



2019 Energy Code

Nonresidential Building Commissioning

- California Energy Commission, Efficiency Division
- Kelly Morairty, February 2021



QUESTIONS...

- **If you have questions, please feel free to ask at anytime:**
 - During class
 - End of class
 - After class





Goals for this Training

- **Understand CEC requirements on building commissioning**
- **Identify requirements based on building area and equipment type**
 - Signature requirements
 - Which commissioning items apply
- **Gain general understanding of commissioning items**
- **Understand when commissioning items needs to be completed**

Source: <https://www.fortunebuilders.com/real-estate-goals/>





Energy Code Background

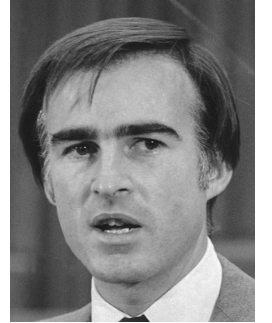
CALIFORNIA ENERGY COMMISSION WARREN-ALQUIST BUILDING



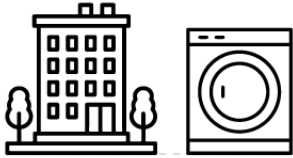
Source: http://www.durabilityanddesign.com/news/?fuseaction=view&id=7805&nl_versionid=2060



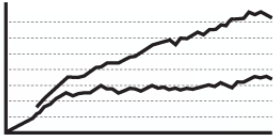
1974: WARREN-ALQUIST ACT PASSED



Created the Energy Commission



Set building and appliance efficiency standards



Forecast electricity demand

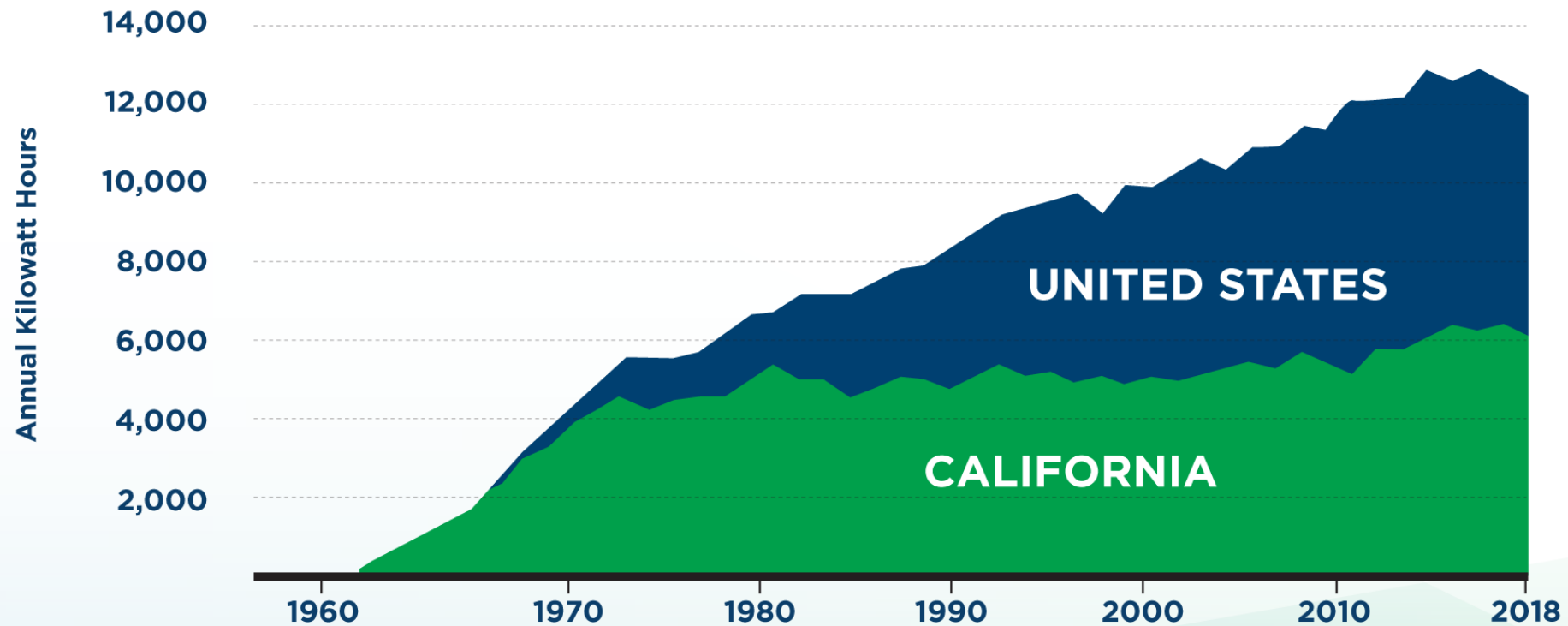


Support R&D into non-conventional energy sources



CA VS. U.S. ENERGY USE

Californians use **half** the per capita electricity as the rest of the U.S.



Source: California Energy Commission



2019 Documents

- Building Energy Efficiency Standards
- Residential Compliance Manual
- Nonresidential Compliance Manual
- Reference Appendices
- All docs available online at:

www.energy.ca.gov/title24

The screenshot shows the California Energy Commission website. The header includes the state seal, the text 'CALIFORNIA ENERGY COMMISSION', and a search bar. A navigation menu contains links for HOME, PROCEEDINGS, RULES AND REGULATIONS, PROGRAMS AND TOPICS (selected), FUNDING, DATA AND REPORTS, and SHOWCASE. A breadcrumb trail reads: California Energy Commission > Programs and Topics > All Programs > Building Energy Efficiency Standards - Title 24 > 2019 Building Energy Efficiency Standards.

2019 Building Energy Efficiency Standards

The 2019 Building Energy Efficiency Standards improve upon the 2016 Energy Standards for new construction of, and additions and alterations to, residential and nonresidential buildings. Buildings whose permit applications are dated on or after January 1, 2020, must comply with the 2019 Standards. The California Energy Commission updates the standards every three years.

