Decoding ★ADUs <sup>™</sup> Let's Talk Recent Changes	BUILDING FEATURE	PRESCRIPTIVE 2019 TITLE 24 PART 6	NOTES							
	ADUs that are an Addition Alone, or Existing + Addition									
Conversion of existing	Roof *	≤700 SF: Insulation to meet Mandatory: CZ 2-10=R-30 / CZ1, 11-16=R-38>700 SF: Prescriptive Package A: Option B or C	Example of High Performance Attic (HPA)       Option B Example of Non HPA							
attached space	Walls	Extended Walls: 2 x 4: R-15 2 x 6: R-21 New Walls: Prescriptive Package A	Existing Wall Existing Wall Existing Wall Existing Wall Existing Wall Existing Wall Existing Wall Existing Wall Existing Wall Continuous Insulation Existended Walls associated Walls apply to walls associated with converted space (§150.2(a)1) if the existing siding is to remain, and Any new walls that are "extended" from any existing wall, horizontally or vertically. New Walls: New walls consist of non- extended walls and converted walls with siding being replaced.							
	Floor	Prescriptive Package A	There are no exceptions from Package A for floors of any type.							
Conversion of existing detached space	Fenestration	New Fenestration: §150.2(a)1 Skylights: ≤16 ft <sup>2</sup> U-Factor = 0.55 SHGC = 0.30 **	All glazing in this space are considered " <b>new</b> ", even if it already exists as part of the unconditioned space and must meet mandatory weighted of U-factor = 0.58 in addition to using either the Prescriptive or Performance Approach. Area allowance exceptions are based on square footage of ADU, per the allowances of §150.2(a)1							
DOCUMENTATION:         Prescriptive option:         CF1R-ADD-01-E (HERS required)         must be registered with a         HERS provider website:         https://www.calcerts.com/             New Solid Door:         U-factor = 0.20 (insulated)            HVAC & all         Applicable         HERS         required of any new ADU		New Solid Door: U-factor = 0.20 (insulated) HVAC = Prescriptive Package A IAQ whole building airflow is required of any new ADU	Solid doors now compared to a NFRC Rating 0.20 U-Factor. <i>Not</i> <i>including door between garage and home.</i> Per Mechanical Code, return air cannot be shared with other dwelling units. It is recommended that each dwelling unit have its own thermostat (ability to control their own heating and cooling setpoints)							
https://www.cheers.org/ or	DHW	<b>150.1(c)8</b> (1) Heat pump tank water heater or any number of gas tankless units	One Heat pump NEEA Tier 3 water heater (CZ 1 and 16 have additional prescriptive PV requirements if using heat pump), or any gas tankless unit(s) meeting Federal efficiency minimums							
Performance option: <i>CF1R-PRF-01-E:</i> Addition Alone, E+A or E+A+A	QII	>700 ft² (not required if ≤700 ft²)	QII is prescriptively required even if the addition is a conversion of already existing conditioned space, but there are exceptions to insulated headers and air barrier verifications.							

\* Additions over 300 SF in Climate Zones 10-15 to meet Package A cool roof installation requirements, dependent upon roof slope.

