TRI-COUNTY
REGIONAL ENERGY NETWORK
SAN LUIS OBISPO • SANTA BARBARA • VENTURA

CALGreen Code with 2025 Update

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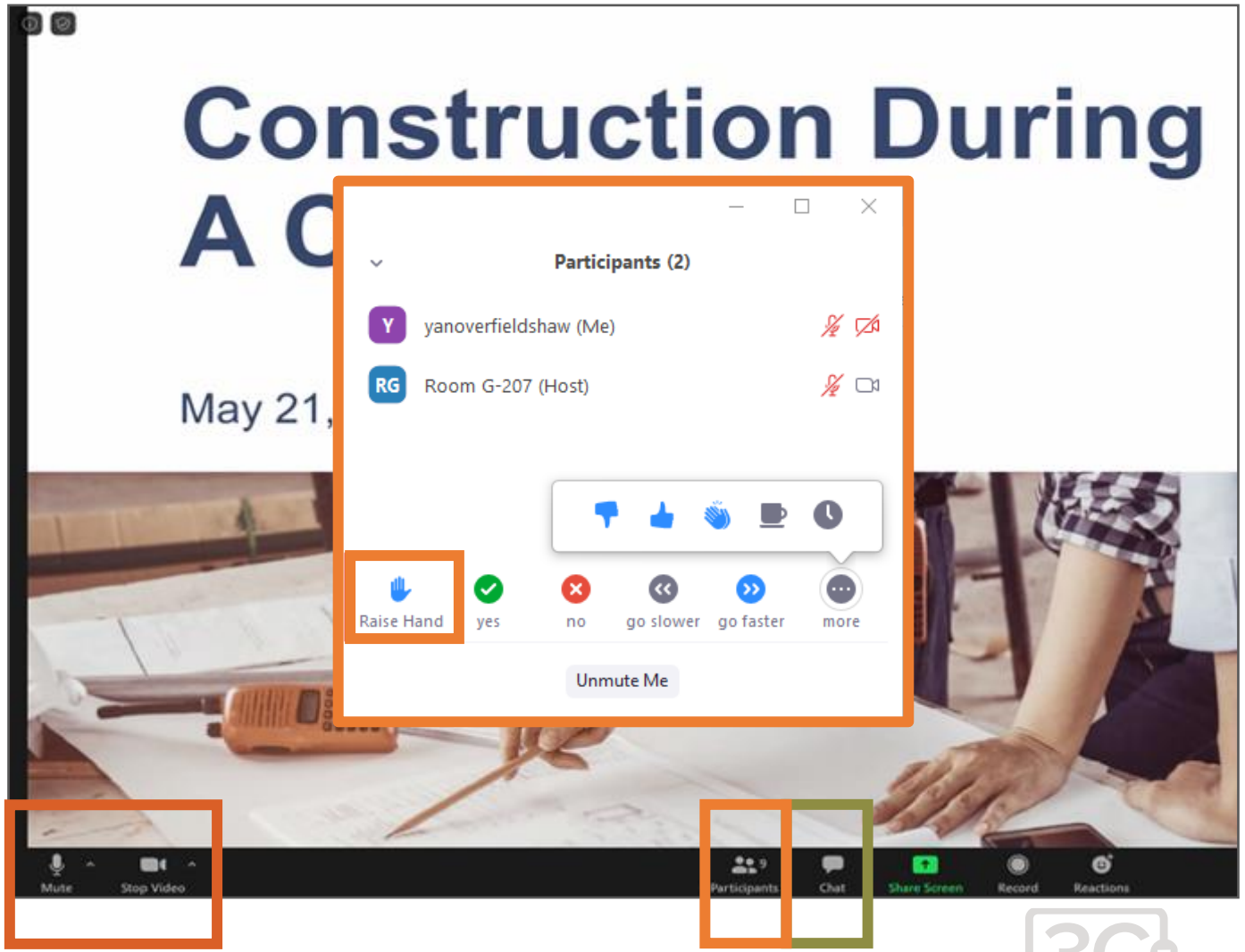
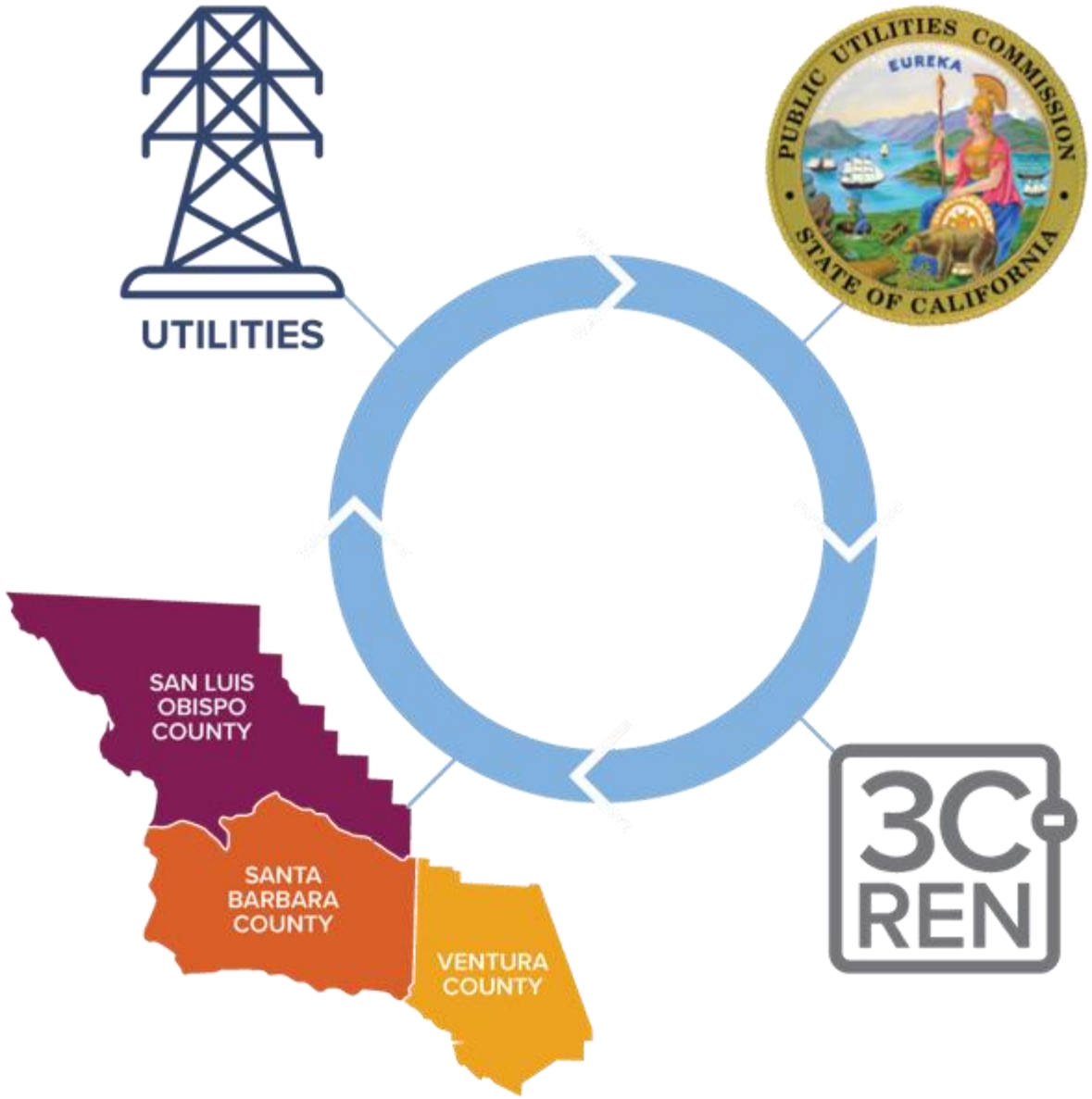
In Balance Green Consulting

August 13, 2025

Zoom Orientation

- Add an **introduction** in the chat.
  Be sure **full name** is displayed.
- Did you call in? Please **share** first and last name with us.
- Please **mute** upon joining
- Use the "**Chat**" to share questions or comments
- Under "**Participant**" select "**Raise Hand**" to share a question or comment verbally
- Session may be **recorded** and posted to 3C-REN's on-demand page
- Slides/recording are **shared** after most events
- 3C-REN does **not** allow **AI notetakers**, unless used to accommodate a disability.





Tri-County Regional Energy Network

3C-REN is a collaboration between the tri-counties

Our programs reduce energy use for a more sustainable, equitable and economically vibrant Central Coast

Our free services are funded via the CPUC, bringing ratepayer dollars back to the region

Our Services

Incentives

HOME ENERGY SAVINGS

3c-ren.org/for-residents

3c-ren.org/multifamily

COMMERCIAL ENERGY SAVINGS

3c-ren.org/commercial

Contractors can enroll at
3c-ren.org/contractors

Training

BUILDING PERFORMANCE TRAINING

3c-ren.org/events
3c-ren.org/building

ENERGY CODE CONNECT

3c-ren.org/code

View past trainings at
3c-ren.org/on-demand

Technical Assistance

AGRICULTURE ENERGY SOLUTIONS

3c-ren.org/agriculture

ENERGY ASSURANCE SERVICES

3c-ren.org/assurance

Today's Learning Objectives

- Understand CAL Green compliance process for residential and nonresidential projects, highlighting changes in the 2025 code.
- Become familiar with CAL Green mandatory measures and green building benefits of each
- Understand Tier 1 and Tier 2 options.
- Learn tools and best practices for submitting and reviewing compliance documentation.

Learning Units:

- 1.5 AIA HSW LU approved for this course
- 0.15 ICC CEU's approved for this course

But first, a poll…

My Knowledge of CALGreen:

1. New to CALGreen!
2. Some familiarity
3. Pretty comfy
4. Know it well, looking for the new stuff
5. CALGreen runs in my veins!

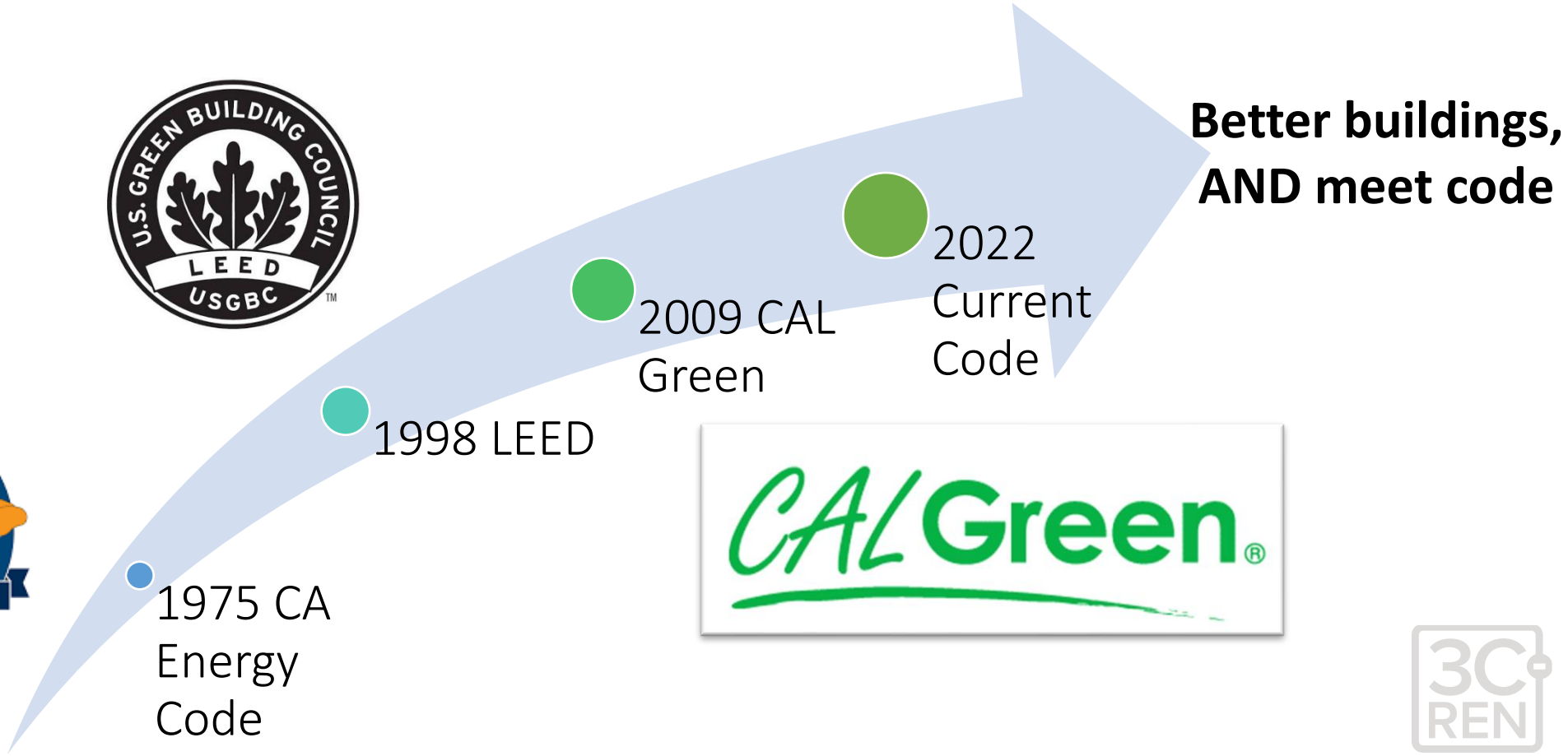
Overview of CALGreen

Intent of CALGreen

- Provide a baseline green building code that raises the bar for the state, yet remains feasible to the building community
- Provide a higher voluntary tier that establishes a ‘reach code’ standard

Mandatory	Voluntary/Reach
• All projects	• Tier 1 • Tier 2

Code Evolution of Green Building



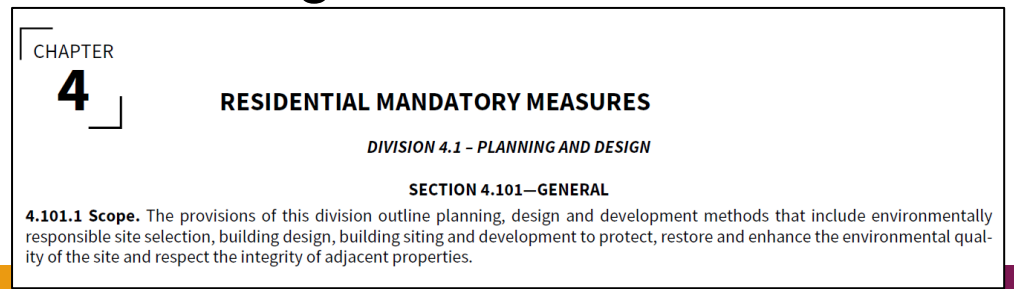
Highlights of Changes:

2022 Code & Intervening Code Cycle July 1, 2024

- Embodied Carbon
- More EV Charging requirements and options
- Additional Measures in Voluntary Tiers

2025 Code, Effective January 1, 2025

- Even more EV Charging requirements
- Bike Parking for Residential projects
- Sans serif font! Single Column! Better numbering!