Expand All

2019 Building Energy Efficiency Standards and Compliance Manuals	+
2019 Compliance Forms	+
Worksheets	+
2019 Compliance Software and Alternative Calculation Method (ACM) Manuals	+
2019 Building Energy Efficiency Standards Rulemaking Documents	+

BUILDING ENERGY EFFICIENCY STANDARDS - TITLE 24

- 2022 Building Energy Efficiency Standards
- Climate Zone tool, maps, and information supporting the California Energy Code
- 2019 Building Energy Efficiency Standards**
 - 2019 Building Energy Efficiency Standards Approved Computer Compliance Programs
- 2016 Building Energy Efficiency Standards
- Online Resource Center
- Solar Assessment Tools
- Past Building Energy Efficiency Standards

CONTACT

[Building Energy Efficiency Standards - Title 24](#)

Toll-free in California: 800-772-3300
Outside California: 916-654-5106

SUBSCRIBE



Energy Code Requirements



- **Mandatory measures**

- Minimum efficiency requirements must always be met
- Can never be traded off



- **Prescriptive measures**

- Predefined efficiency requirements
- May supersede mandatory measures
- Different requirements for newly constructed buildings, additions, and alterations



Source: <http://clipart-library.com/clipart/864003.htm>



Compliance Approaches



• Prescriptive Approach

- Simple approach, no trade-offs
- Each building component (LTG, ENV, MCH) must meet specific requirements
- Standard building baseline



• Performance Approach

- Most flexible approach, allows for trade-offs
- Must meet all mandatory requirements
- Requires the use of CEC-approved software



Source: California Energy Commission Video



§120.8

Mandatory Requirements for Nonresidential Building Commissioning



What is “Building Commissioning?”



- **Code §100.1 Definitions:**

- Building Commissioning:

- Systematic quality assurance process that spans the entire design and construction process including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner’s project requirements



Source:
https://classroomclipart.com/clipart-view/Clipart/People/man-scratching-head-with-question-clipart_jpg.htm

Source: <https://thecodecoach.blogspot.com/2016/06/the-5-documents-commissioning-requires.html>



What is “Building Commissioning?”



Source:
https://classroomclipart.com/clipart-view/Clipart/People/man-scratching-head-with-question-clipart_jpg.htm

- **Code §100.1 Definitions:**
 - Complex Mechanical Systems:
 - Complex Mechanical Systems are systems that include any of the following:
 - Fan systems each serving multiple thermostatically controlled zones; or
 - Built-up air handler systems (non-unitary or nonpackaged HVAC equipment); or
 - hydronic or steam heating systems; or
 - hydronic cooling systems
 - Complex systems are NOT the following:
 - Unitary or packaged equipment listed in Tables 110.2-A, 110.2-B, 110.2-C, and 110.2-E, that serve a single zone; or
 - Two-pipe, heating only systems serving one or more zones



§120.8 - Nonresidential Building Commissioning



• Energy Code Applicability

- Applies to all nonresidential spaces including nonresidential spaces in mixed occupancy buildings
- Requirements are based on square footage of nonresidential spaces
- §120.8 does not apply to Residential dwelling units or Hotel/Motel spaces
- Commissioning is not required for Covered Processes
- Commissioning or retrocommissioning of existing buildings is not required for additions and alterations
- Healthcare facilities must comply with Chapter 7 of the California Administrative Code (Title 24, Part 1)

Source: <https://ecofriend.com/mixed-use-building-in-connecticut-is-powered-by-a-giant-fuel-cell.html>





§120.8 - Nonresidential Building Commissioning (Part 2)



- **Signature Requirements are found in the Administrative Code Title 24, Part 1, Article 1, Section 10-103(a)1**
 - Certificates of Compliance (NRCC-CXR-E) must be reviewed and signed by **licensed** professional engineer, architect, or contractor under the direct supervision of a **licensed** engineer or architect
 - Buildings less than 10,000 sf of nonresidential space:
 - Engineer or Architect of record, Qualified in-house engineer or architect with no other project involvement, or a third-party engineer, architect, or contractor
 - Buildings with 10,000 sf of nonresidential space or larger and 50,000 sf or less:
 - Qualified in-house engineer or architect with no other project involvement or a third-party engineer, architect, or contractor
 - Buildings greater than 50,000 sf and buildings with complex mechanical systems serving more than 10,000 square feet:
 - A third-party engineer, architect, or contractor



§120.8 - Nonresidential Building Commissioning (Part 3)

- **Who to include in the Commissioning (Cx) process – the Commissioning team:**
 - Commissioning coordinator
 - Energy consultant
 - Owner or owner's representative
 - Design review sign off authority
 - Mechanical and electrical acceptance test technicians
 - Prime contractor and architect
 - Building maintenance personnel
 - Manufacturer reps
 - Anyone else who may contribute to keeping project on time and on budget



§120.8 - Summary of Commissioning Requirements



- **Buildings 10,000 sf and larger must comply with the following items:**

§120.8(b) Owner's or Owner Representative's Project Requirements (OPR)

§120.8(c) Basis of Design (BOD)

§120.8(d) Design Phase Design Review

§120.8(e) Commissioning measures shown in the construction documents

§120.8(f) Commissioning Plan

§120.8(g) Functional performance testing

§120.8(h) Documentation and training

§120.8(i) Commissioning report



§120.8 - Summary of Commissioning Requirements (continued)



- Buildings less than 10,000 sf must comply with the following items:

§120.8(d)

Design Phase Design Review

§120.8(e)

Commissioning measures shown in the construction documents



§120.8(b) - Owner's or Owner Representative's Project Requirements (OPR)



- **§120.8(b) - Owner's or Owner Representative's Project Requirements (OPR)**
 - Only required for new buildings with nonresidential spaces 10,000 sf or larger
 - The OPR is a document showing owners expectations for building features
 - Expected hours of occupancy
 - Type of ventilation: natural or mechanical
 - Assembly types: walls, floors foundations, ceilings, roofs...
 - Daylighting requirements
 - Future expansion considerations
 - Budget and operational constraints
 - Desired quality and lifespan of building materials
 - Environmental considerations
 - Equipment type, controls, technologies, maintenance, manufacturers, and lifespan
 - Special characteristics: break rooms, kitchens, snack bars...
 - Energy Efficiency Goals outlined in NRCC-CXR-E Table G, OPR
 - Required for permit application