\*\* CZ 1,3,5, 16 have no SHGC requirements, nor west facing limitations on area

Decoding ★ADUs <sup>™</sup> Let's Talk Recent Changes	BUILDING FEATURE	PRESCRIPTIVE 2019 TITLE 24 PART 6	NOTES
		DETACHED NEWLY CON	STRUCTED ADU
	Roof	Any size ADU is subject to Prescriptive Package A.	Prescriptive Option B or C including the provision that attics are to be ventilated, or use the Performance Approach.
Newly constructed building	Walls All walls are considered "new" and are subject to Prescriptive Package A. Framed: CZ1-5, 8-16: U-factor 0.048 CZ 6-7: U-factor 0.065		Gypsum Wall Board Wood Studs @ 16" o/c R-21 Fiberglass Insulation Plywood Studs @ 16" o/c R-4 Rigid Insulation Stucco Siding
			Example of High Performance Wall = U-factor of 0.051
	Floor	Prescriptive Package A	Raised floor = R-19; Heated Slabs = R-5 slab edge insulation
<b>DOCUMENTATION:</b> Prescriptive option:	Fenestration	All Fenestration is New: Prescriptive Package A Skylights: ≤16 ft <sup>2</sup> U-Factor = 0.55 SHGC = 0.30 **	Must meet mandatory weighted of U-factor = 0.58, in addition to using either the Prescriptive (U-factor = 0.30 and SHGC = $0.23^{**}$ ) or use the Performance Approach. Area allowance 20% of conditioned floor area, 5% west facing limitation ** per §150 1(c)3
<u>CF1R-NCB-01-E</u> (HERS required) must be registered with a	Solid Doors	Solid Door: U-factor= 0.20	Solid doors now compared to a NFRC Rating 0.20 U-Factor. <i>Not including door between garage and home.</i>
HERS provider website: https://www.calcerts.com/ https://www.cheers.org/	HVAC & all Applicable HERS	<b>HVAC</b> = Prescriptive Package A <b>IAQ</b> whole building airflow is required of any new ADU	All applicable HERS measures will apply: Duct testing; refrigerant charge; airflow and fan watt draw; IAQ including MERV-13 filters; kitchen hood; whole house fan.
or Performance option: <i>CF1R-PRF-01-E</i> using	DHW	Prescriptive Package A §150.1(c)8	If recirculation pumps are desired for any type of ADU, Demand Recirculation Systems with manual control pumps per RA4.4 shall be used or use the Performance Approach for control options.
Energy Comission approved software	QII	Prescriptive Package A <u>§150.1(c)1e</u>	QII required as outlined in Reference Appendix RA3.5
	PV	Prescriptive Package A §150.1(c)14	As determined by Equation 150.1-C: kWPV = (CFA x A)/1000 +(NDwell x B)

\* Additions over 300 SF in Climate Zones 10-15 to meet Package A cool roof installation requirements, dependent upon roof slope.



# Accessory Dwelling Units (ADU): Let's Talk Challenges & the 2019 Code

Gina Rodda Gabel Energy <u>gina@gabelenergy.com</u>

Date: March 2020

Handout: <u>http://21elements.com/documents-</u> mainmenu-3/second-units/1062-title-24-andadus/file





This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.

Comply With Me

Learn how to comply with California's building and appliance energy efficiency standards **www.EnergyCodeAce.com** offers **No-Cost** Tools I Training Resources to help you decode Title 24, Part 6 and Title 20





Pacific Gas and Electric Company

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



# ADUs: Challenges & the 2019 Code



- Review examples of different ADU types and how they may be classified, and modeled;
- Explore challenges ADUs face with possible options for compliance including considering Reach Codes;
- Understand how the 2019 code affects ADU compliance that may impact design, planning and construction.



City of Berkeley Planning & Development Department

#### **Building Electrification: Requirements for New Construction**

	Natural Gas Prohibition	Re (local amendme	ach Code ents to the Energy Code)	Electric Vehicle (EV) Charging Requirements (local amendments to CALGreen)	
Occupancy Type	Covers newly constructed buildings with Land Use	Covers newly Building Permit after	constructed buildings with applications submitted on or January I, 2020		
	Permit applications submitted on or after January 1, 2020	All-Electric Building Requirements	Mixed Fuel Building Requirements		
Single family, detached Accessory Dwelling Unit (ADU), two-family dwellings, and townhomes	Natural gas prohibited <sup>1</sup>	All-electric, solar PV <sup>3</sup>	10 Total EDR compliance margin <sup>4</sup> , solar PV <sup>3</sup> , electric ready <sup>5</sup>	One EV Charger Ready <sup>6</sup> space per dwelling unit with on-site parking	
Low-rise multifamily (3 stories or less)	Natural gas prohibited <sup>1</sup>	All-electric, solar PV <sup>3</sup>	10 Total EDR compliance margin <sup>4</sup> , solar PV <sup>3</sup> , electric ready <sup>5</sup>	20% EV Charger Ready <sup>6</sup> , 80% "EV Spaces Raceway Equipped <sup>"7</sup>	
High-rise multifamily (4 stories or more)	Natural gas prohibited <sup>1</sup>	All-electric, solar PV	10% compliance margin <sup>4</sup> , solar PV, electric ready <sup>5</sup>	20% EV Charger Ready <sup>6</sup> , 80% "EV Spaces Raceway Equipped <sup>"7</sup>	
Hotel/Motel	Natural gas prohibited <sup>1</sup>	All-electric, solar PV	10% compliance margin <sup>4</sup> , solar PV, electric ready <sup>5</sup>	10% EVCS installed, 40% "EV Spaces Raceway Equipped" <sup>7</sup>	
Other Nonresidential <sup>2</sup>	Natural gas prohibited <sup>1</sup>	All-electric, solar PV	10% compliance margin <sup>4</sup> , solar PV, electric ready <sup>5</sup>	10% EVCS installed <sup>8</sup> , 40% "EV Spaces Raceway Equipped" <sup>7</sup>	

<sup>1</sup> Limited exceptions to Natural Gas Prohibition as described in BMC Sections 12.80.040 and 12.80.050.

