



Unit two: Title 24 Energy Standards

Lesson #1: Past, Present & Future of the California Energy Code (3 class periods)

Objectives

Students will be able to...

- Understand the history and intent of the California Energy Code.
- Understand the future goals for California's Energy Code and its impact on the construction industry.
- Describe the difference between Mandatory, Prescriptive, and Performance requirements.

Standards

LS11-12.6
RSIT 11-12.2
Technology 4.1, 4.2, 4.3,
Problem Solving and Critical Thinking 5.1, 5.2, 5.3, 5.4
Health and Safety 6.3, 6.6,
Ethics and legal responsibilities 8.1,
Leadership and Teamwork 9.1, 9.2, 9.3
Technical Knowledge and Skills 10.1, 10.2, 10.3, 10.4
Demonstration and Application 11.1

Materials

- Internet or other resource for instruction
 - Slides from the Train-the-trainer presentation
 - Slides 13-34 and 51-67, some will apply to other learning objectives for this year.
 - California's Long-Term Energy Efficiency Strategic Plan- summary sheet
 - Source:
<https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5304>
- Additional internet resources for background information or specific inquiries
 - California's Long Term Energy Efficiency Strategic Plan- multiple resources at landing page- <https://www.cpuc.ca.gov/General.aspx?id=4125>
 - Title 24 Part 6- <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency>

- Title 24 Part 11
https://codes.iccsafe.org/content/document/658?site_type=public
- Title 20- <https://www.energy.ca.gov/rules-and-regulations/appliance-efficiency-regulations-title-20>
- Energy Code Ace- multiple Energy Code references including Reference Ace (a cross referenced, hyperlinked tool for simple searching across multiple code sources), Fact Sheets, and online trainings and lectures-
 - Website - <https://energycodeace.com>
 - 2019 Reference Ace - <https://energycodeace.com/content/reference-ace-2019-tool>

Resources - <https://energycodeace.com/resources>

Lesson Sequence

• Lecture

- History of the Energy Code
 - 1973 Oil Embargo / Warren-Alquist Act / 1978 First Energy Code / Triannual updates- working under 2019 code by time course is delivered
 - Note that the 2019 Code will be effective January 1, 2020 and any project submitted for plan check after that date will have to comply with the updated standards
- Applicable Code references
 - Title 24, Part 6- Building Efficiency Standards for Residential and Nonresidential Buildings (California Energy Code)
 - Regulates building energy use and are categorized into residential and nonresidential building types
 - Title 24, Part 6 is divided into 9 subchapters
 - 1-2 All occupancies
 - 3-6 Nonresidential, High-Rise Residential, and Hotel/Motel Occupancies
 - 7-9 Low-Rise Residential
 - Energy Standards establish the energy budget for most new buildings, additions and altered existing buildings
 - See Train the trainer PPT slides 24-30
 - Supplemental materials such as Appendices, Compliance Manuals, and others related to energy modeling are also available and can help clarify requirements listed in the Energy Code
 - Title 24, Part 11- California Green Building Standards Code (CalGREEN)
 - The purpose of CalGREEN is to improve public health, safety and general welfare through enhanced design and construction of buildings using concepts that reduce negative impacts and

- promote those principles that have a positive environmental impact and encourage sustainable construction practices.
- To be used in conjunction with all parts of Title 24, including the Energy Code
- Title 20- Appliance Efficiency Regulations
 - Outlines applicable requirements for the efficiency, testing, and certification of appliance for sale or installation in California.
 - Includes products that use electricity or water, such as:
 - Air conditioners, heaters, and fans
 - Clothes washers and dryers
 - Dishwashers
 - Lighting Products
 - Plumbing fittings and fixtures
 - Pool and spa equipment
 - Refrigerators and freezers
 - Televisions and consumer audio and video equipment
 - Water heaters
 - Requires the maintenance of a database of all appliances that have been certified for sale or installation in California
 - If the appliance is not on the list, it has not been approved
 - Modernized Appliance Efficiency Database System (MAEDBS) www.appliances.energy.ca.gov
- Current New Construction Residential Energy Code requirements
 - Mandatory Requirements- Title 24, Part 6, §150.0
 - Measures identified by building science as always cost effective in any building in any climate zone in California. These minimum equipment efficiencies and building assembly requirements must be met or exceeded in every project.
 - These are the “worst” allowed options and will not comply with the Energy Code using the prescriptive method. The performance path will be required.
 - Prescriptive Requirements- Title 24, Part 6, §150.1
 - Based on climate zone, these requirements have been determined to be the most optimized and cost-effective measures for that zone.
 - The prescriptive requirements set the baseline for Energy Code compliance in a given climate zone. If any measure falls below this standard, the prescriptive path cannot be used, and a performance calculation must be done.
 - This is a checklist approach to compliance- each item must meet or exceed the requirement in order to proceed as a prescriptive project