Source: <http://complianceconnect.net/portfolio/buildingproperty-owner/>



§120.8(c) - Basis of Design (BOD)



- **§120.8(c) - Basis of Design (BOD)**

- Only required for new buildings with nonresidential spaces 10,000 sf or larger
- Explanation of how the system designs meet the OPR and why they were selected
 - HVAC and water heating systems
 - Controls
 - Load calculations
 - Indoor and outdoor design conditions
 - Space constraints
 - Utility incentives...etc.
 - Lighting systems
 - Controls
 - Power densities
 - Fixtures types...etc.
 - Envelope wall and fenestration efficiencies
 - Cost effectivity of the chosen systems
 - Systems O&M requirements
 - NRCC-CXR-E Table H Basis of Design
- Should be developed early by design team and updated during the design process
- Required for permit application



§120.8(d) – Design Phase Design Review



- **§120.8(d) - Design Phase Design Review**
 - Required for all new buildings with nonresidential spaces
 - Intent of design phase review is to improve compliance with the Energy Code, encourage adoption of best practices in design, and lead to designs that are constructible and maintainable
 - Two design reviews during design phase:
 1. Design Review Kickoff
 2. Construction Documents Design Review
 - Design reviewer per §10-103(a)1 must review and approve with a signature on the NRCC-CXR-E Commissioning form
 - Required for permit application on all buildings with nonresidential spaces



§120.8(d) - Design Phase Design Review



- **§120.8(d) - Design Phase Design Review**

- Design reviewer requirements

- Design reviews must be conducted by a licensed professional as described in the Administrative Regulations Title 24, Part 1, §10-103(a)1
 - The NRCC-CXR-E form must be signed off by the same reviewer
 - Reviewer requirements are as follows per §10-103(a)1
 - **Nonresidential area less than 10,000 ft²**: the building design engineer, architect, or contractor
 - **Nonresidential area from 10,000 ft² to 50,000 ft²**: an in-house engineer or architect not associated with the project, or a third-party design engineer, architect, or contractor
 - **Nonresidential are greater than 50,000 ft²** : a third-party design engineer, architect, or contractor
 - **Nonresidential area greater than 10,000 ft² with complex mechanical systems**: a third-party engineer, architect, or contractor



§120.8(d) - Design Phase Design Review (Part 2)



- **§120.8(d) - Design Phase Design Review**
 - Design Review Kickoff
 - In person meeting during the schematic design phase of the building project with the owner or owner's representative, design team and design reviewer to review and discuss the following:
 - Project scope (OPR and BOD) for buildings $\geq 10,000$ sf
 - Project goals related to energy efficiency listed in Table F of [NRCC-CXR-E](#) Commissioning form for buildings $< 10,000$ sf
 - Commissioning Plan for buildings $\geq 10,000$ sf
 - Energy Efficiency measures
 - Schedule
 - Documentation and issue tracking
 - Coordination of team activities
 - Responsibilities
 - Review Certificate of Compliance NRCC documents
 - Required for all new buildings with nonresidential spaces
 - Required for permit application



§120.8(d) - Design Phase Design Review (Part 3)



- **§120.8(d) - Design Phase Design Review**

- Construction Documents Design Review

- Review and document changes in the OPR, BOD, Commissioning Plan, schedule, and other design documents
 - Reviewer verifies the construction documents meet the design requirements and signs the NRCC-CXR-E Commissioning form
 - Review applicable Certificate of Compliance documents
 - NRCC-CXR-E Commissioning
 - NRCC-PLB-E Plumbing
 - NRCC-ELC-E: Electrical Power Distribution
 - NRCC-ENV-E: Envelope
 - NRCC-LTI-E: Lighting - Indoor
 - RCC-LTO-E: Lighting - Outdoor
 - NRCC-LTS-E: Lighting - Sign
 - NRCC-MCH-E: Mechanical
 - NRCC-PRC-E: Process Systems
 - NRCC-SRA-E: Solar Ready
 - NRCC-PRF-01-E: Performance Compliance
 - Required for all buildings with nonresidential spaces
 - Required for permit application



§120.8(d) - Design Phase Design Review (Part 4)



- **§120.8(d) - Design Phase Design Review**
 - NOTE:
 - For all nonresidential new construction, regardless of compliance approach (prescriptive or performance) or building size, the NRCC-CXR-E is always required



Source: <http://jeffnielsen.com/requirements-vs-needs/>



§120.8(e) – Commissioning Measures Shown in the Construction Documents



- **§120.8(e) - Commissioning Measures Shown in the Construction Documents**
 - Commissioning measures must be included in the plans and specifications and be clear, detailed, and complete. The following should be reviewed and discussed:
 - List of systems and assemblies to be commissioned
 - List of Energy Code acceptance testing to be completed
 - Roles and responsibilities of contractors
 - Requirements for meetings
 - Management of issues
 - Commissioning schedule
 - O&M manual development and training
 - Roles of non-contractor parties (for information only)
 - NRCC-CXR-E Table I, Construction Document Design Review Checklist
 - Required for all new buildings with nonresidential spaces
 - Required for permit application



§120.8(f) – Commissioning Plan



- **§120.8(f) - Commissioning Plan**

- Required for new buildings with nonresidential spaces 10,000 sf or larger
- The commissioning plan must document how the project will be commissioned and must be started during the design phase
- The Commissioning Plan must include the following:
 - Defines roles and responsibilities
 - Commissioning goals that ensure OPR and BOD are met
 - Project schedule
 - Functional test requirements and verification for all systems and equipment
 - Schedule of testing for systems and equipment
 - List of required documentation to support testing
 - Describes how issues will be logged and how issue log will be used
 - Describes how maintenance staff training will be facilitated
- Required for permit application



Source: <http://selfreg4accomplishment.weebly.com/planning.html>



§120.8(g) – Functional Performance Testing



- **§120.8(g) - Functional Performance Testing**
 - Required for new buildings with nonresidential spaces 10,000 sf or larger
 - Ensures that installed equipment, systems, and system-to-system interfaces operate as required by the following:
 - Acceptance test requirements in Sections 120.5 and 130.4
 - Testing of systems described in the BOD
 - Functional testing reports must contain information addressing the testing methods utilized and include any readings and adjustments made
 - Test reports and acceptance tests forms (NRCA) are required for final inspection