<sup>2</sup> Newly constructed mixed-fuel buildings occupied for laboratory, industrial, or manufacturing uses are exempt from the 10% compliance margin of the Reach Code

<sup>3</sup> Required by the 2019 California Energy Code Section 150.1(c)14

<sup>4</sup> If a certified energy analyst prepares the Certificate of Compliance, the design receives a credit towards the compliance margin; additional prescriptive measures can be substituted in place of the compliance margin

<sup>5</sup> Must provide electrical panel space, conductors or raceways, and bus bar capacity to support future electrification of natural gas appliances

<sup>6</sup> An "EV Charger Ready" space is a parking space equipped with raceway, wiring, and power to support a future Level 2 EV charging station

7 An "EV Spaces Raceway Equipped" space is a parking space equipped with a raceway between an enclosed, inaccessible, or concealed area and an electrical service panel/subpanel

<sup>8</sup> When 10 or more parking spaces are constructed

# CALIFORNIA'S 2019 RESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

CALIFORNIA ENERGY COMMISSION

The state's energy efficiency standards for new buildings and appliances have saved consumers billions in lower electricity and natural gas bills. The 2019 Building Energy Efficiency Standards for residential buildings includes a first-in-the-nation requirement to install solar photovoltaic systems. Other features enable homes to reduce the electricity demand from the grid, helping to reduce energy bills and the carbon footprint.



# 52% more stringent



#### SOLAR PHOTOVOLTAIC SYSTEM

Promote installing solar photovoltaic systems in newly constructed residential buildings. The systems include smart inverters with optional battery storage. This will increase the self-utilization of the electricity generated to power the home's electricity loads including plug-in appliances. California is the first state in the nation to require smart systems on homes.



Encourage battery storage and heat pump water heaters that shift the energy use of the house from peak periods to off-peak periods. Utilities moving to time-of-use pricing assists the grid to meet the state's climate change goals and helps homes reduce energy bills.



#### HEALTHY INDOOR AIR QUALITY

Enable using highly efficient filters that trap hazardous particulates from both outdoor air and cooking and improve kitchen ventilation systems. Moving air around and in and out of the home while filtering out allergens and other particles makes the home healthier.



Strengthen insulation in attics, walls and windows to improve comfort and energy savings. Keeping the heat out during the summer and warm air during the winter makes a home more resilient to climate change.



Helps you navigate the Standards using key word search capabilities, hyperlinked tables and related sections



EnergyCodeAce.com/tools







# What's an ADU?



California Department of Housing and Community Development Where Foundations Begin

Accessory Dwelling Unit Memorandum December 2016

http://www.hcd.ca.gov/policyresearch/docs/17Jan30-ADU-TA-Memo.pdf

- Often called an "in-law apartment" or "garage flat", accessory dwelling units are 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 law has changed to help eliminate barriers to ADU construction that are adopted by EACH local government (or not):
  - ♦ SB 1069
  - ♦ AB 2299
  - ♦ AB 2406
  - ♦ AB 2044 (not voted upon yet)
  - ♦ And more being added almost daily ☺





- + Glazing percent may be high
- Not all mechanical options are practical
  - Space for mechanical equipment
  - ♦ No gas at ADU
- Site Issues:
  - ♦ Property line limits
  - Property height restrictions
  - Limitations based what may be already built
- Owners want what they want
   MONEY







### Hot/Cold Climate Zones



### **Mild Climate Zones**





- A. Attached conversion of unconditioned space to ADU
- B. Attached new construction of ADU
- C. Detached conversion of unconditioned space to ADU
- D. Detached new construction of ADU



# Classifying ADUs as Additions or New Construction



**Photo Courtesy of:** Dr. Karen Chapple, UC Berkeley

# ADU = "Accessory Dwelling Unit"

- Treated either as New Construction or an Addition based on whether it's attached or detached, and whether it's a conversion from existing space
- All Newly Constructed dwellings (Addition or New) must meet IAQ ventilation requirements



