

2022

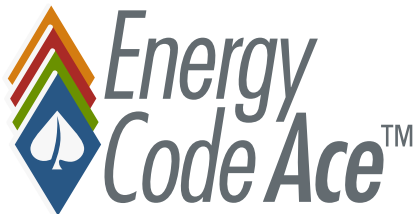
# CODE BREAKER

## Accessory Dwelling Units (ADU)

Solving the Energy Code Puzzle One Piece at a Time

# Participant Workbook

September 2023



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## LEGAL NOTICE

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## ABOUT THE STATEWIDE CODES AND STANDARDS PROGRAM

The Statewide Codes and Standards Program (C&S Program) is jointly managed by PG&E, SDG&E, and SCE. 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](mailto:info@energycodeace.com) to find out more about all program offerings.**



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# AIA Information

**Code Breaker:  
Accessory Dwelling Units (ADUs)  
— 2022 Energy Code**

Learning Units: 1.0 AIA LU | HSW

**Energy Code Ace**

Provider Number: 404109083

**AIA  
Continuing  
Education  
Provider**

## Course Description

This hour-long virtual course focuses requirements in the 2022 Energy Code (Title 24 Part 6) for accessory dwelling units (ADU). We will discuss how to identify the ADU type and its impact on Energy Code requirements for envelope, mechanical, photovoltaics (PV), battery storage or battery ready and HERS measures. We will also review how the compliance metrics differ depending on ADU type, including the new EDR source energy metrics for new construction ADUs.

## Course Objectives

- Establish if an ADU design is considered an alteration, addition, or a new residential building per the Energy Code.
- Discuss the envelope (roof, walls, floors, fenestration) requirements associated with the ADU type (alteration, addition, new construction) under the 2022 Energy Code.
- Recognize the renewable energy requirements of ADU type including photovoltaics (PV), battery storage, and battery ready.
- Determine mechanical equipment requirements, including any HERS verification measure options that provide ADU design flexibility, and how utility source energy metric may impact those choices.

**AIA**  
**Continuing**  
**Education**  
**Provider**

Credit(s) earned on completion of this course will be reported to **AIA CES** for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.


This course is registered with **AIA CES** for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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# Welcome



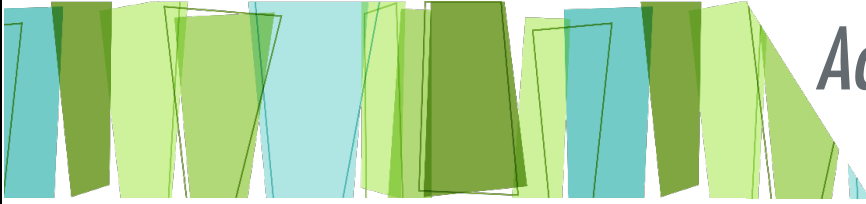
**2022** **CODE BREAKER** \* **Accessory Dwelling Units (ADUs)**  
Solving the Energy Code Puzzle One Piece at a Time



**Gina Rodda**  
Energy Code Ace Instructor  
Gabel Energy

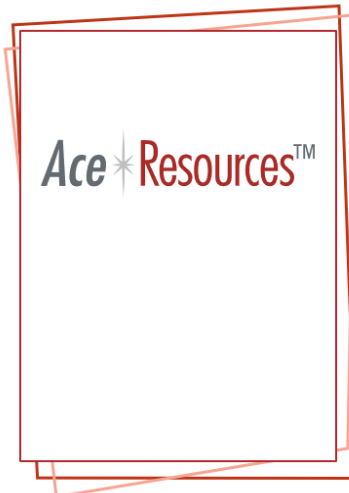
**Nick Brown**  
Energy Code Ace Instructor  
Build Smart Group

Continuing Education Information	
AIA Provider ID: 40410982	AIA Course Number: 22 CB ADU
ICC Provider ID: 1534	ICC Course Number: 35313



## Learning Objectives

- ✦ Establish if an ADU design is considered an alteration, addition, or a new residential building per the Energy Code.
- ✦ Discuss the envelope (roof, walls, floors, fenestration) requirements associated with the ADU type (alteration, addition, new construction) under the 2022 Energy Code.
- ✦ Recognize the renewable energy requirements of ADU type including photovoltaics (PV), battery storage, and battery ready.
- ✦ Determine mechanical equipment requirements, including any HERS verification measure options that provide ADU design flexibility, and how utility source energy metric may impact those choices.



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    | ✦ Q&Ace                        |
| ✦ Forms Ace                     | ✦ Reference Ace                |
| ✦ Image Ace                     | ✦ Timeline Ace                 |
| ✦ Navigator Ace                 | ✦ Virtual Compliance Assistant |
| ✦ Nonres. Indoor Lighting Wheel |                                |





## Ace\*Tools™



## TRAINING

## Ace\*Resources™

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



## Ace\*Tools™

## Ace\*Training™



## RESOURCES

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

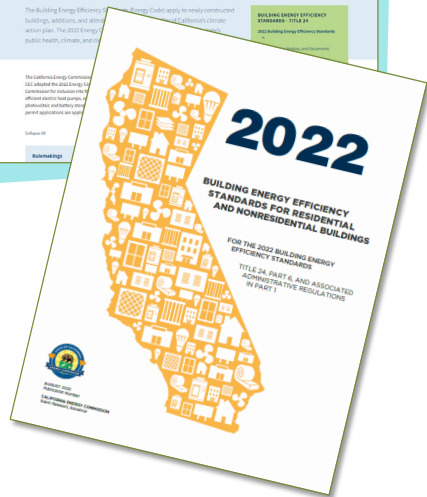
**Our Resources include:**

- ✦ Application Guides
- ✦ Checklists
- ✦ Fact Sheets
- ✦ Submit a Question
- ✦ Trigger Sheets
- ✦ Useful Links



**Join us at**  
[www.EnergyCodeAce.com](http://www.EnergyCodeAce.com)

## 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>



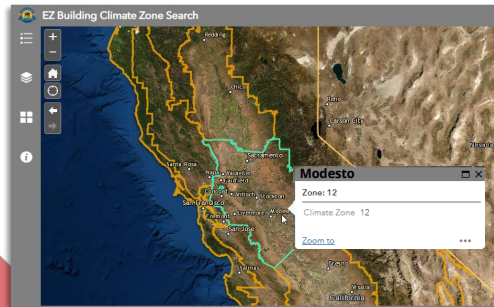
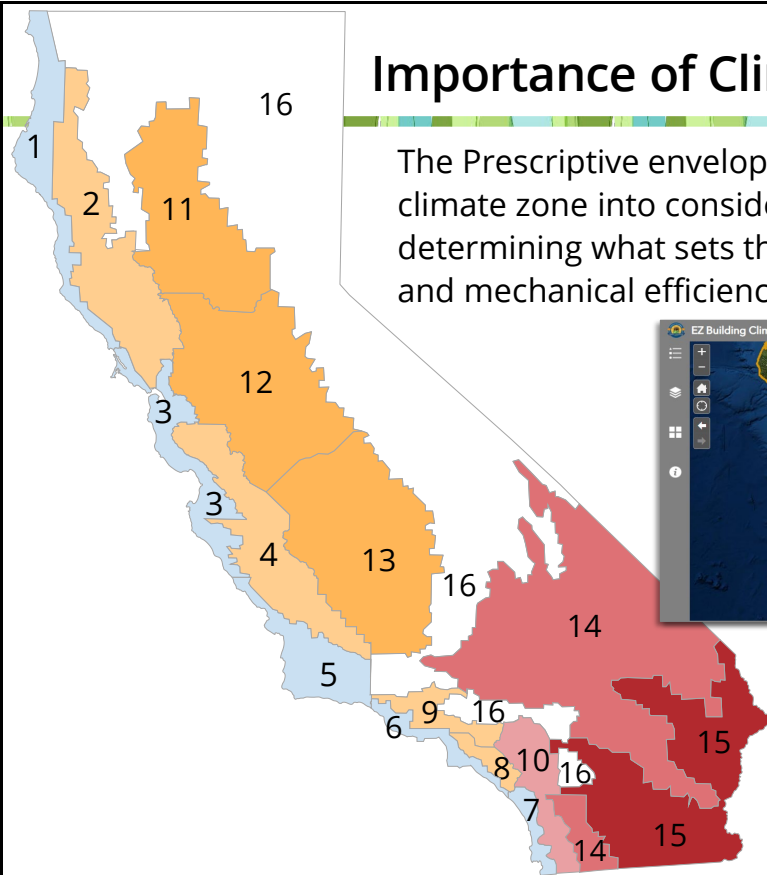
# Course Conventions

Mandatory	Prescriptive	Performance
 <ul style="list-style-type: none"><li>Always required regardless of compliance approach used</li></ul>	 <ul style="list-style-type: none"><li>Required when using the Prescriptive compliance approach</li></ul>	 <ul style="list-style-type: none"><li>Optional feature accounted for when doing Performance-based computer modeling</li></ul>



## Importance of Climate Zones

The Prescriptive envelope requirements take climate zone into consideration when determining what sets the minimum envelope and mechanical efficiency measures.