Source: <https://electrical-engineering-portal.com/6-energy-efficiency-improvement-opportunities-in-fan-systems>



§120.8(h) – Documentation and Training



- **§120.8(h) - Documentation and Training**
 - Required for new buildings with nonresidential spaces 10,000 sf or larger
 - A **Systems Manual** must be delivered to the building owner and facilities operator and must include the following:
 - Site information including a facility description and historical and current requirements
 - Site contact information
 - Instructions for basic operations and maintenance, general site operating procedures, basic troubleshooting, recommended maintenance requirements, and a site events log
 - Description of major systems
 - Site equipment inventory and maintenance notes
 - Copies of special inspection verifications required by the enforcing agency or codes
 - Required for final or before building occupancy



§120.8(h) – Documentation and Training (continued)



- **§120.8(h) - Documentation and Training – cont.**
 - **Systems Operations Training** completed with the appropriate maintenance staff for each equipment type or system and documented in the commissioning report
 - Training materials must include the following:
 - System and equipment overview (i.e., what the equipment is, what it does, and with what other systems or equipment it interfaces)
 - Review and demonstration of operation, servicing, and preventive maintenance procedures
 - Review of the information in the Systems Manual
 - Review of the record drawings on the systems and equipment
 - Required for final or before building occupancy



Source: <https://www.facilitiesnet.com/green/article/Facility-Managers-Play-Crucial-Role-in-Healthcare-Commissioning--17970>



§120.8(i) – Commissioning Report



- **§120.8(i) - Commissioning Report**

- **Code Language:** A complete report of commissioning process activities undertaken through the design, construction, and reporting recommendations for post-construction phases of the building project shall be completed and provided to the owner or owner's representative.
 - The report documents the commissioning process and test results
 - Includes commissioning process activities through the design and construction with recommendations for post-construction phases of the building project
 - The report should include confirmation how commissioned systems meet the conditions of the OPR, BOD, and Contract Documents
 - Change and issue logs
 - A summary of the O&M training completed and scheduled
 - The report must be provided to the owner
- Required for buildings with nonresidential spaces 10,000 sf or larger
- Required for final or before building occupancy



Code Quiz:

1. When do commissioning requirements apply?

- a) Nonresidential buildings and spaces greater than 10,000 ft²
- b) Nonresidential buildings and spaces less than 10,000 ft²
- c) Both a) and b)

2. Who can conduct a design review for a building > 50,000 ft²?

- a) A third-party engineer, architect, or contractor
- b) In-house engineer or architect not associated with the project
- c) Both a) and b)

3. Who can conduct a design review for a 15,000 ft² building that has a complex mechanical system?

- a) A third-party engineer, architect, or contractor
- b) In-house engineer or architect not associated with the project
- c) Both a) and b)



Code Quiz #4:

4. Which commissioning measures are mandatory for a new, 9,000 sf motel building? Choose all that apply.

- a) Owner's or owner representative's project requirement
- b) Basis of design
- c) Design phase design review
- d) Commissioning measures shown in the construction documents
- e) Commissioning plan
- f) Functional performance testing
- g) Documentation and training
- h) Commissioning report
- i) None



Code Quiz #5:

5. Which commissioning measures are mandatory for a new, 9,000 sf nonresidential building? Choose all that apply.

- a) Owner's or owner representative's project requirements
- b) Basis of design
- c) Design phase design review
- d) Commissioning measures shown in the construction documents
- e) Commissioning plan
- f) Functional performance testing
- g) Documentation and training
- h) Commissioning report
- i) None



Code Quiz #6 & 7:

6. A mixed occupancy building has both residential and nonresidential spaces. The water heating system serves both the residential and nonresidential spaces of the building. Is the water heating system included in the building commissioning?

a) Yes

b) No

7. Do the commissioning requirements apply to tenant improvements (first time buildouts) for multi-tenant buildings such as a strip mall?

a) Yes

b) No

- Yes, but..., depending on the local AHJ policy, commissioning may be completed for the entire building prior to tenant improvements, or for each individual tenant improvement depending on the policy.



Code Quiz #8:

8. Which of the following require the NRCC-CXR-E form?

- a) Nonresidential projects using the performance compliance approach
- b) Nonresidential projects using the prescriptive compliance approach
- c) Nonresidential projects greater than 10,000 ft²
- d) Nonresidential projects less than 10,000 ft²
- e) b) and c)
- f) a), b), and c)
- g) All the above



Requirements Summary

				Complex Systems	Complex Systems
	< 10,000 sf	≥ 10,000 < 49,999 sf	≥ 50,000 sf	< 10,000 sf	≥ 10,000 sf
OPR		X	X		X
BOD		X	X		X
Kickoff Design Review	X	X	X	X	X
Construction Document Design Review	X	X	X	X	X
Commissioning Plan		X	X		X
Functional Performance Testing		X	X		X
Documentation and Training		X	X		X
Commissioning Report		X	X		X
Signed by Engineer or Architect of Record	X			X	
Signed by Non-Affiliated Engineer or Architect	X	X			
Signed by Third Party Engineer or Architect	X	X	X		X



When Commissioning Items Need to be Completed









				Complex Systems	Complex Systems
	< 10,000 sf	≥ 10,000 < 49,999 sf	≥ 50,000 sf	< 10,000 sf	≥ 10,000 sf
OPR		Permit	Permit		Permit
BOD		Permit	Permit		Permit
Kickoff Design Review	Permit	Permit	Permit	Permit	Permit
Construction Document Design Review	Permit	Permit	Permit	Permit	Permit
Commissioning Plan		Permit	Permit		Permit
NRCC-CXR-E Form	Permit	Permit	Permit	Permit	Permit
Documentation and Training		Final/Occupancy	Final/Occupancy		Final/Occupancy
Commissioning Report		Final/Occupancy	Final/Occupancy		Final/Occupancy
Functional Performance Testing		Final	Final		Final



Enforcement

- **Permit and Plans Review:**
 - **NRCC-CXR-E** Commissioning Document:
 - Verify Table **A. GENERAL INFORMATION** matches plans (area, occupancy type, HVAC type, climate zone...etc.)

