CABEC

Residential Certified Energy Analyst (CEA)
Under the 2013 Energy Standards

CEA Competency 2

Third in a six-part series

California Association of Building Energy Consultants

Recorded & brought to you by..

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GABEL ASSOCIATES, LLC
BUILDING ENERGY ANALYSIS & ENERGY CODE COMPLIANCE

California Statewide Codes & Standards

EnergyCode Ace™
Helping you play your cards right

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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.

Welcome

- **Welcome**
- 2.1 Scope and triggers for Residential Standards
- 2.2 Assess nature and scope of proposed project
- 2.3 Application of Standards to proposed project
- 2.4 Review project drawings and specifications
- 2.5 Analyze project for missing or incorrect data
- Wrap Up

CEA Competency Two

Conduct Initial Project Assessment and Determine How to Apply the 2013 California Building Energy Efficiency Standards

2

Code Triggers

Correct application of the 2013 Standards based on the project's permitted scope of work

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.

- Pop-Up Resource!

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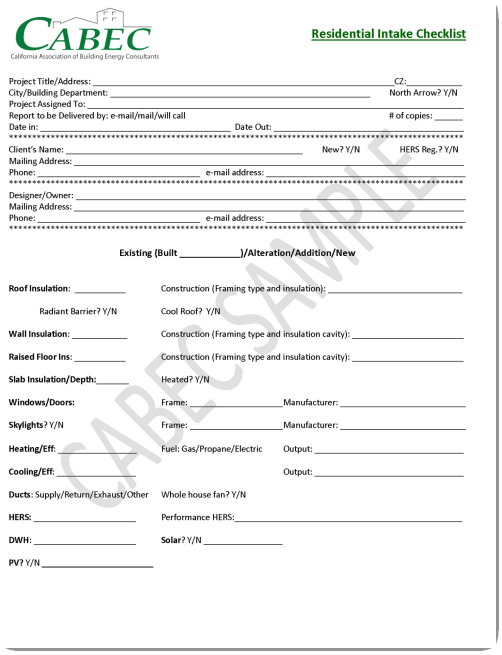
CABEC Intake Checklist



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Residential Intake Checklist

Project Title/Address: _____ CZ: _____
City/Building Department: _____ North Arrow? Y/N
Project Assigned To: _____
Report to be Delivered by: e-mail/mail/will call # of copies: _____
Date in: _____ Date Out: _____

Client's Name: _____ New? Y/N HERS Reg.? Y/N
Mailing Address: _____
Phone: _____ e-mail address: _____

Designer/Owner: _____
Mailing Address: _____
Phone: _____ e-mail address: _____

Existing (Built _____)/Alteration/Addition/New

Roof Insulation: _____ Construction (Framing type and insulation): _____
Radiant Barrier? Y/N Cool Roof? Y/N
Wall Insulation: _____ Construction (Framing type and insulation cavity): _____
Raised Floor Ins: _____ Construction (Framing type and insulation cavity): _____
Slab Insulation/Depth:_____ Heated? Y/N
Windows/Doors: Frame: _____ Manufacturer: _____
Skylights? Y/N Frame: _____ Manufacturer: _____
Heating/Eff: _____ Fuel: Gas/Propane/Electric Output: _____
Cooling/Eff: _____ Output: _____
Ducts: Supply/Return/Exhaust/Other Whole house fan? Y/N
HERS: _____ Performance HERS: _____
DWH: _____ **Solar**? Y/N _____
PV? Y/N _____

CABEC SAMPLE

- This resource was created for you by CABEC as a tool for project intake
  - This can be found at www.cabec.org

2.1 Scope and triggers

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2 Code Triggers

- Welcome
- **▶2.1 Scope and triggers for Residential Standards**
- 2.2 Assess nature and scope of proposed project
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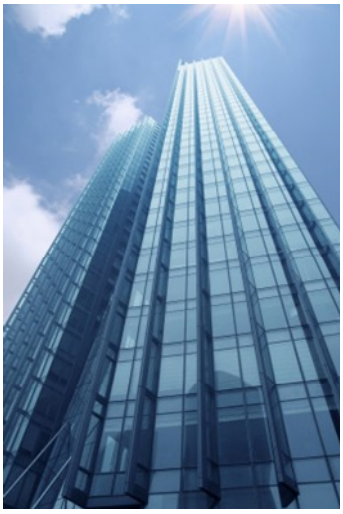
Competency 2.1