# 2022 ADU Factsheet

2022 ENERGY CODE



## Single-family Buildings: Accessory Dwelling Units



### What Are the Residential Accessory Dwelling Unit (ADU) Requirements?

The 2022 California Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) includes requirements for single-family and multifamily accessory dwellings units (ADUs).

An ADU is accessory to a primary residence and has complete independent living facilities for one or more persons. It is supported in the Energy Code as a "single-family" project when the ADU is associated with a single-family occupancy, and multifamily when associated with a multifamily occupancy. This fact sheet will concentrate on single-family ADU types.

**Single Family:** A residential building of Occupancy Group R-2 with two or less dwelling units; a building of Occupancy Group R-3, other than a multifamily building or hotel/inns building; a townhouse; a building of Occupancy Group R-3.1; or a building of Occupancy Group U when located on a residential site.

### How Does this Fact Sheet Apply to Your Project?

ADU Energy Code requirements differ depending upon the ADU type. Use this fact sheet to determine your ADU type and the Energy Code compliance options and requirements applicable to that ADU type. This includes requirements for envelope, mechanical, renewables and electric readiness.

### Importance of Compliance

California continues to encourage and support ADUs through the legislative process via Assembly and Senate bills, in addition to recent changes in the Government Code 95582-150. Complying with the building codes assures health, safety and cost-effective energy efficiency measures, many of which aim to reduce California's greenhouse gas emissions.

It is important to confirm the ADU development and design standards of the local jurisdiction because each jurisdiction determines how compliance to California legislation supporting ADU construction impacts the local concerns such as parking, height and setback.

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System Components and Key Terms	2
Compliance Requirements	3
Alteration ADU Type	4
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### California Department of Housing and Community Development

To learn more about ADU laws and requirements, see the California Department of Housing and Community Development (HCD) website. The HCD maintains the Accessory Dwelling Unit Handbook and other useful information on the HCD website at <https://www.hcd.ca.gov/programs-and-research/accessory-dwelling-units>



2022-10-26, Ver. 1 - Single-Family Buildings: Accessory Dwelling Units

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2022-10-26



# ADU Challenges

## Code Breaker: Accessory Dwelling Units (ADU)

### 1. ADU Challenges

2. ADU Types

3. Envelope

4. Renewables

5. Mechanical

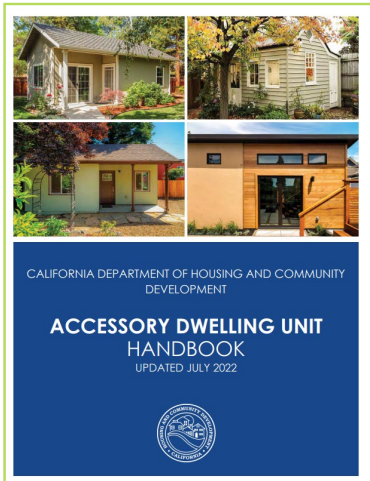
6. Next Steps

### ★ ADU Challenges

- ✧ What is an ADU?
- ✧ Design and logistic concerns



## What is an ADU?



✦ Often called in-law apartments or garage flats, an accessory dwelling unit (ADU) is a separate and complete dwelling unit (e.g., kitchen, sleeping area and bathrooms) that is either attached or detached from the primary residential unit on a single-family lot.

✦ California has changed state law to help eliminate barriers to ADU construction, and each local government can adopt these state bills (or not).

<https://www.hcd.ca.gov/policy-and-research/accessory-dwelling-units>

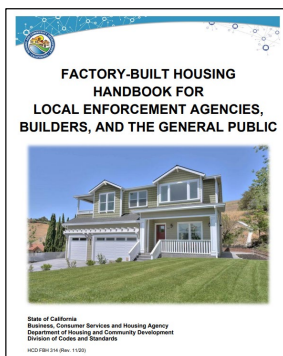
✦ CAL FIRE has provided new guidance for fire sprinkler requirements of ADUs.

<https://osfm.fire.ca.gov/media/q1xg3mu/d/ib-accessory-dwelling-units-final.pdf>



## Factory Built ADUs

Typically considered a New Construction ADU type, these are factory-constructed versions of site built ADUs that are manufactured and then transported to their permanent installation locations.



✦ These are **regulated by the California Department of Housing and Community Development (HCD) under Title 25, which incorporates Title 24** as the applicable building code for design and construction.

✦ These ADUs are **reviewed and approved through HCD Factory-built Housing (FBH) requirements** with the on-site installation and assembly under the jurisdiction of the local authority (typically the local building department).

✦ As these are constructed off-site, **many of the Home Energy Rating System (HERS) are to be performed at the factory.**

California Department of Housing and Community Development

✦ To learn more about ADU laws and requirements, see the California Department of Housing and Community Development (HCD) website.

✦ The HCD maintains the Accessory Dwelling Unit Handbook and other useful information on the HCD website at <https://www.hcd.ca.gov/policy-and-research/accessory-dwelling-units>



## ADU Buildings Can Have Some Challenges



### ✦ Site Issues:

- ✦ Property line limits:
  - ◆ City setbacks
  - ◆ Utility setbacks
- ✦ Property height restrictions
- ✦ Local zoning requirements (e.g., covered parking)
- ✦ Limitations based what already may be built
- ✦ Available utilities (natural gas versus all-electric)

### ✦ Getting everyone involved at the right time:

- ✦ Utilities:
  - ◆ Setback approvals
  - ◆ Natural gas connections



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# ADU Types

## Code Breaker: Accessory Dwelling Units (ADU)

1. ADU Challenges

2. ADU Types

3. Envelope

4. Photovoltaics (PV)

5. Mechanical

6. Next Steps

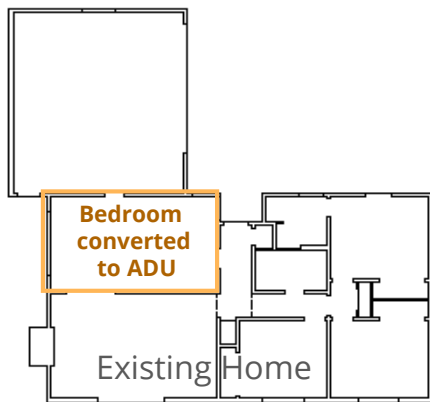
### ✦ ADU Types

- ✦ **Alteration:** Only altered features required to meet Title 24, Part 6 requirements
- ✦ **Addition:** Allowed to meet the requirements associated with additions rather than those for new residential buildings
- ✦ **New Residential Building:** Must meet all the requirements applicable to new buildings

## Classifying ADU Types



### ADU Type Example



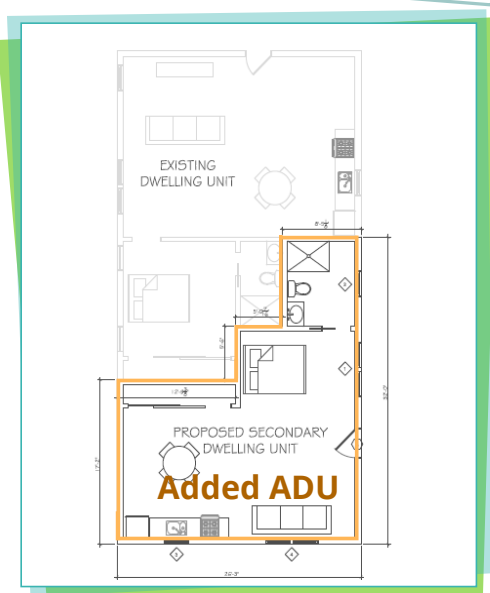
#### Upper Level ADU

*An Existing Bedroom on the Second Floor Converted to an ADU*


### Alteration

- ✦ Existing conditioned space that is altered to become an ADU
  - ◇ Examples:
    - ◇ Converting a living room into an ADU

