



2022 Title 24, Part 6
Essentials



Nonresidential & Multifamily
Standards
Plans Examiners

Participant Handout

August 2024

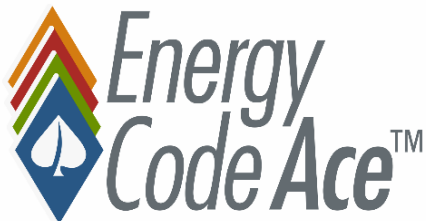


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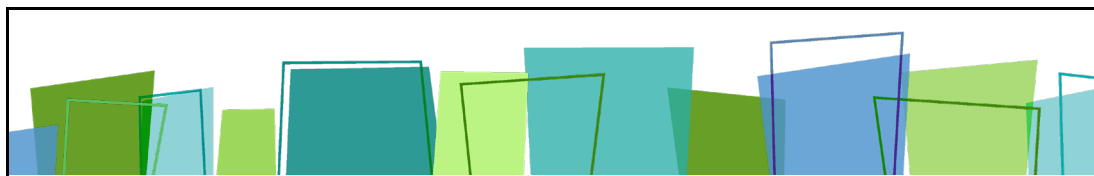
ABOUT THE STATEWIDE CODES AND STANDARDS PROGRAM


The Statewide Codes and Standards Program (C&S Program) is jointly managed by the Pacific Gas and Electric Company, Southern California Edison, and San Diego Gas and Electric Company. The C&S Program saves energy on behalf of ratepayers by directly influencing standards and code-setting bodies to strengthen energy efficiency regulations, by improving compliance with existing codes and standards, and working with local governments to develop ordinances that exceed statewide minimum requirements.

This class is one of many free courses, tools, and resources that the C&S Program offers. Please visit <http://energycodeace.com/> or contact info@energycodeace.com to find out more about all program offerings.

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.

Day One



 **2022 Title 24, Part 6**
Essentials * **Nonresidential & Multifamily Standards**
Plans Examiners


Marina Chavez-Blanco
Energy Code Ace Instructor
Gabel Energy

Part 1

Continuing Education Information			
AIA Provider ID:	404109082	AIA Course Number:	22 NR MF PE
ICC Provider ID:	1534	ICC Course Number:	34203


Today's Instructor and Support Team

Instructor




Marina Chavez-Blanco
Gabel Energy

Support



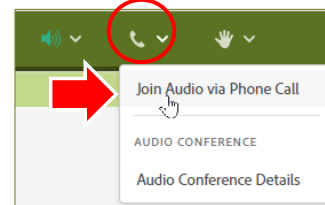
Behind the Scenes
McLain ID Consulting



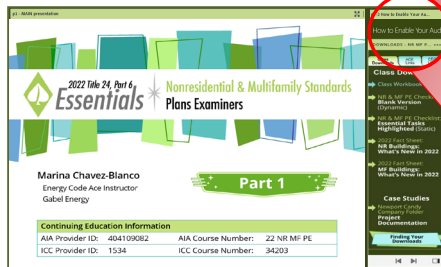
Hear & Be Heard



- ✦ Do **NOT** select "Device Speaker"
- If you did select "Device Speaker," switch to using your phone



- ✦ If you need more information, chat with Tech Support or download the detailed directions.

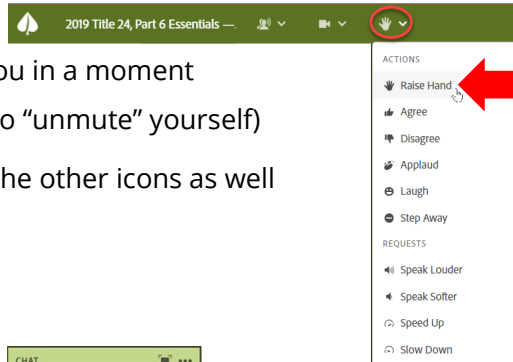


Getting Our Attention



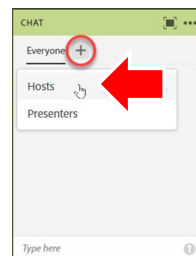
If you're not comfortable just "shouting out"

- ✦ Raise your hand
 - ✦ We'll call on you in a moment
 - ✦ (Don't forget to "unmute" yourself)
- ✦ Feel free to use the other icons as well



If you need technical support

- ✦ Use "Chat" (lower left of your screen)
- ✦ Direct your chat to "Hosts"
- ✦ Give us a moment to chat back



Pre-Test

1 PRETEST

Pre-test

Purpose: Test the course — NOT you. Also previews course content.

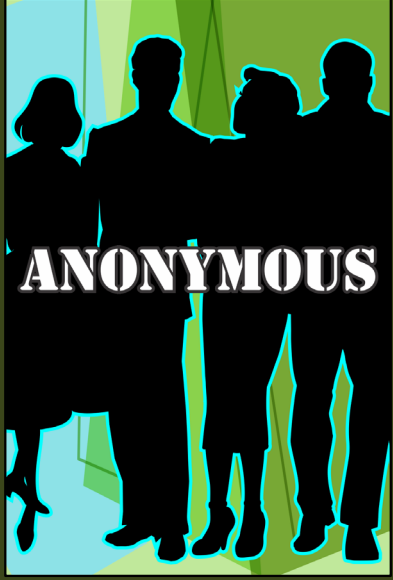
Description: 15-question **open-book** test focused on course objectives.

Directions: You may refer to any documents you like.

- ✦ If you DO NOT know the answer, please DO NOT guess. It's okay to leave a question blank.
- ✦ Make sure to click "SUBMIT" after each question.

Time: 10 minutes

Raise your hand when you're done.



Group Discussion

What's on Your Mind?

- ✦ What did you think of the pre-test?
- ✦ Any questions you found particularly challenging — or interesting?
- ✦ Anything in particular you want to be sure we cover today?

Time: 5 minutes



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Course Introduction

Class Agenda

Today

1. Course Introduction & Pre-test

2. Focusing Review Time on Key Energy Savings
3. General Information
4. Envelope
5. Lighting
6. Mechanical
7. Solar PV & Battery
8. Putting It All Together
9. Additional Resources
10. Course Conclusion & Post-test

Tomorrow



Course Materials — Downloads

- ✦ Class-specific materials
 - ✦ Participant workbook (slides, notes, and handouts)
 - ✦ Demo and Breakout activity materials
 - ✦ Supporting information for this class
- ✦ Other Energy Code Ace recommendations
- ✦ California Energy Commission references

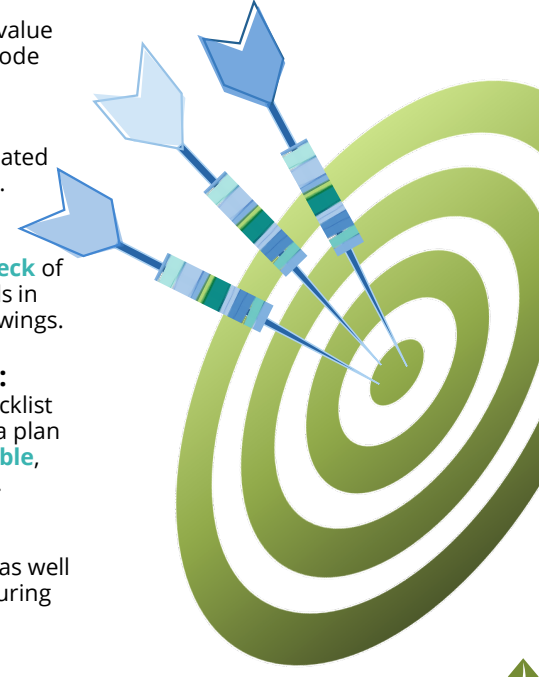
Note: participants logged in via browser may need to refresh a blank tab in order to initiate the download



Course Objectives

Course Objectives

- ✦ **Understand What's Crucial:**
Identify the "top seven" categories of high-value energy savings and impact on 2022 Energy Code compliance.
- ✦ **Use Review Time Strategically:**
Identify "essential" plan check tasks associated with the top seven energy savings categories.
- ✦ **Leverage Available Resources:**
Use the given PE checklist to guide plan check of essential tasks and confirm key project details in compliance documentation and Plan Set drawings.
- ✦ **Develop a Flexible Review Strategy:**
Use the given project documentation, PE checklist and task prioritization strategies to perform a plan check that is appropriate given time available, realities on the job, & goals of Title 24, Part 6.
- ✦ **Focus on Communication:**
Practice ways to address non-compliance, as well as methods for communicating effectively, during plan check.



General Course Flow (and What to Expect)

In Each Building Feature

MODULE

of this course

Gen Info

Envelope

Mechanical

Lighting

Solar

You Will:

- Find a great "Cheat Sheet" on that topic

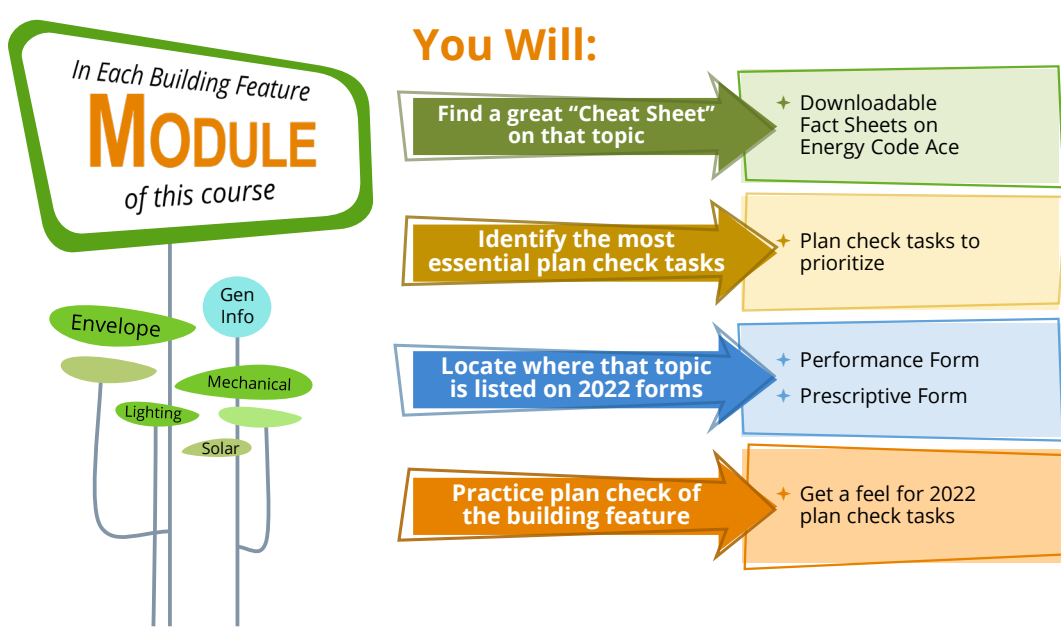
✦ Downloadable Fact Sheets on Energy Code Ace
- Identify the most essential plan check tasks

✦ Plan check tasks to prioritize
- Locate where that topic is listed on 2022 forms

✦ Performance Form

✦ Prescriptive Form
- Practice plan check of the building feature

✦ Get a feel for 2022 plan check tasks



What to Expect in Building Feature Modules

Building Features
& Checklists

Practice Review of Projects by Building Feature

- 3: General Information
- 4: Envelope
- 5: Lighting
- 6: Mechanical
- 7: Solar PV & Battery Storage

★ Decreased focus on listing code specifics

- ◇ Don't worry – we'll point you to some great resources

★ Increased focus on hands-on practice

- ◇ Explore what's listed in the PE checklists for this feature
- ◇ Identify "essential checklist" tasks and practice them (whole class)
- ◇ Practice "full checklist" review of all task line items (small teams)



Course Scope: Allows Time for Deeper Focus

Covered

- ★ Envelope
- ★ Indoor Lighting
- ★ Outdoor Lighting
- ★ Mechanical HVAC
- ★ Mechanical DHW
 - ◇ for Multifamily, Hotel/Motel & School
- ★ Solar PV
- ★ Battery Storage

Not Covered*

- ★ Commissioning
 - ◇ Although a brief review is offered
- ★ Electrical Distribution
- ★ Tailored Lighting Method
- ★ Sign Lighting
- ★ Covered Processes

Curious about what these are for 2022?
Next slide has a list.

Rationale*

- ★ Keeps content to a 7-hour course with deeper focus on topics of greatest impact
- ★ Energy Code Ace provides other resources covering these topics
 - ◇ "Additional Resources" module at end of this course offers suggestions



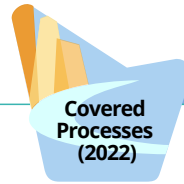
Covered Processes



✦ **Process:**
An activity or treatment of a building for purposes that **do not relate to human occupancy**, but still relate to:

- ✧ Space conditioning
- ✧ Lighting
- ✧ Service water heating
- ✧ Ventilation

✦ **Covered Process:**
Builds upon the "process" definition with **more specific Energy Code requirements**



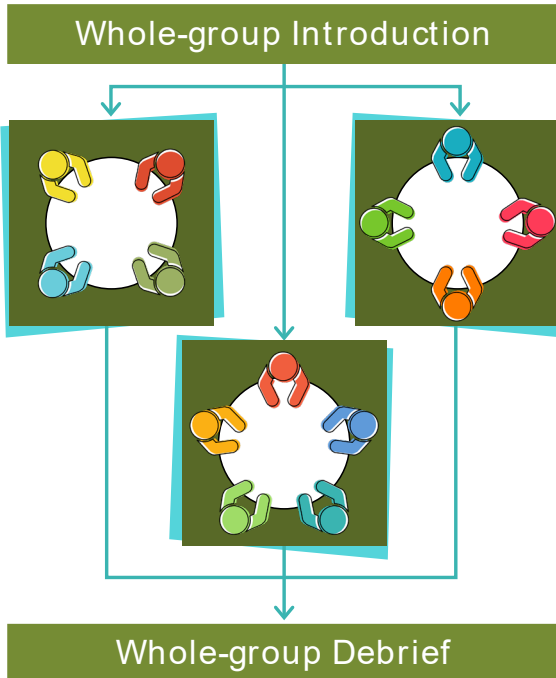
- ✦ Parking Garages
- ✦ Elevators
- ✦ Computer Rooms
- ✦ Escalators & Moving Walkways
- ✦ Process Boilers
- ✦ Compressed Air Systems
- ✦ Commercial Kitchens
- ✦ Commercial Refrigeration
- ✦ Refrigerated Warehouse
- ✦ Laboratory/Factory Exhaust Systems & Fume Hood
- ✦ Controlled Environmental Indoor Grow or Conditioned Greenhouses
- ✦ Steam Traps

New

New



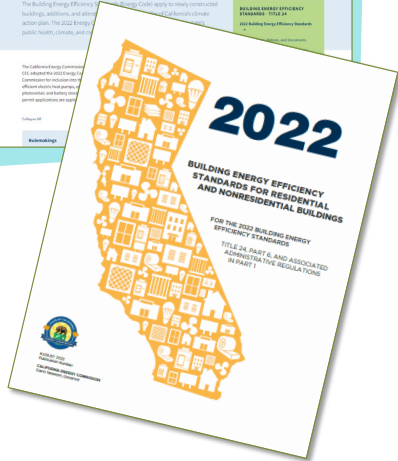
Coming Soon...A Breakout with Your Team



- ✦ All members of the team should **participate** in the breakout
- ✦ Select a team leader to represent the team in the breakout debriefs
- ✦ Your Tech Team member will support you with logistics in the room
- ✦ Respect the opinion of other team members



2022 Energy Code



Implementation Date

❖ **January 1, 2023**

❖ Any projects that apply for a permit on or after this date will be subject to the 2022 Energy Code requirements

Information and documents available on the CA Energy Commission website at:

❖ <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency>



Course Conventions

Mandatory



✦ Always required regardless of compliance approach used

Prescriptive



✦ Required when using the Prescriptive compliance approach

Performance

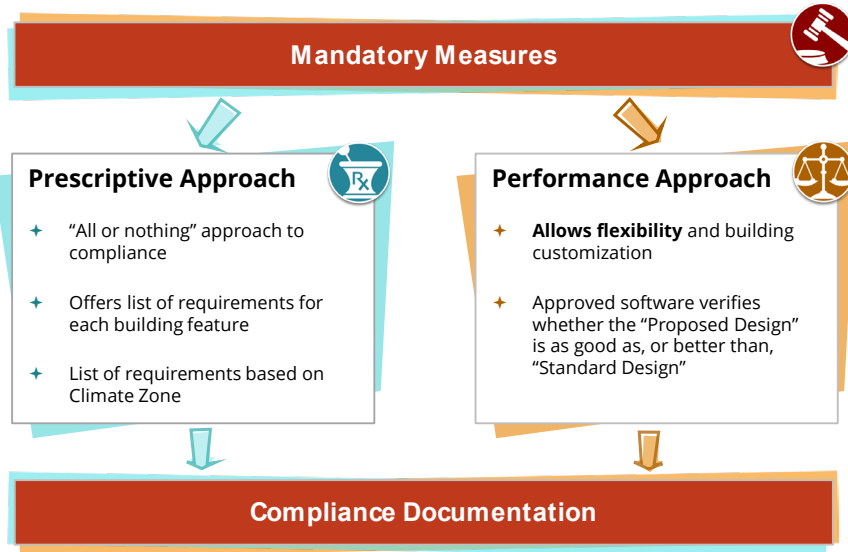


✦ Optional feature accounted for when doing Performance-based computer modeling



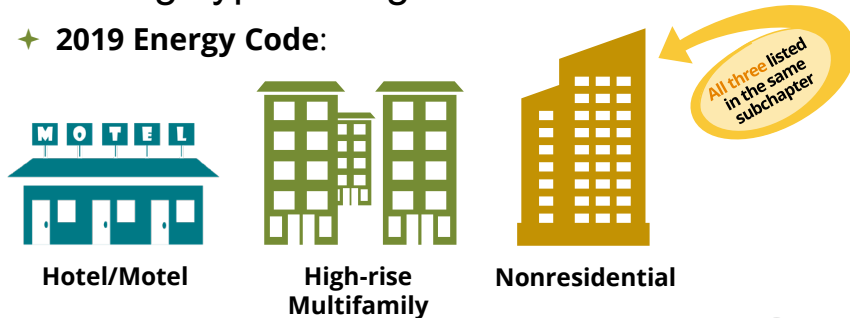
Showing Energy Code Compliance (Any Project)

- Any project triggering the Energy Code must **first comply** with applicable **Mandatory Measures**
- Compliance is demonstrated using one of **two pathways** – the **Prescriptive** or **Performance Approach**
- Associated **Energy Code forms** are completed during the building process to document compliant design, installation and verification

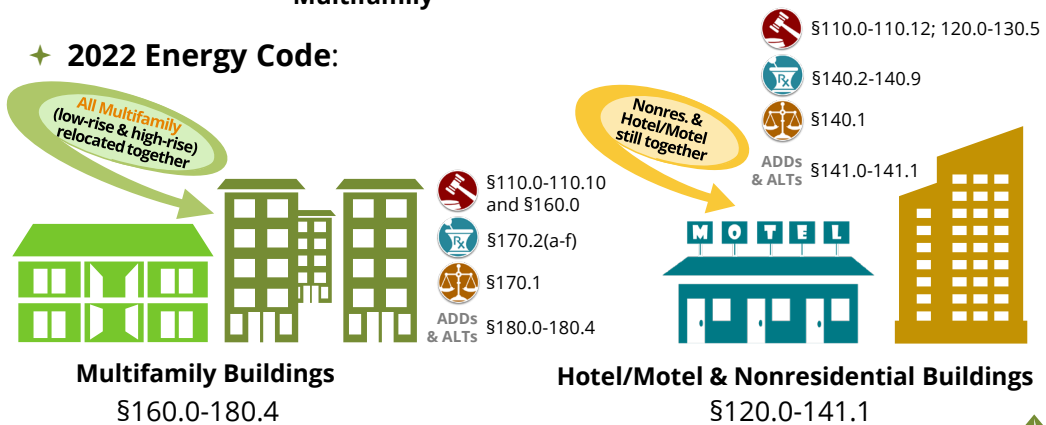


Building Type Reorganization

2019 Energy Code:



2022 Energy Code:



Occupancy Types

Group	Occupancy Type	Examples
A	Assembly	Theaters, churches, arenas, amusement parks
B	Business	Office buildings, banks, schools above 12 th grade
E	Education	K-12 schools
F	Factory	Food processing, airports, dry cleaning, foundries
H	High Hazard	Detonation, accelerated burning, health hazards
I	Institutions	Convalescent homes, board and care (24 hours), hospitals
	I-2	Hospitals and 24-hour medical care facilities
	I-3	Correctional facilities (exempt from Energy Code)
	I-4	Daycare facilities (exempt from Energy Code)
L	Laboratories	Buildings with one or more lab suites (exempt from Energy Code)
M	Mercantile	Grocery stores, department stores
R	Residential	Any building used for sleeping purposes. There are many sub-divisions of this section:
	Uses NR code → R-1	Hotels, motels and similar businesses
	Uses MF code → R-2	Apartment buildings, dormitories and multi-user residences with more than 2 dwelling units
	Uses SF or MF → R-3	Single-family homes and duplexes, as well as other permanent dwellings
	Uses MF code → R-4	Care facilities and similar businesses
S	Storage	Home goods, tires, food products, parking garages
U	Miscellaneous	Agricultural, barns, greenhouses, carports

Multifamily Buildings (Mandatory)

§160.0-160.9



Found in 2022 Energy Code Sections:

- ✦ **160.0:** General Scope
- ✦ **160.1:** Envelope (Insulation)
- ✦ **160.2:** Ventilation (IAQ)
- ✦ **160.3:** HVAC Systems
- ✦ **160.4:** Water Heating Systems
- ✦ **160.5:** Indoor, Outdoor and Sign Lighting and Controls
- ✦ **160.6:** Electric Power Distribution
- ✦ **160.7:** Process (elevators, pools and spas)
- ✦ **160.8:** Solar Ready
- ✦ **160.9:** Electric Ready



Defining Multifamily Spaces

Dwelling Unit

- ✦ **Single unit** providing complete, independent living facilities for one or more persons
- ✦ Includes:
 - ◇ Access
 - ◇ Permanent provisions for:
 - ◆ Living
 - ◆ Sleeping
 - ◆ Eating
 - ◆ Cooking
 - ◆ Sanitation

Common Use Areas

- ✦ Occupancy "R" spaces that do **NOT** include dwelling units:
 - ◇ Community rooms
 - ◇ Corridors
 - ◇ Laundry rooms serving multiple units
 - ◇ Lobbies
 - ◇ Lounges
 - ◇ Storage spaces that only serve a Multifamily "R" occupancy
- ✦ Does **NOT** include:
 - ◇ Any of the above serving a Nonresidential occupancy of the building



Form Titles & What They Show (NR & MF)

NR = Nonresidential
LM = Low-rise Multifamily
 (3 stories or fewer)
 High-rise MF (4 stories or more)
 also uses "NR"

Occupancy Type

PRF = Performance Approach
CXR = Commissioning
ELC = Electrical
ENV = Envelope
LTI = Indoor Lighting
LTO = Outdoor Lighting
LTS = Sign Lighting
MCH = Mechanical
PLB = Plumbing (DHW)
PRC = Covered Process
SAB = Solar PV & Battery
STH = Solar Thermal

Building Feature or Category

NRCC - LTI - E

Certificates of...
CC = Compliance
CI = Installation
CA = Acceptance
CV = Verification

Type of Document

E = Enforcement Agency
H = HERS Rater
F = Field Technician (Contractor)
A = Acceptance Test Tech

Primary User



Multifamily Forms (Depends on Number of Stories)

3 Stories or Less

Form Names (Prefixes)

✦ Uses "LM" in Prefix (mostly):

- ✦ Compliance: LMCC-
- ✦ Installation: LMCI-
- ✦ Verification: LMCV-
- ✦ Acceptance: NRCA- (uses the NR form)

Form Registration

- ✦ LMCC, some LMCI, and LMCV forms need to be registered with a HERS Provider
- ✦ Applicable NRCA forms must be recorded with ATT Certified Provider