2.1 Understand the scope, structure and triggers for Title 24 Part 6 Low-rise and High-rise Residential Standards; and applicable federal and state appliance standards

- Low-rise vs. high-rise occupancies and triggers
- Applicable mandatory measures
- Federal and state appliance standards
- Prescriptive and Performance approaches

2.1 Scope and Triggers



Low-rise vs. high-rise occupancies and triggers

- Scope of the Standards
- Definition of low-rise vs. high-rise occupancies
  - How many dwelling units?
  - How many conditioned stories?
- Single family vs. multifamily
  - A few different prescriptive requirements
  - Different performance modeling inputs and HERS measures

- www.energy.ca.gov/title24/2013standards/index.html
  - 2013 Energy Standards: Section 100.0 (Scope) and 100.1 (Definitions)
  - 2013 Residential Manual

continued.. 2.1 Scope and Triggers

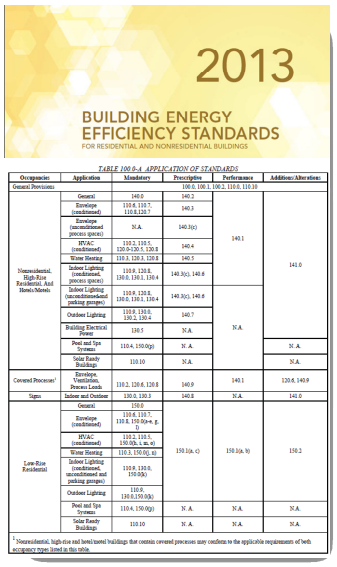


TABLE 100.0-A APPLICATION OF STANDARDS

Occupancies	Application	Mandatory	Prescriptive	Performance	Additions/Alterations
General Provisions			100.0, 100.1, 100.2, 110.0, 110.10		
Nonresidential, High-Rise Residential, And Hotels/Motels	General	140.0	140.2	140.1	141.0
	Envelope (conditioned)	110.6, 110.7, 110.8,120.7	140.3		
	Envelope (unconditioned process spaces)	N.A.	140.3(c)		
	HVAC (conditioned)	110.2, 110.5, 120.0-120.5, 120.8	140.4		
	Water Heating	110.3, 120.3, 120.8	140.5		
	Indoor Lighting (conditioned, process spaces)	110.9, 120.0, 130.0, 130.1, 130.4	140.3(c), 140.6		
	Indoor Lighting (unconditioned and parking garages)	110.9, 120.0, 130.0, 130.1, 130.4	140.3(c), 140.6	N.A.	
	Outdoor Lighting	110.9, 130.0, 130.2, 130.4	140.7		
	Building Electrical Power	130.5	N.A.		
	Pool and Spa Systems	110.4, 150.0(p)	N. A.		N. A.
	Solar Ready Buildings	110.10	N.A.		N.A.
Covered Processes[1]	Envelope, Ventilation, Process Loads	110.2, 120.6, 120.8	140.9	140.1	120.6, 140.9
Signs	Indoor and Outdoor	130.0, 130.5	140.8	N.A.	141.0
Low-Rise Residential	General	150.0	150.1(a, c)	150.1(a, b)	150.2
	Envelope (conditioned)	110.6, 110.7, 110.8, 150.0(a-e, g, l)			
	HVAC (conditioned)	110.2, 110.5, 150.0(h, i, m, o)			
	Water Heating	110.3, 150.0(j, n)			
	Indoor Lighting (conditioned and parking garages)	110.9, 150.0, 150.0(k)			
	Outdoor Lighting	110.9, 130.0,150.0(k)			
	Pool and Spa Systems	110.4, 150.0(p)	N. A.	N.A.	N.A.
	Solar Ready Buildings	110.10	N. A.	N.A.	N.A.