REPLACE WITH COURSE TITLE



### Addition Alone, E+A or E+A+A New Building





#### Type D = PROVIDE STREET TREE PROTECTION PER DETAIL 16-11/2 1/1.1 & PLAN CHECK NOTE 1-HOUR RATED ASSEMBLY AT EXTERIOR WALL #14. SHEET 1.2 REMOVE & RELOCATE (E) FENCE (E) 1-6" REAR YARD (SOUTH) PROPERTY LINE = = N51'07 W = 50.00 SETBACK -----DEMO (E) SHED - (N) FENCE (6'-0" H. MAX.) (N) D.S. DEMO (E) GARAGE -1 1 REMOVE (E) 14 REDWOOD Sel l TREE 23 E (N) KITCHEN AT EXTERIOR W DFT OF N HIV Г g (E) REDWOOD XH 8 FOR KITCHEN, BATH, & Z TREE TO REMAIN ADU DIMENSIONS, ELECTRICAL & LIGHT (N) GAS FIRED INFORMATION, SEE WALL-HEATER ENLARGED FLOOR PLA ON SHEET 7. (N) LIVING SPACE (N) SKYLT. (N) BATH (E) DECK $(\Delta)$ (B) (N) RETAINING WALL =3/4 (N) OPEN BIKE 1 TO 2 (E) 1-23/8" SIDE STORAGE SPACE N) SIN (NO ROOF, NOT YARD (EAST) 000 ENCLOSED) SETBACK (N) STAR NOTE: SEE LOFT (N) TWH GUARDRAL NHB. PLAN AT LEFT (N D.S. W/ HANDRAL TEMP.GL NOS FOR EXTERIOR (E) 3-0 × 5-0 WD-DG CSMT (E) 3'-0' × 5-0" OBSC G DIMENSIONS WD-DG CSMT (E) 9-53/4 CLR. (E)

(E) BEDROOM #1 (E) CLG. HT. 8'-89/4'



# ADU: Addition Alone or E+A or E+A+A

# Let's Explore







## **Attached Converted ADU**

- Existing unconditioned space associated with single family home, such as:
  - ♦ Garage

Basement

# **Allowances:**

#### **Building Features**

- Walls are considered "extended" not "new".
- Prescriptive glazing allowance based on size.
- Possible QII exemption based on size (under 700 ft<sup>2</sup>)





# What IS that?: Type B



# **Attached Newly Constructed ADU**

- New conditioned space added to an existing home with walls attached for the new dwelling unit, such as:
  - Adding to the back of a home;

## **Allowances:**

#### **Building Features**

- Walls are considered "extended" not "new".
- Prescriptive glazing allowance based on size.
- Possible QII exemption based on size (under 700 ft<sup>2</sup>)



# What IS that? Type C



## Detached Converted Unconditioned Space to ADU

- Existing unconditioned space not connected to existing single family home, such as:
  - Detached Garage;
  - ♦ Illegal Unit.





# Building Features: Roof 2019

Can meet the prescriptive requirements of "additions" §150.2(a)1; or

Can use the performance approach as "addition" alone or E+A or E+A+A.

Insulation:

≤700 ft<sup>2</sup>: CZ 2-10=R-30 /CZ1, 11-16=R-38

>700 ft<sup>2</sup>: Package A

Roof

Cool roof:

Roof >300 ft<sup>2</sup> in CZ 10-15 for steep sloped roofs >2:12 / CZ

13 & 15 for low sloped ≤2:12

**Radiant barrier:** 

>700 ft<sup>2</sup>: Package A: CZ 2-15, when vented attic construction and no below roof deck insulation







# **Option B**

- Below the roof deck insulation: R-19 (was R-18)
  - ♦ Not required: CZ1-3, 5-7
- Ceiling Insulation in vented attic:
  - ♦ CZ 3, 5-7: R-30
  - ♦ All Others: R-38
- Airspace required (was an option)
- Radiant barrier in CZ with no below roof desk insulation (CZ1-3, 5-7)

Option C (ducts in conditioned space) still a prescriptive option

# Building Features: Walls 2019







Mandatory Minimum  $2 \times 4 = U$ -factor of 0.102 (R-13)  $2 \times 6 = U$ -factor of 0.071 (R-20) (was R-19) Prescriptive: CZ 6-7 U-factor: 0.065 (2 x 4 with R-15 + R-4) No change Prescriptive: All Other CZ's U-factor: 0.048 (was 0.051) □ 2 x 6 with R-21(*was R-19*) + R-5 (1") or 2 x 6 with R-19 + R-7 (1-1/2") (was 1") or 2 x 4 with R-15 (was R-13) + R-10 (2") or 2?