4 Stories or More

Form Names (Prefixes)

✦ Uses "NR" in Prefix:

- ✦ Compliance: NRCC-
- ✦ Installation: NRCI-
- ✦ Verification: NRCV-
- ✦ Acceptance: NRCA-

Form Registration

- ✦ Applicable NRCVs just like 2019 Nonresidential process for registration with HERS Provider
- ✦ Applicable NRCA forms must be recorded with ATT Certified Provider



2022 Multifamily, Nonresidential and Hotel/Motel Forms

Compliance Forms	Certificates of Compliance		Certificates of Installation		Certificates of Verification		Certificates of Acceptance	
(Multifamily based on number of habitable stories)	Multifamily and Multifamily Mixed Use 3 Stories or Less	Multifamily 4 Stories or More, Hotel/Motel and NR	Multifamily and Multifamily Mixed Use 3 Stories or Less	Multifamily 4 Stories or More, Hotel/Motel and NR	Multifamily and Multifamily Mixed Use 3 Stories or Less	Multifamily 4 Stories or More, Hotel/Motel and NR	Multifamily and Multifamily Mixed Use 3 Stories or Less	Multifamily 4 Stories or More, Hotel/Motel and NR
Performance Method	LMCC-PRF-E	NRCC-PRF-E	See below for applicable building feature		See below for applicable building feature		See below for applicable building feature	
Envelope	LMCC-ENV-01-E	NRCC-ENV-E	LMCI-ENV-##-H LMCI-ENV-E	NRCI-ENV-E	LMCV-ENV-##-H	N/A	NRCA-ENV-##-F	NRCA-ENV-##-F
Commissioning	LMCC-CXR-01-E*	NRCC-CXR-E*	N/A	N/A	N/A	N/A	N/A	N/A
HVAC	LMCC-MCH-01-E	NRCC-MCH-E	LMCI-MCH-##-H LMCI-MCH-##-E LMCI-MCH-E	NRCI-MCH-##-F NRCI-MCH-E	LMCV-MCH-##-H	NRCV-MCH-##-H	NRCA-MCH-##-A	NRCA-MCH-##-A
Ventilation/IAQ	LMCC-MCH-01-E	NRCC-MCH-E	LMCI-MCH-##-H LMCI-MCH-##-E LMCI-MCH-E	NRCI-MCH-E	LMCV-MCH-##-H	NRCV-MCH-##-H	NRCA-MCH-##-A	NRCA-MCH-##-A
Water Heating	LMCC-PLB-01-E	NRCC-PLB-E	LMCI-PLB-##-H LMCI-PLB-##-E LMCI-PLB-E*	NRCI-PLB-E	LMCV-PLB-##-H	NRCV-PLB-##-H	N/A	N/A
Lighting (Indoor, Outdoor and Sign)	LMCC-LTI-01-E LMCC-LTO-01-E LMCC-LTS-01-E	NRCC-LTI-E NRCC-LTO-E NRCC-LTS-E	LMCI-LTI-E LMCI-LTO-E LMCI-LTS-E	NRCI-LTI-E NRCI-LTO-E NRCI-LTS-E	N/A	N/A	NRCA-LTI-##-A NRCA-LTO-##-A	NRCA-LTI-##-A NRCA-LTO-##-A
Solar PV & Battery Storage Systems	LMCC-SAB-01-E	NRCC-SAB-E	LMCI-SAB-E	NRCI-SAB-E	N/A	N/A	N/A	N/A
Solar Ready	LMCC-SAB-01-E	NRCC-SAB-E	LMCI-SAB-E	NRCI-SAB-E	N/A	N/A	N/A	N/A
Electrical Power Distribution	LMCC-ELC-01-E	NRCC-ELC-E	LMCI-ELC-E	NRCI-ELC-E	N/A	N/A	N/A	N/A
Electric Ready	LMCC-ELC-01-E	NRCC-ELC-E	LMCI-ELC-E	NRCI-ELC-E	N/A	N/A	N/A	N/A
Covered Processes: Elevators & Pool/Spa	LMCC-PRC-01-E	NRCC-PRC-E	LMCI-PRC-E	NRCI-PRC-E	N/A	N/A	NRCA-PRC-##-F	NRCA-PRC-##-F

* Nonresidential occupancies within mixed-use buildings only Must be registered with a HERS Provider Must be recorded with ATT Cert. Provider



LMCCs must be registered with a HERS Provider for all New Construction projects and any Additions or Alterations that trigger HERS. HERS registration is NOT required for Additions and Alterations that do not involve HERS measures.

Approved Software for Compliance Documentation

Compliance documentation submitted with a permit application must be produced with software that has been approved by the Energy Commission for that code cycle



CEC APPROVED



- ✦ Different versions of software are approved at different times and appropriate for different permit applications, based on date
- ✦ Similarly, certain versions of software are *decertified* at different times and can no longer be used for new permit applications
- ✦ Check the Energy Commission website to confirm use of appropriate compliance modeling software based on permit date
- ✦ For permits granted under **2022** code: <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency-1>



Finding Compliance Status on 2022 PRF

C1. COMPLIANCE SUMMARY			
	COMPLIES ³ ✓		
	Time Dependent Valuation (TDV)		Source Energy Use
	Efficiency ¹ (kBtu/ft ² - yr)	Total ² (kBtu/ft ² - yr)	Total ² (kBtu/ft ² - yr)
Standard Design	254.42	254.42	21.46
Proposed Design	227.89	227.89	21.40
Compliance Margins	26.53 Pass ✓	26.53 Pass ✓	0.06 Pass ✓

¹ Efficiency measures include improvements like a better building envelope and more efficient equipment
² Compliance Totals include efficiency, photovoltaics and batteries
³ Building complies when efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded

Just One Place to Check

- ✦ Look for "Table C1: Compliance Summary"
- ✦ Compliance status appears in **first row**
 - ✦ Either states "COMPLIES" or "DOES NOT COMPLY"



If You Need to Interpret the Table Further

- ✦ 2022 Energy Code considers **three Performance Metrics** - **all** of which must pass to comply
- ✦ Passing means each factor's:
 - ✦ "Proposed Design" score is **lower or equal to** "Standard Design" score
 - ✦ Compliance Margin is a positive value (or at least 0 when equal to Standard)
 - ✦ The higher (more positive) a compliance margin, the better it is over Standard Design



Performance Compliance Metrics (2022)



Source Total
a score representing the building energy efficiency expressed in terms of an hourly source carbon based metric

Includes energy used by:

- ✦ Envelope
- ✦ IAQ
- ✦ HVAC
- ✦ DHW
- ✦ Photovoltaics
- ✦ Batteries
- ✦ Other loads

TDV Efficiency
a score representing the building energy efficiency expressed in terms of TDV energy based metric

Includes energy used by:

- ✦ Envelope
- ✦ IAQ
- ✦ HVAC
- ✦ DHW
- ✦ Other loads

TDV Total
a score representing the building's Total TDV while also factoring in PV + Flexibility

Includes energy used by:

- ✦ Efficiency measures
- ✦ Photovoltaics
- ✦ Batteries
- ✦ Precooling

A building complies **ONLY** if **all three** compliance scores are met (**each** Proposed Design score is **lower or equal** to Standard Design score)

Building Commissioning

§120.8



Applies to

- ✦ All **New Construction** NR buildings
- ✦ Any **conditioned NR occupancies within a mixed use building**
- ✦ Extent of requirements depend on size of **conditioned floor area**

Does NOT apply to

- ✦ Unconditioned space in Nonresidential New Construction
- ✦ Additions & Alterations
- ✦ Multifamily & Hotel/Motel
- ✦ 3rd-party commissioning (which is a different code requirement, but can still opt in)

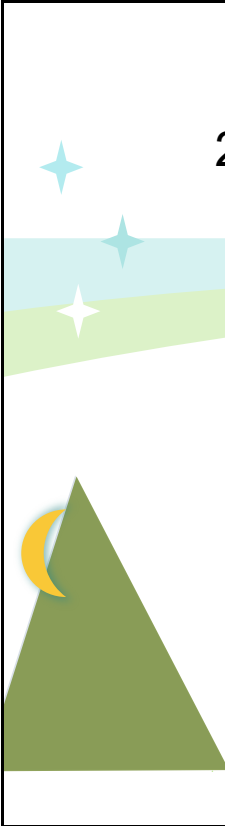
Commissioning Requirements	Conditioned Floor Area		When
	<10k ft ²	≥10k ft ²	
Owner's Project Requirements (OPR) (§120.8(b))		X	Pre-Design Involves Plans Examiner
Basis of Design (BOD) (§120.8(c))		X	Draft during Schematic Design, update as necessary
Design Review (§120.8(d))	X	X	Preliminary at 50% Design / Final at 90% Design
Commissioning specifications in Construction Docs (CD) (§120.8(e))	X	X	Draft at 50% Design / Final at 90% Design
Commissioning Plan (§120.8(f))		X	Draft at 90% Design / Final during Construction
Functional Performance Tests (§120.8(g))		X	Construction Involves Building Inspector
Operation & Maintenance (O&M) Training (§120.8(h))		X	Occupancy
Commissioning Report (§120.8(i))		X	Draft during Construction / Final during Occupancy

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Focusing Review Time on Key Energy Savings

2. Focusing Review Time on Key Energy Savings

- ✦ Develop a **General Strategy** for Plan Check
 - ◇ Identify the **“Top 7” Areas of Impact** on Energy Code Compliance
 - ◇ Start your review with those areas
 - ◆ Complete **“Essential tasks”** first
 - ◆ If time allows, move on to a comprehensive pass
- ✦ Get oriented on online resources to assist your review
 - ◆ **2022 Plans Examiner Checklist**
 - ◆ **2022 Fact Sheets**




We’ve Heard Your Feedback



- ✦ Common Job Challenges:
 - ◇ Much to review in limited time (often 30 minutes or less)
 - ◇ Energy Code just one part of review
 - ◇ Many details to enforce within the Energy Code
- ✦ Looking for a **“Breathable” Review Strategy** That:
 - ◇ Factors in time constraints
 - ◇ Identifies **“what’s essential”**
 - ◇ Adapts to different types of projects
 - ◇ Uses **“at-a-glance”** code resources

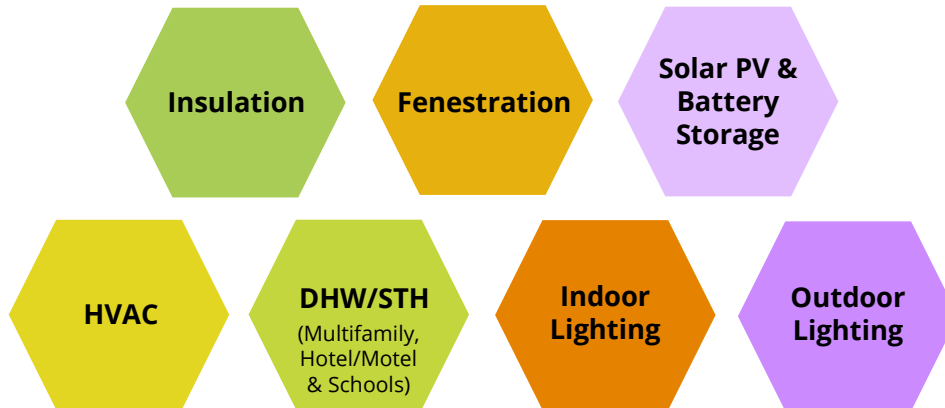
Let’s Get Started



Plan Check Strategy

Targeting Review to Key Areas

These building features typically have the greatest impact on a project's compliance with the Energy Code.



These are listed in **no particular order**.

Our Strategy: Use available review time to target *these 7* key areas. (You'll practice this strategy throughout this course.)



Review Tips: Starting a Project

Use this 3-step strategy to get oriented and streamline review time:



1 Determine the project scope.

What type of project do you have?

2

Focus your plan check on the "top seven" areas of impact.

Where is your review most critical to enforcing energy efficiency?

3

Leverage available resources to support your review.

What reference tools can help streamline review time?



Step 1: Determine the Project Scope

**“Take Inventory”
by Gathering
High-level Details**

Project Facts

**New Construction,
Addition or Alteration?**

**Prescriptive, Performance
or a Mix of Both?**

**Submitting for all
(or just some)
building components?**

**We’ll “walk through” this process as a
class starting in the next module**

A. General Information	
1 Project Name	Walkin Warehouse
2 Run Title	Title 24 Analysis
3 Project Location	1111 Main Street
4 City	San Diego
6 Zip code	92102
8 Climate Zone	Nonresidential
10 Building Type(s)	New complete scope
12 Project Scope	
14 Total Conditioned Floor Area in Scope (SF)	602
16 Total Unconditioned Floor Area (SF)	5396
18 Nonresidential Conditioned Floor Area	602
20 Residential Conditioned Floor Area	0

Step 2: Focus Plan Check on “Top Seven” Areas

Here’s the 7 key areas of compliance along with their “essential review tasks.”

Key Area	Essential Review Task
1 Insulation	<ul style="list-style-type: none"> Verify wall, roof and floor insulation levels on the NRCC/LMCC are consistent with the plans.
2 Fenestration	<ul style="list-style-type: none"> Verify window performance values match specs included with the plans. Verify window areas on the NRCC/LMCC are consistent with the plans.
3 Solar PV & Battery Storage	<ul style="list-style-type: none"> Verify Solar PV system matches the NRCC/LMCC. Verify Battery Storage system matches the NRCC/LMCC.
4 HVAC	<ul style="list-style-type: none"> Verify HVAC schedules match the NRCC/LMCC. Verify ventilation air flows (CFM) match the NRCC/LMCC. Verify HVAC controls from the NRCC/LMCC are shown on the plans.
5 DHW/STH (Multifamily, Hotel/Motel & Schools)	<ul style="list-style-type: none"> Verify DHW systems match the NRCC/LMCC. Verify solar thermal systems match the NRCC/LMCC.
6 Indoor Lighting	<ul style="list-style-type: none"> Verify indoor lighting fixture count and schedule matches the NRCC/LMCC. Verify indoor lighting controls from the LTI are shown on the plans.
7 Outdoor Lighting	<ul style="list-style-type: none"> Verify outdoor lighting fixture count and schedule matches the NRCC/LMCC. Verify outdoor lighting controls from the LTO are shown on the plans.

Step 3: Leverage Available Tools & Resources

Use these tools to support your review (introduced on next set of slides).



For Plan Check (Performance & Prescriptive)

- ✦ Make sure Plan Set details match those of NRCC/LMCC
- ✦ **PE Checklist**



For More Info on Code Requirements



- ✦ If the permit applicant needs further information on code requirements (Mandatory, Prescriptive and Performance), direct them to:
- ✦ **Fact Sheets**



Plans Examiner Checklist

Tool: Plans Examiner Checklist

The image shows a stack of checklist forms for different building types and sections. The top form is the '2022 Energy Code Plans Examiner Checklist' from Aca Resources. It includes sections for:

- Planning: Includes a table for 'Include Green To meet applicable requirements for conditions'.
- Outdoor Lighting: Section for 'Are the required minimum outdoor lighting levels met?'.
- Interior Lighting: Section for 'Are the required minimum interior lighting levels met?'.
- Design Review Commissioning: Section for 'Are commissioning building or non-residential occupancy in a mixed-use building...?'.
- Renewables: Section for 'New non-residential, multifamily and multifamily buildings...?'.
- Envelope: Section for 'New construction, addition, major conditional space(s) and alteration of opaque surfaces or fenestration...?'.
- Mechanical: Section for 'New space conditioning, ventilation, distribution system(s) and/or...?'.

Versatile Design to Support Any Project

- ✦ For “as much time as it takes” projects:
 - ✦ Offers **comprehensive** list of plan check tasks
- ✦ For “30-min or less” project availability:
 - ✦ Streamline by focusing only on “**essential**” checklist tasks, (shown later in this course by building feature)
- ✦ Offered in two formats (dynamic & static)
 - ✦ Dynamic checklist:
 - ◆ Needs a computer with Adobe Reader
 - ◆ Expands according to selections made
 - ◆ Offers correction comments feature



You'll practice using this checklist in each module of this class.



Tool: Plans Examiner Checklist (cont.)

Plan Check Item	Envelope	Reference	YES	NO	NA
ENV1. Table D: Exceptional Conditions Any areas reported to be reviewed by Permit Acquisition	Exceptional conditions reviewed by Plans Examiner and Permit Acquisition		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV2. Table E: Additional Remarks	Notes for Plans Examiner or Contractor		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV3. Opaque Assemblies (wall, floor, roof)	Types: e.g. thermal panel, concrete, masonry, insulation; Between framing, continuous, no-studs Status: New, altered, existing MF roof type: attic-D, attic-C, non-attic		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV4. Rated Roofing Material	Roofing Pitch Roof Material Performance (U-factor, reflectance, emittance, or SR) Status: New, altered, existing	Nonresidential §110.3(a) JM4.5.1 Additions §111.2(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV5. Opaque Door	Door Type: Swinging, non-swinging, MF: fire rated U-factor: U<=2.0 rgs versus a NFRC rate of door Status: New, altered, existing	Nonresidential §110.3(a) Tables 110.3-1 BC-D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV6. Fenestration (vertical and skylights)	Classification: NFRC/default / NFRC Skylight > 200 sq ft / MF: All Performance: U-factor, SHGC, VT Glass: Permittivity and type Overhang/Slab/Fin: Projection, distance above window Status: New, altered, existing	Nonresidential §111.2(a) Additions §111.2(b) Alterations §111.2(c)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NEW! ENV7. Air Barrier (Does not apply to MF)	Design: Air barrier boundaries, interconnections and penetrations, square foot calculations all sides of air barrier Materials: Acceptable materials or assemblies Performance Method: When verification credited, testing protocol	Multifamily §110.2(b) §110.1 §110.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV8. Daylighting	Compliance Method: Method used matches plans Design: Area and VT matches plans Status: Applies to new construction only	Nonresidential Table 110.3-1 Multifamily §110.3(c) §110.2(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

...adds this page of Envelope tasks to the checklist

Scope of Topics in Checklist

- ★ **Default Display (3-page download)**
 - ✦ First couple pages list building features that require energy compliance forms (NRCCs/LMCCs). Select what applies.
 - ✦ As applicable features are selected for a project, checklist expands to display corresponding plan check tasks
- ★ **Topic Selections Will Display These Tables:**
 - ✦ General Information
 - ✦ Design Review and Commissioning
 - ✦ Envelope (shown here)
 - ✦ Indoor Lighting
 - ✦ Outdoor Lighting
 - ✦ Sign Lighting
 - ✦ Electrical
 - ✦ Mechanical HVAC
 - ✦ Plumbing
 - ✦ Covered Processes
 - ✦ Renewables (Solar Thermal, PV, Battery, Solar Ready)

PE Checklist (How to Access & Use)

Home Forms Buildings Appliances Training Sign In

Buildings: Resources

An array of downloadable materials providing practical information on how and when to comply with California's building and appliance energy efficiency standards.

Search Resources

Codes & Regs Occupancy Type

+ 3 / 3 Results

Checklist: Multifamily & Nonresidential - Plans Examiner - 2022

This checklist assists Plans Examiners in verifying compliance for each nonresidential and/or multifamily building component under California's 2022 Energy Code.

Clear All

- Annotated Forms
- Application Guide
- Checklist
- Fact Sheet
- Lighting Audit
- Note Blocks
- Outreach Material
- Report
- Trigger Sheet

Save Share Download

See Details

1. Download the **NR & MF PE Checklist** from the **Energy Code Ace Building Resources** page (use filters to find it fast)

PE Checklist (How to Access & Use)

2022 Energy Code
Ace Resources Multifamily and Nonresidential - Title 24, Part 6
Plans Examiner Checklist

Permit Number: _____ Review Date: _____
 Project Name: _____ Updated: _____
 Project Address: _____ Reviewed By: _____

This is a dynamic document that creates a custom Part 6 checklist for a project's scope. This checklist also can be used to create a set of example correction comments that may be used or modified by the plans examiner.

Would you like to use the sample correction comments features? YES NO

The dynamic version of this checklist is available at www.EnergyCodeAce.com under the checklist section of the buildings tab.

Certificate of Compliance (NRCC) - Required Based on Scope of Work (check all that apply).
 If NRCC-PRF-01-E used, verify which building features are included. Applicable features in project scope not included in NRCC-PRF-01-E must show compliance via Prescriptive and/or Mandatory forms).

Design Review/Commissioning: New nonresidential buildings or nonresidential occupancy in a mixed-use building. Does not apply to hotel/motel or multifamily occupancies, nor Additions and Alterations.

Design review for nonresidential conditioned¹ building or mixed-use building with nonresidential occupancy of any size Yes N/A
 Commissioning for nonresidential conditioned² buildings, or mixed-use buildings with nonresidential occupancy ≥ 10,000 sq ft NRCC-COR-E None Provided NA

Renewables: New nonresidential, hotel/motel and multifamily buildings. Photovoltaics, battery storage and solar thermal do not apply to Additions and Alterations.

Photovoltaics Yes N/A
 Solar Thermal: Hot water / water and multifamily central gas DHW systems, state heliostats NRCC-LMCC-PRF-01-E NRCC-LMCC-PRF-01-E
 Solar Thermal Readiness: New construction nonresidential buildings < 3 stories and multifamily and maximum of 10 stories and Additions with >2,000 sq ft of new roof area where photovoltaic requirements DO NOT apply NRCC-LMCC-ENV-E NA

Envelope: New construction, Additions, newly conditioned space(s) and Alterations of opaque surfaces or fenestration.

Envelope of Conditioned Spaces Yes N/A
 Daylighting New room > 4,000 sq ft with ≥ 15 ft ceiling of conditioned spaces NRCC-LMCC-PRF-01-E None Provided NRCC-LMCC-PRF-01-E None Provided NA
 Daylighting New room > 5,000 sq ft with ≥ 15 ft ceiling of unconditioned spaces NRCC-LMCC-ENV-E None Provided NA

Mechanical: HVAC New space conditioning, ventilation, distribution system(s) and/or alterations to existing systems. Yes N/A
 Plumbing: New domestic or service hot water system, pumps, distribution system(s) and/or alterations to existing systems. NRCC-LMCC-PRF-01-E None Provided NRCC-LMCC-PLB-E NA

EnergyCodeAce 2022 Title 24, Part 6 - Multifamily and Nonresidential Energy Plans Review Page 1 of 9

2. This opens a **pdf file** that will expand based on your selections.

On your device:

- ◆ Select all checkboxes that apply to the project's **building features and NRCC/LMCC forms**.
- ◆ Select the **"Yes"** checkbox at the top of page 1 to **enable the sample correction comments** feature.
- ◆ Scroll to remaining pages to view your **custom-built list** of plan check tasks

PE Checklist (How to Access & Use)

Envelope
 Are the following items confirmed on the plans? If "NO" items to be corrected per plan check comments.