CHAPTER

4

RESIDENTIAL MANDATORY MEASURES

DIVISION 4.1 – PLANNING AND DESIGN

SECTION 4.101—GENERAL

4.101.1 Scope. The provisions of this division outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

California Building Standards – Title 24

- Part 1 - CA Administrative Code
- Part 2 - CA Building Code
- Part 3 - CA Electrical Code
- Part 4 - CA Mechanical Code
- Part 5 - CA Plumbing Code
- Part 6 - CA Energy Code
- Part 7 – Vacant
- Part 8 - CA Historical Building Code
- Part 9 - CA Fire Code
- Part 10 - CA Existing Building Code
- Part 11 - CA Green Building Standards Code
- Part 12 - CA Referenced Standards Code

Not to be confused with

Reading the Code- Adopting Agencies

- Housing and Community Development (HCD) – Residential, including hotels/motels
- Building Standards Commission (BSC) – Nonresidential
- Division of the State Architect (DSA) – State and Schools – some sections
- OSHPD – Hospitals, nursing facilities – some sections

CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE
CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES
DIVISION 5.1 – PLANNING AND DESIGN

(Matrix Adoption Tables are nonregulatory, intended only as an aid to the code user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA		OSHPD						BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	1	1R	2	3	4	5								
Adopt entire CA chapter		X																				
Adopt entire chapter as amended (amended sections listed below)																						
Adopt only those sections that are listed below								X														
Chapter/Section																						
5.101								X														
5.102 Definitions								X														
5.106.4.2 and subsections								X														

Chapters of CALGreen

- Chapter 1: Administration
- Chapter 2: Definitions
- Chapter 3: Green Building (scope)
- Chapter 4: Residential Mandatory Measures
- Chapter 5: Nonresidential Mandatory Measures
- Chapter 6: Reference Organizations & Standards
- Chapter 7: Installer & Special Inspector Qualifications
- Chapter 8: Compliance Forms and Worksheets
- Appendix A4 – HCD voluntary measures
- Appendix A5 – BSC voluntary measures
- Appendix A6.1 – OSHPD voluntary measures

Chapter 3 – CAL Green Scope

Residential

- New Construction
- Alt/Add that adds area or volume*

Non-Res

- New Construction
- Adds over 1,000 SF
- Alteration >$200,000*
- Parking Lot Alt./Add.

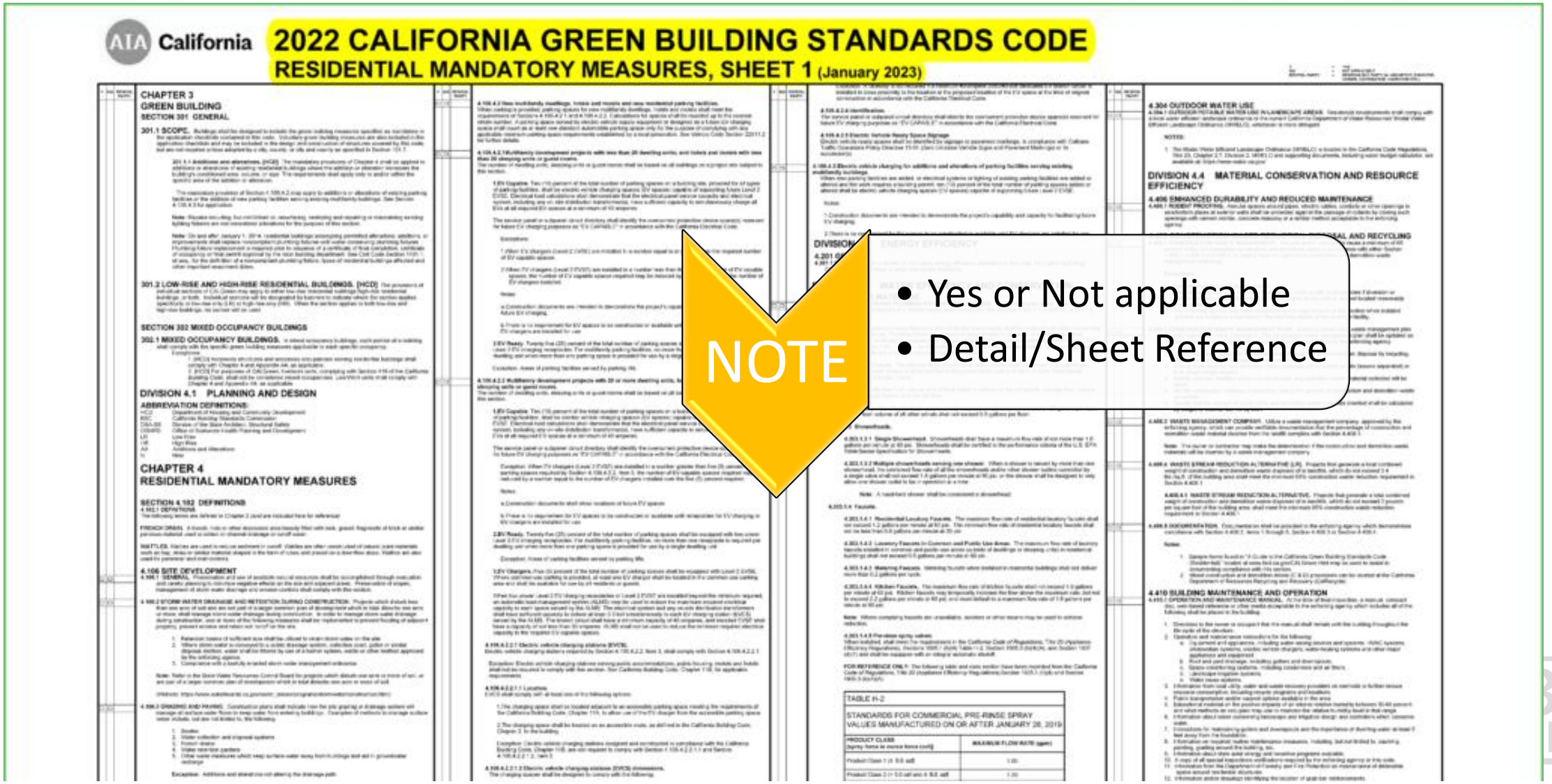
*CALGreen applies ONLY to new work in an alteration.

Exceptions when triggered, e.g., upgrade all old plumbing fixtures

Chapter 3 – CAL Green Scope

- Mixed occupancy shall comply with appropriate requirements for each separate occupancy type.
  - Watch out for hotels, mid-rise/high-rise housing
- Phased projects
  - For shell buildings & buildings for initial TI, only code measures relevant to the new construction building components & systems shall apply.

CALGreen Compliance?



Chapters 4 and 5 – Mandatory Measures

Chapter Divisions

- Division 4.1/5.1 - Planning and Design
- Division 4.2/5.2 - Energy Efficiency
- Division 4.3/5.3 - Water Efficiency & Conservation
- Division 4.4/5.4 - Material Conservation and Resource Efficiency
- Division 4.5/5.5 - Environmental Quality

Notes on Documentation:
Provided in orange boxes

Code Reference

4.1 & 5.1 Planning and Design

Reuse of Existing Building

Effective July 1, 2024 as part of intervening code cycle

One option out of 3 pathways addressing embodied carbon

- For additions or alterations

Before we dig in,

Let's put a pin in that…

We'll discuss this in more detail in the materials section.

Storm Water Pollution Prevention During Construction

<1 acre

Measures must:

- Prevent flooding and dust to adjacent property
- Prevent erosion & retain soil on site
- Prevent run-off from construction activity

Contain runoff to washout areas

Burlap mat on site soil & straw wattles at

Prevent runoff from construction activity

4.106.2 / 5.106.1

Storm Water Pollution Prevention:

≥1 acre

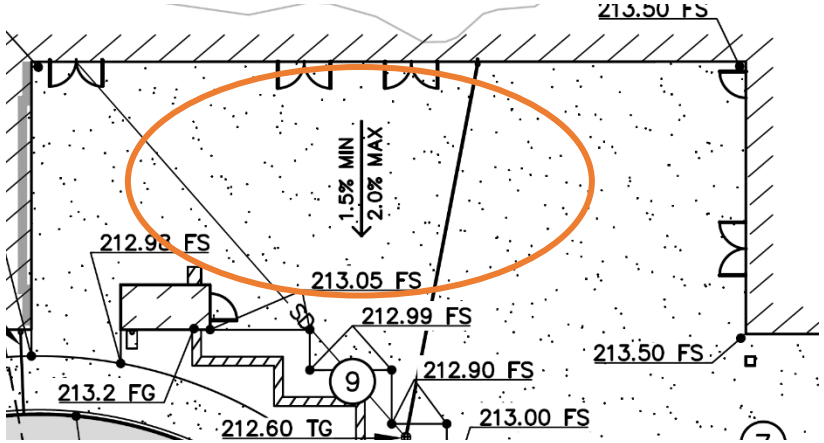
- Comply with stormwater discharge regulations and postconstruction requirements from **National Pollution Discharge Elimination System** (NPDES)
  - Postconst. runoff must match preconst. runoff
- Prevent erosion & retain soil runoff on site

Documentation:
Site or Civil Drawings demonstrate compliance with either local ordinance, best management practices listed here, or NPDES requirements

5.106.2

Grading and Paving

- Managed to prevent water from entering building
- Exception – additions/alterations not altering drainage path



Documentation:
Site Plan & Landscape Plans show required slope on flatwork

Flatwork should bring water away from building and possibly to landscaping

4.106.3 / 5.106.10

Bicycle Parking – Non Res Only for 2022 Code

- Short term bike parking – permanent racks within 200ft of visitor's entrance
  - Easily visible, 2 bike minimum
  - **≥5% of new motorized vehicle parking spaces**
    - Exception: Additions/alterations adding ≤9 visitor parking spaces
- Long Term bike parking – easily accessible from street
  - New buildings with over 10 tenant-occupants OR adding over 10 tenant vehicle spaces OR new shell in phased project (minimum 1 space)
  - **≥5% of tenant vehicle parking**

5.106.4

NEW FOR '25

Bicycle Parking – Non-Res in 2025 Code

- Short term bike parking – permanent racks within 200ft of visitor's entrance
  - Easily visible, 2 bike minimum
  - **20% of peak daily visitors**
- Long Term bike parking – easily accessible from street
  - New buildings with over tenant spaces – **10% of tenant-occupants**
  - Additions or alterations – **10% of tenant-occupants being added**
  - New shell in phased project – **10% of anticipated tenant-occupants**
  - **Minimum of 1 for each building type**

3C REN

5.106.4

NEW FOR '25

Bicycle Parking – Residential Added in 2025 Code

- Short term bike parking for multifamily buildings, hotels, and motels – permanent racks within 200ft of building entrance
  - Easily visible, 2 bike minimum
  - **1 space for every 10,000 square feet**
- Long Term bike parking – easily accessible from street
  - For multifamily buildings – 1 parking space for every 2 dwelling units
  - For hotel and motel buildings – 1 space for every 25,000 square feet; minimum of 2 spaces

3C REN

4.106.4.4

Bicycle Parking

- Public schools and community colleges
  - Student parking- permanently anchored, 4 two-bike capacity rack per new building
  - Staff parking- 2 staff long-term parking spaces per new building

Documentation:
Bike rack type and location on Site Plans, with details and specifications;
Parking/bike calculations on Cover Sheet with car-parking calcs, or occupancy calc.