# Extended Walls 2019



PROPOSED FLOOR PLAN 1/4"= 1'-0"



**Fenestration** 

 Can meet the prescriptive requirements of "additions" §150.2(a)1; or

Can use the performance approach as "addition" alone or E+A or E+A+A.

		R				Rx
Additions	Mandatory	Additions <u>&lt;</u> 4	00 ft <sup>2</sup>	Additions > 400 ft² and <u>&lt;</u> 700 ft²	Additions > 700 ft <sup>2</sup> and <u>&lt;</u> 1,000 ft <sup>2</sup>	Additions > 1,000 ft <sup>2</sup>
Total Glazing Area:	N/A	Up to 75 ft <sup>2</sup> or <b>30%</b> of Conditioned Floor Area, whichever is greater		Up to 120 ft <sup>2</sup> or <b>25%</b>	Up to 175 ft <sup>2</sup> or <b>20%</b>	Same as "new"
West-Facing: CZ's 2, 4, 6-16	N/A	Up to 60 ft <sup>2</sup>			The greater of 70 ft <sup>2</sup> or <b>5%</b>	construction
U-Factor & SHGC:	Weighted <u>U-Factor</u>	Skylights:	≤16 ft <sup>2</sup> >16 ft <sup>2</sup>	U = 0.55  and SH U = 0.30  and SH	GC = 0.30 GC = 0.23 GC = 0.22 (C7.2, 4.8, 6.1)	5)
	<u>&lt;</u> 0.50	vertical:		0 = 0.30 and SHC	50 = 0.23 (02 2, 4 & 6-1)	ວ)

Glass Doors: A door that has 25% or more glazing







- Maximum U-Factor = 0.30 (was 0.32)
- Maximum SHGC = 0.23 (was 0.25)
  - No requirement in Zones 1,3,5 &16 (CZ 16 is a new exception)
    - Zone 16 is now treated like the other heating climate zones, not like the cooling climate zones (encourages passive design)





- Subject to a maximum NFRC rated U-Factor requirement of 0.20
  - ♦ Basically an R-5 insulated door.
- Same in all Climate Zones
- Includes doors to outside and to unconditioned spaces
  - Does not apply to doors from house to garage.
- Doors with 25% or more glass now treated as fenestration (windows). (was 50%)

150.1(c)5

# But....Its Existing?!? Right?



## **Old Windows**

- Converting unconditioned space does not allow the fenestration associated with the space to be considered "existing".
- They must be considered "new" and be shown to meet the mandatory and prescriptive requirements of the Energy Code.



# Building Features: Mechanical 2019

HVAC/IAQ/DHW

Can meet the prescriptive requirements of "additions" §150.2(a)1; or

Can use the performance approach as "addition" alone or E+A or E+A+A.

 + HVAC: Cannot share return air with other dwelling units (Mechanical Code requirement 311.4).

 It is recommended that each dwelling unit have its own thermostat (ability to control their own heating and cooling setpoints).

 IAQ: All additional dwelling units shall meet ALL of ASHRAE Standard 62.2

♦ Kitchen Hoods will need to be HERS verified

 DHW: A gas tankless water heater meeting §150.1(c)8, can be installed to serve ADU, or (1) tank heat pump NEEA 3 water heater (some additional requirements in CZ1 & 16)





#### **New Construction & Alterations**

## Minimum 2" MERV-13 Filter

- 4 1" filter is allowed if sized according to Equation 150.0-A
- Filter not required if 10 feet or less of ductwork

#### Alterations

- When all new ducting
- When all new ducting and new air handler

# Single-family IAQ Fans





2019 Energy Code requires use of an updated formula to determine the minimum ventilation rate:

- Total Required Ventilation Rate (Equation 150.0-B)
  - $Q_{tot} = 0.03 \times A_{floor} + 7.5 \times (N_{br} + 1)$ 
    - **Q**<sub>tot</sub> = Total required ventilation rate, cfm
    - A<sub>floor</sub> = Dwelling-unit floor area, ft<sup>2</sup>
    - *N<sub>br</sub>* = Number of bedrooms (not to be less than 1)

So, the 2019 rate is **almost double** that of 2016.