[1] Nonresidential, high-rise and hotel/motel buildings that contain covered processes may conform to the applicable requirements of both occupancy types listed in this table.

Applicable mandatory measures

- Which measures apply to both low-rise and high-rise residential?
  - Application of Standards
- Which apply to low-rise residential only?
- Which apply to high-rise residential (and nonresidential) only?

- www.energy.ca.gov/title24/2013standards/index.html

Check Your Understanding

Are low-rise and high-rise residential energy standards the exact same for envelope, lighting and mechanical for the actual dwelling unit?

a. Envelope = no; lighting = no ; mechanical = no
b. Envelope = no; lighting = yes ; mechanical = no
c. Envelope = yes; lighting = yes ; mechanical = no
d. Envelope = yes; lighting = yes ; mechanical = yes

Sample CEA Exam Question

When an existing split HVAC system is altered by replacing a heating coil, 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

2.2 Assess Nature and Scope

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2 Code Triggers

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- 2.1 Scope and triggers for Residential Standards
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Competency 2.2

2.2 Analyze proposed project information, schedules and drawings to determine the scope of work and key attributes that affect energy code compliance.

- New construction, addition and/or alteration
- Number of dwelling units and habitable stories
- Front orientation, north arrow, site location and climate zone
- Conditioned vs. unconditioned space
- Nonresidential occupancies within the building

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2.2 Assess Nature and Scope

New Construction, Addition, Alterations

- New construction
  - All new building(s)?
  - New conditioned pool house in the back yard?
  - Complete rebuild after a fire?
- Addition vs. Alteration
  - Additions
    - Adding conditioned floor area and volume?
    - Legalizing an existing space?
  - Alterations
    - Data available on existing conditions to be altered or existing to remain?

- 2013 Energy Standards: Definitions (Section 100.1)
- 2013 Residential Compliance Manual: Chapter 9 (Additions/alterations)

cont.. 2.2 Assess Nature and Scope

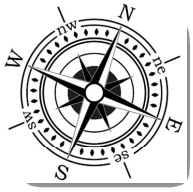
Dwelling Units and Habitable Stories

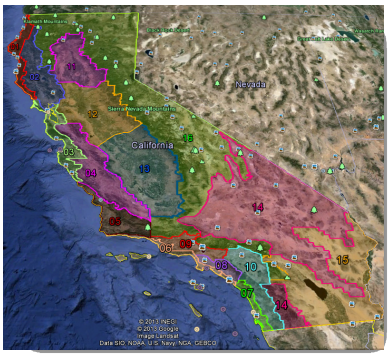
- Number of dwelling units / number of stories:
  - Single family vs. multifamily most likely affect performance modeling inputs

- Low-rise buildings: Any single family or duplex (no limit on # of stories)
- High-rise buildings: Multifamily (with 3 or more dwelling units) AND 4-story (or more) building

- 2013 Residential Manual
- 2013 Residential Alternative Calculation Method (ACM) Manual

cont.. 2.2 Assess Nature and Scope





Location Location Location

- Site address? Jurisdiction?
- "Front" of the building?
- True north?
- Climate zone
  - Climate Zone Google Earth overlay
  - http://www.energy.ca.gov/maps/renewable/building_climate_zones.html

- http://www.energy.ca.gov/maps/renewable/building_climate_zones.html

cont.. 2.2 Assess Nature and Scope

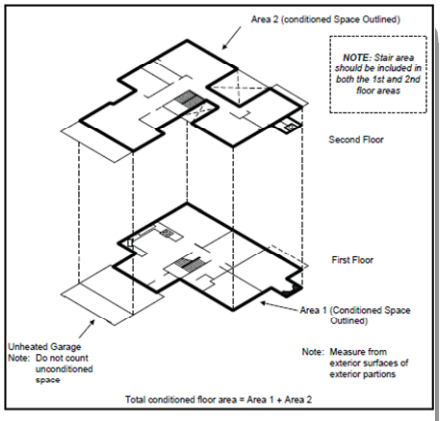


Figure 1-2 – Total Conditioned Floor Area

Conditioned vs. Unconditioned Space

- Conditioned vs. unconditioned space
  - Remember: Conditioned includes both Directly *and* Indirectly Conditioned Spaces
- Conditioned Floor Area (CFA)
  - What *is* it?
  - What does it effect?
  - Impacts to prescriptive "addition alone" compliance options