Bicycle Parking: Long-Term Parking

Acceptable Long-Term Parking Facilities:

- Covered, lockable enclosure w/permanently anchored racks
- Lockable Bicycle Rooms w/permanently anchored racks
- Lockable, permanently anchored bike lockers

Yes

Likely Not

5.106.4.1.5

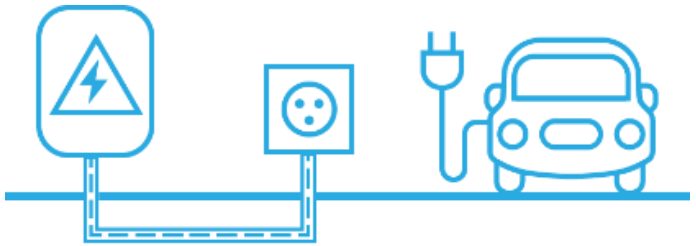
Electric Vehicle Charging

- EV charging Definitions
- Single Family
- Multi Family
- Non-Res
- Medium- & Heavy-Duty Charging
- Additions/Alterations

EV Charging – 3 Types

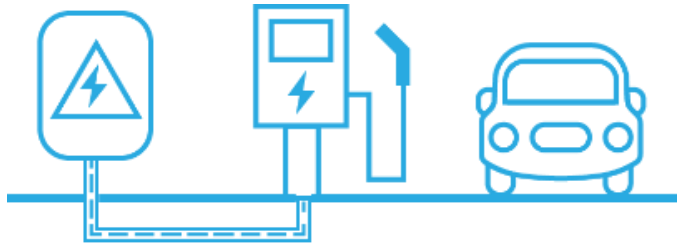
EV CAPABLE

Provide electrical panel space, conduit (no wire), and a termination box for a future 208/240--volt, 40-amp circuit



EV READY

Provide a space that is fully wired for 208/240 volt and has a receptacle so it's "ready" for someone with their own plug-in cord



EV CHARGING STATION

Provide Level 2 EV Charging Stations (EVCS). These should be stand-alone chargers in common-use parking areas

Types of Chargers

Level 1

120-volt, 16-amp commercial cable

Level 2

208/240-volt, 40-amp receptacle, or charge station

This is what is required of EVCS

Level 3 & DCFC

(Direct current Fast Charger)

480-volt, 80-amp charging station

Allowed but not required by code

Two types of “Level 2”

Level 2

208/240-volt, 40-amp charge station, Used for EVCS

Low Power Level 2

208/240-volt, **20-amp** receptacle, Used for EV Ready

Market options for Receptacle Use

Electric Vehicle Charging- New Single Family

- One- and two-family dwellings, townhouses with attached private garages
- Requires EV Capable (no charger, just conduit and panel space for future)
- Exception: Not required for ADUs/JADUs

4.106.4.1

Clear Labeling for Future & Installed EV

For EV Capable (future) Spaces

- Label on Breaker for EV Space
- Stub Up Labeled for EV Space
- **No** Label/Paint Marking on Stall

For Installed EV Spaces

- Label on Breaker for EV Space
- Clear Paint Marking for EV Stall

4.106.4.1

EV Charging - Multifamily & Hotel/Motels

2022 Code, as of July 1, 2024:

- 40% low power Level 2 EV charging receptacles!
- 10% Level 2 EV chargers

Note for Multi-family:

EV charging receptacles … shall be provided with a dedicated branch circuit connected to the ***dwelling unit's*** electrical panel (unless infeasible)

4.106.4.2 / 4.106.4.3

EV Charging - Multifamily & Hotel/Motels in the 2025 Code

NEW FOR '25

2025 Code, Multi-family

- One low power Level 2 EV charging receptacles for each unit! Or, if fewer spaces than units, 100% of spaces!
- Plus 25% Level 2 EV chargers in 'common area' parking

2025 Code, Hotels/Motel

Similar to 2022 Code

- 40% low power Level 2 EV charging receptacles
- **25%** Level 2 EV chargers

4.106.4.2 / 4.106.4.3

Electric Vehicle Charging - Non-Res

	2022 Code	
Total Spaces	EV Capable	EVCS
0-9	0	0
10-25	4	0
26-50	8	2
51-75	13	3
76-100	17	4
101-150	25	6
151-200	35	9
201+	20%	25% of EV Capable

Note that the EVCS count towards the total number of EV Capable Spaces

Electric Vehicle Charging - Non-Res

	2022 Code		2025 Code		
Total Spaces	EV Capable	EVCS	EV Capable	EVCS	EVCS Office/Retail
0-9	0	0	0	0	0
10-25	4	0	4	**2**	**3**
26-50	8	2	8	**4**	**6**
51-75	13	3	13	**6**	**8**
76-100	17	4	17	**8**	**13**
101-150	25	6	25	**12**	**19**
151-200	35	9	35	**18**	**26**
201+	20%	25% of EV Capable	**50% of EV Capable**	**50% of EV Capable**	**75% of EV Capable**

Note that the EVCS count towards the total number of EV Capable Spaces

Alternative Approaches to EVCS

PARKING SPACES	6.6 kVA	LOW POWER LEVEL 2, LEVEL 2, ... OR DCFC
0–9	0	0
10–25	26.4	26.4
26–50	52.8	52.8
51–75	85.8	85.8
76–100	112.2	112.2
101–150	165	165
151–200	231	231
	20 percent of	Total required kVA = P × .20 × 6.6

DC Fast Charger =

five (5) Level 2

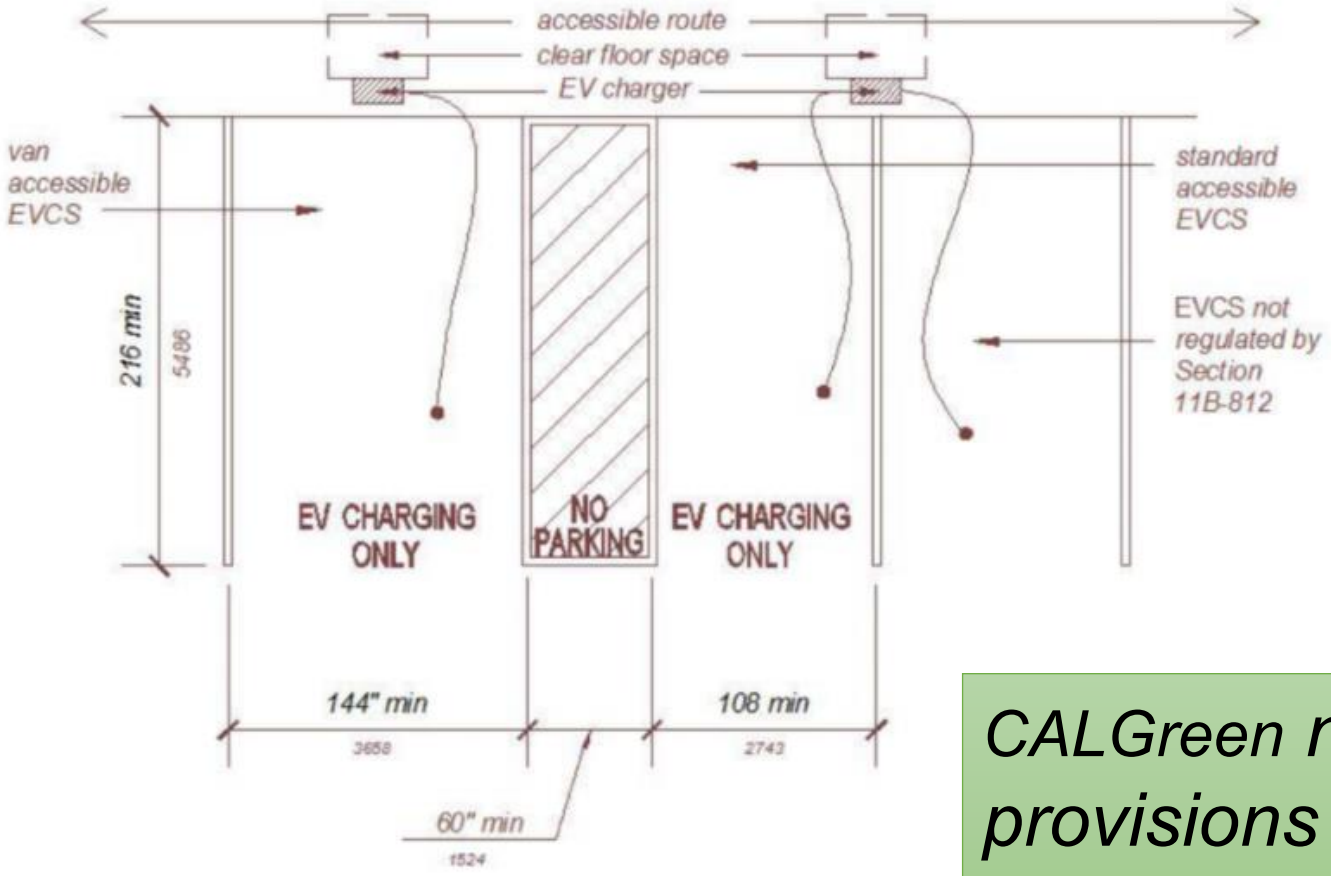
Low-Power Level 2 EVSE =

Half (½) regular Level 2

Power Allocation Method

Note: If using DCFC, at least one charger must be regular Level 2

Electric Vehicle Charging- Accessibility



All of the EVCS that are built for Non-residential uses, or hotels, motels and public housing, must comply with California Building Code, Chapter 11B-228.3.

CALGreen now includes similar provisions for Multi-family, where Chapter 11 is silent.

Medium- and Heavy-Duty Charging

BUILDING TYPE	BUILDING SIZE (SQ. FT.)	NUMBER OF OFF-STREET LOADING SPACES	ADDITIONAL CAPACITY REQUIRED (KVA) FOR RACEWAY & BUSWAY AND TRANSFORMER & PANEL
Grocery	10,000 to 90,000	1 or 2	200
		3 or Greater	400
	Greater than 90,000	1 or Greater	
Manufacturing Facilities	10,000 to 50,000	1 or 2	
	10,000 to 50,000	3 or Greater	
	Greater than 50,000	1 or Greater	
Office Buildings	10,000 to 135,000	1 or 2	
	10,000 to 135,000	3 or Greater	
	Greater than 135,000	1 or Greater	
Retail	10,000 to 135,000	1 or 2	
		3 or Greater	
	Greater than 135,000	1 or Greater	400
Warehouse	20,000 to 256,000	1 or 2	200
		3 or Greater	400
	Greater than 256,000	1 or Greater	400

Construction for warehouses, grocery stores and retail stores shall add additional capacity in their raceways, transformers, and panels. This is so that off-street loading can become charging for electric hauling vehicles

5.106.5.3

EV charging at public schools and community colleges.

New table, similar approach

TABLE 5.106.5.6.1

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED EV CAPABLE SPACES	NUMBER OF REQUIRED EVCS[2]
0–9	0	0
10–25	4	1
26–50	8	2
51–75	13	3
76–100	17	4
101–150	25	6
151–200	35	9
201 and over	20 percent of total[1]	25 percent of EV capable spaces[1]

1. Calculation for spaces shall be rounded up to the nearest whole number.
2. Each EVCS shall reduce the number of required EV capable spaces by the same number.

5.106.5.6

Parking Lot Addition/Alterations

Res + Hotel/Motel (projects under the jurisdiction of HCD):

- Parking facilities are added OR
- Electrical or Lighting Systems of facilities are added or altered

10% of spaces added/altered must be made EV Ready

2025 Code: *ALL* new or altered spaces must be EV Ready or EVCS

Non-Res projects:

- When parking area is added, or electrical work is done

Then comply with relevant parking table.

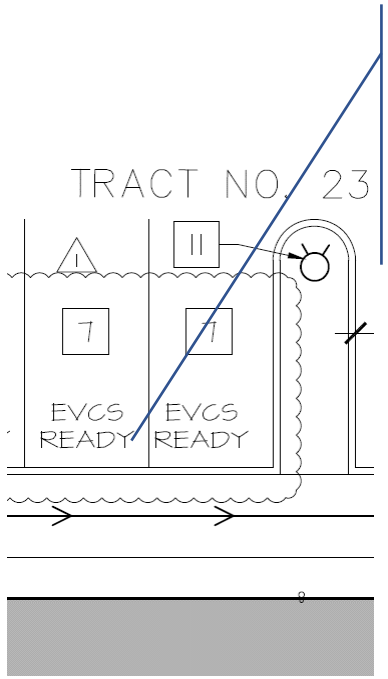
***2025 Code**: Upgrade all existing EV Capable with EVCS*

4.106.4.3

Documentation for EV

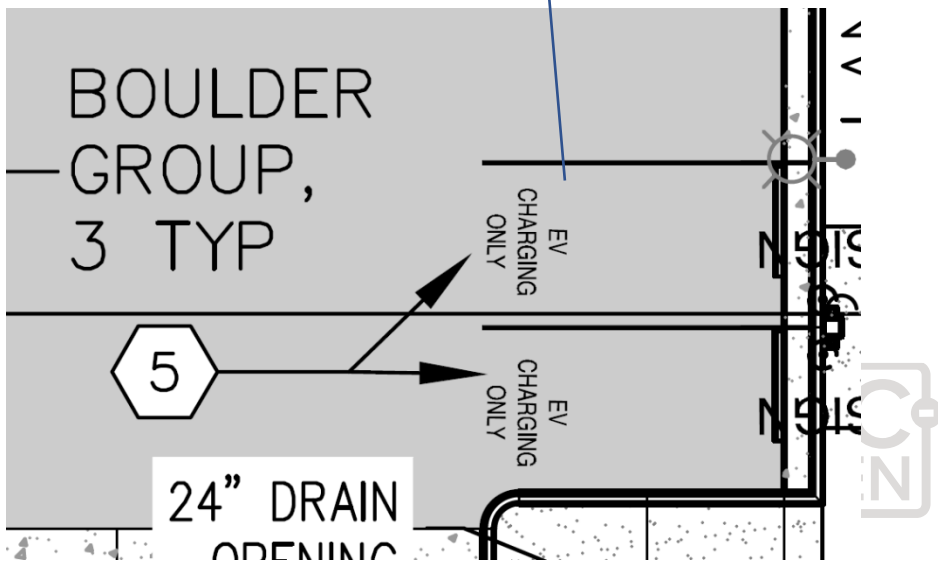
Documentation:

- Calculations on Cover Sheet for number and type of spaces
- Spaces labeled on Site Plans, with Details
- Sufficient capacity in panels on Electrical Sheets



Shows Builder (and plans examiner) location of EV ready spaces

Shows Builder *striping for stall* of EVCS space



Remember “Designated Parking”?

- **5.106.5.2 Designated parking for clean air vehicles.**

~~CLEAN AIR/ VANPOOL/EV~~

Eliminated, with new the emphasis on EV charging

(but may be included as a

voluntary measure)

Light Pollution

Outdoor Lighting Designed

- Backlight, Uplight, and Glare (BUG) Ratings as defined by IESNA TM-15-11; and per light zone.
- Or, Compliance with a stricter local ordinance

Exceptions (Align with Energy Code)

- Does not apply to lighting for the public right of way and Emergency Lighting
- Luminaires with less than 6,200 initial lumens

Documentation:

Lighting schedule provided on Site Plan or Electrical Sheets

Shade Trees- DSA Only

- Surface Parking: min #10 container size or equal to shade 50% of area within 15 years
  - Exception for areas covered by PV shade structures
- Landscape areas: min #10 container size or equal to shade 20% of area within 15 years
  - Exceptions for playfields
- Hardscape areas: min #10 container size or equal to shade 20% of area within 15 years
  - Exceptions for areas covered by PV shade structures

4.2 & 5.2 Energy Efficiency

Chapter 4.2 and 5.2 – Energy Efficiency

- Must comply with Title 24, Part 6 (Energy Code).