Plan Check Item	Code Reference	YES	NO*	N/A
ENV1. Table D: Exceptional Conditions	Exceptional conditions reviewed by Plans Examiner and match design. Any errors reported to be resolved by Permit Applicant	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ENV2. Table E: Additional Remarks	Notes for Plans Examiner or Contractor (optional)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV3. Opaque Assemblies (wall, floor, roof)	Slip: e.g. framed (metal), wood, mass, spandrel, MF fire rating is suitable. Between framing, continuous, none slotted. New, altered, existing. A = Roof type: attic-B, attic-C, non-attic	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV4. Rated Roofing Material	Slip: Pitch. Roof Material Performance (Aged): Reflectance, emittance, or SR. Status: New, altered, existing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV5. Opaque Door	Door Type: Swinging, non-swinging, MF fire rated. U-factor: U=0.20 represents a NFRC rated door. Status: New, altered, existing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ENV6. Fenestration (vertical and skylights)	Classification: NFRC / default / N/A. Skylights ≥ 200 sq ft / MF: AUV rating. Performance: U-factor, RSHGC, VT. Area: Per orientation and type. Overhangs/Sillfinis/Projections, distance above window. Status: New, altered, existing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NEW/ENV7. Air Barrier (Does not apply to MF)	Design: Air barrier boundaries, interconnections and penetrations, square foot calculations all sides of air barrier. Materials: Acceptable materials or assemblies. Performance Method: When verification credit used, testing protocol	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV8. Daylighting	Compliance Method: Method used matches plans. Design: Area and VT match plans. Status: Applies to new construction only	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

EnergyCodeAce 2022 Title 24, Part 6 - Multifamily and Nonresidential Energy Plans Review Page 4 of 8

3. Conduct your plan check and **select checkboxes to track your findings**.

- ◆ **"Yes"** – this line item has passed plan check review
- ◆ **"No"** – something is wrong and needs further attention
- ◆ **"N/A"** – this line item feature doesn't apply to the current project

PE Checklist (How to Access & Use)

Reference	Example Part 6 Plan Check Correction Comments
ENV3	The opaque envelope assembly details including framing type, cavity R-value, continuous R-value, and status do not match the plans or meet Mandatory requirements in §120.7. Please correct the inconsistencies and resubmit.
ENV5	Exterior doors must meet requirements per §140.3(a)7 or §180.1, §180.2, §170.2(a)4 for multifamily. Applicable door type and specs such as opaque door U-factor indicated do not match plans. Please correct inconsistencies and resubmit.



Reference	Example Part 6 Plan Check Correction Comments
ENV3	The opaque envelope assembly details including framing type, cavity R-value, continuous R-value, and status do not match the plans or meet Mandatory requirements in §120.7. Please correct the inconsistencies and resubmit.
ENV5	Exterior doors must meet requirements per §140.3(a)7 or §180.1, §180.2, §170.2(a)4 for multifamily. Applicable door type and specs such as opaque door U-factor indicated do not match plans. Please correct inconsistencies and resubmit.

4. For each line item with **“No”** selected, **associated plan check comments populate** on the final page.

Print the completed checklist for:

- ◆ A record of your findings
- ◆ Plan check correction comments
- ◆ Energy Code language and citations



Resources for “At-A-Glance” Energy Code Requirements

Use Fact Sheets for quick consults on Energy Code requirements

2022 Energy Code
ACE Resources **Fact Sheet**

What Are Solar and Battery Systems Requirements?

The 2022 California Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) requirements for distributed PV systems, battery storage systems and solar readiness multifamily buildings with 4 or more habitable stories, nonresidential buildings, hotels, and mixed-use buildings.

PV and battery systems requirements apply to newly constructed:

- Multifamily buildings with 4 or more habitable stories
- Nonresidential buildings
- Hotels and motels
- Mixed-use buildings when 50% of the floor area is one or more of the following:
 - o Multifamily Building > 4 Habitable Stories
 - o Grocery
 - o Office
 - o Financial Institutions
 - o Unlicensed Retail Space
 - o Retail
 - o School
 - o Warehouse

Solar readiness requirements apply when a PV system is not included in the design. See newly constructed buildings of the types listed above, and Additions to them that increase total area by > 2,000 SF, as required to be solar ready.

For information on solar and battery systems requirements that apply to single-family but multifamily buildings with 3 or fewer habitable stories, see the Energy Code Act Single-Family Low-Rise Multifamily Solar and Battery Systems Fact Sheet at <https://ace.energycodeace.com>

2022 ENERGY CODE
ACE Resources **Fact Sheet**

What Are the Envelope Requirements for Nonresidential Buildings?

This fact sheet explains the Title 24, Part 6 Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) envelope requirements for nonresidential building projects that are classified as New Construction, Additions or Alterations. The envelope features covered include roofs, walls, or barriers, floors and ceilings, fenestration and daylighting.

When a nonresidential building is newly constructed and conditioned or an existing nonresidential building is newly conditioned, all applicable nonresidential envelope requirements must be met. However, when a project is an Alteration, requirements apply only for the altered envelope features.

In addition, newly constructed, unconditioned spaces - 5,000 SF or more have daylighting requirements.

For building envelope, Energy Code requirements apply to:

- Building material
- Exterior or demising wall, wall, and/or floor insulation
- Air barrier design
- Window to wall and skylight to roof ratio
- Fenestration efficiency and rating
- Daylighting
- Retractable school buildings

ACE Tip
Not all requirements in this fact sheet apply to every project. Beyond the section of this fact sheet that applies to your project or to a specific building feature, refer to the Table of Contents and enter the applicable page range.

Nonresidential Envelope

Table of Contents

How Does this Fact Sheet Apply to Your Project? 2

Key Terms 2

Does Your Project Trigger the Energy Code? 3

Roofs 4

Key Terms 4

New Construction and Additions 4

Alterations 4

Walls 10

Key Terms 10

New Construction and Additions 11

Alterations 13

Air Barrier 15

Key Terms 15

New Construction and Additions 15

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New Construction and Additions 23

Alterations 27

Daylighting 28

Key Terms 28

Alterations 28

Retractable School Buildings 30

Compliance Forms 30

For More Information 30

See the Downloads pod for a link to Fact Sheet Resources



How Are Fact Sheets Organized?

This Res Fact Sheet also covers lighting controlled within a Multifamily Unit

2022 ENERGY CODE
Ace Resources **Fact Sheet** **Residential Indoor and Outdoor Lighting**

What's Included in this Fact Sheet?
This fact sheet covers residential indoor and outdoor lighting technologies that are required by California's Building Energy Efficiency Standards (Title 24, Part 6 of Energy Code) and related high efficiency luminaires, recessed can light specifications, vacancy or occupancy sensors, dimming and on/off switching control requirements.
The requirements in this fact sheet apply to single-family buildings, duplexes and townhomes. Residential lighting requirements also apply to dwelling units in multifamily buildings, quarters of hotels/motels, and dwelling spaces of fire stations, dormitories and senior housing.

How Does this Fact Sheet Apply to Your Project?
Use this fact sheet to answer these questions about a lighting project:
1. What requirements does your project need to meet to comply with the Energy Code?
2. What's involved in the compliance process?
3. How should you document your project's compliance?

Table of Contents

- Importance of Compliance 7
- Know Your Key Terms 7
- Nonresidential Lighting and Controls in Multifamily Buildings 7
- Residential Lighting Requirements 3
- Commonly Installed Luminaires 3
- Installed Luminaires 4
- Lighting Controls 5
- Additional and Alternative 7
- Compliance Items for Residential Indoor and Outdoor Lighting 7
- Forms for Single-Family Buildings 8
- Forms for Multifamily Buildings, Dwelling Units for More Information 10

- ✦ **Fact Sheets Typically Offer:**
- ✦ **Definitions** of energy efficiency topics
- ✦ Related **code sections** and **compliance forms** (live links)
- ✦ Mandatory and Prescriptive **requirements**, as well as information on Performance **compliance credits**
- ✦ **Forms guidance** – which, when and who signs
- ✦ **Additional resources** (live links)

EnergyCodeAce.com/resources

Fact Sheets

2022 Fact Sheets on Energy Code Ace

AVAILABLE NOW

What's New in 2022?
What's Changed?

Because everyone loves a good cheat sheet...

Multifamily Edition

Nonresidential Hotel/Motel Edition

General Information

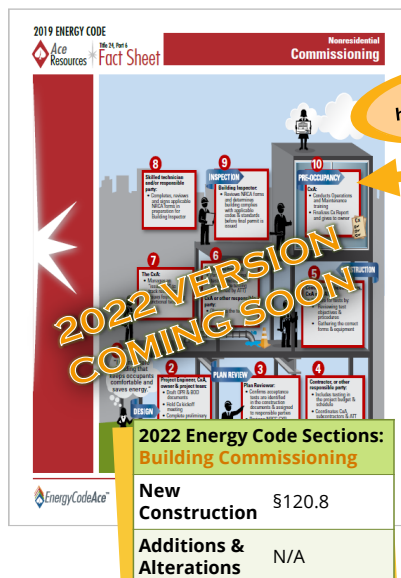
3. General Information

- ✦ **Applicable Resources on Energy Code Ace**
- ✦ **General Info Plan Check “Essentials”**
- ✦ **High-level Scope of 2022 Compliance Forms**
- ✦ **Plan Check of General Information:**
 - ✧ Whole-class Walkthrough Q&A
 - ✧ Small-team Breakouts - Newport Candy Company
- ✦ **Defining and Identifying Additions & Alterations**



General Info Fact Sheets on Energy Code Ace

Nonresidential



2019 ENERGY CODE
Ace Resources Fact Sheet
Nonresidential Commissioning

2022 ENERGY CODE SECTIONS:
Building Commissioning

New Construction	§120.8
Additions & Alterations	N/A


Fact Sheets offer high-level summaries of topics




Essential Tasks: General Information

Essential Tasks

General Information: Essential Plan Check Tasks







Essential Plan Check Tasks

Short on time?
Prioritize these tasks


General Information

2022 Energy Code
 Ace Resources
 Multifamily and Nonresidential - Title 24, Part 6
 Plans Examiner Checklist

Prioritize these Plan Check tasks



PE Checklist Item	Essential Plan Check Task	"Top 7" Area
Pages 1-2: [All form checkbox tables]	Verify that all correct NRCC/LMCC forms have been submitted for the scope of the project.	Project scope takes all of the top 7 areas into account.
G2: "Building Complies"	Verify that NRCC/LMCC forms show the building complies.	Project compliance takes all of the top 7 areas into account.



PE Checklist: NRCC Tables on Pages 1-2

Certificate of Compliance (NRCC) - Required Based on Scope of Work (check all that apply).
If NRCC-PRF-01-E used, verify which building features are included. Applicable features in project scope not included in NRCC-PRF-01-E must show compliance via Prescriptive and/or Mandatory form(s).

Design Review/ Commissioning: *New nonresidential buildings or nonresidential occupancy in a mixed-use building. Does not apply to hotel/motel or multifamily occupancies, nor Additions and Alterations.*

<input checked="" type="checkbox"/> Yes	Design review for nonresidential conditioned ¹ building or mixed-use building with nonresidential occupancy of any size	Commissioning for nonresidential conditioned ¹ buildings, or mixed-use buildings with nonresidential occupancy ≥ 10,000 ft ²
<input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-CXR-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC-CXR-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A

Renewables: *New nonresidential, hotel/motel and multifamily buildings. Photovoltaics, battery storage and solar thermal do not apply to Additions and Alterations.*

<input checked="" type="checkbox"/> Yes	Photovoltaics	Battery Storage: when photovoltaics required	Solar Thermal: Hotel / motel and multifamily central gas DHW systems, state bldgs
<input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-PRF-01-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC/LMCC-PRF-01-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC/LMCC-PRF-01-E <input type="checkbox"/> None Provided
	<input type="checkbox"/> NRCC/LMCC-SAB-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC/LMCC-SAB-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC/LMCC-SAB-E <input type="checkbox"/> None Provided
	<input type="checkbox"/> N/A	<input type="checkbox"/> N/A	<input type="checkbox"/> N/A

Envelope: *New construction, Additions, newly conditioned space(s) and Alterations of opaque surfaces or fenestration.*

<input checked="" type="checkbox"/> Yes	Envelope of Conditioned Spaces	Daylighting New room > 5,000 ft ² with ≥ 15 ft ceiling of conditioned spaces	Daylighting New room > 5,000 ft ² with ≥ 15 ft ceiling of unconditioned spaces
<input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-PRF-01-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC/LMCC-PRF-01-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC/LMCC-ENV-E <input type="checkbox"/> None Provided
	<input type="checkbox"/> NRCC/LMCC-ENV-E <input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-ENV-E <input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-ENV-E <input type="checkbox"/> N/A

Mechanical: *HVAC. New space conditioning, ventilation, distribution system(s) and/or alterations to existing systems.*

<input checked="" type="checkbox"/> Yes	HVAC	Plumbing: New domestic or service hot water system, pumps, distribution system(s) and/or alterations to existing systems.
<input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-PRF-01-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC/LMCC-PRF-01-E <input type="checkbox"/> None Provided
	<input type="checkbox"/> NRCC/LMCC-MCH-E <input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-PLB-E <input type="checkbox"/> N/A

Lighting: *Indoor Lighting: New construction. Alterations in which connected load of fixtures in a space are replaced.*

<input checked="" type="checkbox"/> Yes	Conditioned Spaces	Unconditioned Spaces
<input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-PRF-01-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided

Electrical Distribution: *New and replaced electrical branch circuits.*

<input checked="" type="checkbox"/> Yes	Service meters, separation of loads	Escalators
<input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-ELC-E <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC-PRC-E <input type="checkbox"/> None Provided

Covered Process: *Triggers are supported with documentation.*

<input checked="" type="checkbox"/> Yes	Laboratory Exhaust Systems & Hoods	Commercial Refrigeration Food Stores ≥ 8,000 ft ²
<input type="checkbox"/> N/A	<input type="checkbox"/> NRCC-PRF-01 <input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC-PRC-E <input type="checkbox"/> None Provided

NEW! Controlled Environmental Horticulture Indoors: *Commercial Refrigeration Food Stores ≥ 8,000 ft².*

<input type="checkbox"/> None Provided	NRCC-PRC-E	NRCC-MCH-E: HVAC Systems
<input type="checkbox"/> None Provided	<input type="checkbox"/> NRCC-PRF-01: Conditioned Space Option	<input type="checkbox"/> NRCC-ENV-E: Conditioned Indoor Grow

¹ Directly Conditioned Space is an enclosed space that is provided with wood heating, mechanical heating that has a capacity exceeding 10 Btu/hr-ft², or mechanical cooling that has a capacity exceeding 5 Btu/hr-ft². Directly conditioned space does not include process space.

PE Checklist: General Information

General - Applicable to all Certificates of Compliance Forms
 Are the following items confirmed on the plans? If "NO", items to be corrected per plan check comments

Plan Check Item	Code Reference	YES	NO	N/A
G1. Has only one Certificate of Compliance (NRCC/LMCC) been submitted as part of this permit FOR THE SAME FEATURE?	§10-103	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G2. Do all the Certificates of Compliance indicate "Building Complies"?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G3. Are all NRCC documents signed and dated by the: Documentation author? <i>Can be electronic or wet signature</i> Responsible building designers or owner? <i>Can be electronic or wet signature</i>	§10-103	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G4. Are all NRCC Documents printed on the plans?	§10-103	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G5. Is the climate zone correct? EZ Building Climate Zone Finder	JAZ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G6. Is the site orientation correct? <i>True North (not plan north)</i>	Orientation, Cardinal §100.1(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G7. Does the total conditioned and unconditioned area (ft ²) shown on the plan set match the forms?	Conditioned/Unconditioned Space §100.1(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G8. If the Performance method for hotel/motel and multifamily occupancies was used, does the number of dwelling units shown on the plan set match the forms?	§100.1(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G9. If the Performance method was used, does the number of stories above grade in the plan set match the forms?	§100.1(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G10. Is the correct version of the software being used (Performance only)? CEC Compliance Software		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G11. Is the project scope correct? <i>New Constructions / Addition / Alteration</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G12. Is the project occupancy/building/space type(s) correct?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Essential task in blue

Title 24 Part 6 Essentials: Nonresidential & Multifamily Plans Examiners

1-27

Compliance Form Table of Contents (Generalized)

Performance ✦

High-level Scope of Topics in Forms

✦ Prescriptive

NRCC/LMCC-PRF-E

Table Letter & Topic (Performance Form)	
A	General Information
B	Project Scope
C	Compliance
D	Special Features
E	Testing
F	Solar PV & Battery
G	Envelope
H	Mechanical
I	Water Heating
J	Covered Processes
K	Indoor Conditioned Lighting
L-N	Declaration of Required Certificates: Installation, Acceptance and Verification (if applicable)
—	Signature Page

In this Performance form, there may be **multiple tables** listed under a given letter/topic ("G1," "G2," ...)

NRCC/LMCC-???-E

Table Letter & Topic (Prescriptive Form)	
A	General Information
B	Project Scope
C	Compliance Results
D	Exceptional Conditions
E	Additional Remarks
F-?	Series of building feature-specific tables (number of tables varies by form)
Closing 3 tables	Declaration of Required Certificates: Installation, Acceptance and Verification (if applicable)
—	Signature Page

All Prescriptive Certificates of Compliance follow this flow: same opening and closing tables, but the **middle sequence of tables (starting with F) will vary by building feature**



5. According to **Table A** of this NRCC, is this project a New Construction, Addition or Alteration?

- a. New Construction
- b. Addition
- c. Alteration
- d. Not enough information

6. According to **Table B** of this NRCC, which components of this project demonstrate compliance using the Performance approach? **Select all that apply.**

- a. Envelope
- b. Mechanical (HVAC)
- c. DHW
- d. Lighting (Indoor Conditioned)
- e. Solar Thermal Water Heating

7. According to **Table C1** of that project's **NRCC-PRF-E**, does its submitted Envelope, HVAC, DHW and Indoor Conditioned Lighting comply with Energy Code?
- a. Yes
 - b. No
 - c. Not enough information

Breakout Activity 1: General Information

Directions

- We will divide the class into small **teams**
- **Once in Your Breakout Team:**
 - Use the **Plan Set** and **NRCC** documentation for **Newport Candy Company** to complete the following sections of your PE Checklist:
 - **Certificate of Compliance (NRCC)**
 - **General**
 - Note any **issues or discrepancies** discovered during your plan check on this worksheet.
 - When finished, respond to the list of questions for the **“what if” scenarios**.
- **When Breakout Time Ends:**
 - Teams **report out to the class** on plan check findings

Newport Case Study: Fill out the PE Checklist's **Certificate of Compliance (NRCC) section.**

Newport Case Study: Fill out the PE Checklist's **General Information** section.

Newport Case Study: List any issues or discrepancies noted during plan check

NOTE: Number of blanks does **NOT** indicate number of anticipated issues (there may be fewer)

- 1.
- 2.
- 3.
- 4.

Newport Case Study: Provide your guidance for these “What if” Scenarios

Scenario 1: What if this project lies on the border of two climate zones and neighboring Climate Zone 14 is indicated in the NRCC instead of Climate Zone 9?

Recommended course of action:

Recommended communication:

Scenario 2: What if the building orientation from the NRCC-PRF indicated (N) 0 degrees?

Recommended course of action:

Recommended communication:

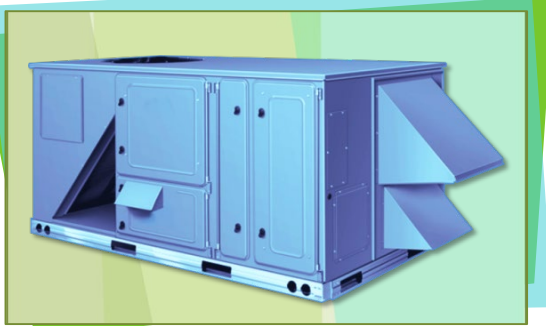
Additions & Alterations



Additions vs Alterations vs Repairs

Additions	Alterations	Repairs
<ul style="list-style-type: none">✦ Any change to a building that increases conditioned floor area (CFA) AND conditioned volume.	<ul style="list-style-type: none">✦ Any change to a building's:<ul style="list-style-type: none">◇ Water heating system,◇ Space conditioning system◇ Lighting system, or◇ Envelopethat is NOT an Addition.	<ul style="list-style-type: none">✦ Reconstruction or renewal for the purpose of maintenance of any component, system, or equipment of existing building.✦ Repairs do NOT trigger the Energy Code and therefore do not need compliance documentation.

Addition, Alteration or Repair?



Project Notes

- ✦ This is common type of **HVAC Alteration** project

Project	ADD	ALT	REP
1. Replacing the entire package unit on a roof		✓	

Addition, Alteration or Repair?



Project Notes

- ✦ This is a **Repair**
- Replacing just fans, motors, belts, electrical components, or refrigerant-containing devices will NOT trigger the Energy Code

Project	ADD	ALT	REP
1. Replacing the entire package unit on a roof		✓	
2. Replacing just the compressor of a package unit			✓

Addition, Alteration or Repair?



Project Notes

✦ This is an **Addition**

It involves an increase of conditioned floor area (CFA) and conditioned volume

Project	ADD	ALT	REP
1. Replacing the entire package unit on a roof		✓	
2. Replacing just the compressor of a package unit			✓
3. Converting part of an unconditioned warehouse into conditioned office space	✓		

Addition, Alteration or Repair?



Project Notes

✦ This is a **Repair**

It involves replacing a lamp (light bulb) - and nothing else

Project	ADD	ALT	REP
1. Replacing the entire package unit on a roof		✓	
2. Replacing just the compressor of a package unit			✓
3. Converting part of an unconditioned warehouse into conditioned office space	✓		
4. Replacing existing screw-base incandescent bulbs with new screw-base LED bulbs			✓

Addition, Alteration or Repair?



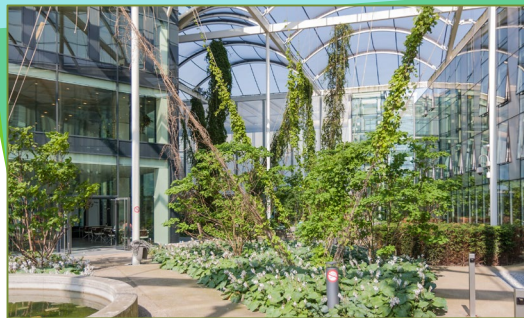
Project Notes

✦ This is an **Alteration**

It involves modifications where luminaires are replaced via a building permit through an Authority Having Jurisdiction (AHJ)

Project	ADD	ALT	REP
1. Replacing the entire package unit on a roof		✓	
2. Replacing just the compressor of a package unit			✓
3. Converting part of an unconditioned warehouse into conditioned office space	✓		
4. Replacing existing screw-base incandescent bulbs with new screw-base LED bulbs			✓
5. Replacing existing screw-base incandescent fixtures with new hardwired LED fixtures		✓	

Addition, Alteration or Repair?



Project Notes

✦ This is an **Addition**

It involves an increase of conditioned floor area (CFA) and conditioned volume

Project	ADD	ALT	REP
1. Replacing the entire package unit on a roof		✓	
2. Replacing just the compressor of a package unit			✓
3. Converting part of an unconditioned warehouse into conditioned office space	✓		
4. Replacing existing screw-base incandescent bulbs with new screw-base LED bulbs			✓
5. Replacing existing screw-base incandescent fixtures with new hardwired LED fixtures		✓	
6. Enclosing and conditioning an outdoor courtyard	✓		

Let's Discuss Addition & Alteration Forms

- Consult your **2022 Multifamily & Nonresidential Plans Examiner Checklist** and use **Pages 1-2** to answer some forms questions about Additions and Alterations

Page 2

Lighting: Interior Lighting: New construction, additions, alterations in which covered area increased or 10% or more in a space in residence, mixed-use or multi-family building, or 10% addition in project in residence.

2022 Energy Code
Ace Resources
Multifamily and Nonresidential Title 24 Part 6
Plans Examiner Checklist

3. Consult the gray header rows when answering the next set of questions

2. Click the "Expand All Items" button on page 1

Renewables: New nonresidential, nonresidential and multifamily buildings. Does not apply in additions and alterations.

Envelope: New construction, additions, newly conditioned spaces and alterations of opaque surfaces or openings.

Mechanics: HVAC: New space conditioning, ventilation, distribution systems, energy recovery, and other alterations to existing systems.

Page 1 of 13

Page 1

1. Download the 2022 NR & MF PE Checklist now and go to pages 1-2

2022 Energy Code
Ace Resources
Multifamily and Nonresidential Title 24 Part 6
Plans Examiner Checklist

Expand All Items

Design Review/ Commissioning: New nonresidential buildings or nonresidential occupancy in a mixed-use building. Does not apply in nonresidential or multifamily occupancies, nor additions and alterations.

Renewables: New nonresidential, nonresidential and multifamily buildings. Does not apply in additions and alterations.

Envelope: New construction, additions, newly conditioned spaces and alterations of opaque surfaces or openings.

Mechanics: HVAC: New space conditioning, ventilation, distribution systems, energy recovery, and other alterations to existing systems.