- 2013 Energy Standards: Definitions (Section 100.1)
- 2013 Residential Manual: Chapter 3 (Envelope) and 9 (Additions)
- Energy Code Ace: Residential Fenestration Factsheet and training "Residential Standard Essentials for the Energy Consultant"

cont.. 2.2 Assess Nature and Scope

Nonresidential Occupancies in the Building

- In multifamily buildings may trigger:
  - Nonresidential indoor lighting requirements (i.e. lobby, meeting room, laundry room, storage, manager's office, hallways)
  - Outdoor lighting may trigger some nonresidential outdoor lighting requirements
  - Nonresidential envelope and/or mechanical requirements if ≥ 20% of floor area or high rise

- 2013 Residential Manual:
  - Chapter 6 (Lighting)
  - Chapter 8.4 (Mixed occupancy)

Check Your Understanding

What space does NOT typically trigger envelope and mechanical energy requirements?

a. Living room
b. Hallway
c. Garage
d. All of the above

2.3 Application of Standards

2 Code Triggers

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Competency 2.3

2.3 Analyze proposed project information to determine which Standards apply, possible compliance paths and strengths and weaknesses of those paths.

- Review of key project attributes and applicable mandatory measures
- Assessment of prescriptive options
- Assessment of performance options

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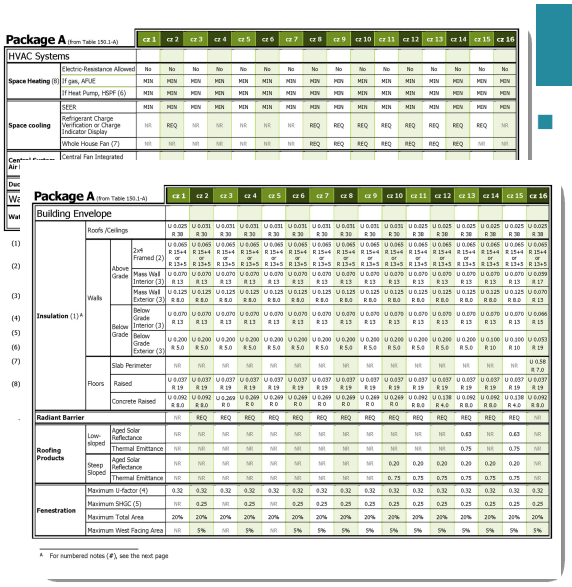
2.3 Application of Standards

Review of Key Project Attributes and Mandatory Measures

- Which set(s) of Standards are triggered?
- Some relevant questions:
  - Will proposed fenestration U-factors meet the 0.58 mandatory U-factor?
  - Does the new glazing area seem relatively large?
  - Are altered or new insulation values indicated?
  - Are there opportunities for new high efficiency HVAC and/or water heaters?
- Will duct sealing and testing be triggered?

- Energy Pro: MF1R
- CEC: CF2R

cont..2.3 Application of Standards

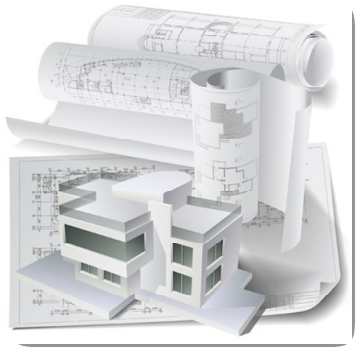


Prescriptive Approach

- What are the prescriptive options available? (see Sections 150.1(c), 150.2(a)1, and 150.2(b)1)
  - Is there one (or more than one) proposed feature that eliminates all prescriptive paths?
  - Are there any Exceptions that make a prescriptive path viable?
  - What sort of design changes are needed for a prescriptive path to work?