STATE OF CALIFORNIA				CALIFORNIA ENERGY COMMISSION 	
Nonresidential Building Commissioning					
NRCC-CXR-E (Created 12/19)					
CERTIFICATE OF COMPLIANCE				NRCC-CXR-E	
<i>This document is used to demonstrate compliance with mandatory commissioning requirements in §120.8 for nonresidential buildings and hotel/motel or high-rise residential buildings with nonresidential spaces. This document does not demonstrate compliance with commissioning requirements within Title 24, Part 11, which need to be documented separately if they apply.</i>					
Project Name: Mechanical				Report Page: Page 1 of 7	
Project Address: 123 Compliance Street				Date Prepared: 2020-04-27	
A. GENERAL INFORMATION 					
01	Project Location (city)	Sacramento	04	Building Size (ft ²)	30,000
02	Occupancy Type	Nonresidential 	05	Nonresidential Conditioned Floor Area (ft ²)	10,000 - 49,999 ft ² 
03	Project Type	Newly constructed 	06	HVAC System Type	All other HVAC system types (indicates "complex") 



Enforcement (Part 2)

- **Permit and Plans Review – cont.:**
 - **NRCC-CXR-E** Commissioning Document:
 - Table **B. PROJECT SCOPE** will populate automatically based on nonresidential area and equipment type. For buildings less than 10,000 sf you will see the following:

B. PROJECT SCOPE				?
Table Instructions: Based on project information provided in Table A, Table B indicates which commissioning related requirements apply per §120.8 . Table B is not editable by the user.				
Commissioning Requirements per §120.8				
01	Table F: Design Review Kickoff	§120.8(d)1 and §120.8(d)2	The design review kickoff meeting establishes who will play the role of the design reviewer, the project schedule and identify owner's requirements. This meeting should be conducted during schematic design.	
02	Table G: Owner's Project Requirements (OPR)	§120.8(b)	This requirement does not apply.	
03	Table H: Basis of Design (BOD)	§120.8(c)	This requirement does not apply.	
04	Table I: Design Review	§120.8(d) and §120.8(e)	The design reviewer(s) reviews the construction documents for clarity, completeness, and adherence to the owner's goals. Commissioning measures must be included in the construction documents to facilitate the design review and commissioning process. For projects with $\geq 10,000$ ft ² of nonresidential conditioned floor area, or with complex mechanical systems, the design review is for adherence with the Owner's Project Requirements (OPR) and Basis of Design (BOD). This should be conducted during design.	
05	Table J: Commissioning Plan	§120.8(f)	This requirement does not apply.	
06	Table K: Functional Performance Testing	§120.8(g)	This requirement does not apply.	
07	Table L: Documentation and Training	§120.8(h)	This requirement does not apply.	
08	Table M: Commissioning Report	§120.8(i)	This requirement does not apply.	



Enforcement (Part 3)

- **Permit and Plans Review – cont.:**
 - **NRCC-CXR-E** Commissioning Document:
 - **Table B. PROJECT SCOPE** will populate automatically based on nonresidential area and equipment type. For buildings 10,000 sf or larger you will see the following:

B. PROJECT SCOPE			
Table Instructions: Based on project information provided in Table A, Table B indicates which commissioning related requirements apply per §120.8 . Table B is not editable by the user.			
Commissioning Requirements per §120.8			
01	Table F: Design Review Kickoff	§120.8(d)1 and §120.8(d)2	The design review kickoff meeting establishes who will play the role of the design reviewer, the project schedule and identify owner's requirements. This meeting should be conducted during schematic design.
02	Table G: Owner's Project Requirements (OPR)	§120.8(b)	The owner's project requirements establish the owner's goals, requirements, and expectations for everything related to energy consumption and operation. This should be completed during schematic design.
03	Table H: Basis of Design (BOD)	§120.8(c)	The basis of design documents the design elements such as calculations and product selections that meet the owner's project requirements and applicable regulatory requirements. This should be completed during schematic design.
04	Table I: Design Review	§120.8(d) and §120.8(e)	The design reviewer(s) reviews the construction documents for clarity, completeness, and adherence to the owner's goals. Commissioning measures must be included in the construction documents to facilitate the design review and commissioning process. For projects with ≥ 10,000 ft² of nonresidential conditioned floor area, or with complex mechanical systems, the design review is for adherence with the Owner's Project Requirements (OPR) and Basis of Design (BOD). This should be conducted during design.
05	Table J: Commissioning Plan	§120.8(f)	The commissioning plan is developed by the commissioning provider with input from the designer and defines the scope of commissioning the project. This should be drafted during design and completed during early construction.
06	Table K: Functional Performance Testing	§120.8(g)	Functional performance testing is conducted on building systems to demonstrate correct installation and operation.
07	Table L: Documentation and Training	§120.8(h)	Documentation of the operational aspects of the building shall be completed within the Systems Manual and delivered to the building owner or representative and facilities operator.
08	Table M: Commissioning Report	§120.8(i)	A complete report of commissioning process activities undertaken through the design, construction and reporting recommendations for post-construction phases of the building project shall be completed and provided to the owner or representative.