Page 1 of 13

Addition & Alteration Form Scenarios



Project Notes

- Per the PE Checklist, Commissioning **does not apply** to Additions or Alterations

Would You Expect to See...?	Yes	No
1. A Commissioning form for a Nonresidential Addition?		✓

Design Review/ Commissioning: New nonresidential buildings or nonresidential occupancy in a mixed-use building. **Does not apply to** hotel/motel or multifamily occupancies, **nor additions and alterations.**

Addition & Alteration Form Scenarios



Project Notes

- Per the PE Checklist, Solar PV **does not apply** to Additions or Alterations

Would You Expect to See...?	Yes	No
1. A Commissioning form for a Nonresidential Addition?		✓
2. A Solar PV form for a Multifamily Roof Alteration?		✓

Renewables: New nonresidential, hotel/motel and multifamily buildings. Does not apply to additions and alterations.



Addition & Alteration Form Scenarios



Project Notes

- Per the PE Checklist, Energy Code is triggered for Indoor Lighting in Additions, so you should expect a form.



Which form should you expect for NR indoor unconditioned lighting?

Would You Expect to See...?	Yes	No
1. A Commissioning form for a Nonresidential Addition?		✓
2. A Solar PV form for a Multifamily Roof Alteration?		✓
3. A Lighting Form for indoor lighting in an Addition?	✓	

Lighting:	Indoor Lighting: New construction, additions, alterations in which connected load increased or 10% of fixtures in a space is replaced, moved or rewired.	Outdoor Lighting: New construction, alterations in which connected load increased, or >=5 fixtures (or greater) is replaced.	Sign Lighting: New signs and alterations in which illuminated signs are moved; Increase to the connected load; >50% ballasts replace/rewired.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> N/A	Conditioned Spaces <input type="checkbox"/> NRCC/LMCC-PRF-01 <input type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A	Unconditioned Spaces <input checked="" type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-LTS-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A

NRCC-LT-E



Break

BREAK

Let's Take a Break

Class will resume on time;
please don't be late



Envelope

4. Envelope

- ✦ **Applicable Resources on Energy Code Ace**
- ✦ **What's New in 2022 Energy Code**
- ✦ **Envelope Plan Check "Essentials"**
- ✦ **Finding Envelope on 2022 Compliance Forms**
- ✦ **Plan Check of Envelope:**
 - ◇ Whole-class Walkthrough Q&A
 - ◇ Small-team Breakouts – Newport Candy Company

Envelope Fact Sheets on Energy Code Ace

2022 ENERGY CODE Ace Resources Fact Sheet

Nonresidential Envelope

What Are the Envelope Requirements for Nonresidential Buildings?

The fact sheet explains the Title 24, Part 6 Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) envelope requirements for nonresidential building projects that are classified as New Construction, Addition or Alteration. The envelope features covered include roofs, walls, air barrier, floors and walls, fenestration and daylighting.

When a nonresidential building is newly constructed and conditioned or an existing nonresidential building is newly conditioned, all applicable nonresidential envelope requirements must be met. However, when a project is an Alteration, requirements apply only for the altered envelope features. In addition, newly constructed, conditioned spaces >5000 sq ft may have daylighting requirements.

For building envelopes, Energy Code requirements apply to:

- Building material
- Exterior or damping roof, wall, and/or floor insulation
- Air barrier design
- Window to wall and daylight to roof ratios
- Fenestration efficiency and sizing
- Daylighting
- Retestable school buildings

Table of Contents

- How Does this Fact Sheet Apply to Your Project? — 2
- Site Scope — 2
- Does Your Project Trigger the Energy Code? — 3
- Basics — 4
- Site Scope — 4
- New Construction and Additions — 4
- Alterations — 7
- Walls — 10
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- New Construction and Additions — 11
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- Air Barrier — 15
- Site Scope — 15
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- New Construction and Additions — 29
- Alterations — 30
- Site Scope — 30
- New Construction and Additions — 30
- Alterations — 32
- Site Scope — 33
- New Construction and Additions — 33

Occupancy Group

Occupancy Group	Examples
A Assembly	Theaters, Churches
B Business	Office Buildings
E Educational Facilities	K-12 Schools
F Fabricates, Low and Moderate Hazard Buildings	Industrial Manufacturing Buildings
H High Hazard Facilities	Laboratories, Refineries
R-1 Hotel/Motel	Hotels, Motels, Assisted Living Facilities
R-2 Institutional	Nursing Homes, Hospitals
M Mercantile	Grocery Stores, Department Stores
S Storage, Low and High Hazard	Industrial Warehouses, Misc Storage
U Utility	Garages, Towers

Table 7. Nonresidential Building Types with Envelope Requirements

Nonresidential

2022 Energy Code Sections: Envelope

New Construction	\$140.0, \$140.1, \$140.3
Additions & Alterations	\$141.0

Multifamily

2022 Energy Code Sections: Envelope

New Construction	\$170.1
Additions & Alterations	\$180.0

What's New in 2022 Energy Code


Mandatory Measures (Nonresidential) §110.6(a)




- ✦ Certification of **Fenestration Products** and **Exterior Glass Doors** Other than Field-fabricated:
 - ◇ For **U-factor, SHGC and VT** in **Nonresidential New Construction**:
 - ◆ NA6 formula can **only** be used for **site-built skylights < 200 ft²**
 - ◆ NA6 formula is **not allowed** for any **vertical** fenestration
 - ◆ This basically means you will be using NFRC-tested products in all applications



Mandatory Measures (Multifamily) §110.6(a)



- ✦ Certification of **Fenestration Products** and **Exterior Glass Doors** Other than Field-fabricated:
 - ◇ For **U-factor, SHGC and VT** in **New Construction**:
 - ◆ **Three stories or less:**
 - ◇ NA6 formula can **only** be used for **site-built fenestration $\leq 250 \text{ ft}^2$ OR 5% of the conditioned floor area** (whichever is greater)
 - ◇ The same applies to **Alterations**
 - ◆ **Four stories or more:**
 - ◇ NA6 formula can **only** be used for **site-built skylights < 200 ft²**
 - ◇ NA6 formula is **not allowed** for any **vertical** fenestration

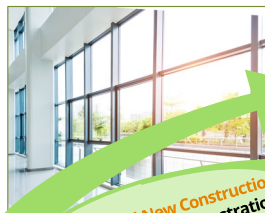


Fenestration Types

Manufactured Products	Site-built Products	Field-fabricated Products
Includes fenestration products constructed of materials that are factory cut or otherwise factory-formed.	Includes fenestration designed to be field-glazed or field assembled.	Includes fenestration that are fabricated at the building site from elements that are not sold together.



Nonresidential Fenestration Classification



Applies to all New Construction, added, or altered fenestration components — regardless whether Prescriptive or Performance.

★ **Four ways to determine U-factor, SHGC and VT values:**

1. NFRC-certified Product Labeling
2. NFRC Component Modeling Approach (CMA)
3. CEC-approved default tables
 - ◆ **Table 110.6-A** (U-factor)
 - ◆ **Table 110.6-B** (SHGC)
4. Alternative Calculation NA6*
 - ◆ **NR & MF 4 stories or more:** skylights < 200 ft²
 - ◆ **MF 3 stories or less:** any fenestration ≤ 250 ft² or 5% of CFA

Method	Manufactured Windows	Manufactured Skylights	Site-built Fenestration (windows, skylights)	Field-fabricated Fenestration	Glass Block
NFRC-certified Products	Yes	Yes	Yes	No	No
NFRC Component Modeling Approach (CMA)	No	No	Yes	No	No
Tables 110.6-A & 110.6-B	Yes	Yes	Yes	Yes	Yes
NA6 Calculation	No	No	Yes*	No	No



Tables 110.6-A and 110.6-B: Default Fenestration U-Factors and SHGC



If it doesn't have a label, the default values must be used

TABLE 110.6-A DEFAULT FENESTRATION PRODUCT U-FACTORS				
FRAME	PRODUCT TYPE	SINGLE PANE ^{3,4} U-FACTOR	DOUBLE PANE ^{1,3,4} U-FACTOR	GLASS BLOCK ^{2,1} U-FACTOR
Metal	Operable	1.28	0.79	0.87
	Fixed	1.19	0.71	0.72
	Greenhouse/garden window	2.26	1.40	N.A.
	Doors	1.25	0.77	
Metal, Thermal Break	Operable	N.A.	0.66	
	Fixed	N.A.	0.55	
	Greenhouse/garden window	N.A.	1.12	
	Doors	N.A.	0.59	
Nonmetal	Operable	0.99	0.58	
	Fixed	1.04	0.55	
	Doors	0.99	0.53	
	Greenhouse/garden windows	1.94	1.06	
	Skylight	1.47	0.84	

TABLE 110.6-B DEFAULT SOLAR HEAT GAIN COEFFICIENT (SHGC)					
FRAME TYPE	PRODUCT	GLAZING	FENESTRATION PRODUCT SHGC		
			Single Pane ^{2,3} SHGC	Double Pane ^{2,3} SHGC	Glass Block ^{1,2} SHGC
Metal	Operable	Clear	0.80	0.70	0.70
	Fixed	Clear	0.83	0.73	0.73
	Operable	Tinted	0.67	0.59	N.A.
	Fixed	Tinted	0.68	0.60	N.A.
Metal, Thermal Break	Operable	Clear	N.A.	0.63	N.A.
	Fixed	Clear	N.A.	0.69	N.A.
	Operable	Tinted	N.A.	0.53	N.A.
	Fixed	Tinted	N.A.	0.57	N.A.
Nonmetal	Operable	Clear	0.74	0.65	0.70
	Fixed	Clear	0.76	0.67	0.67
	Operable	Tinted	0.60	0.53	N.A.
	Fixed	Tinted	0.63	0.55	N.A.

<p>1. For all dual-glazed fenestration products, adjust the listed U-factors as follows:</p> <p>a. Add 0.05 for products with dividers between panes if spacer is less than 7/16 inch.</p> <p>b. Add 0.05 to any product with true divided lite (dividers through the panes).</p> <p>2. Translucent or transparent panels shall use glass block values when not rated by NFRC 200.</p> <p>3. Visible Transmittance (VT) shall be calculated by using Reference Nonresidential Appendix NAG.</p> <p>4. Windows with window film applied that is not rated by NFRC 100 shall use the default values from this table.</p>	<p>1. Translucent or transparent panels shall use glass block values when not rated by NFRC 200.</p> <p>2. Visible Transmittance (VT) shall be calculated by using Reference Nonresidential Appendix NAG.</p> <p>3. Windows with window film applied that is not rated by NFRC 200 shall use the default values from this table.</p>
--	--

A building could have a combination of window types, including fixed, operable, wood, metal, etc., some of which are field-fabricated. What are the options for showing compliance with the Energy Code?

For field-fabricated windows, you must select U-factors and SHGC values from the default tables (Tables 110.6-A and 110.6-B from the Energy Code).

- Windows that are not field-fabricated must be labeled, either with an NFRC label or with a manufacturer's label that certifies the window to have a U-factor and SHGC from the default tables (again, Tables 110.6-A and 110.6-B).
 - The manufacturer must label the window in accordance with §110.6(a)5, which includes noting the U-factor, SHGC, and VT values for the product.
- If the U-factors or SHGC values do not comply with the Prescriptive Approach requirements, the Performance Approach must be used.
 - To simplify data entry into the compliance software, you may choose the U-factor from Table 110.6-A that is the highest of any of the windows and use this for all windows. However, you must use the appropriate SHGC from Table 110.6-B for each window type individually.

Prescriptive Table Changes

§140.3



- ✦ **Notable changes in Table 140.3-B, which outlines Prescriptive Envelope requirements for Nonresidential buildings by climate zone**
 - ✦ **Metal-framed walls** – lower maximum U-factor requirements
 - ✦ **Steep-sloped Cool Roofs** – higher minimum reflectance/emittance ratings
 - ✦ **Air barrier** – now required in all climate zones (except CZ 7 for Hotel/Motel)



Excerpt of Table 140.3-B: Prescriptive Envelope Criteria for Nonresidential Buildings

Nonresidential		Climate Zone															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Roofs / Ceilings	Metal Building	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
	Wood Framed and Other	0.034	0.034	0.034	0.034	0.034	0.049	0.049	0.049	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034
Walls	Metal Building	0.113	0.061	0.113	0.061	0.061	0.113	0.113	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.061	
	Metal-framed	0.060	0.055	0.071	0.055	0.055	0.060	0.060	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	
Steep-sloped Roofing Product	Aged Solar Reflectance	0.20	0.25	0.20	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
	Thermal Emittance	0.75	0.80	0.75	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	
Air Barrier		REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	



Air Barrier

§140.3



- ✦ Per **Table 140.3-B** and **Table 140.3-C**, an air barrier is now **Prescriptively required** in all climate zones (except in CZ 7 for Hotel/Motel guest rooms)

Design	Acceptable Materials and Assemblies	Verification
<p>Construction documents to include:</p> <ul style="list-style-type: none"> ✦ Air barrier boundaries ✦ Interconnections and penetrations ✦ Associated square foot calculations for all sides of barrier 	<p>Entire length of air barrier shall be sealed at all joints and composed of:</p> <ul style="list-style-type: none"> ✦ Materials with an air permeance $\leq 0.004 \text{ cfm/ft}^2$, under a pressure differential of 0.3 inches of water (see Table 140.3-A "Materials Deemed to Comply") OR ✦ Assemblies of materials and components with an average air leakage $\leq 0.04 \text{ cfm/ft}^2$, under a pressure differential of 0.3 inches of water ✦ Exceptions and ASTM testing procedures apply 	<p>If chosen (NOT a requirement), then use one of the following:</p> <ul style="list-style-type: none"> ✦ Tested per new NA 5 to ensure air leakage is $\leq 0.40 \text{ cfm/ft}^2$ ✦ If air leakage is $> 0.40 \text{ cfm/ft}^2$, then visual inspection and diagnostic evaluation per NA 2.4.7 can be used ✦ Buildings $> 50,000 \text{ ft}^2$ CFA can use sampling





Essential Tasks: Envelope

Essential Tasks

Envelope:

Essential Plan Check Tasks






Essential Plan Check Tasks


Short on time?
Prioritize these tasks

Envelope

2022 Energy Code




Multifamily and Nonresidential - Title 24, Part 6
Plans Examiner
Checklist



Prioritize these
Plan Check tasks

PE Checklist Item	Essential Plan Check Task	"Top 7" Area
ENV3: Opaque Assemblies (wall, floor, roof)	Verify wall, roof and floor insulation levels on the NRCC/LMCC are consistent with the plans.	1 Insulation
ENV6: Fenestration	Verify window performance values match specs included with the plans.	2 Fenestration
ENV6: Fenestration	Verify window areas on the NRCC/LMCC are consistent with the plans.	2 Fenestration



PE Checklist: Envelope

Envelope					
Are the following items confirmed on the plans? If "NO" items to be corrected per plan check comments					
Plan Check Item		Code Reference	YES	NO*	N/A
ENV1. Table D: Exceptional Conditions	Exceptional conditions reviewed by Plans Examiner and match design Any errors reported to be resolved by Permit Applicant		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV2. Table E: Additional Remarks	Notes for Plans Examiner or Contractor (optional)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV3. Opaque Assemblies (wall, floor, roof)	Type: e.g. framed (metal, wood), mass, spandrel, MF: fire rating Insulation: Between framing, continuous, none Status: New, altered, existing MF roof type: attic-B, attic-C, non-attic	§110.8 §120.7 §140.3(a)1-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV4. Rated Roofing Material	Slope: Pitch Roof Material Performance (Aged): Reflectance, emittance, or SRI Status: New, altered, existing	All Occupancies §110.8 §110.6 JA4.5.1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV5. Opaque Door	Door Type: Swinging, non-swinging, MF: fire rated U-factor: U=0.20 represents a NFRC rated door Status: New, altered, existing	Nonresidential §140.3(a)1 Tables 140.3- B,C,D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV6. Fenestration (vertical and skylights)	Classification: NFRC / default / NA6 Skylights $\geq 200 R^2$ / MF: AW rating Performance: U-factor, RSHGC, VT Area: Per orientation and type Overhangs/Sidefins: Projections, distance above window Status: New, altered, existing	Additions §141.0(a) Alterations §141.0(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NEW/ENV7. Air Barrier (Does not apply to MF)	Design: Air barrier boundaries, interconnections and penetrations, square foot calculations all sides of air barrier Materials: Acceptable materials or assemblies Performance Method: When verification credit used, testing protocol	Multifamily §170.2(a) §180.1 §180.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENV8. Daylighting	Compliance Method: Method used matches plans Design: Area and VT match plans Status: Applies to new construction only	Nonresidential Table: §140.3-E §140.3(c-d) Multifamily §170.2(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Wall, roof & floor insulation

Window areas and performance values

Essential tasks in blue



Whole Group Demonstration 1: Envelope

High-level Form Treatment of Envelope

Colored table rows indicate locations for essential tasks

NRCC/LMCC-PRF-E

NRCC/LMCC-ENV-E*

**NRCC and LMCC forms both use the same envelope table names, but present data in their own format.*

Envelope (Wall/Roof/Floor)

NRCC/LMCC-PRF-E

Table G5: Opaque Surface Assembly Summary

NRCC/LMCC-ENV-E (Framed Walls)

Table H: Wall Assembly Schedule

Envelope (Wall/Roof/Floor)

NRCC/LMCC-PRF-E

Table G5: Opaque Surface Assembly Summary

NRCC/LMCC-ENV-E (Mass Walls)

Table H: Wall Assembly Schedule

Envelope (Fenestration)

NRCC/LMCC-PRF-E

Table G7A: Fenestration Assembly Summary (Nonresidential)

NRCC/LMCC-ENV-E

Table K: Fenestration and Glazed Door Schedule

Check Your Understanding 2

1. According to this **NRCC-PRF-E** excerpt, which best describes the **exterior wall** assembly?
 - a. Metal wall with R-13 cavity insulation
 - b. Metal wall with R-13 cavity insulation and R-2 continuous insulation
 - c. 8" concrete wall plus furred metal wall with R-13 cavity insulation
 - d. 8" concrete wall with no insulation or furred wall

2. Does that exterior wall assembly from the PRF match this Plan Set detail?

Per NRCC-PRF-E: 8" concrete wall plus furred metal wall with R-13 cavity insulation

- a. Yes
- b. No
- c. Not enough information

3. Do these storefront window performance values from the NRCC match the plans?

- a. Yes
- b. No
- c. Not enough information

4. Here's another project. According to this NRCC, what type of **certification method** was used to determine the window performance values for the storefront fenestration?

- a. NFRC Rated
- b. CEC Default Tables
- c. Center of Glass Calculation
- d. Manufacturer's Specs

5. These floor plan notes in the Plan Set provide the only guidance about the Default storefront window values. Is it a match?
- a. Yes
 - b. No
 - c. Not enough information

6. Does the **total square footage** of storefront fenestration match across the NRCC and plans?
- a. Yes
 - b. No
 - c. Not enough information

Breakout Activity 2: Envelope

Directions

- We will divide the class into small **teams**
- **Once in Your Breakout Team:**
 - Use the **Plan Set** and **NRCC** documentation for **Newport Candy Company** to complete the following sections of your PE Checklist:
 - **Envelope**
 - Note any **issues or discrepancies** discovered during your plan check on this worksheet.
 - When finished, respond to the list of questions for the “**what if**” **scenarios**.
- **When Breakout Time Ends:**
 - Teams **report out to the class** on plan check findings

Newport Case Study: Fill out the PE Checklist's Envelope section.

Newport Case Study: List any issues or discrepancies noted during plan check

NOTE: Number of blanks does **NOT** indicate number of anticipated issues (there may be fewer)

- 1.
- 2.
- 3.
- 4.

Newport Case Study: Provide your guidance for these “What if” Scenarios

Refer to the NRCC documentation and the Newport Plan Set.

Scenario 1: What if the floor plan indicated one curb mounted skylight in each bathroom? (4 ft² each; Default U-factor, SHGC & VT)

Recommended course of action:

Recommended communication:

Scenario 2: What if the plans indicated that the demising wall between the conditioned office and the unconditioned warehouse did **not** include R-2 continuous insulation?

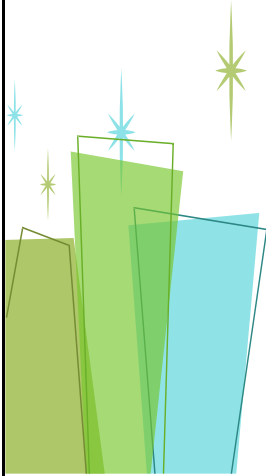
Recommended course of action:

Recommended communication:

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Lighting

5. Lighting



- ✦ **Applicable Resources on Energy Code Ace**
- ✦ **What's New in 2022 Energy Code**
- ✦ **Lighting Plan Check "Essentials"**
- ✦ **Finding Lighting on 2022 Compliance Forms**
- ✦ **Plan Check of Lighting:**
 - ❖ Whole-class Walkthrough Q&A
 - ❖ Small-team Breakouts - Newport Candy Company



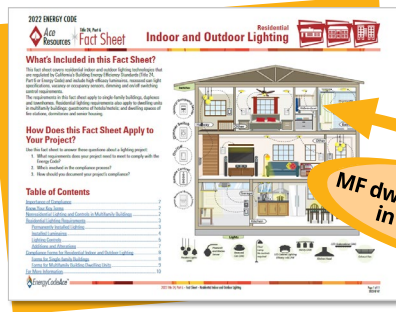
Lighting Fact Sheets on Energy Code Ace



Same Fact Sheet covers both NR and MF (common area controls)

Nonresidential

2022 Energy Code Sections: Lighting	
New Construction	§140.0-1, §140.3(c), §140.6-7
Additions & Alterations	§141.0



Controls for MF dwelling units covered in this Fact Sheet

Multifamily

2022 Energy Code Sections: Lighting	
New Construction	§170.1, §170.2(e)
Additions & Alterations	§180.0



Defining Multifamily Spaces

Dwelling Unit

- ✦ **Single unit** providing complete, independent living facilities for one or more persons
- ✦ Includes:
 - ◇ Access
 - ◇ Permanent provisions for:
 - ◆ Living
 - ◆ Sleeping
 - ◆ Eating
 - ◆ Cooking
 - ◆ Sanitation

Common Use Areas

- ✦ Occupancy "R" spaces that do **NOT** include dwelling units:
 - ◇ Community rooms
 - ◇ Corridors
 - ◇ Laundry rooms serving multiple units
 - ◇ Lobbies
 - ◇ Lounges
 - ◇ Storage spaces that only serve a Multifamily "R" occupancy
- ✦ Does **NOT** include:
 - ◇ Any of the above serving a Nonresidential occupancy of the building



Controls

§130.1



- ✦ Exceptions for Manual Area Control locations
- ✦ Shutoff Controls changes for Offices > 250 ft²
- ✦ Demand response lighting controls triggered at 4,000 watts
- ✦ Automatic Daylighting Controls
- ✦ Daylighting is now **mandatory** in Secondary Daylit Zones



Photo Source: WattStopper



Complete Building Lighting Allowances

§140.6-B



- ✦ Reductions in some lighting power density values
- ✦ Two new building types added

Table 140.6-B (Adapted): Complete Building Method Lighting Power Density Values

Type of Building	Allowed Lighting Power Density (Watts per Ft ²)
Assembly Building	0.65
Bank or Financial Institution Building	0.65
Grocery Store Building	0.90
Gymnasium Building	0.60
Healthcare Facility	0.90
Industrial/Manufacturing Facility Building	0.60
Library Building	0.70
Motion Picture Theater Building	0.60
Museum Building	0.65
Office Building	0.60
Parking Garage Building	0.13
Performing Arts Theater Building	0.75
Religious Facility Building	0.70
Restaurant Building	0.65
Retail Store	0.90
School Building	0.60
Sports Arena Building	0.75
All Other Buildings	0.40

New

New

Orange values reduced in 2022



Area Category Lighting Allowances

§140.6-C



Table 140.6-C: Area Category Method - Lighting Power Density Values (Watts/Ft²)