### ADU Type Example



**Added ADU**

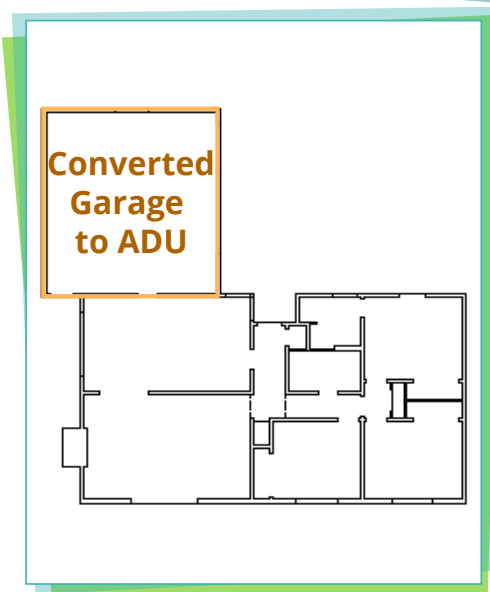


**Attached ADU**  
*A New ADU Added to an Existing Home*


### Addition: Attached

- ✦ Attached to an existing building on the property
  - ◇ Examples:
    - ◆ Converting unconditioned space to a new ADU

### ADU Type Example



**Converted Garage to ADU**

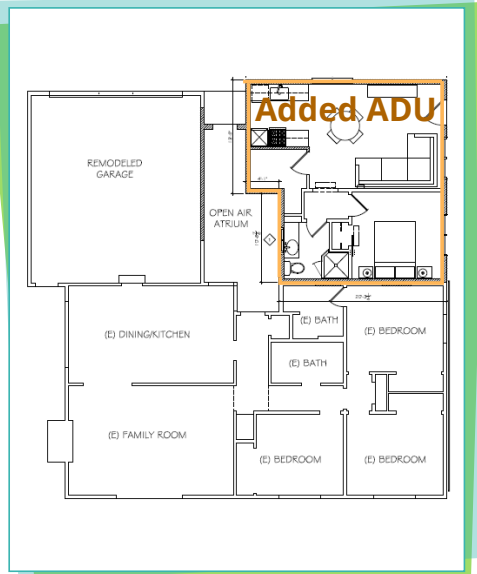


**Garage Conversion ADU**  
*An Existing Unconditioned Space (such as a Garage) Converted to an ADU*

### Addition: Attached

- ✦ Attached to an existing building on the property
  - ◇ Examples:
    - ◆ Converting unconditioned space to a new ADU
    - ◆ Converting an existing attached garage to an ADU

### ADU Type Example



*A New ADU Added to an Existing Home*

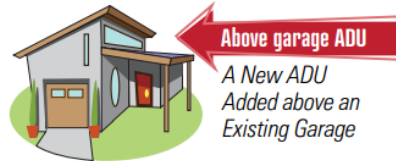
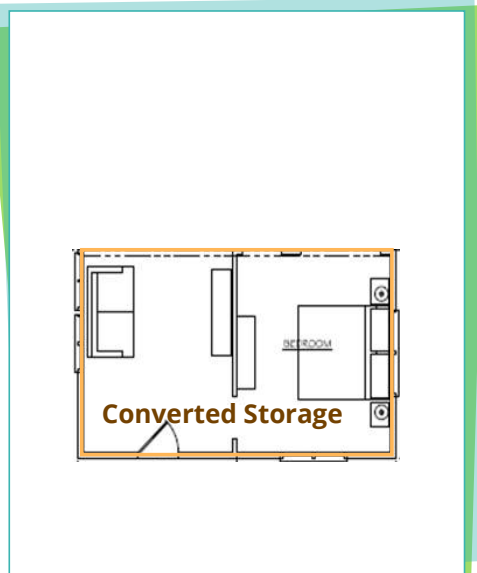
### Addition: Attached

✦ Attached to an existing building on the property

◇ Examples:

- ◇ Converting unconditioned space to a new ADU
- ◇ Converting an existing attached garage to an ADU

### ADU Type Example



*A New ADU Added above an Existing Garage*

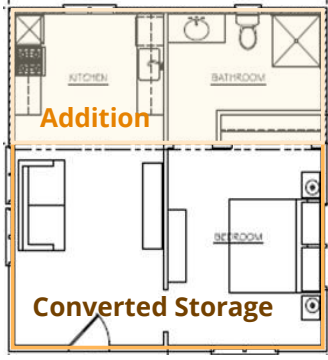
### Addition: Detached


✦ Converted from an existing building on the property

◇ Examples:

- ◇ Converting an unconditioned storage building to a new ADU

### ADU Type Example





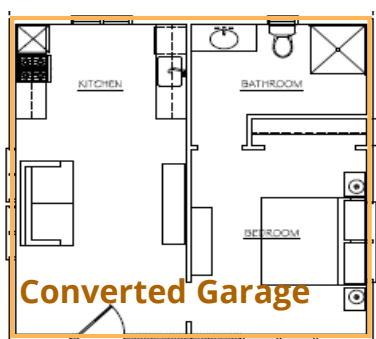
Above garage ADU


*A New ADU  
Added above an  
Existing Garage*

### Addition: Detached

- ✦ Converted from an existing building on the property
  - ◇ Examples:
    - ◆ Converting an unconditioned storage building to a new ADU
    - ◆ Converting unconditioned storage and adding onto it for a new ADU

### ADU Type Example





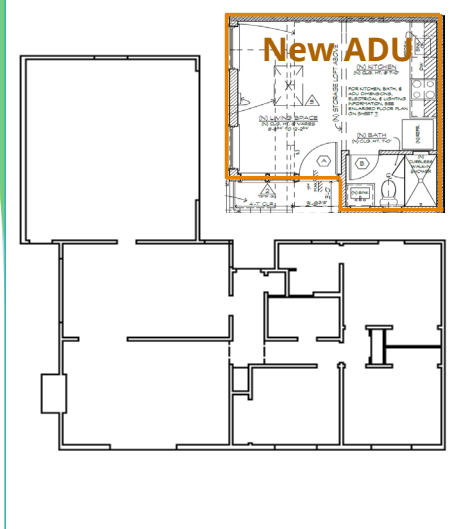
Above garage ADU


*A New ADU  
Added above an  
Existing Garage*

### Addition: Detached

- ✦ Converted from an existing building on the property
  - ◇ Examples:
    - ◆ Converting an unconditioned storage building to a new ADU
    - ◆ Converting unconditioned storage and adding onto it for a new ADU
    - ◆ Converting an existing detached garage to an ADU

### ADU Type Example





**New Residential Building**

- ✦ A detached brand-new building
- ✦ Example:
  - ◆ A new building not attached to any existing building on the property

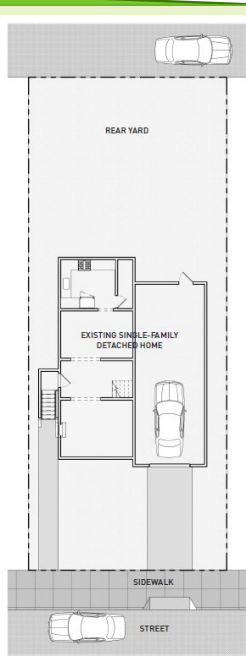
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## Check Your Understanding #1

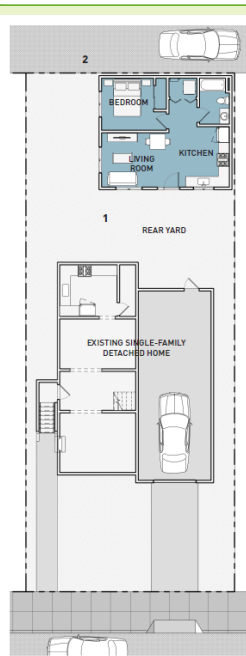
**What do you think?**

- A. Alteration**
- B. Addition**
- C. New Residential Building**

*Images used for "Check your Understandings" are courtesy of San Francisco Planning and Open Scope Studios. THANK YOU!*