Enforcement (Part 4)

- **Permit and Plans Review – cont.:**
 - **NRCC-CXR-E** Commissioning Document:
 - Verify Table **C. COMPLIANCE RESULTS** shows **COMPLIES** and all required items show **Yes**. For buildings less than 10,000 sf you should see the following:

C. COMPLIANCE RESULTS								
Table Instructions: Table C will indicate if the project data input into the compliance document is compliant with commissioning requirements per §120.8 . This table is not editable by the user. If this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.								
01	02	03	04	05	06	07	08	09
Design Review Kickoff	Owner's Project Requirements	Basis of Design	Design Review	Commissioning Plan	Functional Performance Testing	Documentation and Training	Commissioning Report	Compliance Results
Table F	Table G	Table H	Table I	Table J	Table K	Table L	Table M	
Yes			Yes					COMPLIES
10	Design Reviewer(s) for the project include:			In house engineer or architect of record				COMPLIES



Enforcement (Part 5)

- **Permit and Plans Review – cont.:**
 - **NRCC-CXR-E** Commissioning Document:
 - Verify Table **C. COMPLIANCE RESULTS** shows **COMPLIES** and all required items show **Yes**. For buildings 10,000 sf and larger you should see the following:

C. COMPLIANCE RESULTS								
Table Instructions: Table C will indicate if the project data input into the compliance document is compliant with commissioning requirements per §120.8 . This table is not editable by the user. If this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.								
01	02	03	04	05	06	07	08	09
Design Review Kickoff	Owner's Project Requirements	Basis of Design	Design Review	Commissioning Plan	Functional Performance Testing	Documentation and Training	Commissioning Report	Compliance Results
Table F	Table G	Table H	Table I	Table J	Table K	Table L	Table M	
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	COMPLIES
10	Design Reviewer(s) for the project include:			Licensed Third Party Reviewer				COMPLIES



Enforcement

- **Permit and Plans Review – cont.:**
 - **NRCC-CXR-E** Commissioning Document:
 - Table **D. EXCEPTIONAL CONDITIONS** and Table **E. ADDITIONAL REMARKS** are information tables to assist the AHJ at permit and plan check

D. EXCEPTIONAL CONDITIONS	?
<i>This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.</i>	
Table G. indicates that the Owner's Project Requirements (OPR) document is attached to the permit application. Table H. indicates that the Basis of Design (BOD) document is attached to the permit application. Table I. indicates that a Design Review document is attached to the permit application. Table J. indicates that a draft commissioning plan is attached to the permit application.	
E. ADDITIONAL REMARKS	?
<i>This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.</i>	



Enforcement (Part 6)

- **Inspection:**
 - Verify NRCC-CXR-E and the following documents are present and complete:
 - May either be separate documents or completed in the NRCC-CXR-E form:
 - Owner's Project Requirements (OPR)
 - Basis of Design (BOD)
 - Commissioning plan
 - Stand alone documents:
 - All Energy Code acceptance testing documents are complete and passed
 - Other BOD commissioning tests documents are complete and show passing
 - Systems Manual
 - Evidence of training
 - Commissioning Report





Commissioning Key Takeaways



Some commissioning measures are required regardless of building size

Commission requirements do not apply to hotel/motel or residential spaces

Commissioning only applies to newly constructed buildings – retrocommissioning is not required

There are three levels of design review sign off determined by the nonresidential area and equipment type

The NRCC-CXR-E form is always required regardless of compliance method

Review Tables A, B, and C for accuracy, completeness, and compliance results

Verify all documentation is present and complete at final



QUESTIONS?

About Commissioning



Source:
<https://solopracticeuniversity.com/2017/05/25/time-to-ask-us-your-questions-about-creating-and-building-a-solosmall-firm-practice/>



ADVICE

HELP

SUPPORT

RESOURCES

TIPS

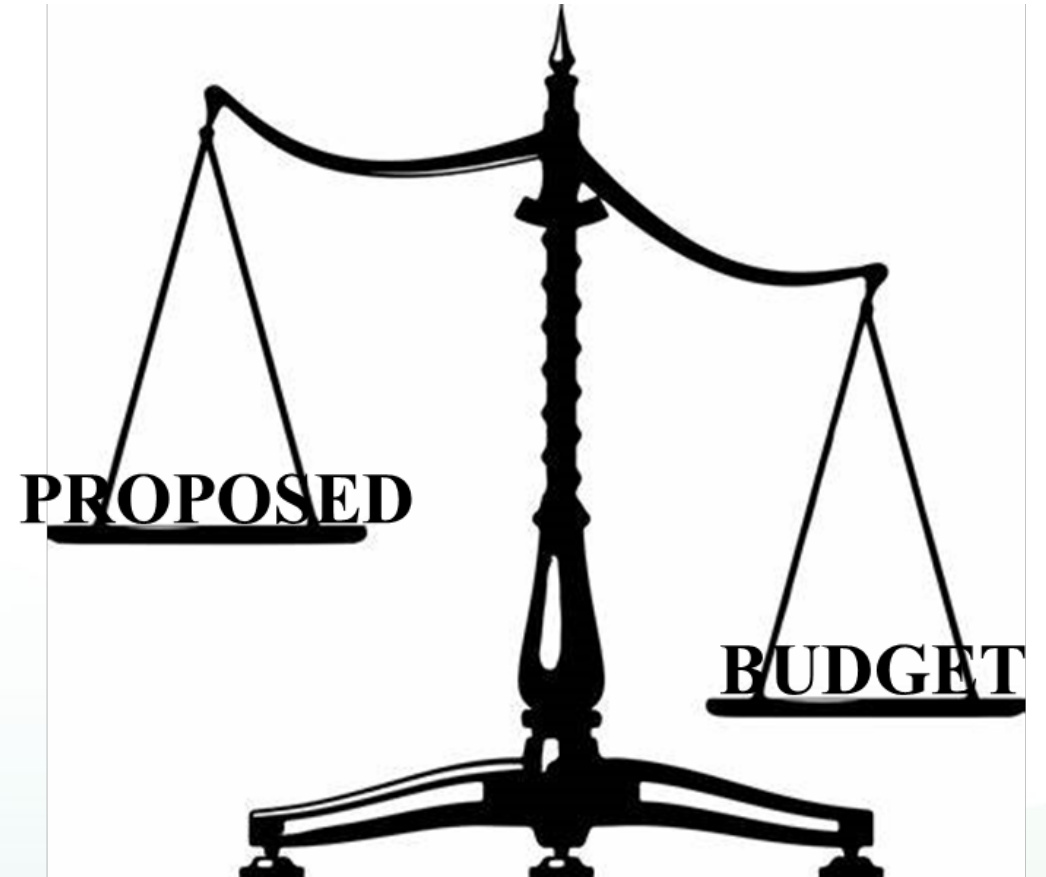
ASSISTANCE

GUIDANCE



Compliance Software

- Used to demonstrate compliance with the Energy Codes when using the Performance Approach
- CBECC-Com is free to the public
- More information at:
https://www.energy.ca.gov/title24/2019standards/2019_computer_prog_list.html