Primary Function Area	Allowed Lighting Power Density for General Lighting (W/ft ²)	Additional Lighting Power ¹	
		Qualified Lighting Systems	Additional Allowance (W/ft ² unless noted otherwise)
Aging Eye/ Low-vision ¹¹	Corridor Area	0.70	Decorative/Display 0.30
	Dining	0.80	Decorative/Display 0.30
			Tunable white or dim-to-warm ¹⁰ 0.10
	Lobby, Main Entry	0.85	Decorative/Display 0.30
			Transition Lighting OFF at night ¹² 0.95
			Tunable white or dim-to-warm ¹⁰ 0.10
	Lounge/Waiting Area	0.80 ↑	Decorative/Display 0.30
			Tunable white or dim-to-warm ¹⁰ 0.10
	Multipurpose Room	0.85	Decorative/Display 0.30
			Tunable white or dim-to-warm ¹⁰ 0.10
Religious Worship Area	1.00	Decorative/Display 0.30	
		Tunable white or dim-to-warm ¹⁰ 0.10	
Restroom	1.00	Decorative/Display 0.20	
Stairwell	0.80	Decorative/Display 0.30	
Audience Seating Area	0.50	Decorative/Display 0.25	
Auditorium Area	0.70	Decorative/Display 0.45	
Auto Repair/ Maintenance Area	0.55	Detailed Task Work ⁷ 0.20	

Many LPD and additional allowance changes: reductions = orange values, increases = orange values + ↑

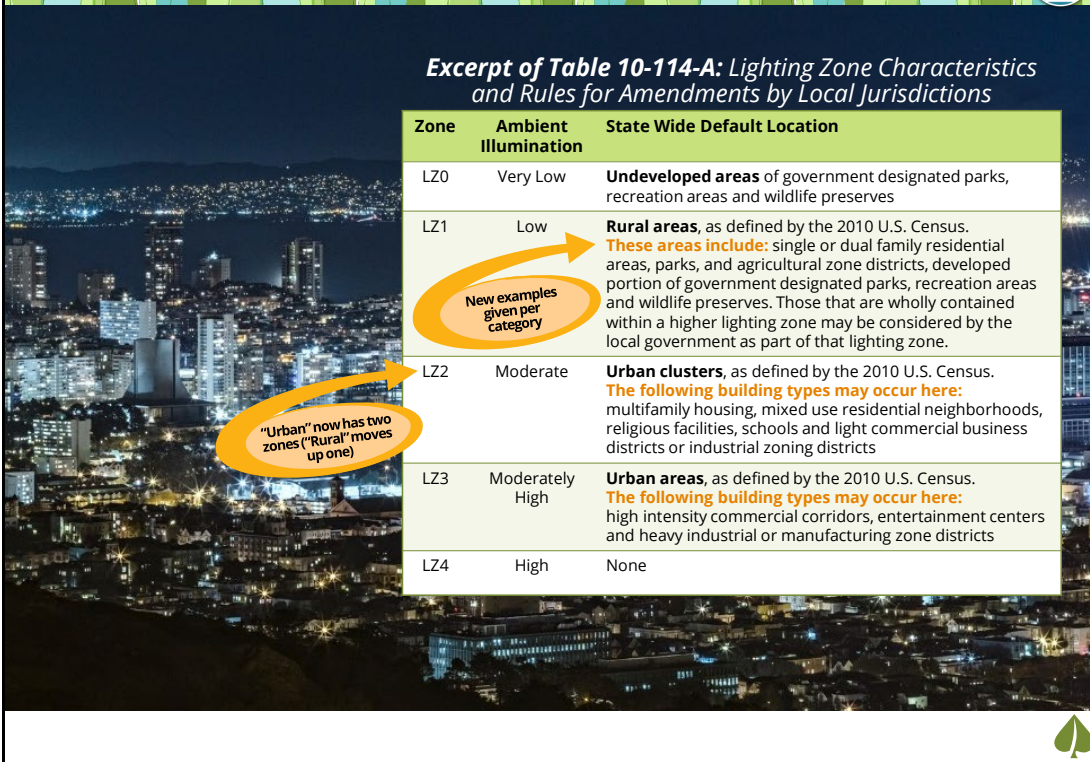
New alphabetical listing





Excerpt of Table 10-114-A: Lighting Zone Characteristics and Rules for Amendments by Local Jurisdictions

Zone	Ambient Illumination	State Wide Default Location
LZ0	Very Low	Undeveloped areas of government designated parks, recreation areas and wildlife preserves
LZ1	Low	Rural areas , as defined by the 2010 U.S. Census. These areas include: single or dual family residential areas, parks, and agricultural zone districts, developed portion of government designated parks, recreation areas and wildlife preserves. Those that are wholly contained within a higher lighting zone may be considered by the local government as part of that lighting zone.
LZ2	Moderate	Urban clusters , as defined by the 2010 U.S. Census. The following building types may occur here: multifamily housing, mixed use residential neighborhoods, religious facilities, schools and light commercial business districts or industrial zoning districts
LZ3	Moderately High	Urban areas , as defined by the 2010 U.S. Census. The following building types may occur here: high intensity commercial corridors, entertainment centers and heavy industrial or manufacturing zone districts
LZ4	High	None



How to Determine Lighting Zones

- ✦ Use the interactive map provided by the U.S. Census Bureau to zoom in and determine a given region's designation
 - ✦ CA lighting zone designations defer to 2010 U.S. Census definitions and listings of **rural areas**, **urban clusters** and **urbanized areas**
 - ✦ If the region is NOT shown as an urban cluster or urbanized area, it is considered rural

Map Legend:

- Urban Areas (no rural component)
 - Urbanized Area
 - Urban Cluster
- Metropolitan Statistical Area

Source: U.S. Census Bureau, Cartographic Boundary Shapefiles (2015)





Rural Population

In a previous section, we presented a map of the rural area of the


<https://mtgis-portal.geo.census.gov/arcgis/apps/MapSeries/index.html?appid=49cd4bc9c8eb444ab51218c1d5001ef6>



Lighting Forms: Compliance Options

 Indoor (Conditioned)	 Indoor (Unconditioned)	 Outdoor Lighting	 Sign Lighting
<ul style="list-style-type: none">+ Two Options: Performance or Prescriptive<ul style="list-style-type: none">◇ NRCC/LMCC-PRF-E◇ NRCC/LMCC-LTI-E+ Cannot be listed on both forms for the same project	<ul style="list-style-type: none">+ Only One Option: Prescriptive<ul style="list-style-type: none">◇ NRCC/LMCC-LTI-E	<ul style="list-style-type: none">+ Only One Option: Prescriptive<ul style="list-style-type: none">◇ NRCC/LMCC-LTO-E	<ul style="list-style-type: none">+ Only One Option: Prescriptive<ul style="list-style-type: none">◇ NRCC/LMCC-LTS-E

Note on Form Titles:
"NRCC" prefix applies to NR, Hotel/Motel, and MF 4 stories or more
"LMCC" prefix applies to Multifamily 3 stories or less





Essential Tasks: Lighting

Essential Tasks

Lighting:

Essential Plan Check Tasks






Essential Plan Check Tasks

✨ Short on time?
Prioritize these tasks


Lighting (Indoor & Outdoor)

2022 Energy Code




Multifamily and Nonresidential - Title 24, Part 6
Plans Examiner
Checklist

Prioritize these
Plan Check tasks



PE Checklist Item	Essential Plan Check Task	"Top 7" Area
LT14: Fixture Schedule	Verify indoor lighting fixture count and schedule matches the NRCC/LMCC.	6 Indoor Lighting
LT15: Lighting Controls	Verify indoor lighting controls from the LTI are shown on the plans.	6 Indoor Lighting
LTO4: Fixture Schedule	Verify outdoor lighting fixture count and schedule matches the NRCC/LMCC.	7 Outdoor Lighting
LTO6: Lighting Controls	Verify outdoor lighting controls from the LTO are shown on the plans.	7 Outdoor Lighting



PE Checklist: Indoor Lighting

Indoor Lighting					
Are the following items confirmed on the plans? If "NO", items to be corrected per plan check comments					
Plan Check Item		Code References	YES	NO*	N/A
LT11. Table D: Exceptional Conditions	Exceptional conditions reviewed by Plans Examiner and match design. Any errors reported to be resolved by Permit Applicant		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT12. Table E: Additional Remarks	Notes for Plans Examiner or Contractor (optional)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT13. Unconditioned Spaces	Lighting in unconditioned spaces is documented via NRCC-LT-E even if Performance approach is used.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT14. Fixture Schedule (Only applies to common areas in multifamily buildings)	Wattage: Luminaire wattage match fixture schedule on plans. Number: Total number per type of luminaire. Exempt: Excluded luminaires per §140.6(a)(3) / MF: §170.2(e) Status: New, Altered, Existing		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT15. Lighting Controls (Only applies to common areas in multifamily buildings)	Manual Areas: Accessible / within enclosed space / exception used. Multi-Level: Controls steps provided / uniformity / exception used. Shut-Off: Time-switch / occ. sensors / partial-off / exception used. Primary & Secondary Daylighting: Daylit zones on plans / sensors not readily accessible / exception used. Diamond Responsive: Provided when general wattage ≥ 4,000 W / exception used. Control Interactions: Sequence of operations provided. Power Adjustment Factor (PAF): Supported in control design.	Nonresidential §130.0 §130.1 §140.6(a)(3) Alterations §141.0(b)(2)(ii)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT16. Wattage Allowances (Only applies to common areas in multifamily buildings)	Building / Room / Function Type: Type used matches plans	Multifamily §160.5(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Essential tasks in blue

Indoor Lighting Fixtures

Indoor Lighting Controls

Depending on how cond. & uncond. lighting is submitted, you may need to do both of these tasks twice (PRF & LTI)

Lighting:	Indoor Lighting: New construction, additions, alterations in which connected load increased or 10% of fixtures in a space is replaced, moved or rewired.	Outdoor Lighting: New construction, alterations when connected load increased, or >=5 fixtures or 10% (whichever is greater) is replaced.	Sign Lighting: New signs and alterations in which illuminated signs are moved; Increase to the connected load; >50% ballasts replace/rewired.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> N/A	Conditioned Spaces <input type="checkbox"/> NRCC/LMCC-PRF-01 <input type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A	Unconditioned Spaces <input type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A

Unconditioned indoor lighting can only use Prescriptive form NRCC/LMCC-LT-E

PE Checklist: Outdoor Lighting

Outdoor Lighting					
Are the following items confirmed on the plans? If "NO", items to be corrected per plan check comments					
Plan Check Item		Code References	YES	NO*	N/A
LT01. Outdoor Lighting Zone	LZ0 (very low) / LZ1 (low) rural areas / LZ2 (moderate) urban clusters / LZ4 (moderately high) urban areas / LZ5 (high) if approved by CEC	§10-114	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT02. Table D: Exceptional Conditions	Exceptional conditions to be reviewed by Plans Examiner. Errors to be resolved by Permit Applicant		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT03. Table E: Additional Remarks	Notes for Plans Examiner or Contractor (optional)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT04. Fixture Schedule	Wattage: Luminaire wattage match fixture schedule on plans. Number: Total number per type of luminaire. Exempt: Excluded luminaires per §140.7(a) / MF: §170.2(e)(5A) Status: New, altered (existing power verified when Reduced Power Method used), existing. MF: Does NOT apply to fixtures controlled from within dwelling units		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT05. Shielding (BUG)	Mounting Height & Lighting Type: Matches plans. Backlight, Uplight, & Glare Ratings: When fixture ≥ 6,200 lumens / Exception Used. MF: Does NOT apply to fixtures controlled from within dwelling units	Nonresidential §130.2 §140.7 Alterations §141.0(b)(2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LT06. Lighting Controls	Daylight Available: Photo control / astronomical time-switch / other. Scheduling: Reduce power / 2 nighttime periods / override. Motion Sensing: >40 W and mounted within 24 ft. of grade / exception used. MF: Does NOT apply to fixtures controlled from within dwelling units	Multifamily MF: §160.5(c) §170.2(a) §180.2(b)(4)(b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Essential tasks in blue

Outdoor Lighting Fixtures

Outdoor Lighting Controls

Lighting:	Indoor Lighting: New construction, additions, alterations in which connected load increased or 10% of fixtures in a space is replaced, moved or rewired.	Outdoor Lighting: New construction, alterations when connected load increased, or >=5 fixtures or 10% (whichever is greater) is replaced.	Sign Lighting: New signs and alterations in which illuminated signs are moved; Increase to the connected load; >50% ballasts replace/rewired.
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> N/A	Conditioned Spaces <input type="checkbox"/> NRCC/LMCC-PRF-01 <input type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A	Unconditioned Spaces <input type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A	<input type="checkbox"/> NRCC/LMCC-LT-E <input type="checkbox"/> None Provided <input type="checkbox"/> N/A

Outdoor lighting can only use Prescriptive form NRCC/LMCC-LT-E

Whole Group Demonstration 2: Lighting

High-level Form Treatment of Lighting

Colored table rows indicate locations for essential tasks

NRCC/LMCC-PRF-E

NRCC/LMCC-LTI-E*

**NRCC and LMCC forms both use the same envelope table names, but present data in their own format.*

Lighting Fixtures (Indoor Conditioned)

NRCC/LMCC-PRF-E

Table K2: Indoor Conditioned Lighting Schedule

NRCC/LMCC-LTI-E

Table F: Indoor Lighting Fixture Schedule

Lighting Controls (Indoor Conditioned)

NRCC/LMCC-PRF-E

Table K4: Indoor Conditioned Lighting Mandatory Lighting Control

NRCC/LMCC-LTI-E

Table H: Indoor Lighting Controls (Not Including PAFs)

Lighting Fixtures (Indoor Unconditioned)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table F: Indoor Lighting Fixture Schedule

Lighting Controls (Indoor Unconditioned)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table H: Indoor Lighting Controls (Not Including PAFs)

Lighting Fixtures (Outdoor)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table F: Outdoor Lighting Fixture Schedule

Lighting Controls (Outdoor)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table H: Outdoor Lighting Controls

Check Your Understanding 3

1. Which of these forms is used to demonstrate energy compliance of **indoor conditioned** lighting? **Select all that apply.**
 - a. NRCC-LTO-E
 - b. NRCC-LTI-E
 - c. NRCC-PRF-E
 - d. NRCC-LTS-E
2. According to this project's NRCC, how is **Indoor Conditioned** Lighting being submitted?
 - a. Performance
 - b. Prescriptive
 - c. Both of these
3. A New Construction project is submitting its indoor, outdoor, and sign lighting in the following manner. Which NRCC forms should you receive to document all aspects of lighting compliance? **Select all that apply.**
 - a. NRCC-PRF-E
 - b. NRCC-LTI-E
 - c. NRCC-LTO-E
 - d. NRCC-LTS-E

4. Let's focus on the project's **NRCC-LTI-E** form first. Does its **indoor unconditioned** lighting comply with Energy Code?

- a. Yes
- b. No
- c. Not enough information

5. The project's **NRCC-LTI-E** shows indoor unconditioned lighting fixtures marked as "A1" and "A2."

Does the "**A1/A2**" **lighting fixture type and wattage** on the Plan Set match the NRCC?

- a. Yes
- b. No
- c. Not enough information

6. Does the **"A1/A2" luminaire count** from the NRCC match the Plan Set?

- a. Yes
- b. No
- c. Not enough information

7. Let's move on to **indoor conditioned** lighting on the **NRCC-PRF-E** (shown as "A1" fixtures).

Does the **"A1" lighting fixture type and wattage** on the Plan Set match the NRCC?

- a. Yes
- b. No
- c. Not enough information

8. Does the “**A1**” **luminaire count** from the NRCC match the Plan Set?

- a. Yes
- b. No
- c. Not enough information

9. Do the **required controls** listed in the **NRCC-LTI** match the plans for these unconditioned spaces?

- a. Yes
- b. No

Breakout Activity 3: Lighting

Directions

- We will divide the class into small **teams**
- **Once in Your Breakout Team:**
 - Use the **Plan Set** and **NRCC** documentation for **Newport Candy Company** to complete the following sections of your PE Checklist:
 - **Indoor Lighting** (conditioned & unconditioned)
 - **Outdoor Lighting**
 - Note any **issues or discrepancies** discovered during your plan check on this worksheet.
 - When finished, respond to the list of questions for the **“what if” scenarios**.
- **When Breakout Time Ends:**
 - Teams **report out to the class** on plan check findings

Newport Case Study: Fill out the PE Checklist's **Indoor Lighting** section.

Newport Case Study: Fill out the PE Checklist's **Outdoor Lighting** section.

Newport Case Study: List any issues or discrepancies noted during plan check

NOTE: Number of blanks does **NOT** indicate number of anticipated issues (there may be fewer)

- 1.
- 2.
- 3.
- 4.

Newport Case Study: Provide your guidance for these “What if” Scenarios

Refer to the NRCC documentation and the Newport Plan Set.

Scenario 1: What if the NRCC-LTI compliance form also included lighting for indoor conditioned space?

Recommended course of action:

Recommended communication:

Scenario 2: What if the lighting plan indicated 6 linear feet of track lighting in the Conference Room?

Recommended course of action:

Recommended communication:



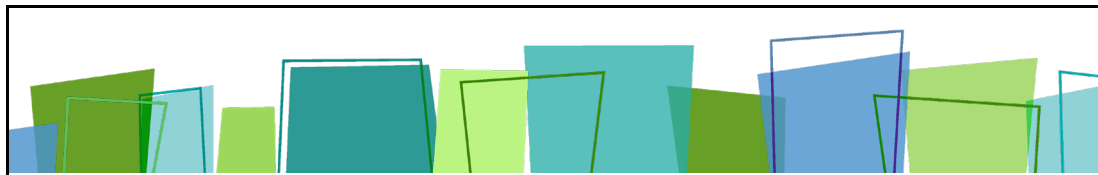
Thank you for your participation today!
We look forward to hearing from you tomorrow!



Please feel free to reach out to us with your questions and comments!

Part 1 — Title 24 Part 6 Essentials — NR & MF Plans Examiners


Contact	Role	Email	Phone
Marina Chavez-Blanco	Instructor	Marina@gabelenergy.com	(510) 428-0803 x 1002
Energy Code Ace Online Training	Design, development and delivery support	Online.training@energycodeace.com	(949) 667-1322
Jill Marver	Energy Code Ace Program Manager	Jill.Marver@PGE.com	(925) 788-6312
Energy Code Ace	Multiple	http://energycodeace.com/content/contact	

Day Two



 **2022 Title 24, Part 6**
Essentials  **Nonresidential & Multifamily Standards
Plans Examiners**

Marina Chavez-Blanco
Energy Code Ace Instructor
Gabel Energy

 **Part 2**

Continuing Education Information			
AIA Provider ID:	404109082	AIA Course Number:	22 NR MF PE
ICC Provider ID:	1534	ICC Course Number:	34203

Today's Instructor and Support Team

Instructor



Marina Chavez-Blanco
Gabel Energy

Support



Behind the Scenes
McLain ID Consulting

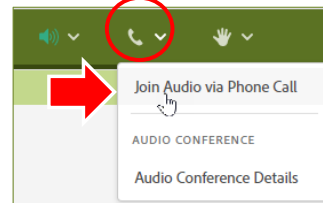


Hear & Be Heard

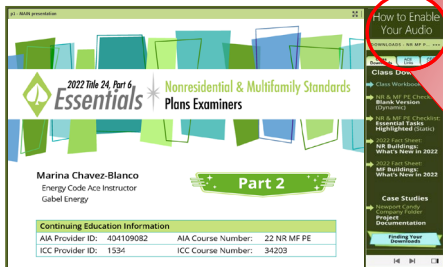


✦ Do **NOT** select "Device Speaker"

If you did select "Device Speaker," switch to using your phone



✦ If you need more information, chat with Tech Support or download the detailed directions.



Class Agenda

Class Agenda

Yesterday

1. Course Introduction & Pre-test
2. Focusing Review Time on Key Energy Savings
3. General Information
4. Envelope
5. Lighting

Today

6. Mechanical
7. Solar PV & Battery
8. Putting It All Together
9. Additional Resources
10. Course Conclusion & Post-test



Group Discussion

What's on Your Mind?


- ✦ Do you have any remaining questions regarding:
 - ✧ "Top 7" Areas of Key Energy Savings
 - ✧ General Information
 - ✧ Envelope
 - ✧ Lighting
- ✦ Anything in particular you want to be sure we cover today?

Time: 5 minutes



Let's Talk...

Mechanical



6. Mechanical

- ✦ **Applicable Resources on Energy Code Ace**
- ✦ **What's New in 2022 Energy Code**
- ✦ **Mechanical Plan Check "Essentials"**
- ✦ **Finding Mechanical on 2022 Compliance Forms**
- ✦ **Plan Check of Mechanical:**
 - ✦ Whole-class Walkthrough Q&A
 - ✦ Small-team Breakouts – Newport Candy Company

Mechanical Fact & Trigger Sheets on Energy Code Ace

NR Trigger Sheet

2022 ENERGY CODE
Ace Resources
Trigger Sheet
Small Commercial HVAC – Alterations
Nonresidential

For Details Click a code section	Control			Equipment			Ventilation			Distribution		
	Thermostat	Demand Control Ventilation	Minimum Chilling	Minimum Heating	Apartment Sizing per Unit	Fan Energy Calculations	Ventilation Calculations	Supply and Return	Air Filtration	Duct Insulation	Duct Seal	Duct Leak
110.0.0.0	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 1. Single-zone, Direct Expansion (DX) – Packaged Units and Split Systems

NR & MF Fact Sheet

2022 ENERGY CODE
Ace Resources
Fact Sheet
Nonresidential and Multifamily Buildings
Acceptance Testing

What is Included in this Fact Sheet?

What is Acceptance Testing?

Table of Contents

Nonresidential

2022 Energy Code Sections: Mechanical

New Construction \$140.0-1, \$140.4-5

Additions & Alterations \$141.0

Multifamily

2022 Energy Code Sections: Mechanical

New Construction \$170.1, \$170.2(c-d)

Additions & Alterations \$180.0

What's New in 2022 Energy Code

Duct Leakage Testing

§120.4(g)



- ✦ New duct systems meeting criteria below shall be **HERS or ATT tested to verify no more than 6% leakage:**
 - ✧ Provides conditioned air to an occupiable space for a **constant volume, single zone** space-conditioning system
 - ✧ **Serves < 5,000 ft²** of CFA
 - ✧ **Have more than 25%** of duct in unconditioned space or outdoors
- ✦ **Exemptions:**
 - ✧ Healthcare facilities
- ✦ New duct systems that are not subject to HERS/ATT testing are still subject to the CMC

Changed from Prescriptive to Mandatory



New



Economizers

§140.4(e)



- ✦ **Prescriptively required** when the air handler has cooling capacity > **33,000 Btu/hr**
 - ✧ Smaller rooftop units
 - ✧ Smaller split DX air handlers
 - ✧ VRFs and mini-splits
- ✦ **Exception:**
 - ✧ Each air handler that has a design cooling capacity < **54,000 Btu/hr** and ventilation provided by a **dedicated outdoor air system (DOAS)** with exhaust air heat recovery
 - ✦ The DOAS unit shall meet the exhaust air heat recovery ratio as specified in §140.4(q)1 and includes bypass or control to disable energy recovery as specified in §140.4(q)2
 - ✦ The DOAS unit shall provide at least the minimum ventilation air flow rate as specified in §120.1(c)3 and provide no less than 0.3 cfm/ft² during economizer conditions

Was 54,000 Btu/hr in 2019



Economizers

§140.4-F



Table 140.4-F: Economizer Trade-off Table for Cooling Systems

Climate Zone	Efficiency Improvement ^a
1	70%
2	65%
3	65%
4	65%
5	70%
6	30%
7	30%
8	30%
9	30%
10	30%
11	30%
12	30%
13	30%
14	30%
15	30%
16	70%

Table Footnote

^a If a unit is rated with an annualized or part-load metric, then to eliminate the required economizer, only the applicable minimum cooling efficiency of the unit must be increased by the percentage shown.

If the unit is only rated with a full load metric, like EER or COP cooling, then that metric must be increased by the percentage shown.