That's it.

4.3 & 5.3 Water Efficiency and Conservation

Water Conserving Plumbing Fixtures & Fitting

Fixture Type		
Residential Bathroom	> 0.8 gpm	≤ 1.2 gpm
Public Bathrooms	≤ 0.5 gpm	
Metering Faucets	≤0.2 gallons/cycle	
Kitchen Faucets	≤ 1.8 gpm	
Wash Fountains	≤ 1.8 gpm	
Metering Faucets for Wash Fountains	≤0.2 gallons/cycle	
Water Sense Toilet	≤ 1.28gpf	
Wall Mounted Urinal	≤ 0.125gpf	
Other Urinals	≤ 0.5gpf	
Watersense Showerheads	≤ 1.8 gpm	
Multiple Showerheads	Total flow ≤ 1.8 gpm	
Pre-rinse Spray Valve	≤ 0.5gpf	

4.303.1 / 5.303.2

Meters

- Submeters Required?
  - Non-Res
    - New/Add over 50,000 SF → Yes, for uses over 100 gal/day
    - Less than 50,000 SF → No, unless “excessive”
    - Excessive Consumption >1,000 gal/day → Yes
  - Multi-family → Yes, per plumbing code → Includes ADU’s!

“multi-family” is 2 units or more

5.303.1.1-2

Water Conserving Plumbing Fixtures & Fitting

- Food waste disposers
  - ≤ 1 gpm when not in use or auto shutoff after 10 minutes,
  - ≤ 8 gpm when in use

Documentation:

Requirements in Fixture Schedule in Plumbing Drawings

4.304.1 / 5.303.4

Model Water Efficient Landscape Ordinance

- Local water efficient landscape ordinance or DWR Model Water Efficient Landscape Ordinance
  - ≥500 sqft of landscape area for residential projects
  - All non-res developments

AB 1881 MODEL - WELO (WATER EFFICIENT LANDSCAPE ORDINANCE)

WATER EFFICIENT LANDSCAPE WORKSHEET

ETO FOR, S.L.O., CA	43.8						
REGULAR LANDSCAPE AREAS							
HYDROZONE# PLANTING DESCRIPTION	Plant Factor (PF)	Irrigation Method	Irrigation Efficiency (IE)	ETAF (PF/IE)	Hydrozone Landscpe Area (SF)	ETAF x AREA	ESTIMATED Total H2O Use (Gallons / Year)
DROUGHT TOLERANT PLTGS. - Agave Clusters in Decorative Gravel (WUCOLS - VERY LOW)	0.2	DRIP	0.81	0.25	5,640.00	1,392.59	37,817.24
DROUGHT TOL. PLTGS. - Agave Mass'g / Dec. Rock (WUCOLS - LOW)	0.3	DRIP	0.81	0.37	4,655.00	1,724.07	46,818.96
DROUGHT TOLERANT PLNT'G. - Sun Exposure (WUCOLS - LOW / MED)	0.5	DRIP	0.81	0.62	8,075.00	4,984.57	135,360.93
ENTRY / CTYARD PLTG AREAS - Succulent Mix (WUCOLS - MED)	0.6	DRIP	0.81	0.74	1,015.00	751.85	19,849.87
TOTALS				1.98	19,385.00	8,853.09	239,847.00
SPECIAL LANDSCAPE AREAS							
Retent'n. Basin / Dri-Creek (WUCOLS - SPEC'L USE)	1.0	COBBLE	0.75	1.33	1150.00	1,533.33	1,533.33
TOTALS				3.31	20,535.00	10,386.42	241,380.33
ETAF CALCULATIONS						MAWA =	325,444.29
TOTAL ETAF	10,386.42						
TOTAL AREA	20,535.00				** THIS PLAN COMPLIES WITH AB 1881 **		
AVERAGE ETAF	0.51						
					WATER WISE PLANTS (SF).		18,370.00
					NON-WATER WISE PLANTS (SF)		2,285.19
					% OF WATER WISE PLANTS		89.46
MAWA = (Eto)(0.62)[(0.55 x LA) + (0.45 x SLA)							
ETO	43.80						
LA	20,535	SQ FT					
SLA	1,533						
MAWA	325,444	GALLONS					
DAILY WATER	892	GALLONS					

4.304.1 / 5.304.1

Outdoor Potable Water – Special Uses

- MWELO compliance required for public schools and community colleges
  - ≥500 sqft for newly constructed landscape projects
  - ≥1,200 sqft for rehabilitated landscape projects
- Health facilities must comply

5.304.6

4.4 & 5.4 Material Conservation and Resource Efficiency

Rodent Proofing

- CEC: air seal all penetrations
- CALGreen asks to rodent seal all penetrations with materials such as cement mortar, concrete or similar materials (like metal) NOT foam

Weather Protection

- Provide a weather-resistant exterior wall and foundation envelope as required by CBC.

4.406.1 / 5.407.1

Moisture Control

- Sprinklers: irrigation systems do not spray buildings
- Exterior entries/openings to prevent water intrusion
  - All Exterior Entries
    - Install flashings integrated with a drainage plane
  - Primary Doors
    - nonabsorbent flooring within 2 feet around opening
    - Awning/overhang 4 feet deep OR Door recessed 4 feet

5.407.2.1

Construction Waste Reduction at least 65%

- **Recycle and/or salvage a min of 65% of construction waste**
  - Excludes hazardous waste
- Requires **Waste Management Plan** & statement of results (must meet local ordinance if higher than 65%)
- *Optional pathway is proving "reduced generation" to a max of 3.4 lbs/sf (res) or 2 lbs/sf (nonres)*

4.408 / 5.408.1

Construction Waste

Universal Waste

- Additions/alterations must verify universal waste items (fluorescent lamps, ballasts, mercury containing thermostats, etc.) are diverted from waste streams

Excavated Soil & Land Clearing Debris

- 100% vegetation, rocks, etc. from landing clearing must be reused or recycled (mulch)

Documentation:
Add requirements to Notes on plan set.

Embodied Carbon Compliance Pathways

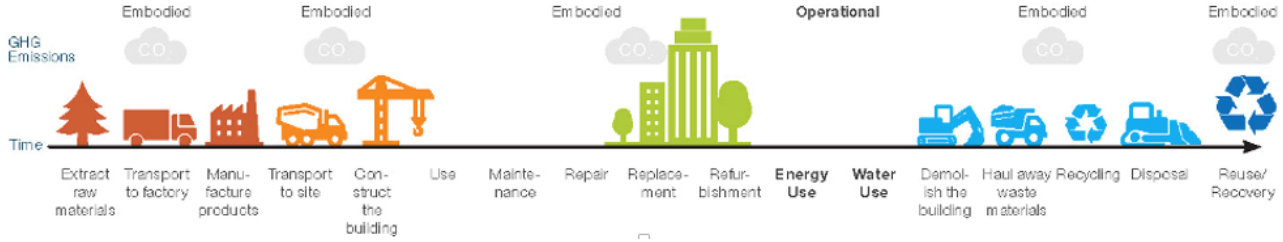
Building Reuse	Life Cycle Analysis	Prescriptive Path
Section 5.105, Deconstruction and Reuse of Existing Structures	Section 5.409, Life Cycle Assessment	Section 5.409.3, Product GWP Compliance

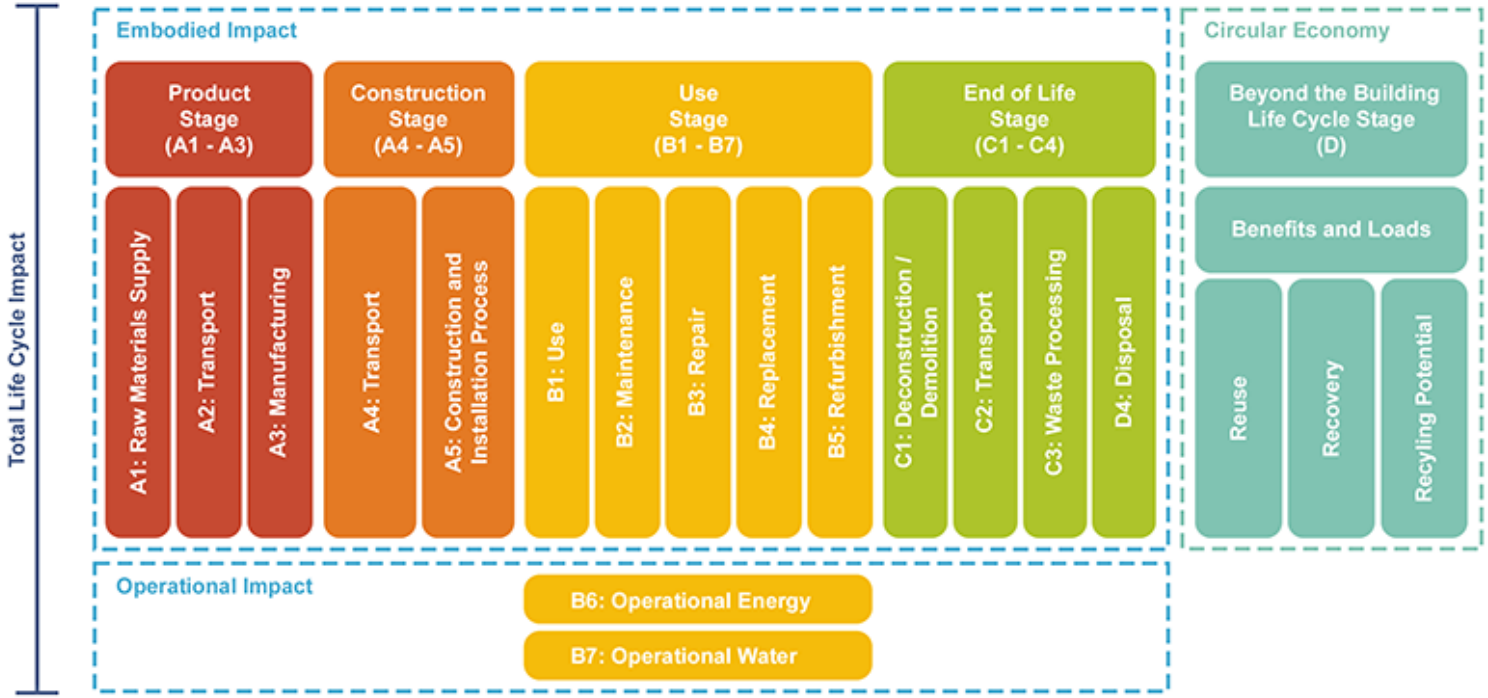
Effective July 1, 2024

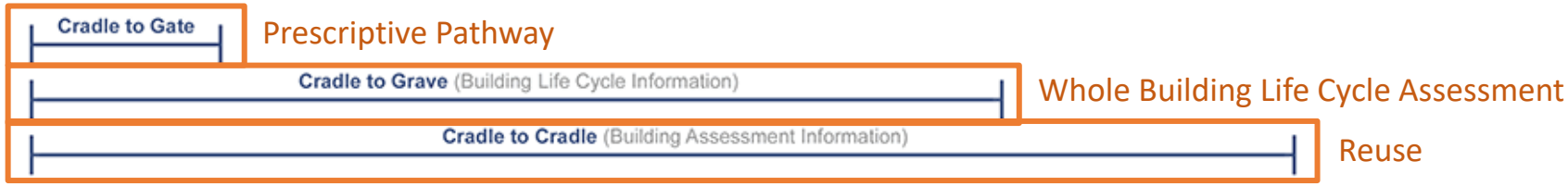
- Nonresidential projects 100,000 square feet, and schools under jurisdiction of DSA 50,000 square feet
- 3 pathways for compliance

5.105/5.409

Embodied Carbon Scope for CALGreen







5.105/5.409

Embodied Carbon Compliance Pathways

Effective July 1, 2024

- Nonresidential projects 100,000 square feet;
- Schools under jurisdiction of DSA 50,000 square feet
- 3 pathways

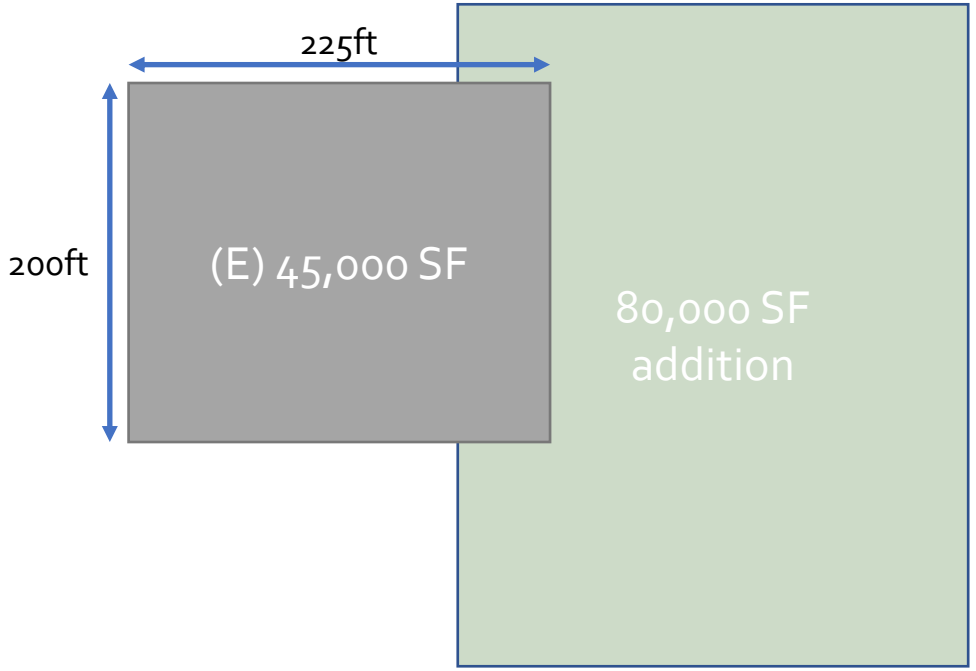
Building Reuse Section 5.105, Deconstruction and Reuse of Existing Structures	Life Cycle Analysis Section 5.409, Life Cycle Assessment	Prescriptive Path Section 5.409.3, Product GWP Compliance
Components: Existing primary structural elements, enclosure, (roof framing, wall framing, and exterior finishes). **Exceptions:** Additions 2x the area or more of the existing building. **Exclude:** Window assemblies, insulation, portions structurally unsound or hazardous, and hazardous materials that are remediated as part of the project shall not be included in the calculation.	**Scope:** 60-year cradle-to-grave WB LCA (ISO 14044), excluding operating energy. Show GWP analysis. **Components:** Primary and secondary structural members, glazing, insulation, exterior finishes.	**Components:** Structural steel, rebar, flat glass, light and heavy-duty mineral wool insulation, and ready mix concrete. **Exception:** Concrete mixes can use a weighted average for all mixes.
Mandatory 45% of the structure and enclosure to be reused	**Mandatory** 10% reduction from baseline	**Mandatory** 175% of IW-EPD GWP Limits
Tier 1 75% of the structure and enclosure to be reused	**Tier 1** 15% reduction from baseline	**Tier 1** 150% of IW-EPD GWP Limits
Tier 2 75% of the structure and enclosure to be reused AND 30% of interior non-structural elements to be reused	**Tier 2** 20% reduction from baseline	**Tier 2** IW-EPD GWP Limits