Existing Ground Floor Plan



Ground Floor Plan

18

Code Breaker: Accessory Dwelling Units (ADU) — 2022 Energy Code

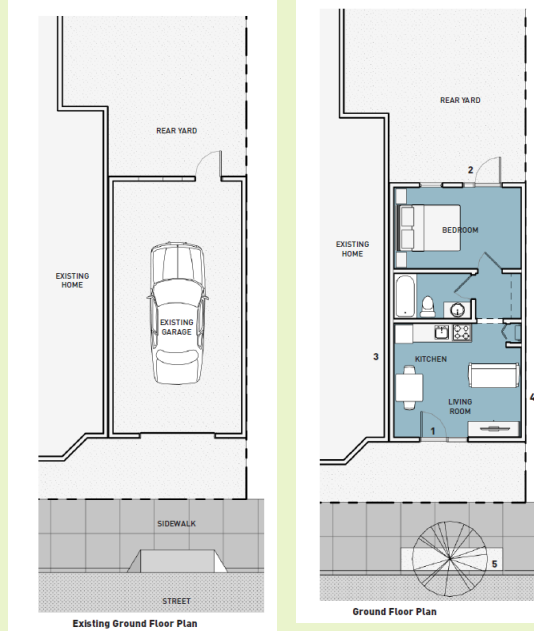


## Check Your Understanding #2

### What do you think?

- A. Alteration
- B. Addition
- C. New Residential Building

*Images used for "Check your Understandings" are courtesy of San Francisco Planning and Open Scope Studios. THANK YOU!*



## Check Your Understanding #3

### What do you think?

- A. Alteration
- B. Addition
- C. New Residential Building

*Images used for "Check your Understandings" are courtesy of San Francisco Planning and Open Scope Studios. THANK YOU!*



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# Envelope Requirements

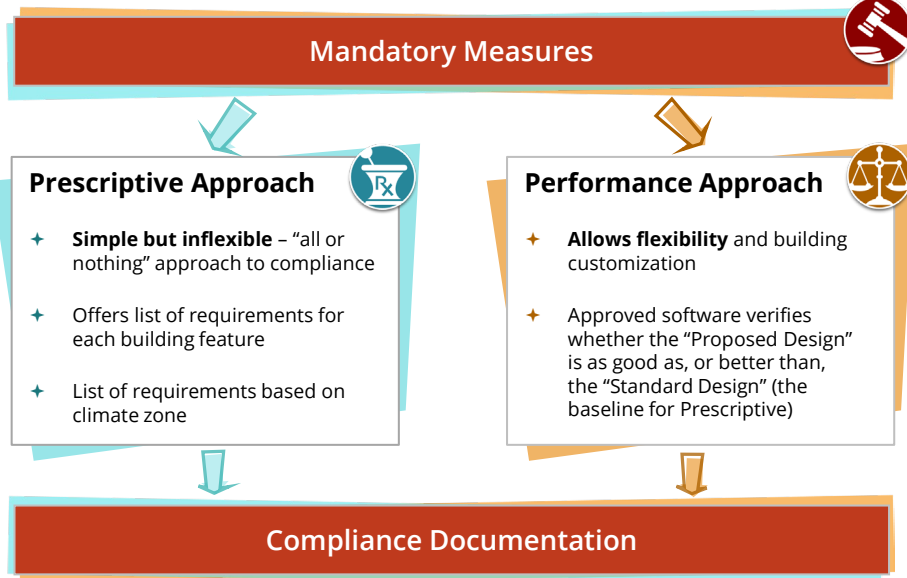
**Code Breaker: Accessory Dwelling Units (ADU)**

- 1. ADU Challenges
- 2. ADU Types
- 3. Envelope Requirements**
- 4. Photovoltaics (PV)
- 5. Mechanical
- 6. Next Steps

- ✦ Envelope Requirements
  - ✧ **Roof**
    - ◆ Alterations
    - ◆ Additions
    - ◆ New Residential Buildings
  - ✧ **Walls**
    - ◆ Converted or Extended
    - ◆ New
  - ✧ **Fenestration**
    - ◆ Efficiency Requirements

# 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

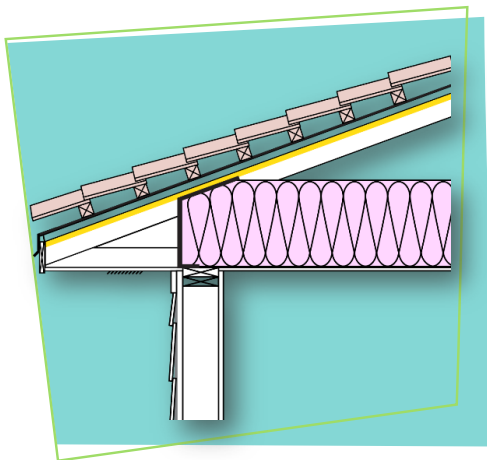
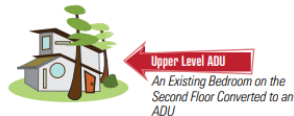


## Roof – Vented Attic



### Alteration ADU Type

These are ADUs that are converting existing permitted conditioned space, such as a family room, to an ADU.



### Alteration ADU

#### Alteration ADU of any size

- + **Insulation (new!):**
  - ◇ CZ 1-4, 6, 8-16:  $\geq R-49$  (exceptions may apply)
  - ◇ CZ 1,3,5,7: Existing  $\geq R-19$  allowed to remain
- + **Air sealing when insulation altered (new!):**
  - ◇ CZ 2,4,8-16
- + **Rated Cool Roof:**
  - ◇ CZ 4, 6-15
- + **Airspace Below Roofing:**
  - ◇ N/A

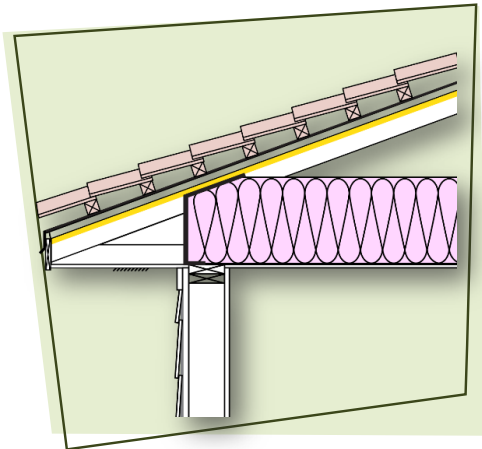
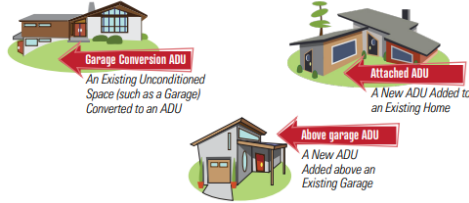


# Roof – Vented Attic



## Addition ADU Type

These are ADUs that are converting an existing space or building that was not habitable space and is considered "newly conditioned space" in the Energy Code or that are adding new conditioned floor area and volume to an existing single-family or multifamily building.



## Addition ADU

### Addition ADU ≤700 ft<sup>2</sup>

- ✦ **Insulation (new!):**
  - ◇ CZ 1-2,4,8-16: ≥R-38 with radiant barrier
  - ◇ CZ 3,5-7: ≥R-30 with radiant barrier
- ✦ **Air sealing of attic ceiling:**
  - ◇ N/A
- ✦ **Rated Cool Roof:**
  - ◇ When addition >300 ft<sup>2</sup> in CZ 10-15
- ✦ **Airspace Below Roofing:**
  - ◇ Required

**Addition ADU >700 ft<sup>2</sup>:** See "New"

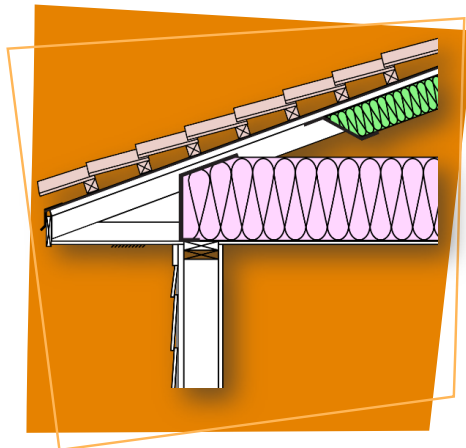


# Roof – Vented Attic



## New Construction ADU Type

These are ADUs that are not being attached to any other structure on the property and are all New Construction.