To determine the efficiency required to eliminate the economizer, when the unit equipment efficiency is rated with an energy-input divided by work-output metric, the metric shall first be converted to COP prior to multiplying by the efficiency improvement percentage and then converted back to the rated metric.



HVAC Selections

§140.4(a)2



Does **NOT** apply to systems utilizing heat recovery for space heating

Required Prescriptively:

(Single zone systems with direct expansion cooling ≤ 240,000 Btu/hr)

- ✦ **School Building Spaces**
 - ✧ **Climate Zones 2-15:** Heat Pump
 - ✧ **Climate Zones 1, 16:** Dual-fuel Heat Pump
- ✦ **Retail and Grocery Building Spaces**
 - ✧ **Climate Zones 2-15:** Heat Pump
 - ✧ **Climate Zones 1, 16:**
 - ◆ Cooling capacity < 65,000 Btu/hr: Furnace A/C
 - ◆ Cooling capacity ≥ 65,000 Btu/hr: Dual-fuel Heat Pump
- ✦ **Office, Financial Institution and Library Building Spaces**
 - ✧ **Climate Zones 1-15:** Heat Pump
 - ✧ **Climate Zone 16:**
 - ◆ Cooling capacity < 65,000 Btu/hr: Furnace A/C
 - ◆ Cooling capacity ≥ 65,000 Btu/hr: Dual-fuel Heat Pump
- ✦ **Office Spaces in Warehouses**
 - ✧ **Climate Zones 1-16:** Heat Pump



HVAC Alterations

§141.0(b)2



Fan Power Allowances

New/Replacement HVAC System

- ✦ Additional Fan Power Allowances are available as specified in **Table 141.0-D**
- ✦ These values can be added to the Fan Power Allowance values in **Tables 140.4-A** and **140.4-B**

System Type

Prescriptive Single-zone Space Conditioning — §140.4(a)2

- ✦ Heat pump requirement does NOT apply to Additions or Alterations

Economizers

Triggers for Economizers — §140.4(e)

- ✦ Altered single package air-cooled commercial unitary air conditioners and heat pumps trigger economizers if they have a cooling capacity of < 33,000 Btu/hr
- ✦ All other equipment types trigger economizers if the system has a cooling capacity of < 54,000 Btu/hr

Hot Water Design

- ✦ A new or replacement gas hot water boiler system is not subject to the hot water design requirements



Domestic Hot Water

§140.5



✦ Required **Prescriptively**:

✦ School buildings < 25,000 ft² and < 4 stories

✦ **Climate Zones 2 - 15**

- ✦ A **heat pump** water-heating (HPWH) system
- ✦ Water-heating system serving an individual bathroom space may be an **instantaneous electric** water heater



✦ **Hotel/Motel Occupancies**

- ✦ Covered in next few Multifamily slides since the requirements of §140.5 are the same as §170.2




✦ **All Other Nonresidential Occupancies**

- ✦ **Any** water heater that meets CA regulations
- ✦ Must be at least 90% efficient if the combined input rate is $\geq 1,000,000$ Btu/hr
 - ✦ Individual gas water heaters with input capacity $\leq 100,000$ Btu/hr shall not be included in the total system input rate
- ✦ Other requirements and exceptions apply



Central Domestic Hot Water

§170.2(d)3 

✦ **Required Prescriptively in Central System Serving Multiple Dwelling Units:**

Gas or Propane System with the following components:

1. **Climate Zones 1-9:**

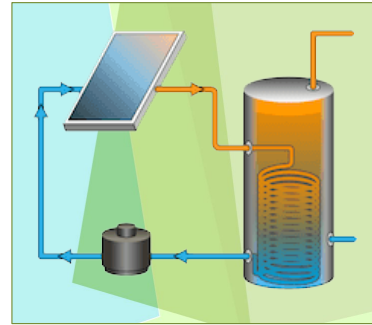
Total input rating $\geq 1,000,000$ Btu/hr with minimum thermal efficiency of **90%**

◆ Exceptions may apply

2. **A recirculation system**

◆ Required for buildings with **9 or more** dwelling units

◆ No longer required to be dual loop



3. **A solar water-heating system** with a minimum solar savings fraction of:

◆ **Climate Zones 1-9:** 0.20

◆ **Climate Zones 10-16:** 0.35

◆ Solar can be reduced by 5% with a **drain water heat recovery system**



Central Heat Pump Water Heater

§170.2(d)2 

Heat Pump Water Heater(s) Compressor	Primary Storage Tank(s)	Temperature Maintenance System	Recirculation Loop Tank
Single-pass primary heat pump water heater , the primary thermal storage tanks shall be piped <i>in series</i> for multiple tanks	The primary storage tank temperature setpoint shall be $\geq 135^\circ\text{F}$	Recirculation system meeting Mandatory requirements of §110.3(c) required for buildings with nine or more dwelling units	Shall be electricity (if auxiliary heating is needed) and be capable of multi-pass water heating operation
Multi-pass primary heat pump water heater , the primary thermal storage tanks shall be piped <i>in parallel</i> for multiple tanks <i>(Performance baseline is single-pass)</i>	Meet the Mandatory requirements for tank insulation of §110.3(c)3	Capable of automatically controlling the recirculation pump operation based on hot water demand and hot water return temperature	Temperature setpoint shall be at least 10°F lower than the primary thermal storage tank temperature setpoint
Minimum heat pump water heater compressor cut-off temperature $\leq 40^\circ\text{F}$	Recirculation return loop shall not directly connect to the primary thermal storage tanks	Recirculation return loop shall not directly connect to the primary heat pump water heater inlet	The hot water return from the recirculation loop shall connect to a recirculation loop tank

✦ **Design documentation** shall be provided in accordance with **JA14.4**



Essential Tasks: Mechanical


Essential Tasks



Mechanical:
Essential Plan Check Tasks





Essential Plan Check Tasks


 Short on time?
Prioritize these tasks


Mechanical (HVAC)

2022 Energy Code




Multifamily and Nonresidential - Title 24, Part 6
Plans Examiner
Checklist





PE Checklist Item	Essential Plan Check Task	“Top 7” Area
MCH3: Equipment Schedules	Verify HVAC schedules match the NRCC/LMCC.	4 HVAC
MCH4: Ventilation	Verify ventilation air flows (CFM) match the NRCC/LMCC.	4 HVAC
MCH5: Controls	Verify HVAC controls from the NRCC/LMCC are shown on the plans.	4 HVAC



PE Checklist: HVAC

Mechanical				
Are the following items confirmed on the plans? If "NO", items to be corrected per plan check comments				
Plan Check Item	Code References	YES	NO	NA
MCH1. Table D: Exceptional Conditions	Exceptional Conditions reviewed by Plans Examiner and match Design Any errors reported to be resolved by Permit Applicant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MCH2. Table E: Additional Remarks	Notes for Plans Examiner or Contractor (optional)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MCH3. Equipment Schedules	Type and # of Systems (e.g., split-up system component(s), heat pump or FAU system(s)) Output or Volume: Heating (kBtu/h) / cooling (kBtu/h) / volume (gal.) Efficiency: Equal or less than equipment schedule on plans Status: New, altered, existing Dry Systems Fans: Type (e.g., supply, exhaust) / airflow (CFM) / motor power (HP) / none Economizer: Type / none VAV Boxes: Min. airflow ratio / fan CFM and BHP (if applicable) / heating and cooling output (kBtu/h) / none Wet Systems Pumps: Type (e.g., chilled, heating) / flow (GPM) / motor power (HP) / none	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MCH4. Ventilation	IAQ Min. CFM: Occupancy type / supply & exhaust / air class / fixed seating: # of people / hotel/motel & MF: # of bedrooms / air filters Local Exhausts: Type (residential kitchen hood, bathroom, lab & kitchen see "Covered Process" / airflow (CFM) / fan power (W or BHP) / sound rating for residential kitchen hood) and IAQ fans / ERV & HRV recovery efficiency and fan power (W or BHP) New! Exhaust Heat Recovery: Energy or enthalpy recovery ratio(%) / None New! DDCs: NRCC, MCH-E: design criteria of net / airflow CFM and fan power (W or BHP) / energy or enthalpy recovery ratio (%) / supply air delivering location / none MF IAQ: Type (exhaust / supply / balanced) / CFM and fan power (W or BHP) / sound rating / IEQ envelope / lower door testing supported if balanced system not being used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MCH5. Controls	System (shut-off; reset; DDC & optimum start/stop; isolation) / control (thermostat; demand shed / terminal box / ventilation / economizer / heat pump)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MCH6. Distribution	Ductwork: Duct insulation / return discharge location / air filters Piping: Pipe insulation thickness / insulation protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

HVAC Equipment

Ventilation

Controls

Essential tasks in blue

Essential Plan Check Tasks

Mechanical (Plumbing)

Multifamily, Hotel/Motel & Schools only



Short on time? Prioritize these tasks

2022 Energy Code



Multifamily and Nonresidential - Title 24, Part 6
Plans Examiner Checklist

Prioritize these Plan Check tasks



PE Checklist Item	Essential Plan Check Task	"Top 7" Area
PLB3: Equipment Schedules	Verify DHW systems match the NRCC/LMCC.	5 DHW/STH
PLB6: Solar Thermal	Verify solar thermal systems match the NRCC/LMCC.	5 DHW/STH



PE Checklist: Plumbing (MF, Hotel/Motel & Schools Only)

Plumbing					
Are the following items confirmed on the plans? If "NO", items to be corrected per plan check comments					
Plan Check Item		Code Reference	YES	NO*	N/A
PLB1. Table D: Exceptional Conditions	Exceptional conditions reviewed by Plans Examiner and match design Any errors reported to be resolved by Permit Applicant		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLB2. Table E: Additional Remarks	Notes for Plans Examiner or Contractor (optional)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLB3. Equipment Schedules	Type and # of Systems: e.g., gas, electric resistance, heat pump, tank, tankless, or indirect Input and Volume: Heating (kBtu/h) / volume (gal.) Standby Loss: If applicable Efficiency: Match equipment schedule on plans NEW! Hotel/Motel and MF Heat Pump: Design features (storage tanks piping, temp. setpoints, compressor cut-off temp., design docs per JA14.4) Status: New, altered, existing	Nonresidential §110.1 §110.3 §120.9 Alterations §141.0(b)2N Multifamily §160.4(a) §180.2(c)3c	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLB4. Controls	Outlet temperature / auto turn-off / none Recirc. Systems: Residential individual DHW manual on/off / central DHW pump control type	Nonresidential §110.1 §110.2 Multifamily §160.4(a)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLB5. Distribution	Piping: Pipe insulation thickness / insulation protection drain water heat recovery: NEW! Hotel/Motel and MF: Distribution design credits (e.g., compact per RAA.4.6 / heat pump recirc. loop design features (recirc. loop tank temp. setpoint)	Nonresidential §110.1 §110.3 §140.5(b) Multifamily §160.4(b) §180.2(c)3b	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLB6. Solar Thermal	Hotel/Motel and MF / High Capacity Service Water Heating ≥ 1 MMBtu/hr / State Bldgs: See NRCC-SAB-E/renewables section	Nonresidential §110.1 §110.3 §140.5(c) Multifamily §160.4(c)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DHW systems

Solar thermal systems

Essential tasks in blue



Whole Group Demonstration 1: Mechanical

High-level Form Treatment of Mechanical

Colored table rows indicate locations for essential tasks

NRCC/LMCC-PRF-E

NRCC/LMCC-LTI-E*

**NRCC and LMCC forms both use the same envelope table names, but present data in their own format.*

Mechanical (HVAC Equipment)

NRCC/LMCC-PRF-E

Table H1: Dry System Equipment

(Furnaces, Air Handling Units, Heat Pumps, VRF, Economizers, etc.)

NRCC/LMCC-LTI-E

Table F: HVAC System Summary (Dry & Wet Systems)

Mechanical (HVAC Economizer & Fan)

NRCC/LMCC-PRF-E

Table H1: Dry System Equipment

(Furnaces, Air Handling Units, Heat Pumps, VRF, Economizers, etc.)

Table H2: Fan Systems Summary

NRCC/LMCC-LTI-E

Table H: Fan Systems & Air Economizers

Mechanical (HVAC Controls)

NRCC/LMCC-PRF-E

Table H8: System Special Features

NRCC/LMCC-LTI-E

Table I: System Controls

Mechanical (Ventilation)

NRCC/LMCC-PRF-E

Table H9: Nonresidential / Common Use Area & Hotel/Motel Ventilation

NRCC/LMCC-LTI-E

Table J: Ventilation and Indoor Air Quality

High-level Form Treatment of Plumbing (DHW)

Colored table rows indicate locations for essential tasks

NRCC/LMCC-PRF-E

NRCC/LMCC-LTI-E*

**NRCC and LMCC forms both use the same envelope table names, but present data in their own format.*

Lighting Fixtures (Outdoor)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table F: Outdoor Lighting Fixture Schedule

Lighting Controls (Outdoor)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table H: Outdoor Lighting Controls

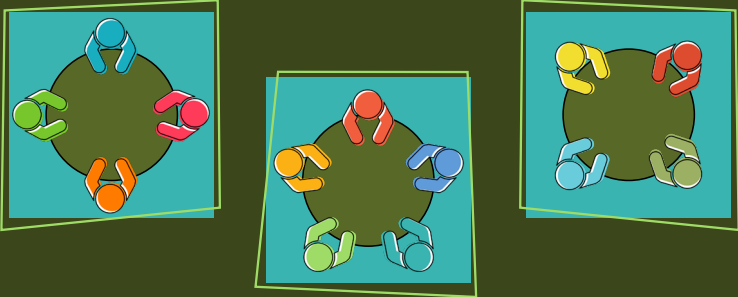
Check Your Understanding 1

1. Let's start with verifying **HVAC equipment size**. Do these heating/cooling sizes match the Mechanical Schedule in the plans?
 - a. Yes
 - b. No
 - c. Not enough information
2. Let's verify **heating/cooling efficiency** and **economizer** details next. Do the highlighted columns in the **NRCC-PRF-E** match the values in this Mechanical Schedule?
 - a. Yes
 - b. No
 - c. Not enough information
3. What about **fan size and efficiency**? Do the highlighted columns in the "Fan Systems Summary" table of the **NRCC-PRF-E** match the values in this Mechanical Schedule?
 - a. Yes
 - b. No
 - c. Not enough information
4. Does the highlighted column for **ventilation** in the **NRCC-PRF-E** match the values in this Mechanical Schedule?
 - a. Yes
 - b. No
 - c. Not enough information
5. This new NR project has a **single zone A/C** being installed. What **controls** are triggered? **Select all that apply.**
 - a. Thermostat
 - b. Interlocks
 - c. Demand Control Ventilation
 - d. Occupant Sensor Control
6. Are the **thermostat** and **interlock controls** indicated on the plans?
 - a. Yes
 - b. No
 - c. Not enough information

7. **True or False?** Plan check of plumbing will always be a high-priority item for all occupancy types.
- True
 - False
8. You have a project that involves central heat pump water heating for a Multifamily building.
Do the highlighted columns for **heat pump water heater equipment** in the **NRCC-PRF-E** match the values in these Plumbing Schedules?
- Yes
 - No
 - Not enough information
9. Do the highlighted columns for **heat pump water heater secondary tank equipment** in the **NRCC-PRF-E** match the values in this Plumbing Schedule?
- Yes
 - No
 - Not enough information
10. Do the highlighted columns for **recirculation pump** in the **NRCC-PRF-E** match the values in this Plumbing Schedule?
- Yes
 - No
 - Not enough information
11. **True or False?**
The same set of plan check tasks are involved for central gas systems as for central heat pump water heating systems.
- True
 - False
12. This new Multifamily project has a **central gas water heating system** being installed.
Is Solar Thermal included in the **NRCC-PRF-E**?
- Yes
 - No
 - Not enough information

Breakout Activity:

**Newport Candy Company:
Mechanical Plan Check (NR)**



Break

BREAK

Let's Take a Break

Class will resume on time;
please don't be late



Solar Photovoltaic & Battery

7. Solar Photovoltaic and Battery

- ✦ **Applicable Resources on Energy Code Ace**
- ✦ **What's New in 2022 Energy Code**
- ✦ **Solar PV & Battery Plan Check "Essentials"**
- ✦ **Finding Solar PV & Battery on 2022 Compliance Forms**
- ✦ **Plan Check of Solar PV & Battery:**
 - ◇ Whole-class Walkthrough Q&A
 - ◇ Small-team Breakouts – Newport Candy Company



Solar PV & Battery Fact Sheet on Energy Code Ace

The screenshot shows two fact sheets from Energy Code Ace. The top one is for 'Single-family and Low-rise Multifamily Solar and Battery Systems' and the bottom one is for 'Nonresidential and High-rise Multifamily Solar and Battery Systems'. Both sections include 'What Are Solar and Battery Systems Requirements?' and 'Importance of Compliance'. The bottom fact sheet also includes a 'Table of Contents' with links to various sections like 'System Components and Key Terms', 'Photovoltaic Systems', 'Solar Storage', 'Energy Storage System Installation', 'Energy Storage System Qualification Requirements', 'Examples - Nonresidential, Multifamily, Mixed', and 'Solar and Battery Compliance Forms and Process'.

Single-family & Low-rise Multifamily

Nonresidential & High-rise Multifamily

Nonresidential

2022 Energy Code Sections: Solar PV & Battery	
New Construction	Nonresidential: \$140.0, \$140.1
Additions & Alterations	N/A

Multifamily

2022 Energy Code Sections: Solar PV & Battery	
New Construction	Multifamily: \$170.1, \$170.2(f-h)
Additions & Alterations	N/A



What's New in 2022 Energy Code

Solar Access Roof Area (SARA) §140.10(a)

★ **SARA includes:**

- ❖ The **area of a building's roof space** capable of structurally supporting a PV system **AND**
- ❖ The area of **all roof space on covered parking areas, carports** and all **other newly constructed structures** on the site that are compatible with supporting a PV system per CA Building Code **§1511.2**

★ **SARA does NOT include:**

- ❖ Any roof area that has < 70% annual solar access
- ❖ Occupied roof areas as specified by CA Building Code **§503.1.4**
- ❖ Roof area that is otherwise not available due to compliance with other building code requirements if confirmed by the Executive Director





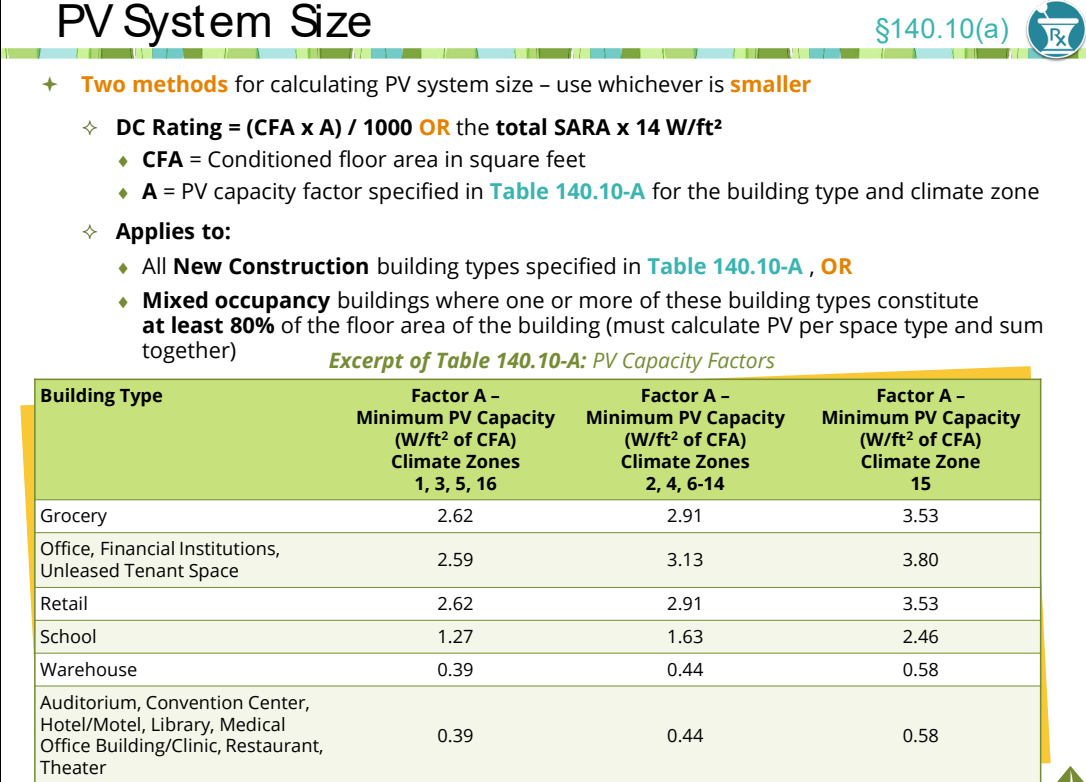
PV System Size §140.10(a)


★ **Two methods** for calculating PV system size – use whichever is **smaller**

- ❖ **DC Rating = (CFA x A) / 1000** **OR** the **total SARA x 14 W/ft²**
 - ◆ **CFA** = Conditioned floor area in square feet
 - ◆ **A** = PV capacity factor specified in **Table 140.10-A** for the building type and climate zone
- ❖ **Applies to:**
 - ◆ All **New Construction** building types specified in **Table 140.10-A** , **OR**
 - ◆ **Mixed occupancy** buildings where one or more of these building types constitute **at least 80%** of the floor area of the building (must calculate PV per space type and sum together)

Excerpt of Table 140.10-A: PV Capacity Factors

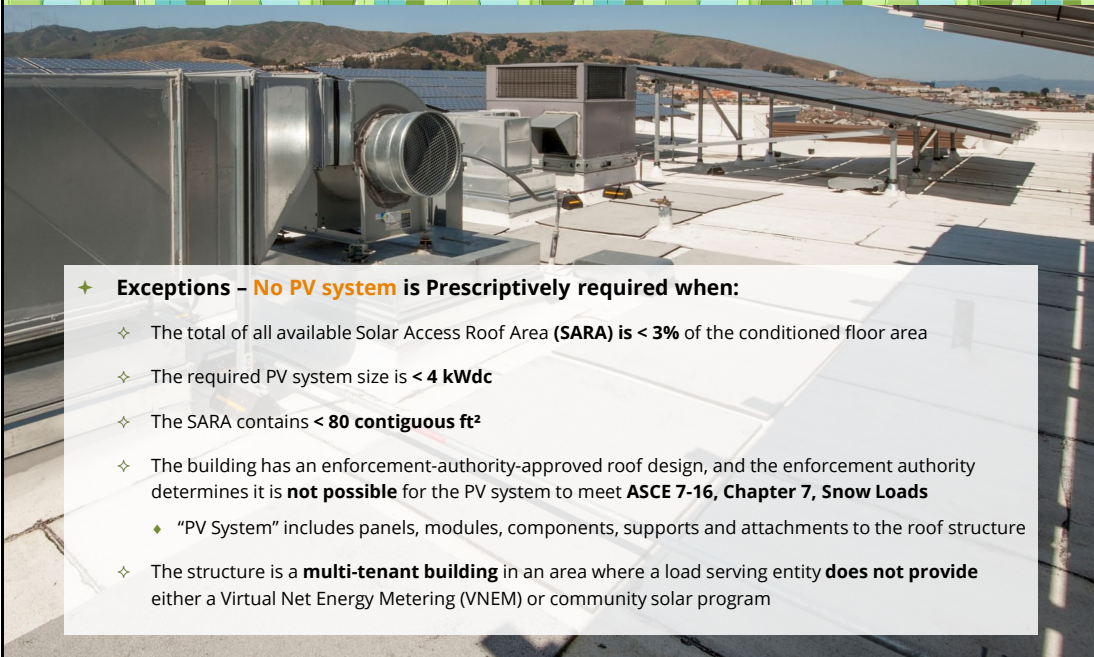
Building Type	Factor A – Minimum PV Capacity (W/ft ² of CFA) Climate Zones 1, 3, 5, 16	Factor A – Minimum PV Capacity (W/ft ² of CFA) Climate Zones 2, 4, 6-14	Factor A – Minimum PV Capacity (W/ft ² of CFA) Climate Zone 15
Grocery	2.62	2.91	3.53
Office, Financial Institutions, Unleased Tenant Space	2.59	3.13	3.80
Retail	2.62	2.91	3.53
School	1.27	1.63	2.46
Warehouse	0.39	0.44	0.58
Auditorium, Convention Center, Hotel/Motel, Library, Medical Office Building/Clinic, Restaurant, Theater	0.39	0.44	0.58