3C REN

5.105/5.409

Reuse of Existing Building

- For additions or alterations, where addition is < 2x the area of existing building



			Existing SF	Retained SF		
Primary Structure						
	perimeter foundation		2550	2550		
	concrete floor		45,000	45,000		
	CMU walls		8500	4250		
	excl windows		*50*	*0*		
	lateral beams		900	0		
		subtotal	*56950*	*51800*	*90.96*	*%*
Existing enclosure						
	roof framing		45000	0		
	wall framing		n/a	n/a		
	exterior finishes		8450	8450		
		subtotal	*53450*	*8450*	*15.81*	*%*
Total			**110,400**	**60,250**	**54.57**	**%**

- Primary structural elements (foundations; columns, beams, walls, and floors; and lateral elements)
- Existing building enclosure (roof framing, wall framing and exterior finishes)
- Exclude windows, insulation, hazardous

WORKSHEET (WS-3)
5.105.2 BUILDING REUSE

DOCUMENTATION OF COMPLIANCE OF EXISTING BUILDING REUSE

Area of Existing Building(s) 45,000 **SF**

Area of Aggregate Addition(s) (if applicable) 80,000 **SF**

	EXISTING TOTAL AREA (A)	RETAINED TOTAL AREA (B)	% OF RETAINED STRUCTURE (B)/(A)
Primary Structural Elements of Existing Building(s) (foundations; columns, beams, walls, and floors; and lateral elements)	56,950 SF	51,800 SF	90.96 %SF
Building Enclosure of Existing Building(s) (roof framing, wall framing and exterior finishes only)	53,450 SF	8450 SF	15.81 % SF

Total % Reuse of Required Elements ≥ 45% 54.57 %

5.105.2

Whole Building Life Cycle Assessment

- Cradle-to-grave scope
- Reference study period of 60 years
- Building enclosure components and primary and secondary structural members – plus glazing and insulation
- Reference building – same location, orientation, size, function, space conditioning

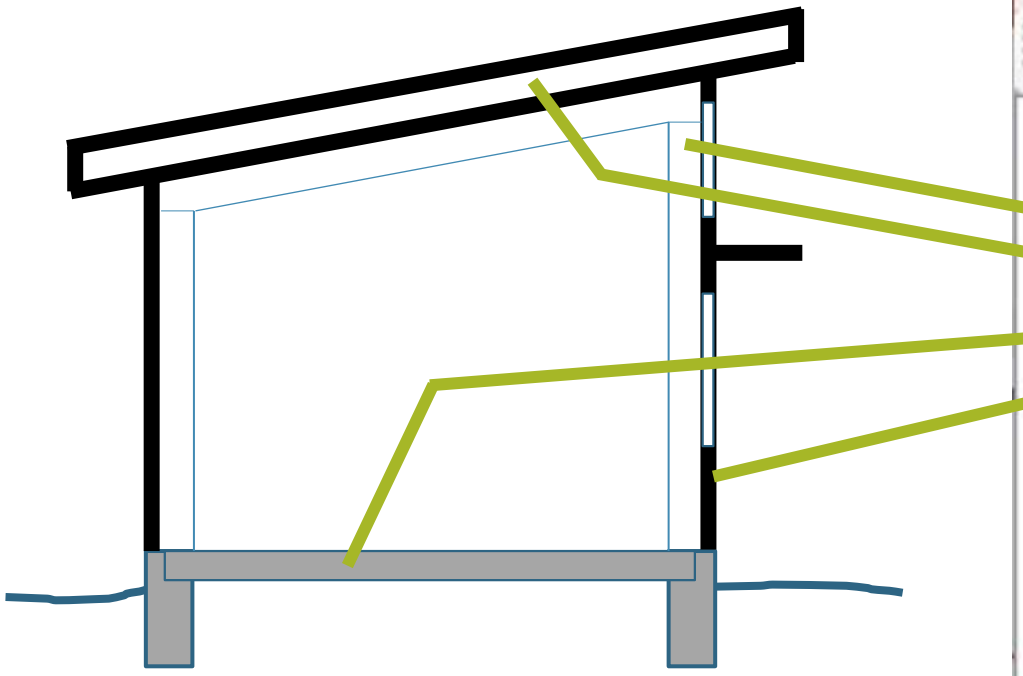
Free software: Athena Sustainable Materials Institute; One Click LCA

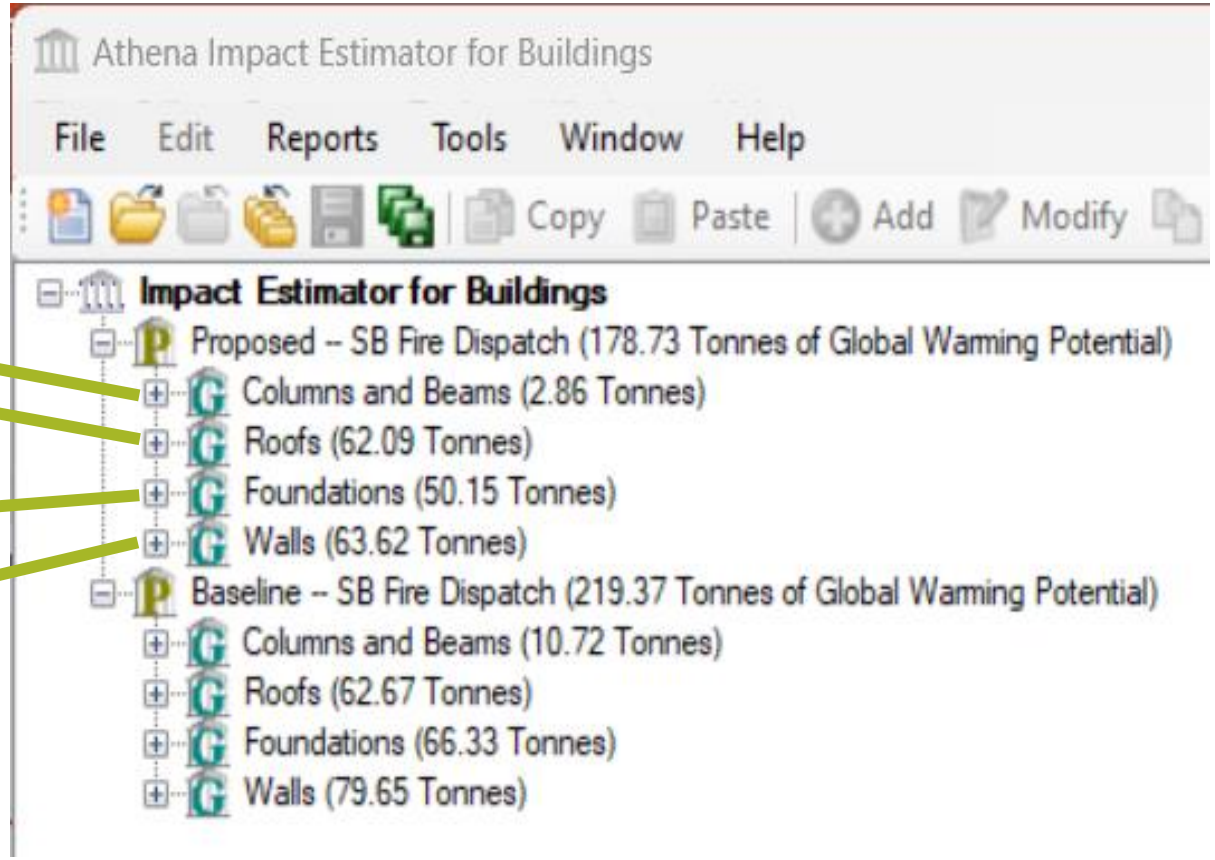
Paid software: sphera (fka GaBi); SimaPro; tally (Revit plug-in)

5.409.2

Building Tree Organization

Athena Impact Estimator for Buildings





The user can build a **Baseline** model and a **Proposed** model for comparison.
The user can define the wall and roof assemblies.
The wall assemblies include "openings" for basic window inputs.
The foundation can include slab, footings, grade beams, pad footings and rebar.

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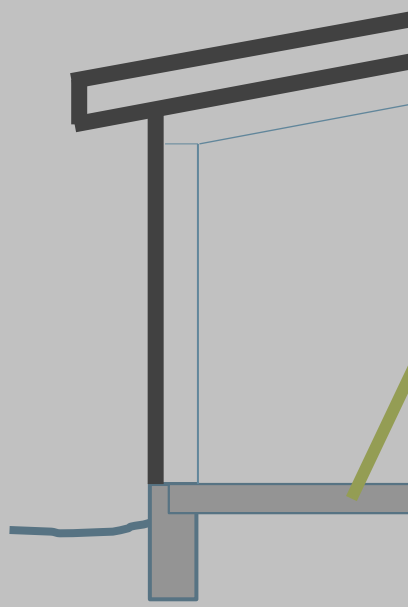
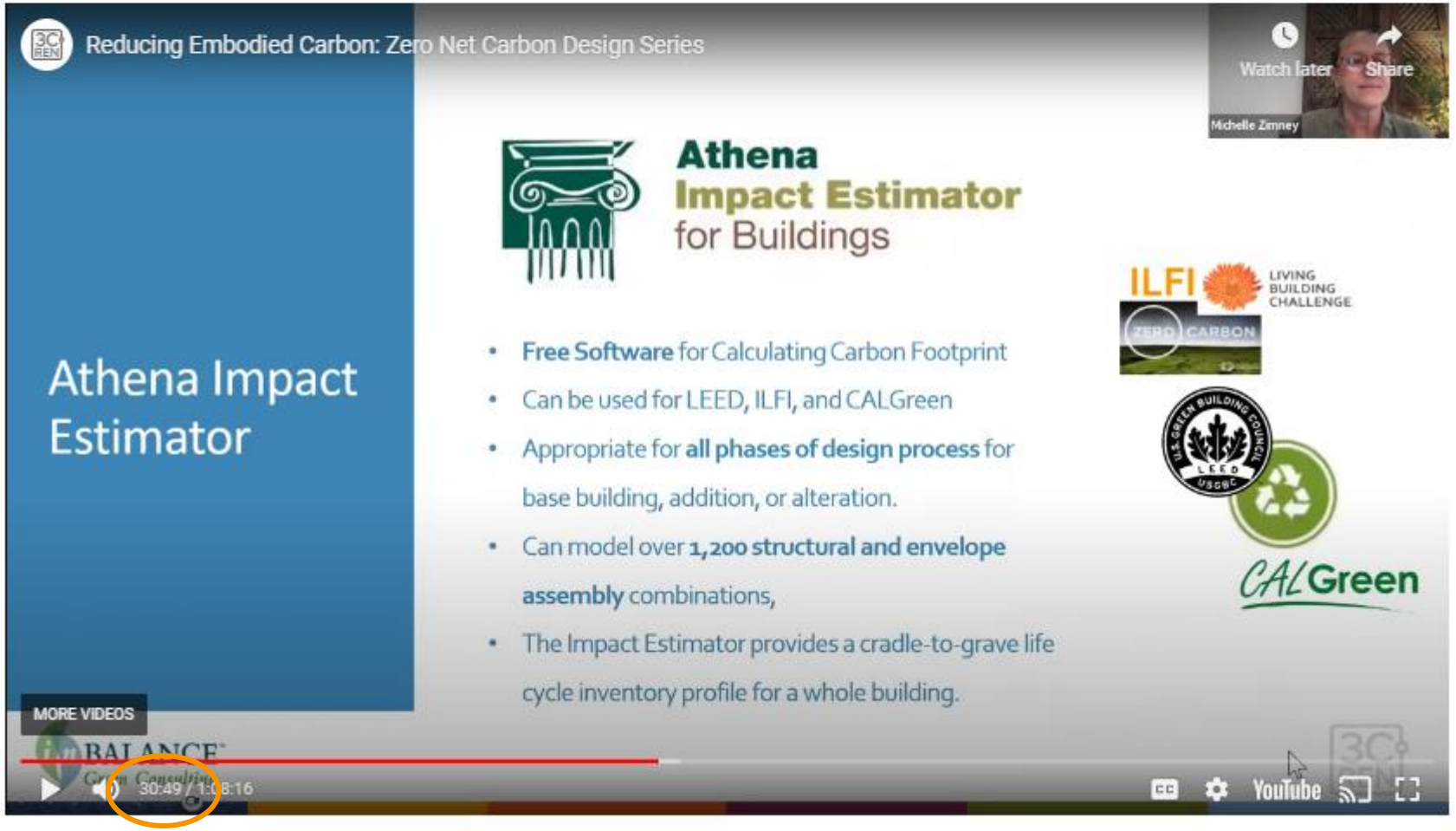