- 2013 Energy Standards: Section 150.1 (Prescriptive Package A)
- Energy Code Ace: Training "Residential Standard Essentials for the Energy Consultant"

cont..2.3 Application of Standards



- 2013 Residential Manual
  - Chapter 8 (Performance)
  - Chapter 9 (Additions and alterations)
- 2013 ACM Manual

Performance Approach

- New Construction
  - Single family custom home
  - Subdivision: All four orientation method?
  - Multifamily:
    - Whole building approach?
    - Unit-by-unit approach?
- Additions
  - Addition alone or as existing + addition + alteration (E+A+A)?
- Alterations
  - With or without HERS verified existing conditions?

Check Your Understanding

When a new home has more than 20% fenestration to conditioned floor area ratio, which compliance method must be pursued?

a. Prescriptive new home

b. Performance new home

c. Prescriptive addition alone

d. Performance addition alone

2.4 Drawings and Specifications

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2 Code Triggers

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Competency 2.4

2.4 Review project information to determine key envelope, mechanical and water heating data.

- Building and "Front" orientation, climate zone (discussed previously)
- Construction assemblies and thermal mass
- Fenestration types, schedule, fixed shading
- HVAC types, efficiencies, zoning, duct locations
- Water heater types, distribution system

2.4 Drawings and Specs

Initial Look at Construction Assemblies (Existing, altered and new)

- Roofs
  - Type:
    - Attic (vented or unvented)
    - Rafter (flat or sloped)
  - Slope < or > 2:12 may affect cool roof requirement
  - Framing material (wood, metal, other) and spacing
  - Insulation:
    - Type (i.e. cavity, continuous)
    - Location (at roof or ceiling)

- 2013 Energy Standards: Section 150.1 (Prescriptive Package A)
- Energy Code Ace: Training "Residential Standard Essentials for the Energy Consultant"

Continued... 2.4 Drawings and Specs

Initial Look at Construction Assemblies (Existing, altered and new)

- Exterior Walls:
  - Type (i.e. framed, mass)
  - Framing
  - Insulation
- Floors:
  - Type (i.e. raised, heated or unheated slab on grade)
  - Framing
  - Insulation

- 2013 Energy Standards: Section 150.1 (Prescriptive Package A)
- Energy Code Ace: Training "Residential Standard Essentials for the Energy Consultant"

Continued...

2.4 Drawings and Specs

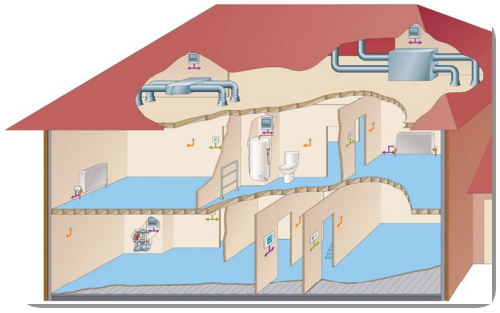
Initial Look at Fenestration (Existing, altered and new)

- Types
  - Windows, glass doors, skylights
  - Glass, frame and operator types
  - NFRC ratings or not? Manufacturer and product line selected?
- Schedules
  - Sash or nominal dimensions indicated?
- Fixed Shading
  - Overhangs and side fins

- 2013 Energy Standards: Section 150.1 (Prescriptive Package A)
- Energy Code Ace: Training "Residential Standard Essentials for the Energy Consultant"

Continued...