## "New" ADU & Addition ADUs >700 ft<sup>2</sup>

- ✦ **Insulation (Option B):**
  - ◇ CZ 4, 8-16: Ceiling: ≥R-30 / Roof ≥R-19 (new! Mandatory U-factor ≤ 0.184)
  - ◇ CZ 1-3, 5-7: Ceiling ≥R-38 with radiant barrier / Roof N/A
- ✦ **Air sealing of attic ceiling:**
  - ◇ Required as part of QII
- ✦ **Rated Cool Roof:**
  - ◇ In CZ 10-15
- ✦ **Airspace Below Roofing:**
  - ◇ Required



# Roof – Vented Attic



## Alteration ADU

### Alteration of any size

- ✦ **Insulation (new!):**
  - ◇ CZ 1-4, 6, 8-16:  $\geq R-49$  (exceptions may apply)
  - ◇ CZ 1,3,5,7: Existing  $\geq R-19$  allowed to remain
- ✦ **Air sealing when insulation altered (new!):**
  - ◇ CZ 2,4,8-16
- ✦ **Rated Cool Roof:**
  - ◇ CZ 4, 6-15
- ✦ **Airspace Below Roofing:**
  - ◇ N/A

## Addition ADU

### Additions $\leq 700 \text{ ft}^2$

- ✦ **Insulation (new!):**
  - ◇ CZ 1-2,4,8-16:  $\geq R-38$  with radiant barrier
  - ◇ CZ 3,5-7:  $\geq R-30$  with radiant barrier
- ✦ **Air sealing of attic ceiling:**
  - ◇ N/A
- ✦ **Rated Cool Roof:**
  - ◇ When addition  $> 300 \text{ ft}^2$  in CZ 10-15
- ✦ **Airspace Below Roofing:**
  - ◇ Required

**Additions  $> 700 \text{ ft}^2$ :** See "New"

## "New" ADU

- ✦ **Insulation (Option B):**
  - ◇ CZ 4, 8-16: Ceiling:  $\geq R-30$  / Roof  $\geq R-19$  (**new!** Mandatory U-factor  $\leq 0.184$ )
  - ◇ CZ 1-3, 5-7: Ceiling  $\geq R-38$  with radiant barrier / Roof N/A
- ✦ **Air sealing of attic ceiling:**
  - ◇ Required as part of QII
- ✦ **Rated Cool Roof:**
  - ◇ In CZ 10-15
- ✦ **Airspace Below Roofing:**
  - ◇ Required

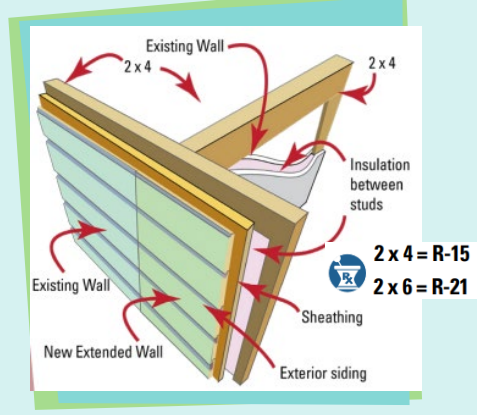


# Wall



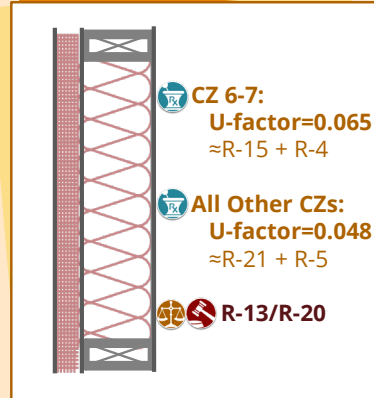
## Addition ADU Only: Extended or Converted Wall

- ✦ Existing wall with existing siding not removed or replaced or
- ✦ New wall extended from existing wall

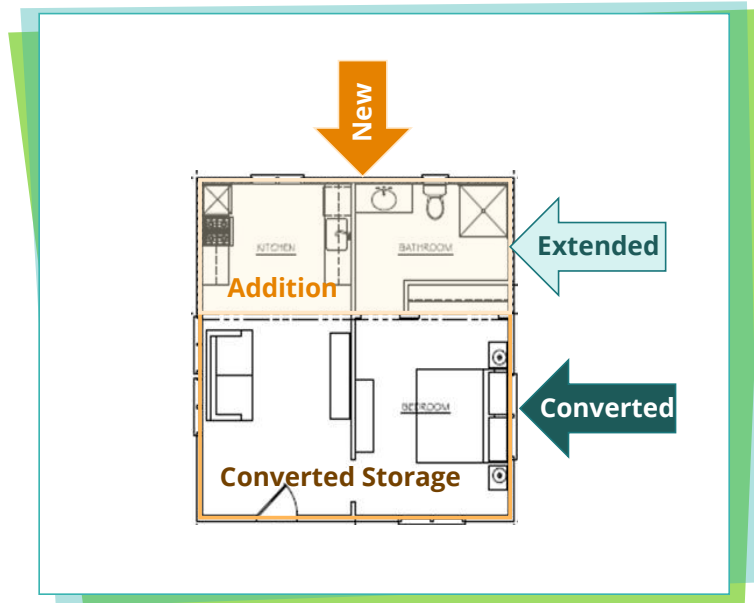


## "New" Wall

- ✦ New wall **not** extended from existing wall for Addition ADUs
- ✦ All exterior walls for "New" ADUs



# Wall



# Fenestration

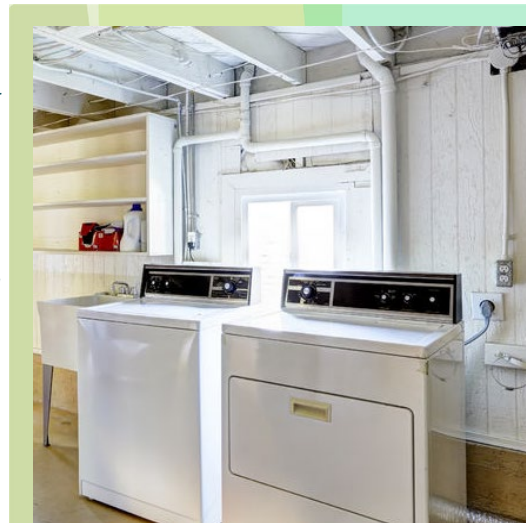
**SHGC = 0.23\***  
*\*excluding CZ 1,3,5,16*  
 NFRC Rated Low-e<sup>3</sup> product

**Window Allowance**

- Alterations and additions will depend on scope of work
- "New": 20% of CFA & 5% of West Facing (excluding CZ 1,3,5,16)

**U-factor = 0.30**  
 NFRC Rated dual-paned nonmetal product

**U-factor = 0.45 (new!)**  
 Allowed with Performance Method



Converting unconditioned space **does not allow** the fenestration associated with the space to be considered "existing"





## Check Your Understanding #4

### What do you think?

Which **two upgrade options** would you use to get the project into compliance?