3C REN

CONTRACTORS & INDUSTRY | MULTIFAMILY PROPERTIES | FOR RESIDENTS

ON DEMAND TRAININGS



Date: August 31, 2023

Reducing Embodied Carbon: Zero Net Carbon Design Series

inBALANCE™ Green Consulting

3C REN

Product GWP Compliance – Prescriptive Path

Only certain steel, glass and insulation…

…. and concrete. Allowed GWP keyed to strength and type of ready-mix

TABLE 5.409.3
PRODUCT GWP LIMITS

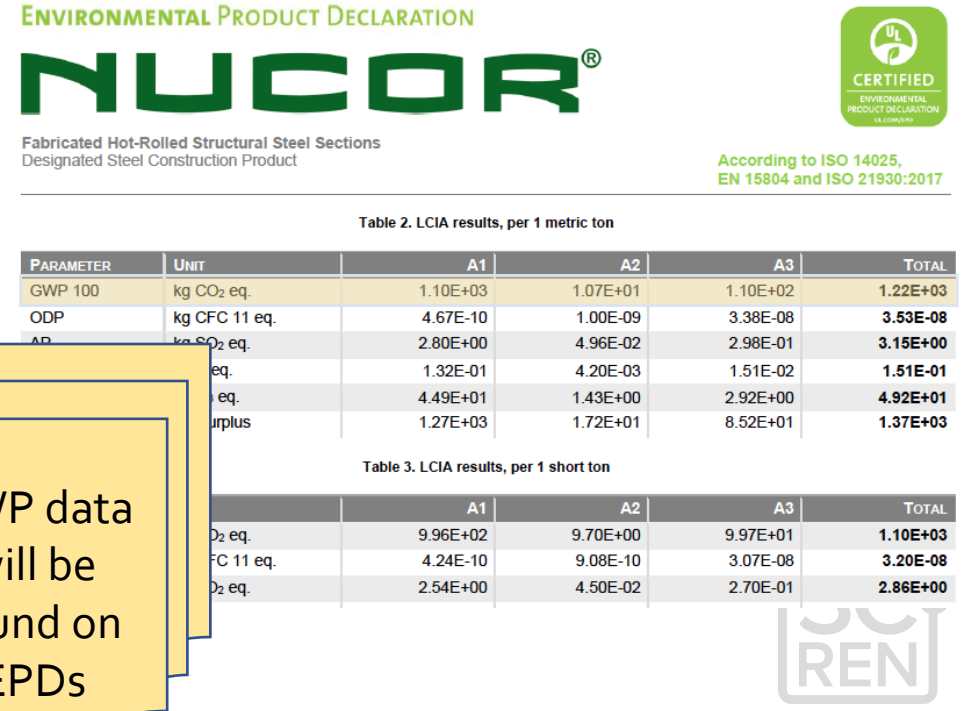
BUY CLEAN CALIFORNIA MATERIALS PRODUCT CATEGORY[1]	MAXIMUM ACCEPTABLE GWP VALUE (unfabricated) ($GWP_{allowed}$)	UNIT OF MEASUREMENT
Hot-rolled structural steel sections	1.77	MT CO_2e/MT
Hollow structural sections	3.00	MT CO_2e/MT
Steel plate	2.61	MT CO_2e/MT
Concrete reinforcing steel	1.56	MT CO_2e/MT
Flat glass	2.50	kg CO_2e/MT
Light-density mineral wool board insulation	5.83	kg CO_2e/1 m^2
Heavy-density mineral wool board insulation	14.28	kg CO_2e/1 m^2
Concrete, Ready-Mixed[2, 3]		
CONCRETE PRODUCT CATEGORY	**MAXIMUM GWP ALLOWED VALUE ($GWP_{allowed}$)**	**UNIT OF MEASUREMENT**
up to 2499 psi	450	kg CO_2e/m^3
2500–3499 psi	489	kg CO_2e/m^3
3500–4499 psi	566	kg CO_2e/m^3
4500–5499 psi	661	kg CO_2e/m^3
5500–6499 psi	701	kg CO_2e/m^3
6500 psi and greater	799	kg CO_2e/m^3
Concrete, Lightweight Ready-Mixed[2]		
CONCRETE PRODUCT CATEGORY	**MAXIMUM GWP ALLOWED VALUE ($GWP_{allowed}$)**	**UNIT OF MEASUREMENT**
up to 2499 psi	875	kg CO_2e/m^3
2500–3499 psi	956	kg CO_2e/m^3
3500–4499 psi	1039	kg CO_2e/m^3

Note: Units for steel are MT or metric tonne. Often noted in EPDs as t.

GWPn < GWPallowed

Where GWPn = Σ (GWPn)(vn) and GWPallowed = Σ (GWPallowed)(vn)

- n = each concrete mix installed in the project
- GWPn = the GWP for concrete mix n per concrete mix EPD
- GWPallowed = the GWP potential allowed for concrete mix n per Table 5.409.3
- vn = the volume of concrete mix n installed in the project, in m3


ENVIRONMENTAL PRODUCT DECLARATION

NUCOR®

Fabricated Hot-Rolled Structural Steel Sections
Designated Steel Construction Product

According to ISO 14025, EN 15804 and ISO 21930:2017

Table 2. LCIA results, per 1 metric ton

PARAMETER	UNIT	A1	A2	A3	TOTAL
GWP 100	kg CO_2 eq.	1.10E+03	1.07E+01	1.10E+02	**1.22E+03**
ODP	kg CFC 11 eq.	4.67E-10	1.00E-09	3.38E-08	**3.53E-08**
AP	kg SO_2 eq.	2.80E+00	4.96E-02	2.98E-01	**3.15E+00**
	eq.	1.32E-01	4.20E-03	1.51E-02	**1.51E-01**
	eq.	4.49E+01	1.43E+00	2.92E+00	**4.92E+01**
	urplus	1.27E+03	1.72E+01	8.52E+01	**1.37E+03**

Table 3. LCIA results, per 1 short ton

		A1	A2	A3	TOTAL
	O_2 eq.	9.96E+02	9.70E+00	9.97E+01	**1.10E+03**
	FC 11 eq.	4.24E-10	9.08E-10	3.07E-08	**3.20E-08**
	O_2 eq.	2.54E+00	4.50E-02	2.70E-01	**2.86E+00**

GWP data will be found on EPDs

5.409.3

Cost-Effective, Low-Carbon Product Selection

Source: https://rmi.org/embodied-carbon-101/

Concrete

Actions to Reduce Carbon

Substitute cement with alternative cementitious materials (ACMs). Choose recycled aggregate. Select structural shapes and sizes that use less material while keeping the same structural integrity.

Structural Steel

Actions to Reduce Carbon

Specify CA or U.S.-made steel and steel with high recycled content. Prioritize electric arc furnace (EAF) production over basic oxygen furnace (BOF) production.

Rebar

Actions to Reduce Carbon

Use 97% or higher recycled content rebar. Select a structural concrete design that uses less material while keeping the same structural integrity.

Insulation

Actions to Reduce Carbon

Replace foam (especially XPS) with lower-carbon materials, like cellulose and mineral wool batt.

Glazing

Actions to Reduce Carbon

Select low-carbon window frame materials. Specify no more than two panes of glazing.

Finish Materials

Actions to Reduce Carbon

Select low-carbon and durable finish materials. Reuse materials and design for deconstruction and reuse for future tenant improvements.

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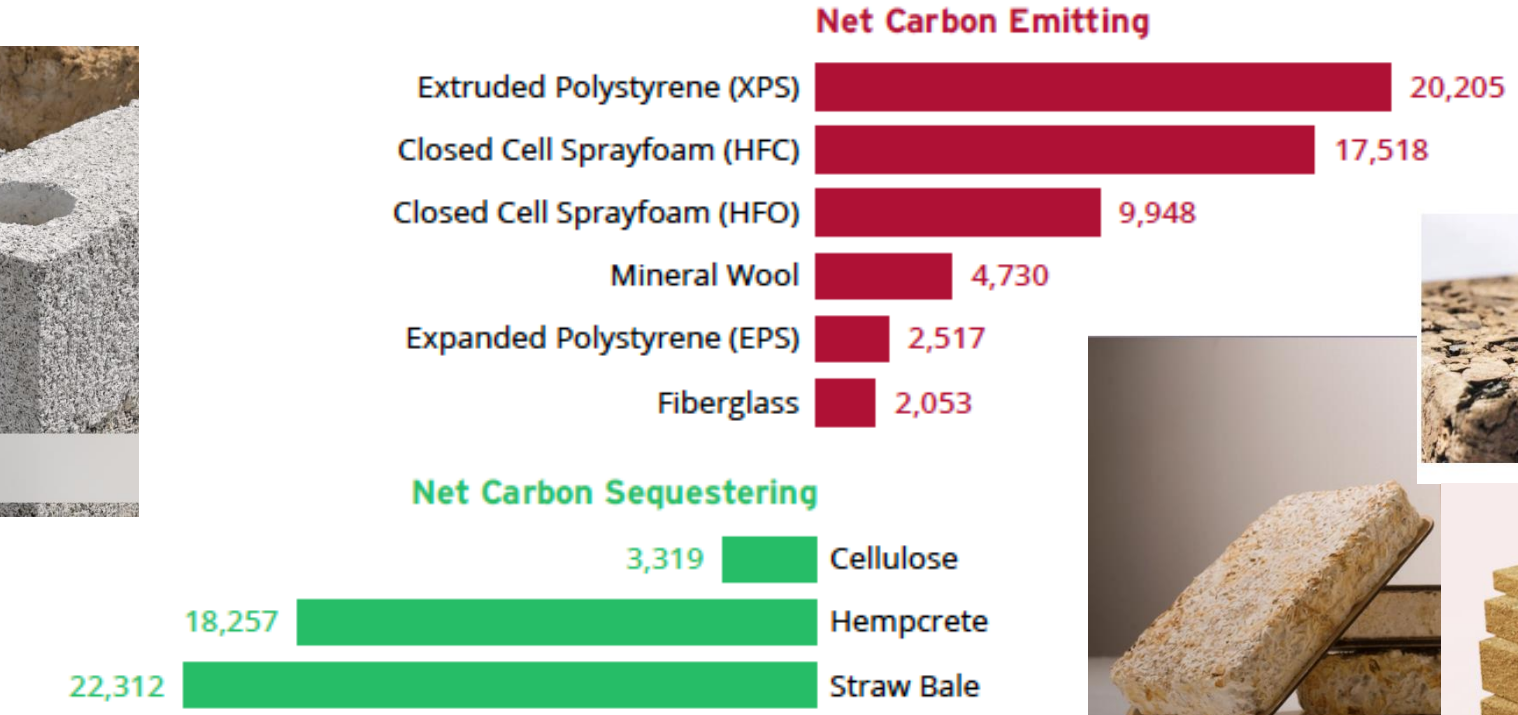
Source: Embodied Carbon and CALGreen Embodied Carbon Requirements, California Energy Codes & Standards, 2024

3C REN

Insulation: Carbon Sequestration Opportunities

Hempitecture.com

Exhibit 3 Embodied carbon of insulation materials (kg CO_2e)



Note: The amount of CO_2e is based on R-20 at 234 m².

Source: Chris Magwood, *Opportunities for CO_2 Capture and Storage in Building Materials*, 10.13140/RG.2.2.32171.39208, 2019.

Expanded Cork: Corklink

Mycelium board: Greensulate

Wood fiber board: Gutex

Insu ities

Hempitecture.com

CONTRACTORS & INDUSTRY | MULTIFAMILY PROPERTIES | FOR RESIDENTS

ON DEMAND TRAININGS

Date: February 20, 2024

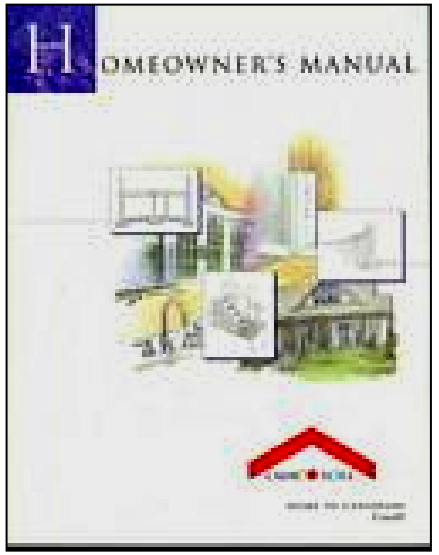
Practical Ways to Address Embodied Carbon

Expanded Cork: Corklink

Wood fiber board: Gutex

Operation and Maintenance Manual

- Provide Building Owner or Representative with manual that contains:
  - Instructions for operation
  - Warranties for appliances
  - Testing of systems
  - New in 2022: Defensible Space!
- Commissioning process can help produce these documents.