2.4 Drawings and Specs



Initial Look at HVAC Systems (Existing, altered and new)

- Heating system type(s) and efficiency
- Cooling system type(s) and efficiency
- Zoning if more than one
- For ducted systems: duct location(s)
- All the above for existing, altered and new

- 2013 Energy Standards: Section 150.1 (Prescriptive Package A)
- Energy Code Ace: Training "Residential Standard Essentials for the Energy Consultant"

Continued…

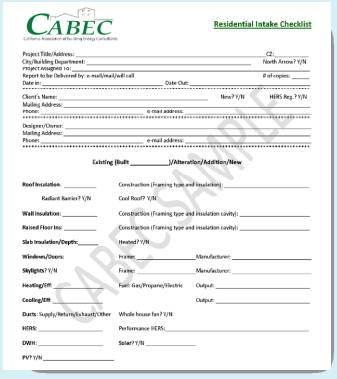
2.4 Drawings and Specs

Initial Look at Water Heating Systems (Existing, altered and new)

- Water heating system type(s) and efficiency
- Distribution system type(s)
- If more than one water heater: areas of the building served by each

- 2013 Energy Standards: Section 150.1 (Prescriptive Package A)
- Energy Code Ace: Training "Residential Standard Essentials for the Energy Consultant"

Check Your Understanding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Residential Intake Checklist

When gathering information on a project, what is the most important piece of information?

a. Address and orientation
b. Building assemblies
c. HVAC equipment and distribution
d. All of the above

2.5 Missing or Incorrect Data

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Competency 2.5

2.5

Review and analyze project information to determine if data and drawings are accurate and internally consistent; whether relevant information is missing or incomplete.

Then communicate with your client to fill in gaps or resolve inconsistencies.

- Correctly scaled and dimensioned drawings?
- Inconsistencies within the drawings?
- Presence of NFRC ratings?
- Mechanical and water heating efficiencies listed?
- For an E+A+A analysis: is it clear what is existing to remain, existing to be altered or an all new component or system?

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Wrap Up

2 Code Triggers

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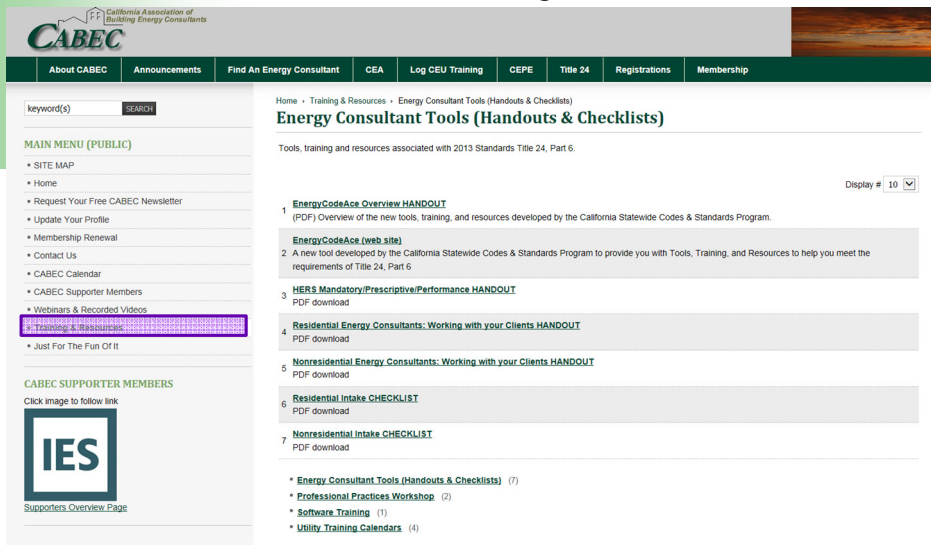
▶**Wrap Up**

Study resources

CABEC **www.cabec.org**

- Recorded webinars on 2013 Energy Standards
- Residential: Working With Your Clients HANDOUT