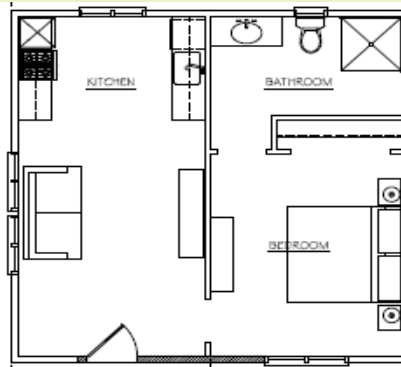
Feature Upgrade Options	Compliance TDV
<b>A. High Performance Attic:</b> R-30 at ceiling + R-19 below roof deck	+8.5
<b>B. Roofing:</b> CRRC Rated "Cool Roof" shingles	+3.5
<b>C. Wall:</b> 2 x 4 wood framed with R-15 + R-4 continuous	+5.5
<b>D. Wall:</b> 2 x 6 wood framed with R-21 batt insulation	+3.5
<b>E. Windows:</b> NFRC triple paned vinyl framed	+2.5

### ADU converted from existing garage in Sacramento (CZ 12):

Standard kTDV/ft<sup>2</sup>-yr: 184.00

Proposed kTDV/ft<sup>2</sup>-yr: 193.00

**Compliance Margin: -9.00**



# Renewables

## Code Breaker: Accessory Dwelling Units (ADU)

- 1. ADU Challenges
- 2. ADU Types
- 3. Envelope
- 4. Renewables**
- 5. Mechanical
- 6. Next Steps



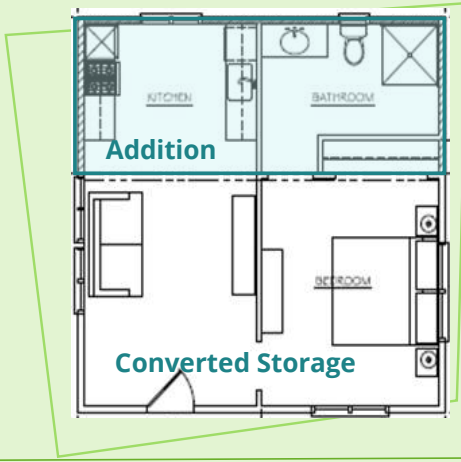
- ✦ Photovoltaics
  - ✧ **Not Required**
    - ◆ Additions and Alterations
  - ✧ **Required**
    - ◆ New Residential Buildings
    - ◆ SARA
- ✦ Battery Ready



# Photovoltaics (PV)

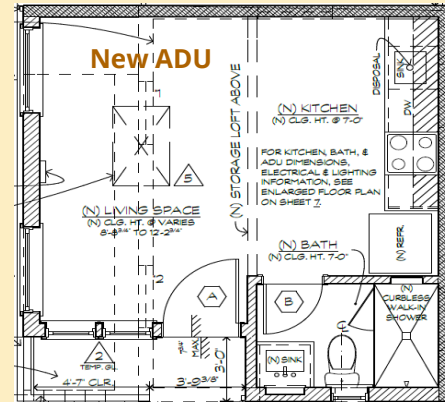
## Not Required

- ✦ Alteration ADU of any size
- ✦ Addition ADU of any size



## Required

- ✦ "New" ADU Residential Buildings



# Solar Access Roof Area (SARA)

§150.1



### ✦ New! 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**

### ✦ Exceptions:

- ✦ Any roof area that has < 70% annual solar access using CEC approved solar access tool
- ✦ 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 Exceptions

§150.1(c)14

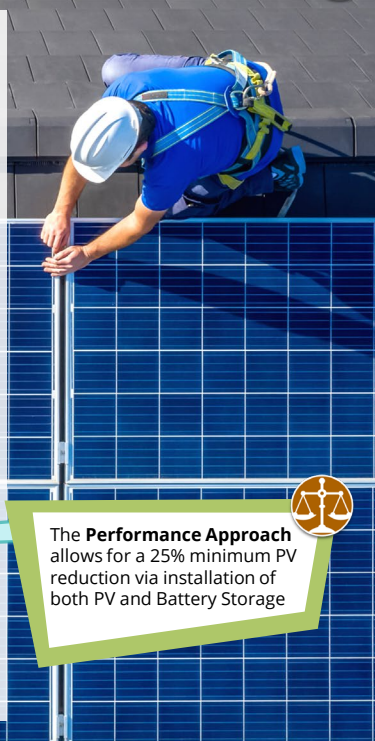


## No PV system is required if:

- ✦ The **SARA is < 80 contiguous square feet**
  - ✧ For steep-slope roofs, SARA shall not consider roof areas with a northerly azimuth that lies between 300 degrees and 90 degrees from true north
- ✦ **New!** The minimum PV system size specified by §150.0(c)14 is **< 1.8 kWdc**
- ✦ 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 building is approved by the local planning department **prior to January 1, 2020** with mandatory conditions for approval

## Required minimum PV system may be reduced by 25% if:

- ✦ Installed in conjunction with a **battery storage system**
  - ✧ Battery storage system shall meet Joint Appendix JA12 qualification requirements and have a minimum **usable capacity of 7.5 kWh**



The **Performance Approach** allows for a 25% minimum PV reduction via installation of both PV and Battery Storage



# Photovoltaics: Design Options




## PV Options

- ✦ **Can** be added to existing PV, but **cannot** use PV kW already installed
- ✦ **Can** be located anywhere on the property
- ✦ **Can** be part of Energy Commission-approved Community Shared Solar System




## Configuring for Battery Ready (new!)

\$150.0(s)




**Mandatory Requirements**

- ✦ **Basic Vision of Energy Code**
  - ✧ All new homes to be **wired to allow** the easy installation of a future whole-house battery supply system
  - ✧ 2022 Energy Code calls this **"Energy Storage Systems (ESS) Ready"**
- ✦ **Main Panel Configuration**
  1. Interconnection equipment with a minimum backed up capacity of 60 amps supplying at least **four circuits**
  2. A dedicated raceway (1" minimum) from the main service to a subpanel supplying at least **four circuits**
    - ✧ Subpanel to be labeled:  
*"Subpanel shall include all backed-up load circuits"*




## Configuring for Battery Ready (cont.)

\$150.0(s)



**Mandatory Requirements**

- ✦ The **four branch circuits** shall feed as a minimum:
  - ✧ Refrigerator
  - ✧ One lighting circuit near the front door
  - ✧ A sleeping room receptacle outlet
  - ✧ Other
- ✦ Main panel must be **minimum 225 amps** busbar rating
- ✦ Sufficient space shall be reserved to allow future installation of a system isolation equipment or transfer switch **within 3 feet** of the main panelboard
- ✦ **Raceways** shall be installed between the panelboard and the system isolation equipment or transfer switch location to allow the connection of backup power source





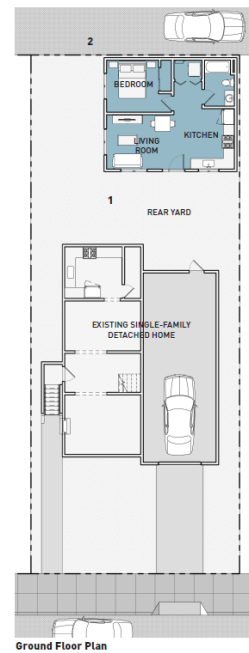
## Check Your Understanding #5

### What do you think?

Will PV be required for this ADU?

- A. Yes (exception may apply)
- B. No

*Images used for "Check your Understandings" are courtesy of San Francisco Planning and Open Scope Studios. THANK YOU!*



## Check Your Understanding #6

### What do you think?

Will PV be required for this ADU?

- A. Yes (exception may apply)
- B. No

*Images used for "Check your Understandings" are courtesy of San Francisco Planning and Open Scope Studios. THANK YOU!*





## Check Your Understanding #7

### What do you think?

**When does the 2022 Energy Code mandate the installation of battery systems?**

- A. Never**
- B. Starting January 1, 2023**
- C. Only if the main panel is 225 amps or greater**



# Mechanical

## Code Breaker: Accessory Dwelling Units (ADU)

- 1. ADU Challenges
- 2. ADU Types
- 3. Envelope
- 4. Photovoltaics (PV)
- 5. Mechanical**
- 6. Next Steps



- ✦ **Mechanical**
  - ✧ **Ventilation**
    - ◆ Kitchen Hood
  - ✧ **Utility Source**
    - ◆ EDR
    - ◆ Space Heating, Cooling, Water Heating
    - ◆ Electric Ready



# Kitchen Hood (new!)

§150.0(o)1G



- ★ **New Kitchen Hood Table 150.0-G**, which is based on:
  - ◇ Home size
  - ◇ Fuel type
- ★ Capture Efficiency (CE) comes from ASTM testing

Dwelling Unit Floor Area (ft <sup>2</sup> )	Hood Over Electric Range	Hood Over Natural Gas Range
> 1500	50% CE or 110 cfm	70% CE or 180 cfm
> 1000 – 1500	50% CE or 110 cfm	80% CE or 250 cfm
750 – 1000	55% CE or 130 cfm	85% CE or 280 cfm
< 750	65% CE or 160 cfm	85% CE or 280 cfm

**Table 150.0-G: Kitchen Range Hood Airflow Rates (cfm) and ASTM E3087 Capture Efficiency (CE) Ratings According to Dwelling Unit Floor Area and Kitchen Range Fuel Type**



# Evolving Building Energy Efficiency Ratings



## For Residential Construction



Energy Code	New Construction	Additions	Alterations
2016	TDV	TDV	TDV
2019	EDRe, EDRt	TDV	TDV
<b>2022</b>	<b>EDRs</b> , EDRe, EDRt	TDV	TDV

New for 2022 s = "source" EDR metric

Enables measure of emissions in some form

### Time Dependent Valuation (TDV):

"TDV Energy" is the time varying energy used by the building to provide space conditioning, water heating and specified building lighting. It accounts for the energy used at the building site and consumed in producing and delivering energy to a site, including, but not limited to, power generation, transmission and distribution losses.