#### **NEW** Applies to

Additions >1,000 ft<sup>2</sup> AND when a new dwelling unit is added to an existing Residential building (i.e. ADU)



§150.0(o)2B





Range hoods (single family and low-rise multifamily) must be **HERS inspected** in the field to verify **HVI certified** for:

- Minimum ventilation airflow rate per ASHRAE 62.2 (100 cfm for typical kitchen layouts)
- Maximum sound ratings per ASHRAE
   62.2 (3.0 sones)

Other airflow options are provided in ASHRAE 62.2 for continuous ventilation





CALIFORNIA

**5%** cooling / **12%** heating energy savings over minimum efficiency



Mini and multi-split VCHP systems with ductless indoor units

- Ducted mini and multi split VCHP systems CEC certified low-static indoor units
  - 50 W/ton continuous fan energy assumed for ducted VCHP systems unless manufacturer certifies the fan does not operate continuously in the factory default control configuration in which there is an additional compliance credit available.

# Installation Requirements



Coming Soon

- Each habitable room must be directly served by ducted air handler or ductless head – Transfer fans do not meet this requirement
  - HABITABLE SPACE is space in a building for living, sleeping, eating or cooking, excluding bathrooms, toilets, hallways, storage areas, closets, utility rooms and similar areas.
- All ducts and indoor units (ducted or ductless) must be located entirely in conditioned space
  - Compliance credit for ducts in conditioned space
- Wall mount thermostat required in each zone>150 ft<sup>2</sup>
- Verified by HERS rater



# ADU: New Construction

# Let's Explore







# **Detached Newly Constructed ADU**

 Building a new building detached from the existing home for an ADU.

This is treated like a new single family home by the Energy Code.





Performance: Building Energy Efficiency RatingsFor Low-rise Residential ConstructionImage: CodeNew ConstructionAdditionsAlterations2016TDVTDV2019EDR \*NEWTDVTDVTDV



The Proposed Design's overall TDV energy usage (called **"Total EDR"**) is found along this range. The lower the EDR index score, the better.



## Energy Design Rating (EDR) index scores help compare any project to any other project

The **lower** the EDR index score,

the more energy-efficient the home

## Your score

A score of **"100"** represents the energy consumption of a building built to the specs of the **2006 IECC** (International Energy Conservation Code)

A score of **"0"** represents the energy consumption of a building that is **energy neutral** 

**VERY** inefficient

building

100

Neutral

home

# EDR as a Compliance Metric



### The building's energy use is measured via two EDR scores:



The building complies when 2 conditions are met:

 Proposed EDR ≤ Standard EDR for Building Efficiency 
 AND
 Building Efficiency EDR - PV + Flexibility EDR = Total EDR 
 "Total EDR" represents the overall TDV energy usage as a score

# Finding EDR, PV & Battery on the CF1R

	CERTIFICATE OF CO Project Name: Wa Calculation Descri	OMPLIANCE Ilker Residence Iption: Title 24 Ana	lysis			Calculation Date Input File Name	e <b>/Time:</b> 20 :: Walker Re	19-07-24T esidence 2	17:49:21 019 GR v	-07:00 1.ribd19		CF1R-PRF-01 (Page 2 of 11
able	ENERGY DESIGN RAT	TING		I								
					Energy De	sign Ratings				Compliance	Margins	
				Efficiency <sup>1</sup> (E	DR)	Total <sup>2</sup> (E	DR)	I	Efficiency <sup>1</sup>	(EDR)	Total <sup>2</sup>	(EDR)
		Standard Design		51.5		25.9						
		Proposed Design		48.2		18.3			3.3		7.0	5
					RESULT: <sup>3</sup>					·		
ing	Standard Desi     PV kWh output	ign PV Capacity: 2.54 ut exceeds proposed	kW electric use by 2.3% whi	ich may violate NEM	rules. Conta	act your utility.						
arv	•				ENERGY US	E SUMMARY						
le	Ene	rgy Use (kTDV/ft <sup>2</sup> -yr	)	Standard Design		Proposed	Design		Complia	ince Margin	Percent II	nprovement
		Space Heating		8.8		7.9	9			D.81		9.2
		IAQ Ventilation		2.94		21.4	4			0		0
		Water Heating		16.91		14.5	8		:	2.33	1	L3.8
	Se	elf Utilization Credit		n/a		0				0		n/a
	Con	npliance Energy Tota	1	55.1		46.9	4			8.16	1	14.8
ble 🛛	REQUIRED PV SYSTE	EMS	1	1							1	1
	01	02	03	04		05	06	07	08	09	10	11
	DC System Size (kWdc)	Exception	Module Type	Array Type	Po	wer Electronics	CFI	Azimuth (deg)	Tilt Input	Array Angle (deg)	Tilt: (x in 12)	Inverter Eff. (%)
	3	NA	Standard	Fixed (open rack)		none	true	n/a	n/a	n/a	n/a	96