Acceptance Test Technician Certification Providers (ATTCP)

- **Lighting ATTCPs**
 - California Advanced Lighting Controls Training Program (CALCTP)
 - National Lighting Contractors Association of America (NLCAA)
- **Mechanical ATTCPs**
 - National Energy Management Institute Committee (NEMIC)
 - National Environmental Balancing Bureau (NEBB)
 - California State Pipe Trades Council (CSPTC)
 - Refrigeration Service Engineers Society (RSES)

More information at: <http://www.energy.ca.gov/title24/attcp/>



Blueprint

- Email Newsletter
- Published quarterly
- Clarifications on frequently asked questions
- <http://www.energy.ca.gov/efficiency/blueprint/>

Issue 132 | October - December 2020

BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

IN THIS ISSUE

- Local Ordinances Exceeding the 2019 Energy Code
- Fillable 2019 NRCA Forms
- Solar Assessment Tools Updated
- Temporary Fenestration Labels
- Certification of Mini-Split Systems and Multi-Split Systems
- Q&A
 - Mini-Split and Multi-Split Performance Modeling Credit
 - Electric Resistance Space Heating - Natural Gas Availability
 - Water Heater Alterations in Outdoor Closets
 - Community Solar Compliance Option

Local Ordinances Exceeding the 2019 Energy Code

Local jurisdictions may adopt building efficiency ordinances that are more stringent than statewide Building Energy Efficiency Standards (Energy Code) requirements. Local

jurisdictions wishing to enforce locally adopted energy standards are required to apply to the California Energy Commission (CEC) for approval. The CEC has updated the [local ordinance webpage](#) with information on how to apply and reflects currently approved local



The screenshot shows the 'Local Ordinance Exceeding the 2019 Energy Code' webpage. It features a header with the California Energy Commission logo and navigation links. The main content area includes a title, a brief description of the process, and a table of approved local energy standards. A sidebar on the right contains contact information and related links.

ordinances. This webpage will be updated as approvals are completed for applications submitted in the future. (Figure 1)

Fillable 2019 NRCA Forms

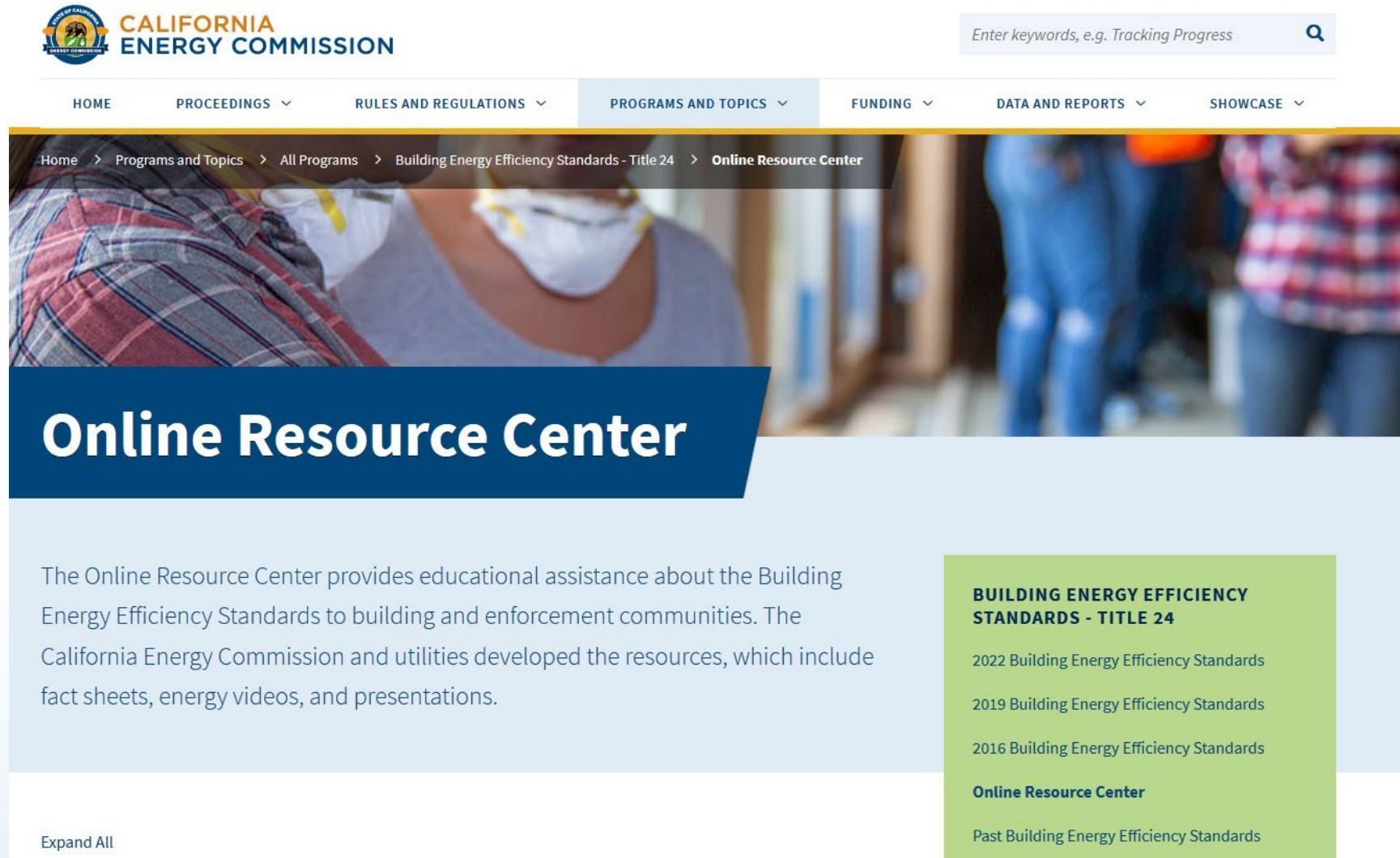
The nonresidential certificate of acceptance (NRCA) forms for 2019 Energy Code compliance are now fillable. The new fillable forms simplify compliance and are easier for users to complete. These fillable compliance forms are available on the [Energy Code Ace website](#) under the *Get Forms* tab.