### Energy Design Rating (EDR):

An alternate way to express the energy performance of a home using a scoring system where 100 represents the energy performance of a reference design building meeting the envelope requirements of the 2006 International Energy Conservation Code (IECC). A score of 0 represents the energy consumption of a building that has zero net energy consumption. The lower the score, the better.

### Source Energy Design Rating (EDRs) (new!):

A separate EDR metric based on "hourly source energy," which establishes a "carbon-proxy" analysis of the building in kBtu/sf-yr units to support decarbonization and electrification policy goals.



# EDR as a Compliance Metric (2022)



**Source EDR**  
*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

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

Includes energy used by:

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

**Total EDR**  
*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)



## "New" ADU Prescriptive Requirements for Heat Pumps

**✦ Heat Pump Water Heater (new!)**

Per 150.1(c)8: Heat pump water heater Prescriptively required in all Climate Zones

**OR**

New dwelling units ≤ 500 ft<sup>2</sup> CFA with point of use distribution may have instantaneous electric water heater

New dwellings with ≤1 bedroom may use 120 volt HPWH

Climate Zones 3, 4, 13 & 14: Gas tankless water heaters Prescriptively allowed if the space heating system is a heat pump

Electric resistance with solar system (solar fraction ≥70%)

**✦ Heat Pump HVAC (new!)**

Per 150.1(c)6: Heat pump space heating Prescriptively required in Climate Zones 3, 4, 13 & 14

All other Climate Zones: Either gas or heat pump space heating is allowed Prescriptively

**Additions & Alterations:**  
 Prescriptive heat pump requirements do NOT apply



# New! Minimum Heating & Cooling Efficiencies



## Single-phase Air Source Heat Pumps (Cooling Capacity < 65,000 Btuh)

Configuration	Manufactured BEFORE 1/1/2023		Manufactured AFTER 1/1/2023*	
	HSPF	SEER	HSPF2	SEER2
Packaged	8.0	14.0	6.7	13.4
Split (incl. ductless)	8.2	14.0	7.5	14.3
Space Constrained	7.4	12.0	6.3	11.9
Small Duct High Velocity	7.2	12.0	6.1	12.0

*Note:*

**HSPF/HSPF2** = Heating Season Performance Factor

**SEER/SEER2** = Seasonal Energy Efficiency Ratio

\* Systems **manufactured** after 1/1/2023 must meet the newer HSPF2/SEER2 requirements.  
Cannot use HSPF or SEER.

Adapted from the Code of Federal Regulations, per 10 CFR 430.32(c)



**Heating Seasonal Performance Factor 2 (HSPF2)** is the HSPF metric for residential central heat pumps effective January 1, 2023, as created by the U.S. Department of Energy "ISSUANCE 2016-11-30 Energy Conservation Program: Test Procedures for Central Air Conditioners and Heat Pumps, Final Rule."

**Seasonal Energy Efficiency Ratio 2 (SEER2)** is the SEER metric for residential central air conditioners and heat pumps effective January 1, 2023, as created by the U.S. Department of Energy "ISSUANCE 2016-11-30 Energy Conservation Program: Test Procedures for Central Air Conditioners and Heat Pumps, Final Rule."

**From Appliance Efficiency Regulations:** Space constrained product means a central air conditioner or heat pump: (1) that has a rated cooling capacity no greater than 30,000 Btu/hr; (2) that has an outdoor or indoor unit having at least two overall exterior dimensions or an overall displacement that: (i) are substantially smaller than those of other units that are (A) currently usually installed in site-built single family homes, and (B) of a similar cooling, and, if a heat pump, heating, capacity, and (ii) if increased, would certainly result in a considerable increase in the usual cost of installation or would certainly result in a significant loss in the utility of the product to the consumer; and (3) is a product type that was available for purchase in the United States as of December 1, 2000.



# New! Minimum Heating & Cooling Efficiencies



## Central Air Conditioners (not Heat Pumps) < 65,000 Btuh

Configuration	Rated Cooling Capacity (Btuh)	Installed BEFORE 1/1/2023		Installed AFTER 1/1/2023*	
		SEER	EER	SEER2	EER2
Split System	< 45,000	14.0	12.2	14.3	11.7/9.8**
	≥ 45,000	14.0	11.7	13.8	11.2/9.8**
Single Package	< 65,000	14.0	11.0	13.4	10.6
Space Constrained	< 30,000	12.0***	No min.	11.7***	No min.

**Note:**

**SEER/SEER2** = Seasonal Energy Efficiency Ratio

**EER/EER2** = Energy Efficiency Ratio

\* Systems **installed** after 1/1/2023 must meet the newer SEER2/EER2 requirements, **regardless of date of manufacture**. Cannot use SEER or EER.

\*\* For systems with 15.2 SEER2 or greater, the minimum EER2 requirement is 9.8

\*\*\* Use manufactured date, not install date for space-constrained units

Adapted from the Code of Federal Regulations, per 10 CFR 430.32(c)




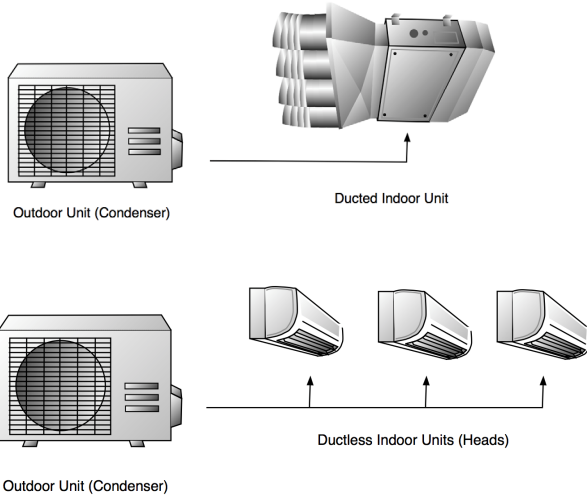
**Seasonal Energy Efficiency Ratio 2 (SEER2)** is the SEER metric for residential central air conditioners and heat pumps effective January 1, 2023, as created by the U.S. Department of Energy "ISSUANCE 2016-11-30 Energy Conservation Program: Test Procedures for Central Air Conditioners and Heat Pumps, Final Rule."

**Energy Efficiency Ratio 2 (EER2)** is the EER metric for residential central air conditioners effective January 1, 2023, as created by the U.S. Department of Energy "ISSUANCE 2016-11-30 Energy Conservation Program: Test Procedures for Central Air Conditioners and Heat Pumps, Final Rule."

# Variable Capacity Heat Pump (VCHP) HERS

## Space Heating

 Heat Pump: Mini-Ductless or Ducted Variable Capacity Heat Pump (VCHP)



### Design Considerations

- ✦ **Location** of the indoor units (heads) and ducts to be *entirely within conditioned space* (thermal envelope)
- ✦ **Airflow to all habitable spaces** either by use of a ductless indoor unit located in the room, or by use of ducts connected directly to the supply air outlet of a ducted indoor unit
- ✦ **Zones >150 ft<sup>2</sup>** to have a wall-mounted thermostat



## Electric Ready (New!)

\$150.0



*"New" and Addition ADUs*

*"New" ADUs only*

### 150.0(n) Water Heaters

Gas or propane water heaters must be installed in or adjacent to a space large enough to accommodate a Heat Pump Water Heater (2.5' x 2.5' x 7')

- ✦ Within 3 ft of water heater with dedicated 125 volt / 20 amp outlet with 120/240 volt 3 conductor branch circuit
- ✦ More than 3 ft 240 volt / 30 amp electrical feed

### 150.0(t) Furnaces

Provide a 240 volt / 30 amp minimum electrical feed to the furnace for future heat pump

### 150.0(u) Cooktops

Include 240 volt / 50 amp minimum feed for future cooktop

### 150.0(v) Dryers

Include 240 volt / 30 amp minimum feed for dryer if the unit has a gas line for a dryer

Each Electric Ready item requires breaker space and labeling in panel





## Check Your Understanding #8

### What do you think?

Which **upgrade options** would you use to get the project into compliance?

