs.
- Local energy and green building ordinances. Utility residential incentive programs.
- State and Federal Low-income Housing Tax Credits.
- CEC Solar Water Heating Calculator, or SRCC OG-100 and OG-300 rating approach for solar thermal hot water systems
- Evaluating site energy performance outside of standard Title 24 assumptions.

Competency Five

Consider Recommendations for Improving Energy Performance and Comfort

Objective 5: Evaluate the energy model for a proposed project to determine defensible recommendations for improving the solar PV system to meet or exceed code.

NEW

Essential content in this objective may contain concepts such as:

- Solar PV and Battery Storage system feasibility (annual solar access, increased/reduced PV system output).
- Areas of greatest potential for Solar PV and Battery Storage system improvement with respect to Solar PV + Flexibility EDR credit, Total EDR and Efficiency EDR.

Sample Question

HERS Verification Required

Which of the following performance credits requires HERS field verification?

a. Building Envelope Sealing

b. CRRC Certified Roofing

c. Attic Radiant Barrier

d. All of the above

Where to find more information

On-demand

- California Multi-Family New Homes & California Advanced Homes Program YouTube Channel
- **Other Reference Material**
- 2019 Residential ACM Reference Manual and Residential Appendices
- Build It Green - Builder Handbook: Guide to Achieving a GreenPoint Rating
- USGBC - LEED for Homes California v2008

Presentation Schedule

Welcome

- Welcome
- Questions and Concerns
- About the Exam

Multiple-choice Exam

- Exam Structure
- Exam Competencies and Objectives
- Sample Questions

ACM Exam

- Exam Structure and Tips
- Modeling Demonstration and Practice
- Common Modeling Mistakes

Wrap-up

- Before the Exam
- During the Exam
- Q&A and Wrap Up

Test-taking Tips

Preparation for the Exam

- Bring the resources and reference you typically use on the job.

  Although you cannot use online resources during the exam (other than energycodeace.com), you CAN use quick look-up sheets and annotated reference materials you typically use to save you time on the job.

- Get familiar with using the available resources

Test-taking Tips

During the Multiple Choice Exam

- When you first receive your test, do NOT scan of the entire test, just start with the first question
- Pace yourself, don't rush
- Read the question and ALL the answer choices, then re-read the question before choosing an answer
- Avoid watching for patterns
- If you don't know an answer, skip it. Come back after you finish the remaining questions
- When you have answered all the questions, don’t rush to leave

Wrap-Up

Thank you!

For more information or to provide feedback...

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