- The prescriptive requirements are the focus of this module, and students will be guided to design assemblies that comply with the prescriptive requirements for high performance walls and attics.
- Performance Options- Title 24, Part 6, §150.1
 - Offers flexibility by allowing building customization while safeguarding that minimum measures are at least met, and quantifying level of design performance compared to a building using the prescriptive requirements.
 - Allows a “give and take” method of building compliance by allowing less efficient building features to be used by increasing the efficiency of other features, so long as the overall energy use of the building is less than or equal to a prescriptive project
 - This method is not going to be emphasized as these concepts require a larger understanding of building science, energy modeling, and Code requirements that are outside the scope of the BITA program.
- Future Goals
 - Zero Net Energy (ZNE)- A term typically applied to a building with a net energy consumption of zero over a typical year. ZNE buildings generally have on-site solar photovoltaic panels with or without a battery storage solution. Generally, these buildings will export electricity to the grid when there is a surplus, and draw power from the grid when not enough electricity is being produced.
 - Residential ZNE by 2020, Commercial ZNE by 2030
 - Greenhouse gas emissions reduction
 - Greenhouse gases are those gases that absorb and emit radiant energy within the thermal infrared range.
 - These gases trap heat by letting sunlight pass through the atmosphere but prevent the heat that the sunlight brings from leaving the atmosphere.
 - Some examples of greenhouse gases
 - Carbon dioxide
 - Methane
 - Ozone
 - Nitrous oxide
 - Chlorofluorocarbons
 - Water vapor
 - Increased renewable energy resources (such as)
 - Solar
 - Wind
 - Biomass
 - Geothermal
 - Hydroelectric

- Impact on construction industry
 - Alternative construction materials and design, green jobs, emerging technologies, workforce education and training
 - Train the trainer presentation has a good list of career options

Assessment

California Energy Codes Quiz

Accommodations/Modifications

One on one support
Peer support
Highlight important material
Extra time if needed

California Energy Codes Quiz

1. Applicable mandatory requirements must always be met or exceeded.
 - a. Never
 - b. Sometimes
 - c. Always
 - d. Depends on the Climate Zone

2. The prescriptive approach for compliance with the Energy Code requires each specific measure (feature) to be met or exceeded.
 - a. Never
 - b. Sometimes
 - c. Always
 - d. Depends on the Climate Zone

3. The California Building Energy Efficiency Standards are updated how often?
 - a. Every year
 - b. Every two years
 - c. Every three years
 - d. Every four years

4. The California Title 24 Building Energy Efficiency Standards are in which of the following parts?
 - a. Part 2
 - b. Part 4
 - c. Part 6
 - d. Part 8

5. What year did California's first Energy Code go into effect?
 - a. 1972
 - b. 1978
 - c. 1985
 - d. 2001

6. California's Appliances Efficiency regulations can be found in which of the following regulations?
 - a. Title 20
 - b. Title 22
 - c. Title 24
 - d. None of the above

7. California's Green Building Code (CalGREEN) can be found in which of the following regulations?

- a. Title 20, Part 6
 - b. Title 24, Part 6
 - c. Title 20, Part 11
 - d. Title 24, Part 11
8. Which of the following is the Energy Code primary purpose?
- a. Reduce peak energy use
 - b. Provide cost-effective building energy regulations
 - c. Increase renewable energy use
 - d. All of the above
9. Which of the following is NOT regulated under California's Energy Code??
- a. Residential single-family new construction
 - b. Hotel addition
 - c. High-rise apartment building lighting system alteration
 - d. None of the above
10. Which of the following appliances are NOT regulated under the Title 20 Appliance Efficiency Regulations?
- a. Air conditioners
 - b. Water heaters
 - c. Ice chests
 - d. Televisions

California Energy Codes Quiz-Answers

1. C
2. D
3. C
4. C
5. B
6. A
7. D
8. D
9. D
10. C