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Study resources

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- Resources

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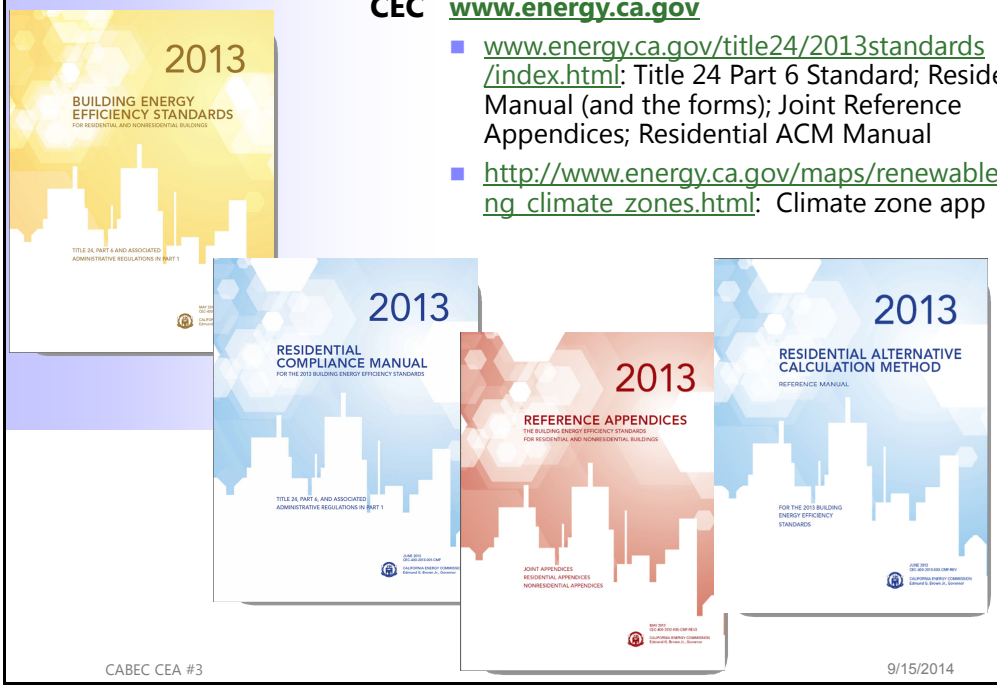
visit us at
www.EnergyCodeAce.com

Study resources

CEC **www.energy.ca.gov**

- www.energy.ca.gov/title24/2013standards/index.html: Title 24 Part 6 Standard; Residential Manual (and the forms); Joint Reference Appendices; Residential ACM Manual
- http://www.energy.ca.gov/maps/renewable/building_climate_zones.html: Climate zone app



What's Next…

3 Gathering and organizing all necessary input data for energy modeling

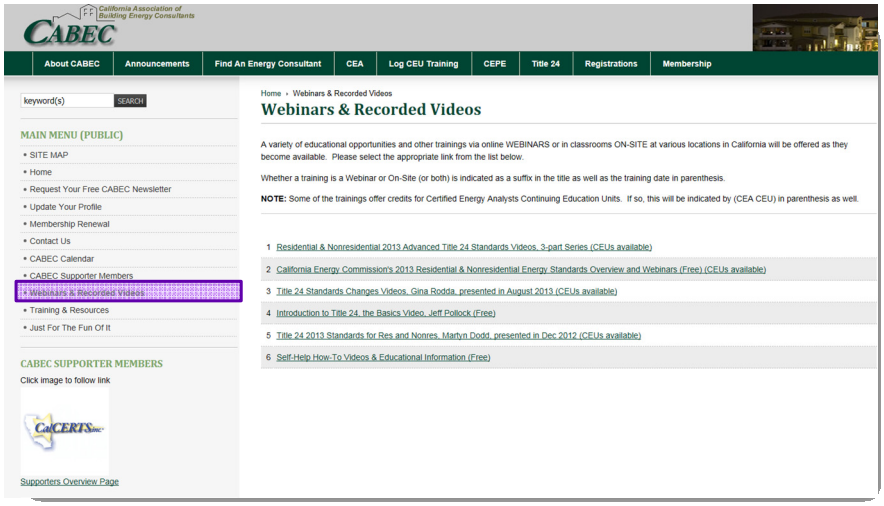
4 Creating an accurate energy model, and trouble-shooting when results do not make sense

5 Interpreting energy performance results and making design recommendations

CABEC CEA Presentations

Where can I find them?

- www.cabec.org
- You can find the recordings and handouts (in PDF format) on the CABEC website under "Webinars & Recorded Videos".



Sample CEA Exam Question

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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

CEA Competencies