Solar Photovoltaic Exceptions

§140.10(a) 



- ✦ **Exceptions – No PV system is Prescriptively required when:**
 - ✧ The total of all available Solar Access Roof Area (**SARA**) is < 3% of the conditioned floor area
 - ✧ The required PV system size is < 4 kWdc
 - ✧ The SARA contains < 80 contiguous ft²
 - ✧ The building has an enforcement-authority-approved roof design, and the enforcement authority determines it is **not possible** for the PV system to meet **ASCE 7-16, Chapter 7, Snow Loads**
 - ✧ “PV System” includes panels, modules, components, supports and attachments to the roof structure
 - ✧ The structure is a **multi-tenant building** in an area where a load serving entity **does not provide** either a Virtual Net Energy Metering (VNEM) or community solar program



Buildings Where Battery Storage is Required

§140.10(b) 

- ✦ All buildings required by §140.10(a) to have a **PV system shall also have a battery storage system** meeting the minimum qualification requirements of Reference Joint Appendix JA12
 - ✧ The **rated energy capacity** and **rated power capacity** shall be **not less than** the values determined by **Equation 140.10-B** and **Equation 140.10-C** (shown on next set of slides)
 - ✧ If the building includes **more than one of the space types** listed below:
 - ✧ The total battery system capacity for the building shall be determined by applying Equations 140.10-B and 140.10-C to **each** of the listed space types and **summing the capacities** determined for each space type and equation
- ✦ Battery values are based upon a **ratio** of the kW rating of the PV that is required

Excerpt of Table 140.10-B: Battery Storage Capacity Factors

Building Type
Storage-to-PV Ratio
Grocery
Office, Financial Institutions, Unleased Tenant Space
Retail
School
Warehouse
Auditorium, Convention Center, Hotel/Motel, Library, Medical Office Building/Clinic, Restaurant, Theater



Battery Energy Capacity Formula

§140.10(b)



★ Minimum rated energy capacity (Equation 140.10-B)

$$\diamond \text{ kWh} = \text{kW}_{\text{PVdc}} \times \text{B} / \text{D}^{0.5}$$

- ◆ kWh = Rated Useable Energy Capacity of the battery storage system in kWh
- ◆ kW_{PVdc} = PV system capacity required by Section 140.10(a) in kWdc
- ◆ B = Battery energy capacity factor specified in Table 140.10-B for the building type
- ◆ D = Rated single charge-discharge cycle AC to AC (round-trip) efficiency of the battery storage system

Excerpt of Table 140.10-B: Battery Storage Capacity Factors

Factor B

Building Type	Factor B - Energy Capacity	Factor C - Power Capacity
Storage-to-PV Ratio	Wh/W	W/W
Grocery	1.03	0.26
Office, Financial Institutions, Unleased Tenant Space	1.68	0.42
Retail	1.03	0.26
School	1.87	0.46
Warehouse	0.93	0.23
Auditorium, Convention Center, Hotel/Motel, Library, Medical Office Building/Clinic, Restaurant, Theater	0.93	0.23



Battery Power Capacity Formula

§140.10(b)



★ Minimum rated power capacity (Equation 140.10-C)

$$\diamond \text{ kW} = \text{kW}_{\text{PVdc}} \times \text{C}$$

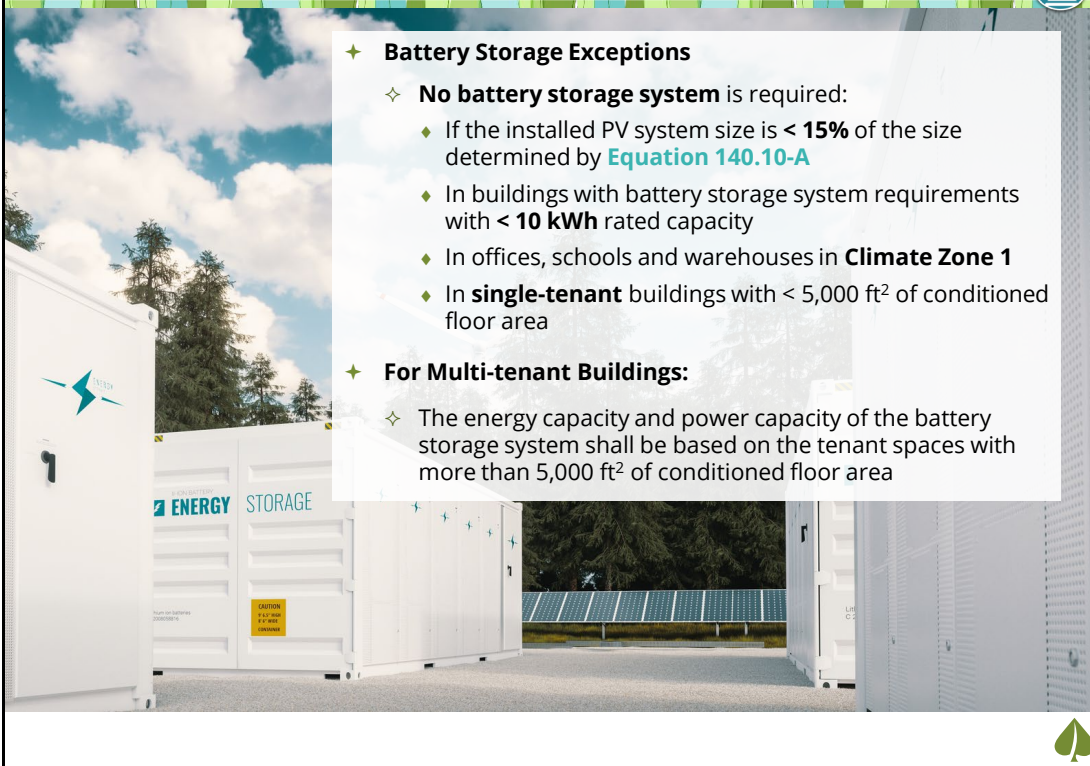
- ◆ kW = Power capacity of the battery storage system in kWdc
- ◆ kW_{PVdc} = PV system capacity required by section 140.10(a) in kWdc
- ◆ C = Battery power capacity factor specified in Table 140.10-B for the building type

Excerpt of Table 140.10-B: Battery Storage Capacity Factors

Factor C

Building Type	Factor B - Energy Capacity	Factor C - Power Capacity
Storage-to-PV Ratio	Wh/W	W/W
Grocery	1.03	0.26
Office, Financial Institutions, Unleased Tenant Space	1.68	0.42
Retail	1.03	0.26
School	1.87	0.46
Warehouse	0.93	0.23
Auditorium, Convention Center, Hotel/Motel, Library, Medical Office Building/Clinic, Restaurant, Theater	0.93	0.23





✦ Battery Storage Exceptions

✦ **No battery storage system** is required:

- ◆ If the installed PV system size is < **15%** of the size determined by **Equation 140.10-A**
- ◆ In buildings with battery storage system requirements with < **10 kWh** rated capacity
- ◆ In offices, schools and warehouses in **Climate Zone 1**
- ◆ In **single-tenant** buildings with < 5,000 ft² of conditioned floor area


✦ For Multi-tenant Buildings:

- ✦ The energy capacity and power capacity of the battery storage system shall be based on the tenant spaces with more than 5,000 ft² of conditioned floor area




Essential Tasks: Solar PV & Battery


Essential Tasks



Solar PV & Battery: Essential Plan Check Tasks




Essential Plan Check Tasks

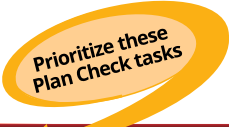
 Short on time?
Prioritize these tasks


Solar PV & Battery

2022 Energy Code




Multifamily and Nonresidential - Title 24, Part 6
Plans Examiner
Checklist





PE Checklist Item	Essential Plan Check Task	"Top 7" Area
SAB4: Table G: Installed Solar PV System	Verify Solar PV system matches the NRCC/LMCC .	3 Solar PV & Battery
SAB5: Battery Storage Systems	Verify Battery Storage system matches the NRCC/LMCC .	3 Solar PV & Battery



PE Checklist: Solar PV & Battery

Essential tasks in blue

Renewables (Solar Thermal / Photovoltaics / Battery Storage / Solar Readiness)					
Are the following items confirmed on the plans? If "NO", items to be corrected per plan check comments					
Plan Check Item		Code Reference	YES	NO*	N/A
SAB1. Table D: Exceptional Conditions	Exceptional conditions reviewed by Plans Examiner and match design Any errors reported to be resolved by Permit Applicant		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAB2. Table E: Additional Remarks	Notes for Plans Examiner or Contractor (optional)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAB3. Solar Zone (Required if no PV, or if installed PV does not meet min. PV KW required by Energy Code)	<p>Roof Area: Total roof area (ft²)</p> <p>Min. Solar Zone: Total area of all zones matches required min. (ft²) / Solar zones located away from obstructions / smallest dimension ≥ 5 ft. / Exception used</p> <p>Interconnection Pathways: Inverter and metering location shown / plans support conduit or pathway from solar zones to electrical and mechanical rooms</p> <p>Structural Load: Roof dead load and live load at solar zone areas provided</p> <p>Main Electrical Panel: Min. busbar rating 200 amps / reserved space for double pole circuit breaker marked "For Future Solar Electric"</p>	<p>Nonresidential §110.10(b)1B</p> <p>Multifamily §160.8(a)</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAB4. Table G: Installed Solar PV System	Total roof area (ft ²) matches plans Designed DC power rating matches plans/specs	<p>Nonresidential §140.10(a)</p> <p>Multifamily §170.2(g) / §140.10(b)</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NEW! SAB5. Battery Storage Systems	<p>Rated Useable Energy Capacity (kWh): Is greater or equal to min. required? / exception used</p> <p>Rated Power Capacity (kWdc): Is greater or equal to min. required? / exception used</p>	<p>Nonresidential §140.10</p> <p>Multifamily §170.2(h)</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAB6. Solar Thermal	<p>Efficiency: Solar saving fraction / none</p> <p>Certification #: SRCC / IAPMO File</p> <p>Drain Water Heat Recovery: if used, see NRCC-PLB-E/ plumbing section</p>	<p>Nonresidential §110.10(b)1B</p> <p>§140.5</p> <p>Multifamily §170.2(d)3</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Solar PV System

Solar Battery Storage



Whole Group Demonstration: Solar PV & Battery

High-level Form Treatment of Lighting

Colored table rows indicate locations for essential tasks

NRCC/LMCC-PRF-E

NRCC/LMCC-LTI-E*

**NRCC and LMCC forms both use the same envelope table names, but present data in their own format.*

Lighting Fixtures (Indoor Conditioned)

NRCC/LMCC-PRF-E

Table K2: Indoor Conditioned Lighting Schedule

NRCC/LMCC-LTI-E

Table F: Indoor Lighting Fixture Schedule

Lighting Controls (Indoor Conditioned)

NRCC/LMCC-PRF-E

Table K4: Indoor Conditioned Lighting Mandatory Lighting Control

NRCC/LMCC-LTI-E

Table H: Indoor Lighting Controls (Not Including PAFs)

Lighting Fixtures (Indoor Unconditioned)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table F: Indoor Lighting Fixture Schedule

Lighting Controls (Indoor Unconditioned)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table H: Indoor Lighting Controls (Not Including PAFs)

Lighting Fixtures (Outdoor)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table F: Outdoor Lighting Fixture Schedule

Lighting Controls (Outdoor)

NRCC/LMCC-PRF-E

Not Applicable (You need to look at the Prescriptive form.)

NRCC/LMCC-LTI-E

Table H: Outdoor Lighting Controls

Check Your Understanding 2

1. **True or False?**

If the **NRCC-PRF-E** for a New Construction project indicates that a project is **exempt** from Solar PV & Battery Storage requirements, then there are no other Energy Code requirements that the project must meet for solar.

- a. True
 - b. False
2. Here is a project where only Solar Ready applies. According to the **NRCC-SAB-E**, what is the **total proposed square footage** of the Solar Ready zones?
- a. 892.8 ft²
 - b. 960 ft²
 - c. Not enough information
3. Does the Solar Ready square footage in these plans match the **960 ft²** indicated on the NRCC?
- a. Yes
 - b. No
 - c. Not enough information
4. Here's a new **Multifamily** project submission for Millennium Condos. Which of the following are included in the project's scope on this **NRCC-SAB-E**? **Select all that apply.**
- a. Solar Ready
 - b. Solar PV
 - c. Battery Storage
 - d. Not enough information
5. What is the **proposed PV system size** on the **NRCC-SAB-E** for Millennium Condos?
- a. 156 kW
 - b. 24 kW
 - c. 145.5 kW
 - d. Not enough information
6. This is all that is shown on the drawings for Millennium's Solar PV system. Does it match the **156 kW** system indicated on the **NRCC-SAB-E**?
- a. Yes

- b. No
- c. Not enough information

7. **True or False?**

If Energy Code requires a Solar PV system for a New Construction project, that means that Battery Storage is also automatically required.

- a. True
- b. False

8. According to Table J of the **NRCC-SAB-E**, what is the **proposed battery size and efficiency** for Millennium Condos?

- a. Energy: 225 kWh,
Power: 51 kW,
Efficiency: 95%
- b. Energy: 145.5 kWh,
Power: 95 kW,
Efficiency: 51%
- c. Energy: 225 kWh,
Power: 55 kW,
Efficiency: 95%

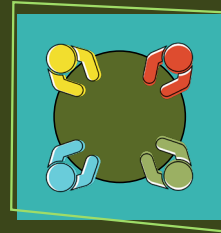
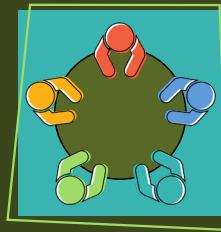
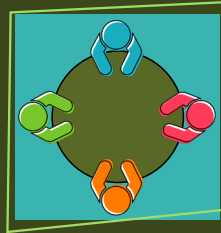
d. Not enough information

9. This is all that is shown on the Millennium Condos Plan Set for Battery Storage. Does the Battery Storage system match the NRCC's proposed design?

- a. Yes
- b. No
- c. Not enough information

Breakout Activity:

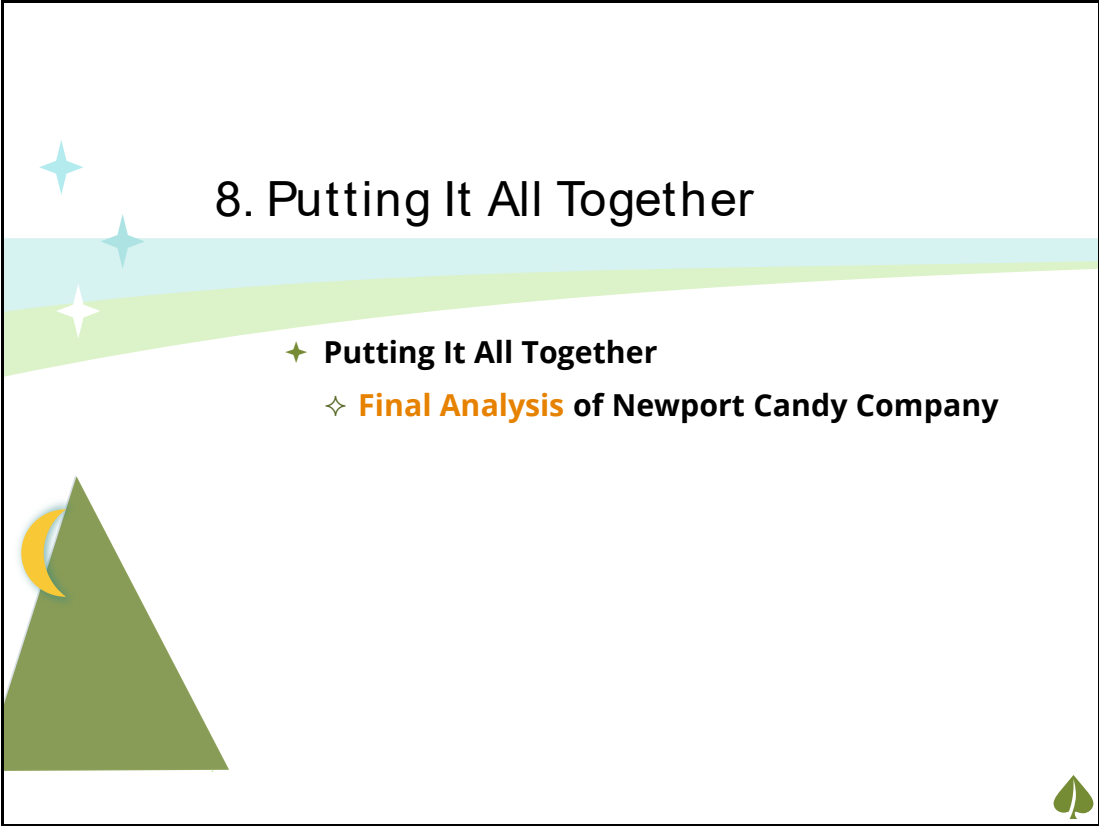
**Newport Candy Company:
Solar PV & Battery Plan Check**



Putting It All Together

8. Putting It All Together

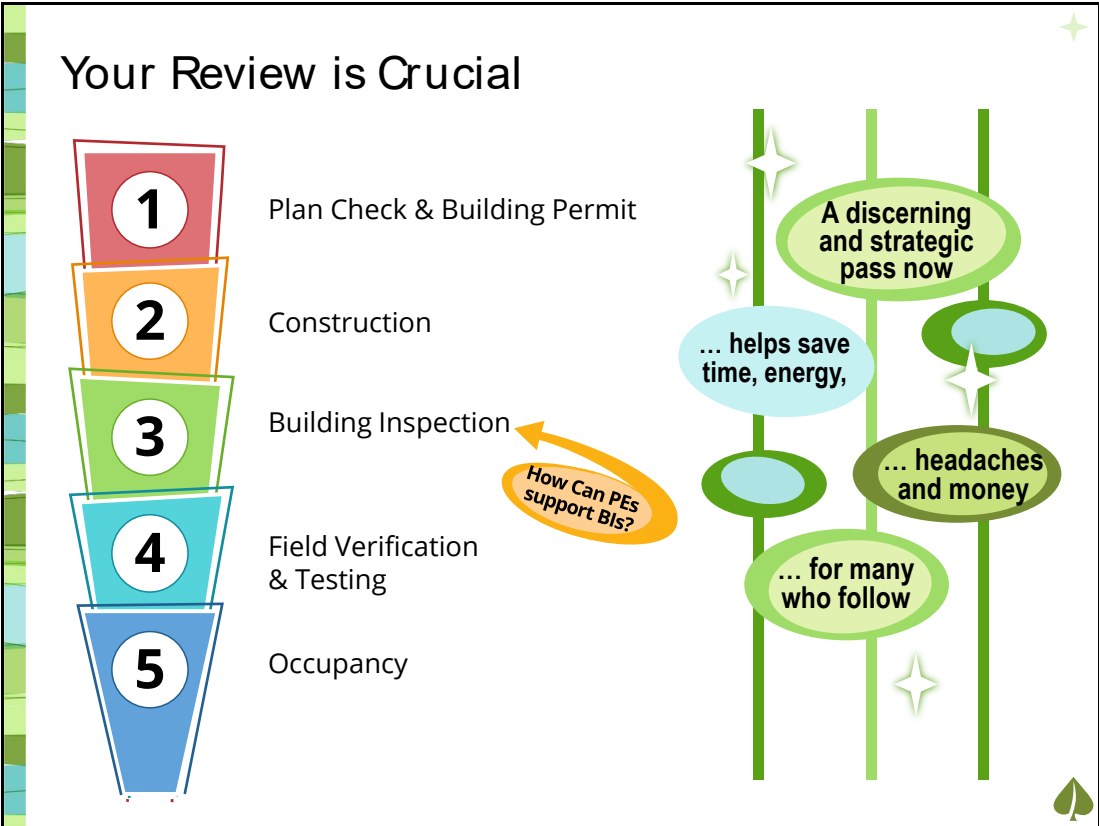
- ✦ Putting It All Together
 - ✦ **Final Analysis** of Newport Candy Company



Your Review is Crucial

1	Plan Check & Building Permit	A discerning and strategic pass now
2	Construction	... helps save time, energy,
3	Building Inspection	... headaches and money
4	Field Verification & Testing	... for many who follow
5	Occupancy	

How Can PEs support BIs?



Optimizing the PE-BI Handoff

Optimizing the PE-BI Handoff

Ways You Can Help Empower the BI to Be Efficient & Effective in the Field

- + **Gen Info:** Confirm all applicable installation (NRCI/LMCI), acceptance (NRCA), and verification (NRCV/LMCV) forms are correctly indicated on the NRCC/LMCC

Why?	What This Avoids
<p>BIs rely on NRCC/LMCC's list of required forms to be accurate for enforcement in their pass.</p> <p>Details appearing in the permitted documentation become the project's "baseline" of energy reqs for Installer construction and BI inspection.</p>	<p>If incorrect, the required documentation for installation, acceptance testing and verification testing may not get done in a manner which supports the code.</p>

- + **Envelope:** Confirm Plan Set sections and details clearly indicate requirements for wall, roof and floor insulation, as well as performance values for fenestration

Why?	What This Avoids
<p>NR and MF buildings typically have multiple wall types with different insulation requirements to comply. If details aren't clear to you on which requirements apply where, they likely won't be to others that follow.</p> <p>Ensure that NRCC/LMCC requirements are easy to locate and fully indicated on the Plans.</p>	<p>If details aren't clear, elements of the building could be built with incorrect products and the project will no longer meet code.</p>



Optimizing the PE-BI Handoff (cont.)

Ways You Can Help Empower the BI to Be Efficient & Effective in the Field

- + **Mechanical:** Confirm the design drawings fully represent NRCC documents plus all of the Mandatory requirements for mechanical

Why?	What This Avoids
<p>Space conditioning in NR and MF buildings are often complex systems. With this level of complexity, features of installation could easily "go wrong."</p> <p>Some crucial Mandatory reqs do not show up in the forms for Mechanical. If not on the forms or Plans, they could be easily left out of the installation.</p> <p>Confirming representation in the drawings enables the Contractor to install equipment the Building Inspector can approve.</p>	<p>In the example of ventilation, if Mandatory Measures are not clear the outcome could be a very unhealthy building that poses a safety issue.</p>

- + **Lighting:** Confirm all fixture types and Mandatory controls are clearly identified in the design drawings

Why?	What This Avoids
<p>The number of fixtures, lamps and controls in a NR or MF building is a lot to keep track of. The control legend needs to indicate all energy code controls and plan drawings should be clear on what controls are required where.</p> <p>Ensure you can find and differentiate these requirements in the legend and drawings so the Installers and Building Inspectors can as well.</p>	<p>All lighting requirements are Mandatory Measures. A lighting system may not meet energy code because incorrect fixtures were installed or controls may be missing.</p> <p>Lighting is one of the highest electrical loads for a NR building and has a large impact on its overall efficiency.</p>



Optimizing the PE-BI Handoff (cont.)

Ways You Can Help Empower the BI to Be Efficient & Effective in the Field

- + **Solar PV & Battery Storage:** If applicable, confirm design drawings show correct sizing requirements for Solar PV and Battery Storage

Why?	What This Avoids
This course showed three Performance compliance metrics that must "pass" for a project to comply with Energy Code. One of the 2022 compliance metrics is heavily focused on Solar PV & Battery Storage.	If a PV or Battery Storage system is missing or incorrectly sized, the project could fall out of compliance with Energy Code.
Confirming system representation and accuracy of details in the drawings enables the Contractor to install equipment the Building Inspector can approve.	Adding a PV system at the end of a project could require extensive (and expensive) electrical system changes.
	Down the line, these systems serve to reduce carbon emissions and offset energy costs.