#### 40

# Building Features: Roof -2019

+ Package A

Roof

♦ Option B or C or

Performance approach

**Insulation:** 

High Performance Roof Option B

CZ 4, 8-16: R-19 below root deck (was R-18)

R-30 or R-38 at ceiling depending on CZ Option C: All ducts in directly conditioned space

Cool roof:

Roof >300 ft<sup>2</sup> in

CZ 10-15 for steep sloped roofs >2:12

CZ 13 & 15 for low sloped ≤2:12

#### **Radiant barrier:**

>700 ft<sup>2</sup>: Package A: CZ 2-15, when vented attic construction and no below roof deck insulation







# Building Features: Fenestration 2019

#### ✦Package A

Fenestration

20% window area / 5% west facing (if applicable)

♦ U-factor 0.30 (was 0.32)/ SHGC 0.23 (was 0.25)

# Doors



### 2016 Code

Doors that are 50% glazed or more count as a glazed opening.

### **Default Table 110.6-B**

- Worst values available, used for non NFRC tested products
- Can only be used in performance approach.

### **NA6 COG formula**

- Less than 250 ft<sup>2</sup> or 5% of CFA for site built fenestration.
- Can only be used in performance approach.



- 2019 Code
  - Doors that are
    - **25%** glazed or more count as a glazed opening.

## **NFRC Tested and Labeled**

 Traditional is required for residential windows, NOT simulated



# Building Features: Mechanical 2019

#### ✦Package A

#### IAQ whole house ventilation airflow HERS verified

All other Package A requirements



HVAC/IAQ/DHW

# But..I don't want gas

- High Efficiency heat pump water heater now allowed without a penalty for (1) tank if NEEA 3
- Mini-Split Heat Pump system will be (coming in April 2020) modeled with better than minimum efficiency and take credit for ductless configurations
  - HERS verified for specific design and installation requirements



✦Pack	kage A
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 $\diamond PV$ 

Renewables

Climate Zone	A - CFA	B - Dwelling Units
1	0.793	1.27
2	0.621	1.22
3	0.628	1.12
4	0.586	1.21
5	0.585	1.06
6	0.594	1.23
7	0.572	1.15
8	0.586	1.37
9	0.631	1.36
10	0.627	1.41
11	0.836	1.44
12	0.613	1.40
13	0.894	1.51
14	0.741	1.26
15	1.56	1.47
16	0.59	1.22

E	Batter	y optior	ו to	o tra	de (		kWh	min.	or
C	ther	buildinc	ı ef	fici	ency	feat	ures		
5			,		<u> </u>				

- Photovoltaic Requirements. All lowrise residential buildings shall have a photovoltaic (PV) system meeting:
- Minimum qualification requirements as specified in Joint Appendix JA11 AND
- Annual electrical output equal to or greater than the dwelling's annual electrical usage as determined by Equation 150.1-C

kWPV = (CFA x A)/1000 + (NDwell x B)

Where: kWPV = kWdc size of the PV system

- CFA = Conditioned floor area
- NDwell = Number of dwelling units
- A = Adjustment factor from Table 150.1-C
- B = Dwelling adjustment factor from Table 150.1-C 45



# 2019 Prescriptive PV Example

#### Table 150.1-C

Climate Zone	A - CFA	B - Dwelling Units
1	0.793	1.27
2	0.621	1.22
3	0.628	1.12
4	0.586	1.21
5	0.585	1.06
6	0.594	1.23
7	0.572	1.15
8	0.586	1.37
9	0.631	1.36
10	0.627	1.41
11	0.836	1.44
12	0.613	1.40
13	0.894	1.51
14	0.741	1.26
15	1.56	1.47
16	0.59	1.22

# §150.1(c)14

Single Family Example:

What is the minimum size (kW) PV system for a 300 ft<sup>2</sup>ADU in climate zone 4?