Documentation:
Add requirements to Notes on plan set

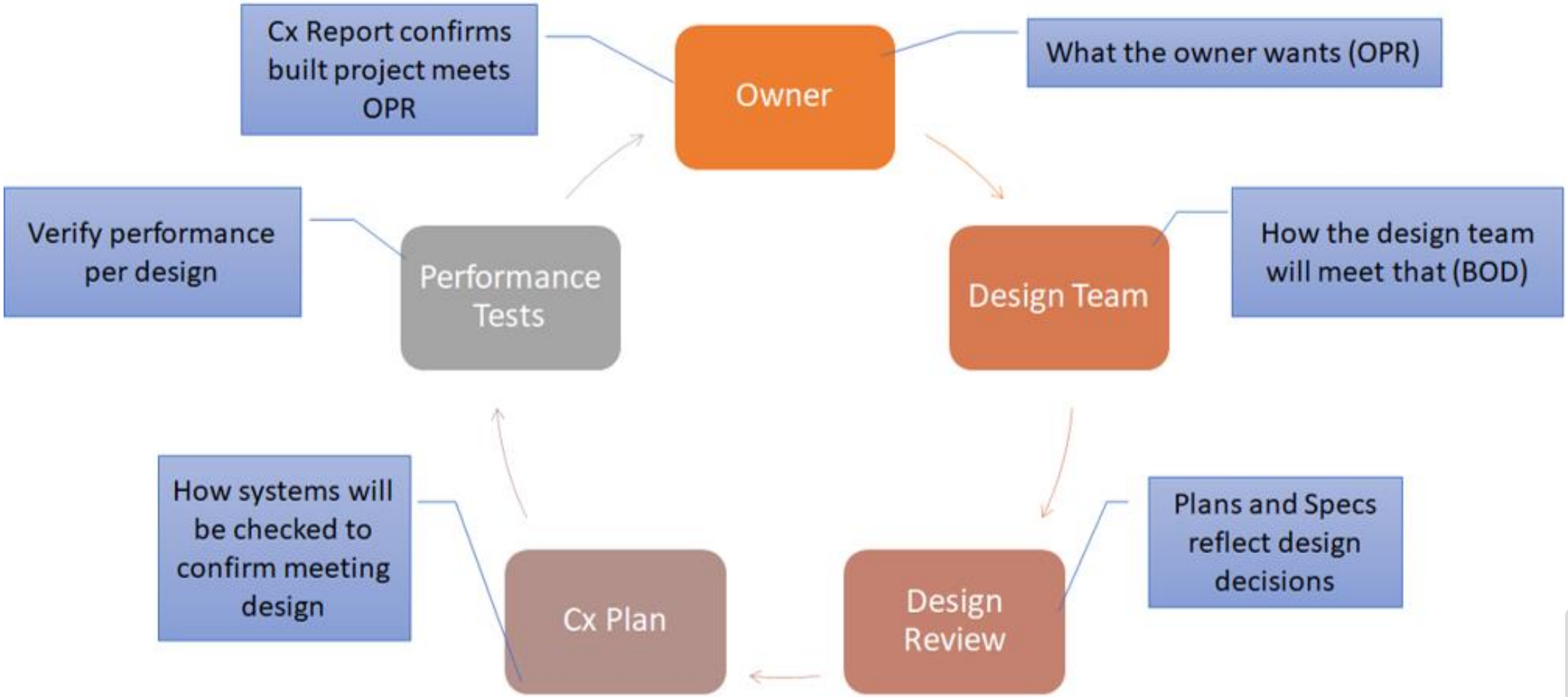
4.410.1 / 5.410.4.5

Recycling by Occupants

- ≥ 5 units: Must have recycling and organic waste collection onsite or meet local recycling ordinance.
- Non-Res additions adding ≥30% floor area must comply.
- Consideration for restaurant food waste under other state laws.

4.410.2 / 5.410.1

Commissioning – Circle of Accountability



Commissioning

New buildings ≥10,000 ft

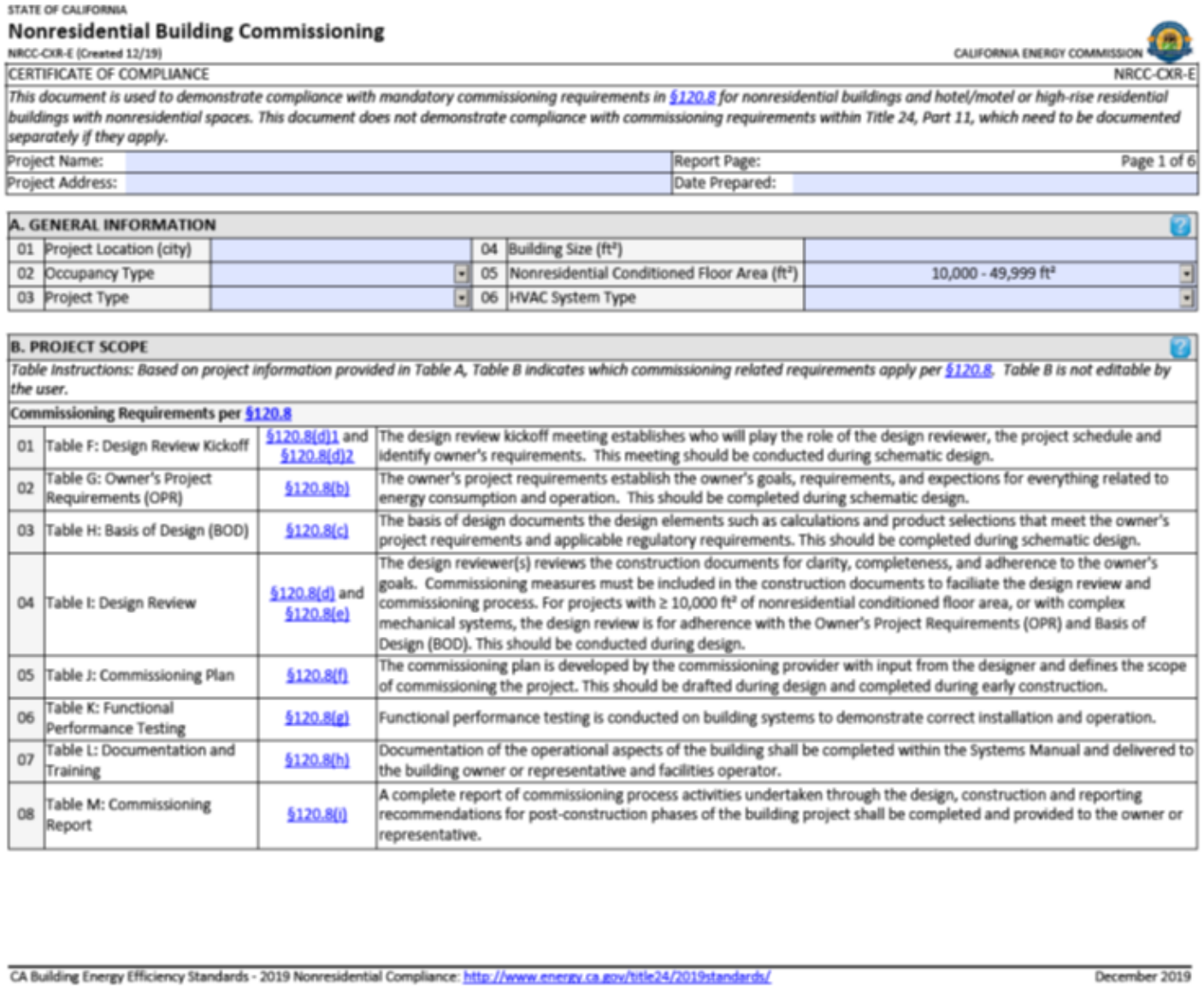
Submitted for permit

1. Owner's or owner representative's project requirements
2. Basis of design
3. Commissioning measures shown in the construction documents
4. Commissioning plan

During construction

5. Functional performance testing
6. Documentation and training
7. Commissioning report

Commissioning – Energy Code



STATE OF CALIFORNIA

Nonresidential Building Commissioning

NRCC-CXR-E (Created 12/19) — CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-CXR-E

This document is used to demonstrate compliance with mandatory commissioning requirements in §120.8 for nonresidential buildings and hotel/motel or high-rise residential buildings with nonresidential spaces. This document does not demonstrate compliance with commissioning requirements within Title 24, Part 11, which need to be documented separately if they apply.

Project Name:		Report Page:	Page 1 of 6
Project Address:		Date Prepared:	

A. GENERAL INFORMATION

01	Project Location (city)		04	Building Size (ft²)	
02	Occupancy Type		05	Nonresidential Conditioned Floor Area (ft²)	10,000 - 49,999 ft²
03	Project Type		06	HVAC System Type	

B. PROJECT SCOPE

Table Instructions: Based on project information provided in Table A, Table B indicates which commissioning related requirements apply per §120.8. Table B is not editable by the user.

Commissioning Requirements per §120.8

01	Table F: Design Review Kickoff	§120.8(d)1 and §120.8(d)2	The design review kickoff meeting establishes who will play the role of the design reviewer, the project schedule and identify owner's requirements. This meeting should be conducted during schematic design.
02	Table G: Owner's Project Requirements (OPR)	§120.8(b)	The owner's project requirements establish the owner's goals, requirements, and expections for everything related to energy consumption and operation. This should be completed during schematic design.
03	Table H: Basis of Design (BOD)	§120.8(c)	The basis of design documents the design elements such as calculations and product selections that meet the owner's project requirements and applicable regulatory requirements. This should be completed during schematic design.
04	Table I: Design Review	§120.8(d) and §120.8(e)	The design reviewer(s) reviews the construction documents for clarity, completeness, and adherence to the owner's goals. Commissioning measures must be included in the construction documents to faciliate the design review and commissioning process. For projects with ≥ 10,000 ft² of nonresidential conditioned floor area, or with complex mechanical systems, the design review is for adherence with the Owner's Project Requirements (OPR) and Basis of Design (BOD). This should be conducted during design.
05	Table J: Commissioning Plan	§120.8(f)	The commissioning plan is developed by the commissioning provider with input from the designer and defines the scope of commissioning the project. This should be drafted during design and completed during early construction.
06	Table K: Functional Performance Testing	§120.8(g)	Functional performance testing is conducted on building systems to demonstrate correct installation and operation.
07	Table L: Documentation and Training	§120.8(h)	Documentation of the operational aspects of the building shall be completed within the Systems Manual and delivered to the building owner or representative and facilities operator.
08	Table M: Commissioning Report	§120.8(i)	A complete report of commissioning process activities undertaken through the design, construction and reporting recommendations for post-construction phases of the building project shall be completed and provided to the owner or representative.

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: http://www.energy.ca.gov/title24/2019standards/ December 2019

- Commissioning ALSO required in Title 24 Part 6!
- Part 6 Requires Design Review for projects <10,000 SF!
- ONLY CAL Green adds irrigation and PV's!

5.410.2

Testing and Adjusting

Testing and adjusting of systems required for new buildings < 10,000 sqft.
Or new systems to serve an addition or alteration subject to Section 303.1.

- Systems (HVAC, lighting, water heating, renewable, landscape, water reuse)
- Plan for system testing
- Procedures according to manufacturer's specs
- HVAC Balancing
- Reporting

Documentation: Engineer include in notes or specifications

3C REN

4.5 & 5.5 Environmental Quality

Fireplaces

- Direct-vent sealed-combustion type
- Meet California Energy Code & local ordinance

Direct Vent

Sealed glass front

4.503.1 / 5.503.1

Temporary Ventilation

HVAC system return air filters use MERV 8 or an average efficiency of 30%.

- Replace all filters immediately prior to occupancy

NEW FOR '25

Temporary air filters must be MERV 13.

Permanent Ventilation

Permanent HVAC system supply and return must use MERV 13

- MERV rating must be stated on filter

3C REN

5.504.5

Covering of Duct Openings and Protection of Mechanical Equipment During Construction

- Covered with tape, plastic, sheetmetal, etc. during construction
- Arrives at jobsite covered

Yes: air tight, stays for the whole process, and won't need cleaning

None of these are good enough and will require cleaning or replacement

4.504.1 / 5.504.3

Pollutant Control: Low Emitting Materials

Requires demonstrating compliance with maximum limits. See CALGreen Tables.

Demonstrated on product or on cutsheet.

- **Adhesives, Sealants, & Caulks (4.504.1&2)**
- **Carpet and Carpet Adhesives (4.504.1)**
- **Resilient Flooring (4.503.4)**
- **Paints & Coatings (4.503.3)**
- **Composite Wood Products (4.504.5)**

TABLE 4.504.1 ADHESIVE VOC LIMIT[1, 2]

Less Water and Less Exempt Compounds in Grams per Liter

ARCHITECTURAL APPLICATIONS	VOC LIMIT
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesive	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesives not specifically listed	50

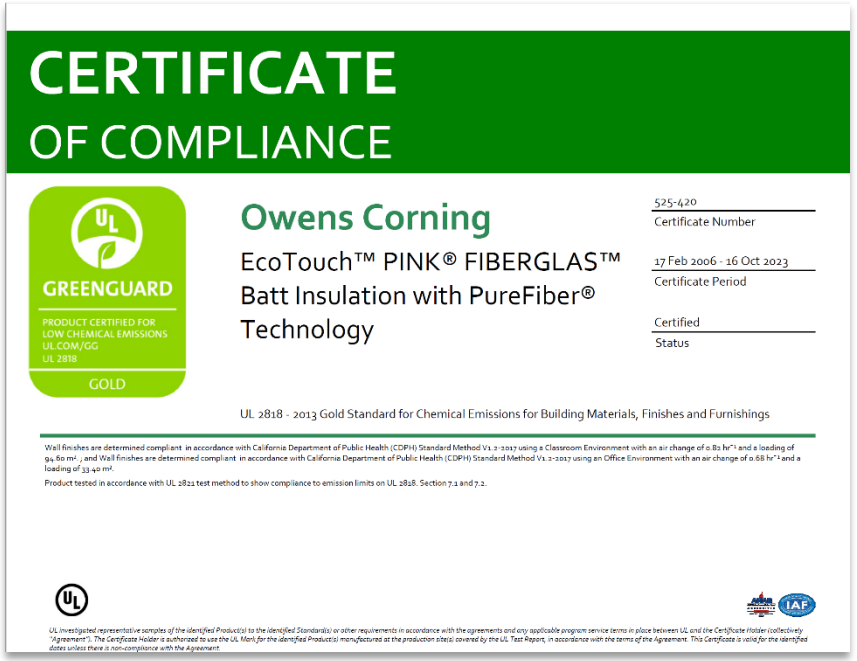
4.504.2.1 / 5.504.4.1

Pollutant Control: Low Emitting Materials

Added in 2022:

- **Insulation**
- **Ceiling Tiles**
- **Wall Panels**

Documentation:
Notes on plan set.
Cutsheets available, if requested



CERTIFICATE
OF COMPLIANCE

GREENGUARD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS UL.COM/GG UL 2818
GOLD

Owens Corning

EcoTouch™ PINK® FIBERGLAS™ Batt Insulation with PureFiber® Technology

525-420
Certificate Number

17 Feb 2006 - 16 Oct 2023
Certificate Period

Certified
Status

UL 2818 - 2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Wall finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using a Classroom Environment with an air change of 0.81 hr^{-1} and a loading of 94.60 m^2 / ; and Wall finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using an Office Environment with an air change of 0.68 hr^{-1} and a loading of 33.40 m^2.

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.

Can also demonstrate compliance with Certificate Programs

4.504.2.1 / 5.504.4.1

Environmental Tobacco Smoke Controls (ETS)

- Prohibit smoking within 25 feet of building entries, outdoor air intakes, operable windows and in buildings.
- Post signage to inform building occupants

NOT QUITE..

YES! BUT…

Yes!