The NRCA-LTI and NRCA-LTO lighting forms will need to be completed by a lighting acceptance test technician (ATT) through an ATT Certification Provider's website. For more information on the acceptance testing program and to find an ATT, visit the [ATTCP webpage](#).

1



Online Resources Program (ORC)



The screenshot shows the California Energy Commission's Online Resource Center (ORC) website. The header includes the CEC logo, the text "CALIFORNIA ENERGY COMMISSION", a search bar with the placeholder "Enter keywords, e.g. Tracking Progress", and a navigation menu with links: HOME, PROCEEDINGS, RULES AND REGULATIONS, PROGRAMS AND TOPICS (highlighted), FUNDING, DATA AND REPORTS, and SHOWCASE. Below the navigation bar is a breadcrumb trail: Home > Programs and Topics > All Programs > Building Energy Efficiency Standards - Title 24 > Online Resource Center. The main content area features a large blue banner with the text "Online Resource Center". Below this banner, a paragraph states: "The Online Resource Center provides educational assistance about the Building Energy Efficiency Standards to building and enforcement communities. The California Energy Commission and utilities developed the resources, which include fact sheets, energy videos, and presentations." To the right of this text is a green sidebar with the heading "BUILDING ENERGY EFFICIENCY STANDARDS - TITLE 24" and a list of links: "2022 Building Energy Efficiency Standards", "2019 Building Energy Efficiency Standards", "2016 Building Energy Efficiency Standards", "Online Resource Center" (highlighted), and "Past Building Energy Efficiency Standards". At the bottom left of the main content area is a link that says "Expand All".

HOME PROCEEDINGS RULES AND REGULATIONS PROGRAMS AND TOPICS FUNDING DATA AND REPORTS SHOWCASE

Home > Programs and Topics > All Programs > Building Energy Efficiency Standards - Title 24 > Online Resource Center

Online Resource Center

The Online Resource Center provides educational assistance about the Building Energy Efficiency Standards to building and enforcement communities. The California Energy Commission and utilities developed the resources, which include fact sheets, energy videos, and presentations.

BUILDING ENERGY EFFICIENCY STANDARDS - TITLE 24

- 2022 Building Energy Efficiency Standards
- 2019 Building Energy Efficiency Standards
- 2016 Building Energy Efficiency Standards
- Online Resource Center**
- Past Building Energy Efficiency Standards

Expand All

<http://www.energy.ca.gov/title24/orc/>



Energy Code Ace

Comply With Me

Learn how to comply with California's building and appliance energy efficiency standards

www.EnergyCodeAce.com

offers **No-Cost**

Tools ♠ Training ♠ Resources
to help you decode Title 24, Part 6 and Title 20

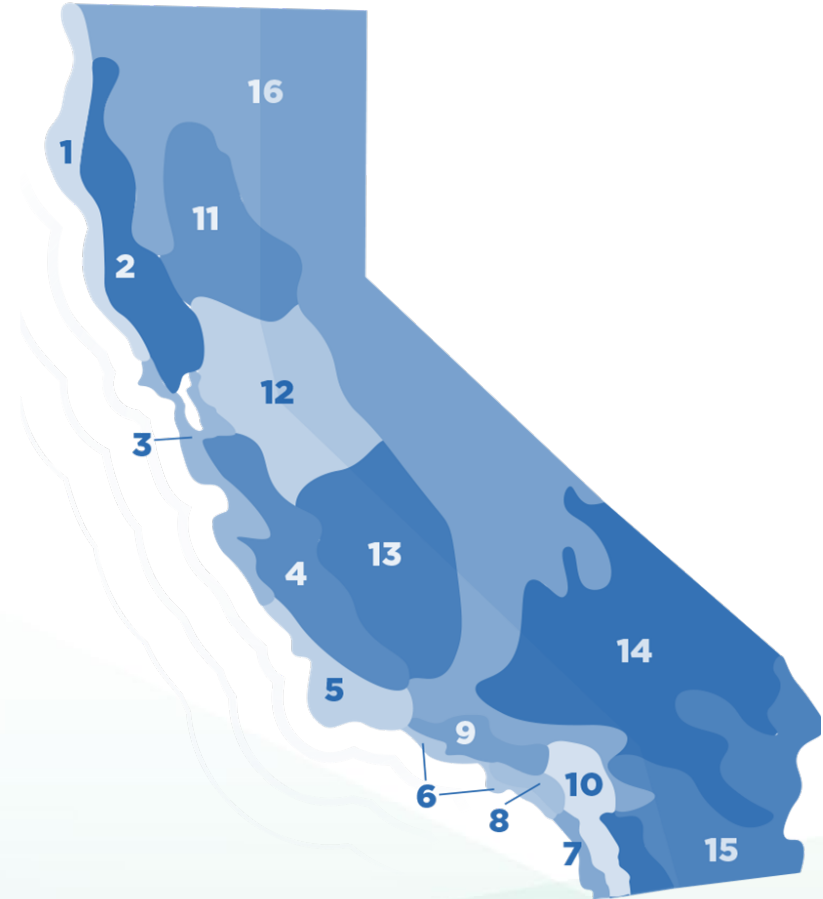


This program is funded by California utility customers and administered by Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E®), Southern California Edison Company (SCE), and Southern California Gas Company (SoCalGas®) under the auspices of the California Public Utilities Commission.



Energy Hotline

- **Toll-free in California**
- **Open Monday through Friday**
 - 8:00 a.m. to noon, and 1:00 p.m. to 4:30 p.m.
- **Call at:**
 - 1-800-772-3300 (In CA)
 - (916) 654-5106 (Outside CA)
- **Email at:** Title24@energy.ca.gov





Email Lists

- **Main conduit for communicating with stakeholders**
- **Sign up at:**
 - <http://www.energy.ca.gov/listservers/>
- **Subscribe to the following Efficiency Lists:**
 - Building Standards
 - Blueprint
- **Respond to confirmation email within 24 hours**



THANK YOU!

Kelly Morairty

Building Standards Office
California Energy Commission

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