### kWPV = (CFA x A)/1000 + (NDwell x B)

Where:

kWPV = *kWdc* size of the PV system

CFA = Conditioned floor area

NDwell = Number of dwelling units

A = Adjustment factor from Table 150.1-C

B = Dwelling adjustment factor from Table 150.1-C

Solution:

 $(300 \times 0.586)/1000 + (1 \times 1.21) =$  **1.39 kW** 

Exceeding prescriptive sizing must be confirmed as meeting NEM rules (with your local utility) and only a small amount is allowed as "tradeoff" towards Building Efficiency EDR.

# 2019 PV Exceptions: Low-Rise §150.1(c)14



If roof faces between E (90) and WNW (300)\* and gets >70% sun, Prescriptive exceptions may apply \* If not within this orientation, Performance Approach to be used based on actual orientation. If CA Flexible Installation (CFI) used in Performance Approach, additional requirements apply.

1: <80 ft <sup>2</sup> of contiguous area	<ul> <li>No PV Required</li> <li>Use Solar Ready requirements</li> </ul>
2: Climate zone 15	<ul> <li>PV sized per Table 150.1-C <b>OR</b> what effective annual solar access accommodates</li> <li>Must be ≥1.5 W DC per ft<sup>2</sup> CFA</li> </ul>
3: Two habitable stories	<ul> <li>PV sized per Table 150.1-C OR what effective annual solar access accommodates</li> <li>Must be ≥1.0 W DC per ft<sup>2</sup> CFA</li> </ul>
4: Three or more habitable stories	<ul> <li>PV sized per Table 150.1-C OR what effective annual solar access accommodates</li> <li>Must be ≥0.8 W DC per ft<sup>2</sup> CFA</li> </ul>
5: Planning approval before 1/1/2020 AND Solar ready zone is 80 to 200 ft <sup>2</sup>	<ul> <li>PV sized per Table 150.1-C OR what effective annual solar access accommodates — whichever is smaller</li> </ul>
6: Sized per 150.1-C AND installed in conjunction with ≥7.5 kWh battery storage that meets JA12	<ul> <li>PV size may be reduced by 25%</li> </ul>

Title 24 Part 6 Essentials – 2019 Residential Standards for Energy Consultants



QII

✦Package A

♦ QII required as outlined in Reference Appendix RA3.5

Quality Insulation Installation (QII) Handbook



For Installers and HERS Raters



# Things to consider when doing QII

- Coordination is key
- Bring on a HERS Rater <u>early</u>
- Make sure the contractor is willing to do it
- Incorporate more details into the plans
- Training, Training, Training



REPLACE WITH COURSE TITLE



- Building Department
- CABEC
- Energy Code Ace





# YOUR Local Building Department



# **ADU Requirements**

- Depend on what the local building department has adopted.
- Make sure to see if guidance has been made available.
  - ♦ City of San Francisco
    - Images used for "Check your Understandings" are courtesy of San Francisco Planning and Open Scope Studios. THANK YOU!
  - $\diamond$  City of LA
  - ♦ City of Berkeley



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BROWN BAG WEBINARS, BUILDING SCIENCE, CA ENERGY EFFICIENCY PROGRAMS, ENERGY MODELING, RENEWABLES, TITLE 24 – PART 6 CABEC 2018 Brown Bag Webinar Series #6, June 20, 2018: Chris Olvera from Energy Commission on ADU's

# Code & Coffee Residential Modeling

#### Coffee & Code with Brian — Residential Modeling: Accessory Dwelling Units (ADU), Part 1: Newly Conditioned Detached ADU

Join host Brian Selby for our next Code & Coffee event — a one-hour live stream YouTube show designed to present "how-tos" for industry professionals working with California's building and appliance energy efficiency standards. The setting is informal, the platform interactive, and the java strong! In this episode of Code & Coffee, Brian will focus on residential building performance modeling for compliance with California's Title 24, Part 6 Building Energy Efficiency Standards. Brian will demonstrate how to model a newly conditioned detached ADU based on converting an existing detached garage to an ADU. This demonstration includes performing plan take-offs, modeling the project in EnergyPro, making recommendations for compliance, and reviewing the CF1R for accuracy.

There are currently no classes scheduled for this topic. But you can click on the link below to view a recording of a previous session.

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