5.504.7

Concrete Slab Foundations & Capillary Break

- All Concrete slab foundations or slab on ground floors must have vapor retarder
- Compliant with CBC chapter 19 and CRC chapter 5
- Vapor retarder and capillary break (4” layer of ½” gravel) is installed at slab on grade foundations.

4.505.2 / 5.505.2.1

Vapor Barrier

No Vapor retarder or capillary break

Vapor retarder installed over gravel for capillary break

4.505.2 / 5.505.2.1

Moisture Content of Building Materials

- Wall and floor framing shall not be enclosed if materials exceed 19% Moisture Content
- Requires 3 random floor/wall moisture tests
- Don’t install materials with visible water damage or mold

Bad

Better

Best

4.505.3

Bathroom Exhaust Fan (tub, shower rooms)

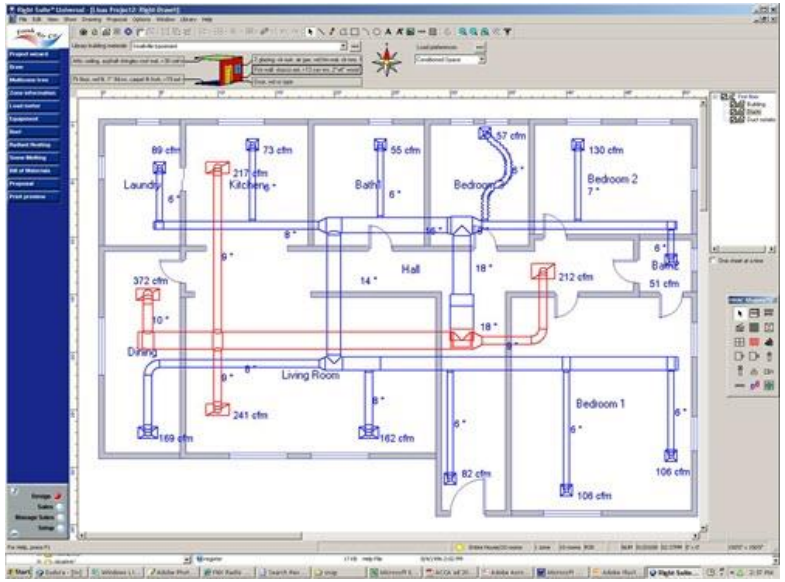
- Exhaust ducted to exterior
- Energy Star compliant
- Unless used as whole house ventilation, fans must be controlled by a humidistat – on wall or in unit, capable of 50-80% RH

ENERGY STAR

4.506.1

Heating and AC System Design

- Design/Install HVAC System to ACCA Manual J, D, & S Recommendations, or ASHRAE



Documentation:
Drawings! Calculations!

4.507.2

Indoor Air Quality

5.506.1- Outdoor Air Delivery – Meet Energy Code and CCR

5.506.2- Carbon Dioxide Monitoring- For buildings equipped with demand control ventilation, CO_2 sensors and ventilation controls shall be specified and installed in accordance with requirements of the Energy Code, Section 120.1 (c)(4).

5.506.3 Carbon dioxide (CO2) monitoring in classrooms.

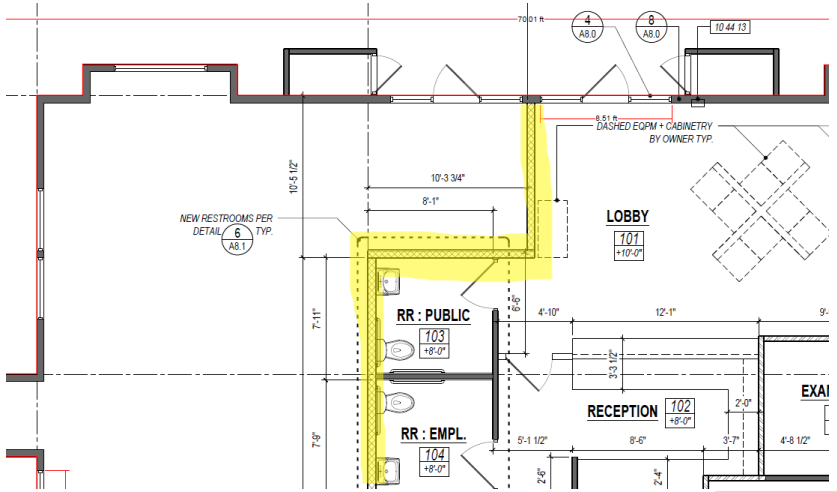
2025 Code: Expanded to include university and private schools

NEW FOR '25

3C REN

Acoustic Control

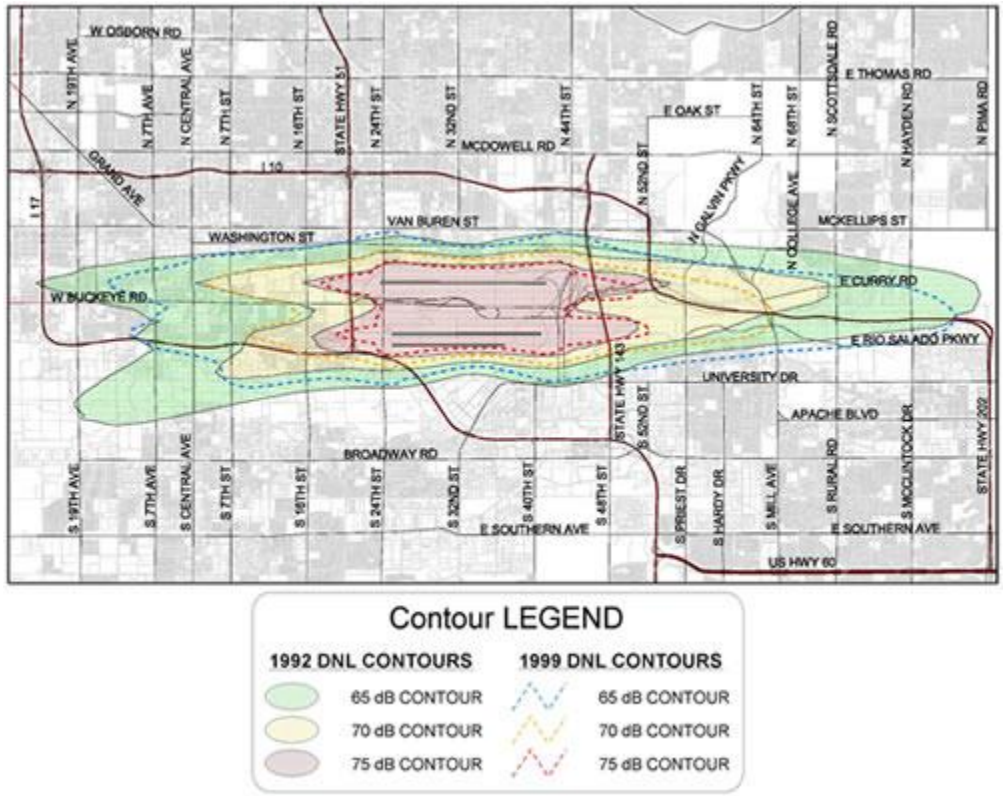
- Multi-tenant spaces require min. of STC 40 for:
  - Wall and floor/ceiling assemblies separating tenant spaces
  - And separating tenant spaces and public places



Can be accomplished through framing method and/or wall assembly layer

5.507.4

Exterior Noise - Prescriptive



IF within 65 CNEL Noise Contour of Airport, freeway, train, etc.:

- Walls and roof: STC 50
- Windows: STC 40 (or OITC 30)

5.507.4.1

Ozone Depletion GHG Reductions

5.508.1.1 Chlorofluorocarbons (CFCs) - HVAC, refrigeration & fire suppression equipment contains no CFCs

5.508.1.2 Halons - HVAC, refrigeration and fire suppression equipment contains no Halons

5.508.1

Supermarket Refrigeration Leak Reduction

- Retail food stores ≥8,000 ft of conditioned area with refrigerated displays or coolers/freezers connected to compressor/condenser units
- Leak reduction measures for refrigeration systems with a GWP ≥150
- New systems include new facilities and replacement systems in existing facilities

Other Stuff and Appendix A4 and A5- Voluntary Tiers

Chapters 6, 7 & 8

- Chapter 6: Current links to all References
- Chapter 7: Special Inspections, with 2025 Code clean up for consistency
- Chapter 8: Handy-dandy forms for water budget, CWM, LCA, Cx and more

Voluntary Tiers - Residential

Category	Tier 1 = Mandatory +	Tier 2 = Tier 1 +
Planning & Design	**4 required, 2 elective**	**4 required, 4 elective**
Energy Efficiency	**4 required**	**4 required**
Water Efficiency and Conservation	**2 elective**	**3 elective**
Material Conservation and Resource Efficiency	**3 required, 2 elective**	**3 required, 4 elective**
Environmental Quality	**2 required, 1 elective**	**2 required, 1 elective**

Voluntary Tiers - Nonresidential

Category	Tier 1 = Mandatory +	Tier 2 = Tier 1 +
Planning & Design	2 additional mandatory 1 elective	2 additional mandatory 3 elective
Energy Efficiency	2 elective	1 elective
Water Efficiency and Conservation	1 additional mandatory 1 elective	1 additional mandatory 3 elective
Material Conservation and Resource Efficiency	2 additional mandatory 1 elective	2 additional mandatory 3 elective
Environmental Quality	2 additional mandatory 1 elective + 1 more	2 additional mandatory 3 elective + 3 more

SLO County: Tier 1 Required for project >10,000 SF; energy reach code NOT required

Example: Bird-friendly Building Design

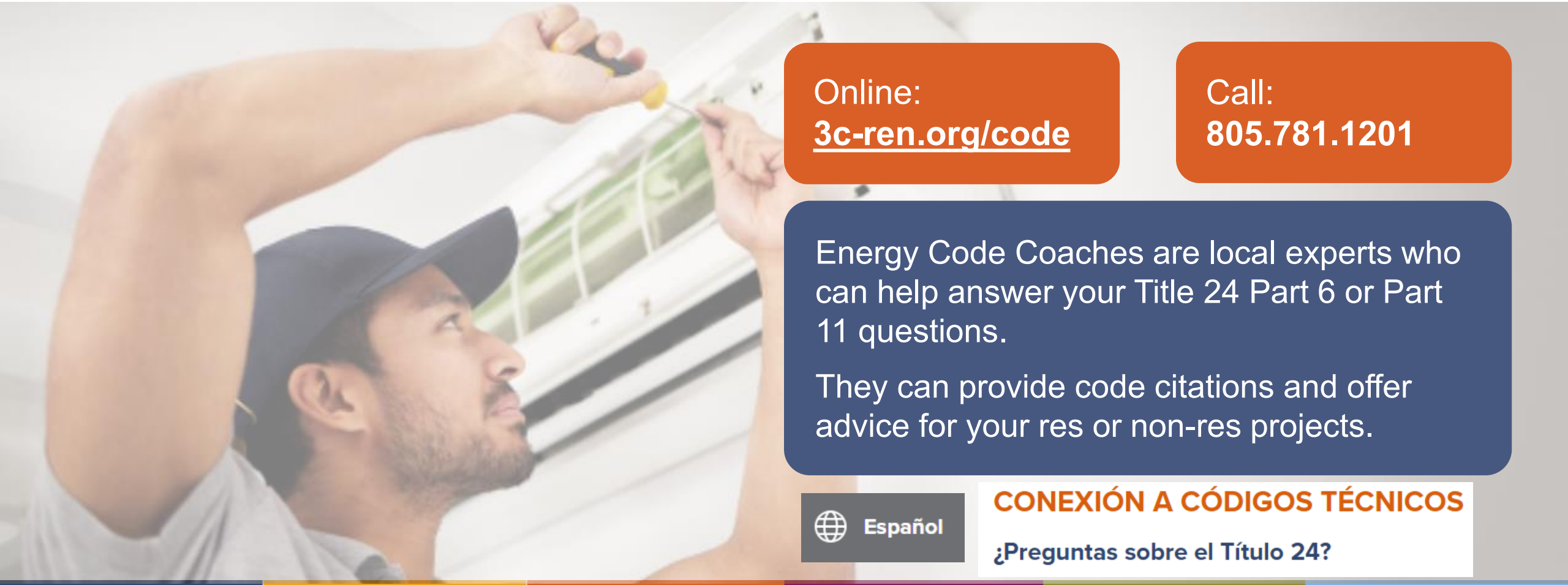
- 90% of building elevation to incorporate bird-friendly mitigation strategies, plus atriums, glass rails, etc.
- Glazing with visual markers (etched or fritted)
- Glazing films / laminated glass with patterns
- Glass block or channel glass
- “Glazing technologies”
- Slats, screens, netting and/or louvers

NuVision Window Film

Wrap up

Questions about Title 24?

3C-REN offers a *free* Code Coach Service



Online:
3c-ren.org/code

Call:
805.781.1201

Energy Code Coaches are local experts who can help answer your Title 24 Part 6 or Part 11 questions.

They can provide code citations and offer advice for your res or non-res projects.

Español

CONEXIÓN A CÓDIGOS TÉCNICOS

¿Preguntas sobre el Título 24?

Other CALGreen Resources

AIA California

CALGreen Checklists (AIA California)

Checklist / Worksheet, Link

CALIFORNIA ENERGY CODES & STANDARDS

A STATEWIDE UTILITY PROGRAM

- Guides and other resources
- Local Reach Codes
- Links to codes online

3C REN

Closing

Continuing Education Units Available

- Contact dresurreccion@co.slo.ca.us for AIA and ICC LUs

Coming to Your Inbox Soon!

- Slides & Recording

2025 Energy Code Implementation Series:

- Entire Series On-Demand

Upcoming Courses:

- Aug 20 – Best Practices for Hot Water Distribution
- Sep 10 – Title 24 Energy Performance Modeling
- Sep 11 – Multifamily Domestic Hot Water
- Sep 23 – Next Generation Passive Solar

Any phone numbers who joined? Please share your name!

Thank you!

More info: **3c-ren.org**

Questions: **info@3c-ren.org**

Email updates: **3c-ren.org/newsletter**

3C REN

TRI-COUNTY REGIONAL ENERGY NETWORK

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