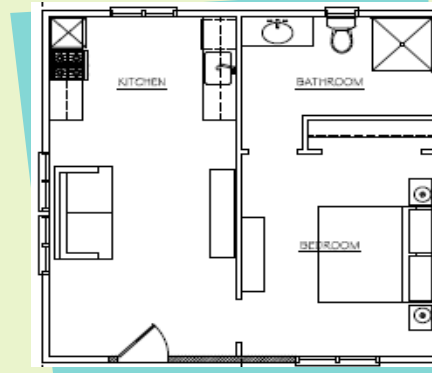
Feature Upgrade Options	Compliance Benefit TDV
<b>A. HVAC:</b> Ductless minisplit + VCHP HERS verification	+29.0
<b>B. HVAC:</b> Heat recovery ventilator	+9.0
<b>C. DHW:</b> Gas tankless condensing water heater	+5.5
<b>D. DHW:</b> Heat pump water heater 50 gal, NEEA Tier III	+11.5

### ADU converted from existing garage in Sacramento (CZ 12):

Standard kTDV/ft<sup>2</sup>-yr: 184.00

Proposed kTDV/ft<sup>2</sup>-yr: 196.00

**Compliance Margin: -12.00**



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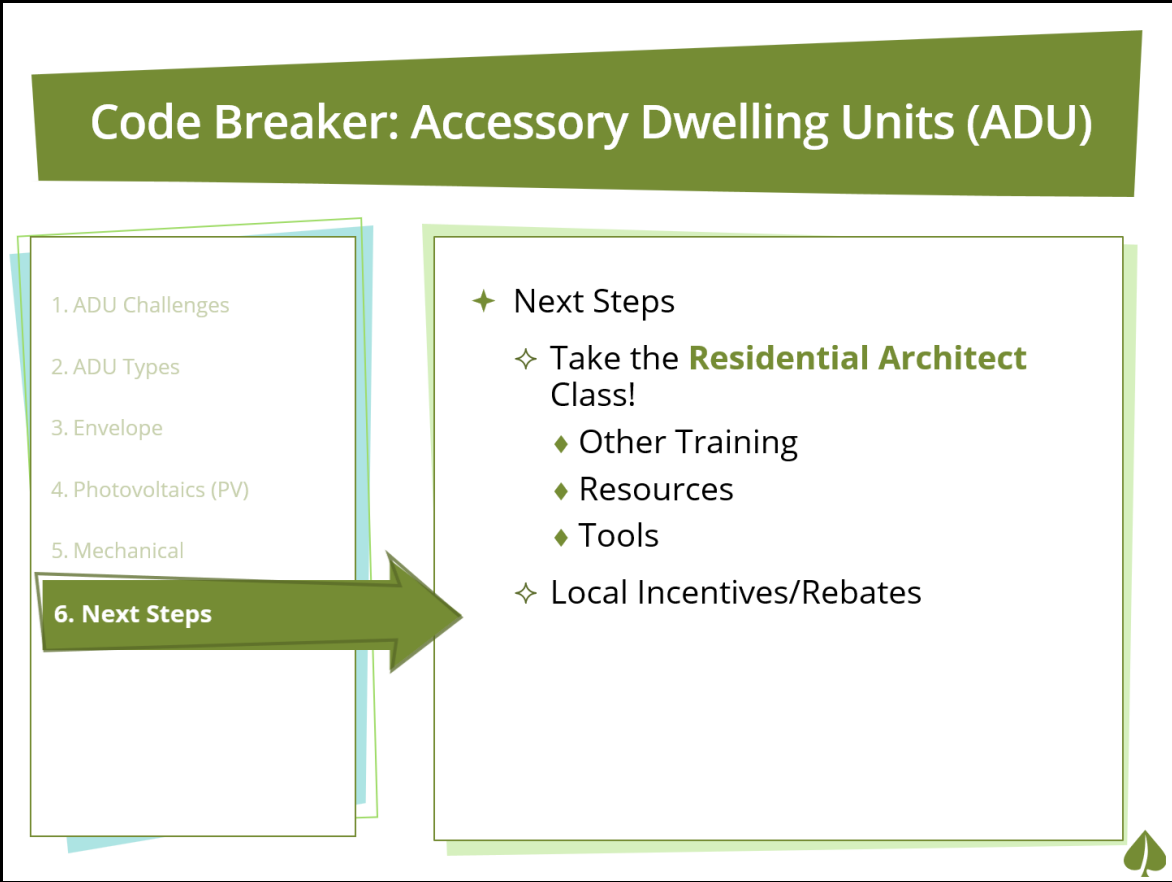
# Next Steps

**Code Breaker: Accessory Dwelling Units (ADU)**

- 1. ADU Challenges
- 2. ADU Types
- 3. Envelope
- 4. Photovoltaics (PV)
- 5. Mechanical
- 6. Next Steps**

✦ Next Steps

- ✦ Take the **Residential Architect Class!**
  - ◆ Other Training
  - ◆ Resources
  - ◆ Tools
- ✦ Local Incentives/Rebates



# Virtual Classes

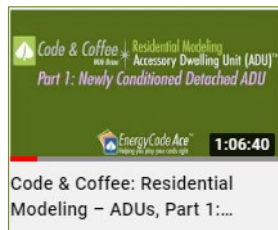
What's New in 2022  
Residential Energy Code  
*Online Live Event*



Single-family Standards  
for Architects & Designers  
*Online Live Event*



Code & Coffee  
*On-Demand*  
YouTube Series



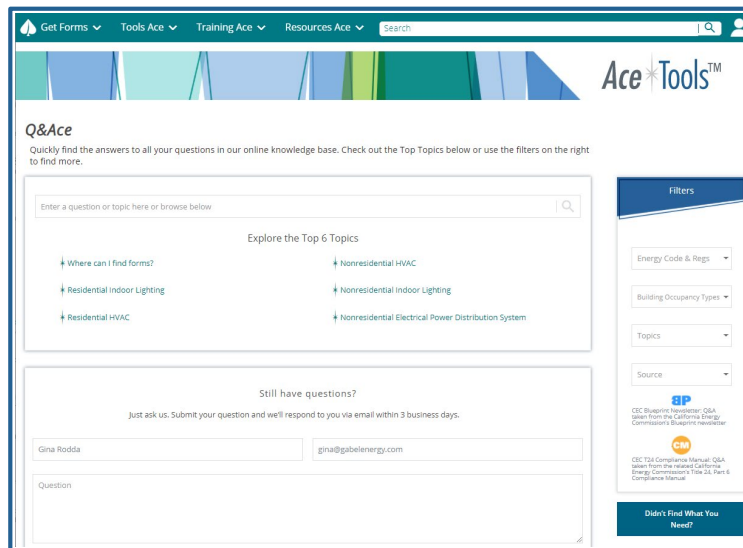
Code & Coffee: Residential  
Modeling – ADUs, Part 1:...



Code & Coffee: Residential  
Modeling – ADUs, Part 2:...



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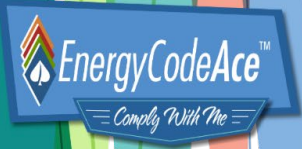
Building Department personnel

Consumer

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# Contacts & Course Evaluation




## Thank you

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

Contact	Role	Email	Phone
Gina Rodda	Instructor	<a href="mailto:gina@gabelenergy.com">gina@gabelenergy.com</a>	
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Energy Code Ace	Multiple	<a href="http://energycodeace.com/content/contact">http://energycodeace.com/content/contact</a>	

**Please complete the Course Evaluation**  
Our Survey Monkey wants to hear from you!



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This concludes the American Institute of  
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Course

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75 - INTERNAL