Class Gut Check: What's High Priority for Newport?

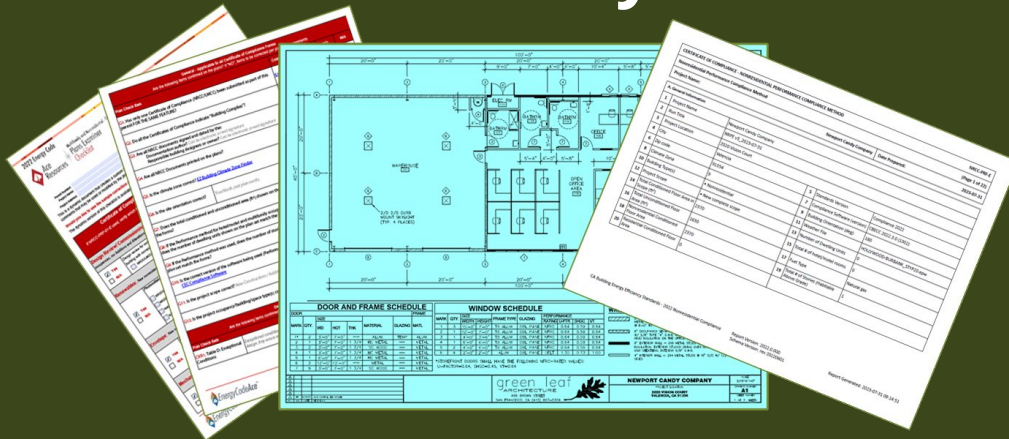
Summary of Newport Plan Check Issues & Discrepancies	High Priority?
NRCC documents not printed on Plans	<input checked="" type="checkbox"/>
NRCC-CXR (Commissioning) forms are missing	<input checked="" type="checkbox"/>
NRCC-LTO form shows "does not comply"	<input checked="" type="checkbox"/>
No rigid insulation indicated on demising wall between conditioned and unconditioned room	<input checked="" type="checkbox"/>
Lighting controls not indicated on NRCC for conditioned spaces	<input checked="" type="checkbox"/>
Window SHGC values worse on Plans (0.59 versus 0.45)	<input type="checkbox"/>
Minimum HVAC cooling efficiency lower on Plans (12.2 EER & 14.6 IEER versus 13.0 EER & 15.0 IEER)	<input type="checkbox"/>
Plans missing exhaust fan schedule for three EF-1 fans	<input type="checkbox"/>
Minimum ventilation rate higher on Plans (850 cfm versus 675 cfm)	<input type="checkbox"/>
Three recessed LED lights missing from NRCC-PRF	<input type="checkbox"/>
Solar PV system kw capacity smaller on Plans (4.5 kW versus 7.0 kW)	<input type="checkbox"/>
Plans missing battery schedule as well as battery on drawings	<input type="checkbox"/>
NRCC-LTO form indicates incorrect lighting zone	<input type="checkbox"/>

Which of the rest would you pick as "high-priority" fixes for compliance? Use the Class Poll to cast your votes.



Class Poll & Discussion

Newport Candy Company: Final Analysis



Here's What Compliance Data Shows (Per Individual Issue)

"Non-starters" in Ability to Comply	Starting/Baseline Compliance Data (Before Any Updates Made)		
	Time Dependent Valuation (TDV)		Source Energy Use
	Efficiency ¹ (kBtu/ft ² - yr)	Total ² (kBtu/ft ² - yr)	Total ² (kBtu/ft ² - yr)
NRCC documents not printed on Plans	22.44	6.28	1.66
NRCC-CXR (Commissioning) forms are missing	Pass ✓	Pass ✓	Pass ✓
NRCC-LTO form shows "does not comply"			
No rigid insulation indicated on demising wall between conditioned and unconditioned room			
Lighting controls not indicated on NRCC for conditioned spaces			

Summary of Newport Plan Check Issues & Discrepancies	Does the Project Still Comply?	Effect on Compliance Metric #1: Efficiency TDV	Metric #2: Total TDV	Metric #3: Source Energy
Window SHGC values worse on Plans (0.59 versus 0.45)	Yes ✓ Worsens 2 out of 3	Worsens (-19%)	Worsens (-17%)	Improves (+3%)
Minimum HVAC cooling efficiency lower on Plans (12.2 EER & 14.6 IEER versus 13.0 EER & 15.0 IEER)	Yes ✓ Worsens 3 out of 3	Worsens (-31%)	Worsens (-27%)	Worsens (-7%)
Plans missing exhaust fan schedule for three EF-1 fans	Yes ✓ Improves 3 out of 3	Improves (+15%)	Improves (+13%)	Improves (+7%)
Minimum ventilation rate higher on Plans (850 cfm versus 675 cfm)	Yes ✓ Worsens 3 out of 3	Worsens (-53%)	Worsens (-45%)	Worsens (-31%)
Three recessed LED lights missing from NRCC-PRF	Yes ✓ Worsens 3 out of 3	Worsens (-7%)	Worsens (-6%)	Worsens (-2%)
Solar PV system kw capacity smaller on Plans (4.5 kW versus 7.0 kW)	Yes ✓ Worsens 2 out of 3	No change	Worsens (-48%)	Worsens (-13%)
Plans missing battery schedule as well as battery on drawings	Yes ✓ Worsens 2 out of 3	No change	Worsens (-8%)	Worsens (-20%)



Overall Compliance Data (All Issues Together)

"Non-starters" in Ability to Comply

- NRCC documents not printed on Plans
- NRCC-CXR (Commissioning) forms are missing
- NRCC-LTO form shows "does not comply"
- No rigid insulation indicated on demising wall between conditioned and unconditioned room
- Lighting controls not indicated on NRCC for conditioned spaces

Starting/Baseline Compliance Data (Before Any Updates Made)

Time Dependent Valuation (TDV)		Source Energy Use
Efficiency ¹ (kBtu/ft ² - yr)	Total ² (kBtu/ft ² - yr)	Total ² (kBtu/ft ² - yr)
22.44	6.28	1.66
Pass ✓	Pass ✓	Pass ✓

Summary of Newport Plan Check Issues & Discrepancies

- Window SHGC values worse on Plans (0.59 versus 0.45)
- Minimum HVAC cooling efficiency lower on Plans (12.2 EER & 14.6 IEER versus 13.0 EER & 15.0 IEER)
- Plans missing exhaust fan schedule for three EF-1 fans
- Minimum ventilation rate higher on Plans (850 cfm versus 675 cfm)
- Three recessed LED lights missing from NRCC-PRF
- Solar PV system kw capacity smaller on Plans (4.5 kW versus 7.0 kW)
- Plans missing battery schedule as well as battery on drawings

Final Compliance Data (Factors in All Issues Together)

Time Dependent Valuation (TDV)		Source Energy Use
Efficiency ¹ (kBtu/ft ² - yr)	Total ² (kBtu/ft ² - yr)	Total ² (kBtu/ft ² - yr)
-1.03	-50.82	0.1
Falls out of compliance ✗	Falls out of compliance ✗	Worsens ✓

2 of 3 compliance metrics fail, so project would fail to comply

Group Discussion

Given What You've Seen for Newport Candy Company:

1. What types of issues would your jurisdiction rank as high priority?
2. Were you surprised by the results on any of these?
3. What areas of Newport would you focus on to optimize the handoff with the Building Inspector?
4. What resources might you point the permit applicant to?

Time: 5 minutes



Let's Talk...

Simply call out or type in chat



Additional Resources



Ace Training™

9. Additional Resources

- ✦ **Find resources and interactive tools from:**
 - ✧ **Energy Code Ace**
 - ✧ **California Energy Commission**





Energy Code Ace



Ace*Tools™ **Ace*Training™** **Ace*Resources™**

Your one-stop shop for no-cost tools, training and resources to help you comply with California's Title 24, Part 6 building energy code and Title 20 appliance standards.

We're powered by the California Statewide Codes & Standards Program and vetted by the California Energy Commission.

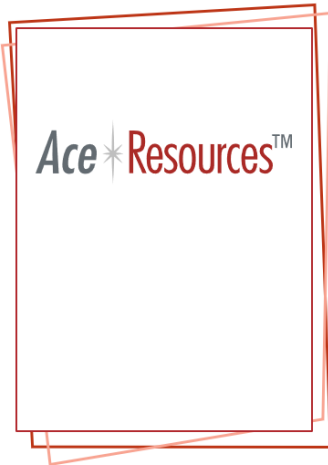


Ace*Training™ **Ace*Resources™**

A suite of interactive tools to help you understand the compliance process, required forms, installation techniques and energy efficiency regulations applicable to building projects and appliances in California

Our Tools include:

- + Energy Code Product Finder
- + Forms Ace
- + Image Ace
- + Navigator Ace
- + Nonres. Indoor Lighting Wheel
- + Q&Ace
- + Reference Ace
- + Timeline Ace
- + Virtual Compliance Assistant



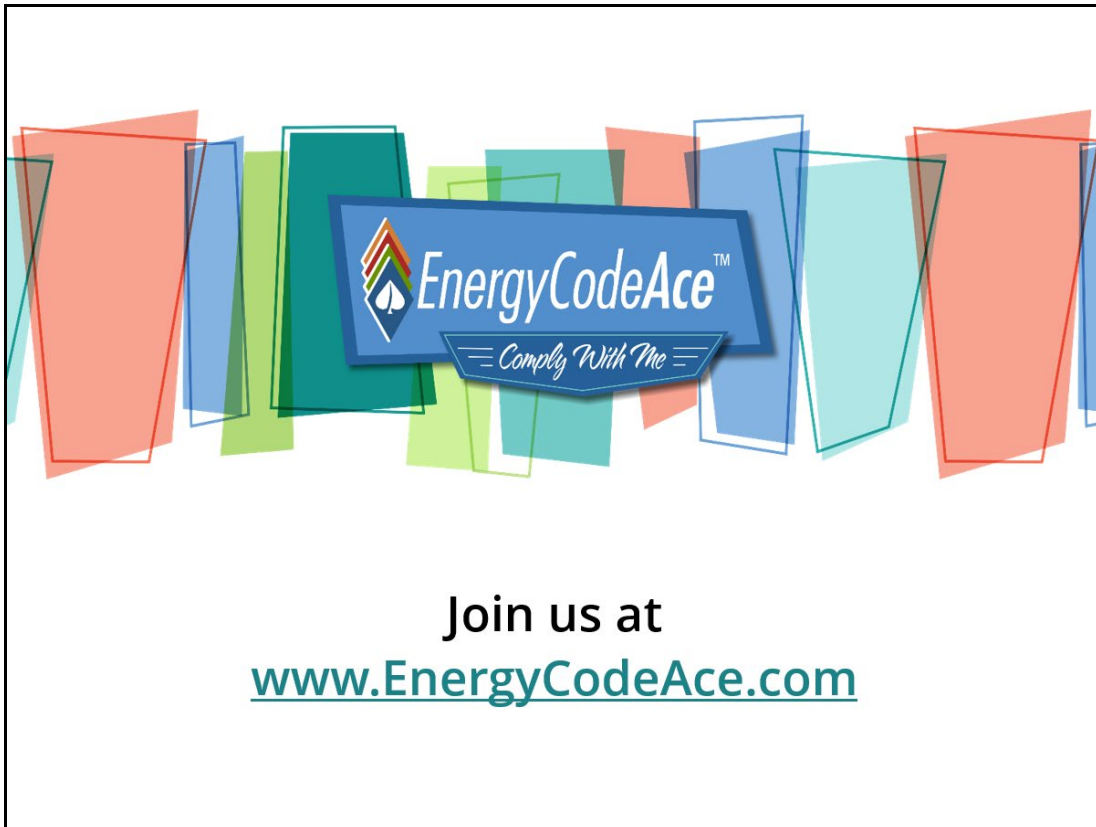
A portfolio of on-demand and live online and in-person training alternatives on California's Energy Code and Title 20 regulations, tailored to a variety of industry professionals and addressing key measures

- Our Training includes a variety of formats:**
- + In-person instructor-led
 - + Online instructor-led
 - + Online self-study
 - + Recorded webinars
 - + YouTube — live streaming & videos




An array of downloadable materials providing practical and concise guidance on how and when to comply with California's building and appliance energy efficiency standards


- Our Resources include:**
- + Application Guides
 - + Checklists
 - + Fact Sheets
 - + Submit a Question
 - + Trigger Sheets
 - + Useful Links



Home Forms Buildings Appliances Training Sign In


Register with Energy Code Ace to stay-up-to-date with new offerings
<https://energycodeace.com>

2 Look for email from admin@energycodeace.com to verify your email address



Hello Example New Account,

Welcome to Energy Code Ace!


Please click the link below to verify your account and access our free Title 24, Part 6 and Title 20 tools, trainings and resources.

You can use your email address (example.new@youremail.com) to sign in with the password you created when you signed up.

To begin using your account, click the verify my email address button below:

[Verify My Email Address](#)

1 Create an account



Sign In to Energy Code Ace

Or if this is your first time here, you can [create a new account](#) in no time!

Email Address

3 Be sure to select at least one Role under "Professional Information"

My Profile

PROFESSIONAL INFORMATION

I would like to receive emails from Energy Code Ace

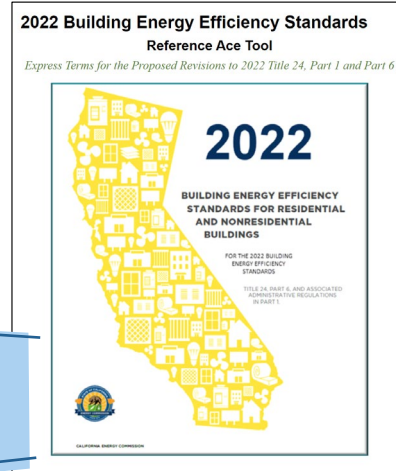
Please select at least one role to opt in to email communications.

Industry Role	Company
<input type="checkbox"/> Appliance Industry	Chapters
<input type="checkbox"/> Builder	
<input type="checkbox"/> Building Department personnel	

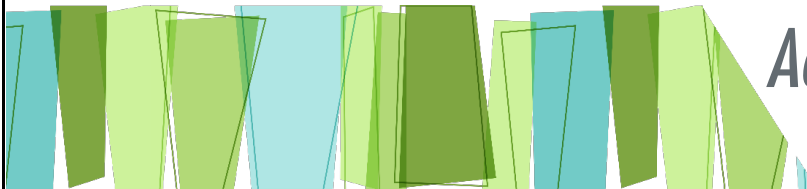
Fast & Easy Access to the Energy Code

Reference Ace Tool

- ✦ Key word and full-phrase search capabilities
- ✦ Hyperlinked tables
- ✦ Links to related Sections and to Compliance Manuals
- ✦ Glossary function



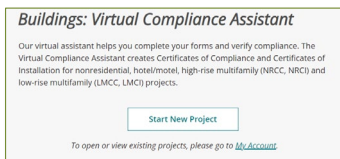
Use the link on the "Downloads" pod...
Give it a try after class



The Virtual Compliance Assistant- Certificates of Compliance

A tool to assist in completing **NRCC** & **LMCC** forms

- ✦ Walks through a series of questions about the project
- ✦ Produces the dynamic **NRCCs** and **LMCCs** for that project
- ✦ Tells you if the project complies — and, if not, where the problem is
- ✦ Saves your projects so you can update if necessary
- ✦ Lets you share your project with other team members



Click **HERE** to go
to **VCA**

<https://energycodeace.com/content/project-tool>

Virtual Classes

Single-family Standards for Plans Examiners Live — Virtual Classroom

2022 Title 24, Part 6 Essentials Single-Family Standards
Plans Examiners

Brian Selby
Energy Code Ace Instructor
Selby Energy, Inc.

Bruce Cheney
Energy Code Ace Instructor
Anchors Aweigh Energy, LLC

Continuing Education Information
ICC Provider ID: 1534 ICC Course Number: 24286

EnergyCodeAce
Comply 2022 Title 24

2022 Title 24, Part 6 Essentials –
Nonresidential Energy Code: What's New

September 24, 2021

Martyn C. Dodd
Energy Code Ace Instructor
Practical Energy, Ltd.
www.energycodeace.com

What's New in 2022 Nonres Energy Code Online Live Event

EnergyCodeAce
Comply 2022 Title 24

2022 Title 24, Part 6 Essentials –
Residential Energy Code: What's New

August 26, 2021

Martyn C. Dodd
Energy Code Ace Instructor
Practical Energy, Ltd.
www.energycodeace.com

What's New in 2022 Residential Energy Code Online Live Event



Code Breaker Sessions

Controlled Environment Horticulture Online Live Event

CODE BREAKER Controlled Environment Horticulture
Solving the Energy Code Puzzle One Piece at a Time

Gina Rodda
Energy Code Ace Instructor
Gabel Energy

Continuing Education Information
AIA Provider ID: 40410982 AIA Course Number: 22 CBCEH
ICC Provider ID: 1534 ICC Course Number: 31429

New covered process in 2022

CODE BREAKER Nonresidential Mechanical Systems
Solving the Energy Code Puzzle One Piece at a Time

Gina Rodda
Energy Code Ace Instructor
Gabel Energy

Nick Brown
Energy Code Ace Instructor
Build Smart Group

Continuing Education Information
ICC Provider ID: 1534 ICC Course Number: 29738

Nonresidential Mechanical Systems Online Live Event

CODE BREAKER 2022 Code Breaker: Multifamily All Electric
Solving the Energy Code Puzzle One Piece at a Time

Gina Rodda
Energy Code Ace Instructor
Gabel Energy

Nick Brown
Energy Code Ace Instructor
Build Smart Group

Continuing Education Information
AIA Provider ID: 40410982 AIA Course Number: 22 CB MF AE
ICC Provider ID: 1534 ICC Course Number: 29844

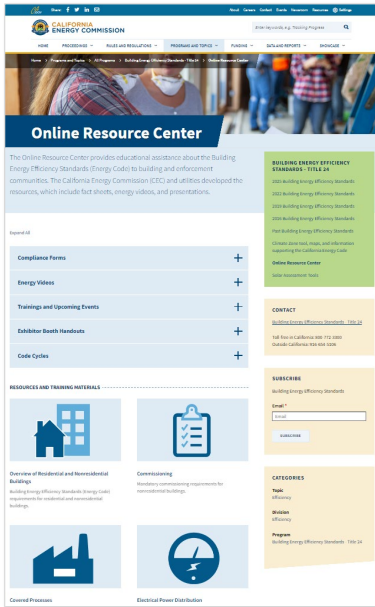
2022 NR All Electric also available

Multifamily All Electric Online Live Event



California Energy Commission

Energy Commission Resources



CEC Hotline

Monday – Friday, 8 a.m. to noon, 1 p.m. to 4:30 p.m.
 1-800-772-3300 (CA), (916) 654-5106 (Outside CA)
 Email: Title24@energy.ca.gov

Email Lists and Newsletter

Main conduit for stakeholder communication:
<https://www.energy.ca.gov/subscriptions>
 (Subscribe to Building Standards and Blueprint Newsletter)
Download the Blueprint Newsletter:
<https://www.energy.ca.gov/newsroom/blueprint-newsletter>

Other Useful Links

CEC Online Resource Center:
www.energy.ca.gov/title24/orc

Approved ATTCPs:
www.energy.ca.gov/title24/attcp/

Approved HERS Providers:
<https://www.energy.ca.gov/programs-and-topics/programs/home-energy-rating-system-hers-program>

Approved Compliance Software:
<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency-1>



Class Agenda

Yesterday

1. Course Introduction & Pre-test
2. Focusing Review Time on Key Energy Savings
3. General Information
4. Envelope
5. Lighting

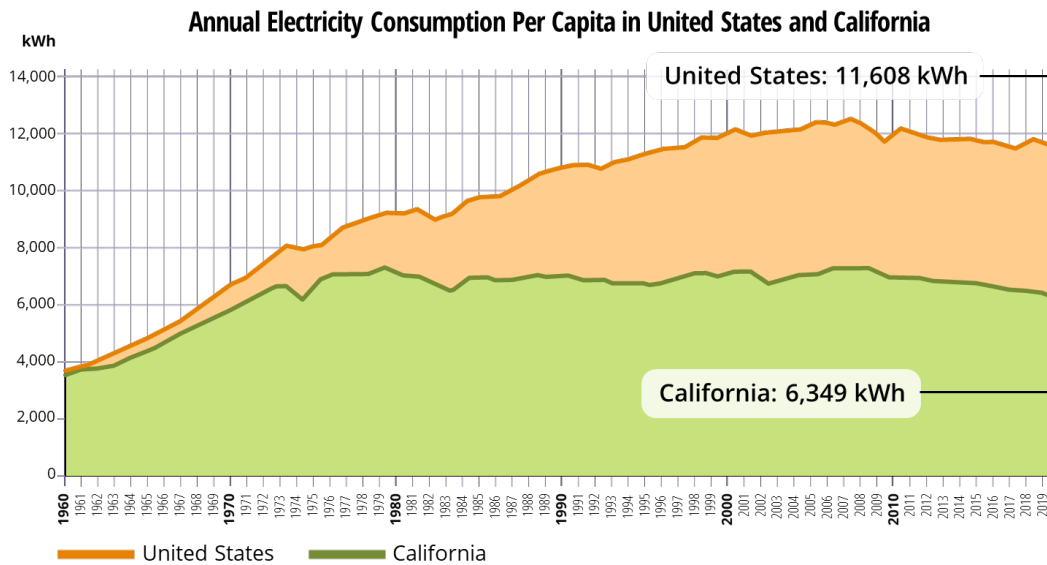
Today

6. Mechanical
7. Solar PV & Battery
8. Putting It All Together
9. Additional Resources
10. Course Conclusion & Post-test



Californians use **31% less electricity...**

... compared to the average American



Source: 2022 BUILDING ENERGY EFFICIENCY STANDARDS SUMMARY; California Energy Commission (CEC); August 2021
https://www.energy.ca.gov/sites/default/files/2021-08/CEC_2022_EnergyCodeUpdateSummary_ADA.pdf



Course Summary



You can make a difference:

- ✦ Lower NR & MF energy costs and help ensure reliable energy supply

What you learned today will help you:

- ✦ Ensure compliance with the core intent of the 2022 Energy Code
- ✦ Craft a project review strategy that adapts to any project type and targets its essentials
- ✦ Use the documentation and tools effectively



Your Role in the Greater Good

Protect Quality of Life

✦ Compliance directly supports initiatives for **occupant health, safety and comfort**, such as with Indoor Air Quality and Domestic Hot Water requirements.

Support Local Economy

✦ The **local economy directly benefits** when compliance guards against higher energy bills.
 ✦ For **every \$1 invested** locally to enforce Title 24, Part 6, there is a **\$3.79 return** to that economy.

Ensure Quality of Construction

✦ Compliance helps to ensure that **construction is done right the first time**, so that we all benefit, as well as the local economy.

Save the Planet

✦ Plans Examiners and Building Inspectors play a critical **role in a long-term strategy** carefully laid out to address evolving energy mandates.



Any remaining questions?

Ask now or reach out to us with your questions and comments!

Part 2 — Title 24 Part 6 Essentials — NR & MF Plans Examiners

Contact	Role	Email	Phone
Marina Chavez-Blanco	Instructor	Marina@gabelenergy.com	(510) 428-0803 x 1002
Energy Code Ace Online Training	Design, development and delivery support	Online.training@energycodeace.com	(949) 667-1322
Jill Marver	Energy Code Ace Program Manager	Jill.Marver@PGE.com	(925) 788-6312
Energy Code Ace	Multiple	http://energycodeace.com/content/contact	

Post-test

Purpose: Test the course — NOT you. Also helps you review course content.

Description: 15-question **open-book** test focused on course objectives.

Directions: You may refer to any documents you like.

- ✦ If you DO NOT know the answer, please DO NOT guess. It's okay to leave a question blank.
- ✦ Make sure to click "SUBMIT" after each question.

Time: 10 minutes

When you're done, please complete the Course Evaluation Survey.



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