



# Stakeholder Workshop: Building Decarbonization Phase II Staff Proposal and Mobilehome Park Electrification and Tenant Protection Topics

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September 15, 2020

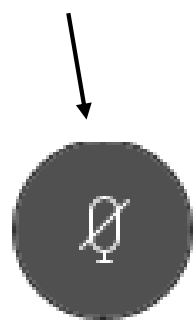
9:00 AM to 2:30 PM



# Workshop Logistics

- Today's presentations and agenda in (.pdf) format are available on the WebEx link under “Event Material” type password “!Energy1” into the box and click “View Info”
- Please submit questions in the Q&A box and specify panelist.
- Questions will be read aloud by Energy Division staff. After the question is read aloud the party will be unmuted to clarify the question or respond.

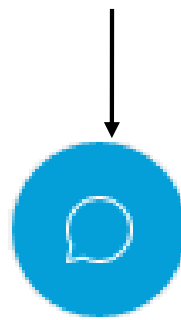
Mute/ Unmute



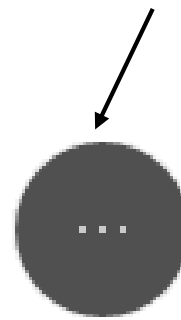
Participant List



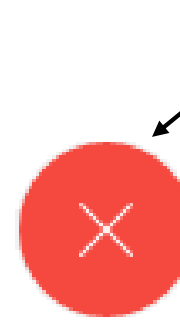
Chat



Audio Options



Leave Meeting

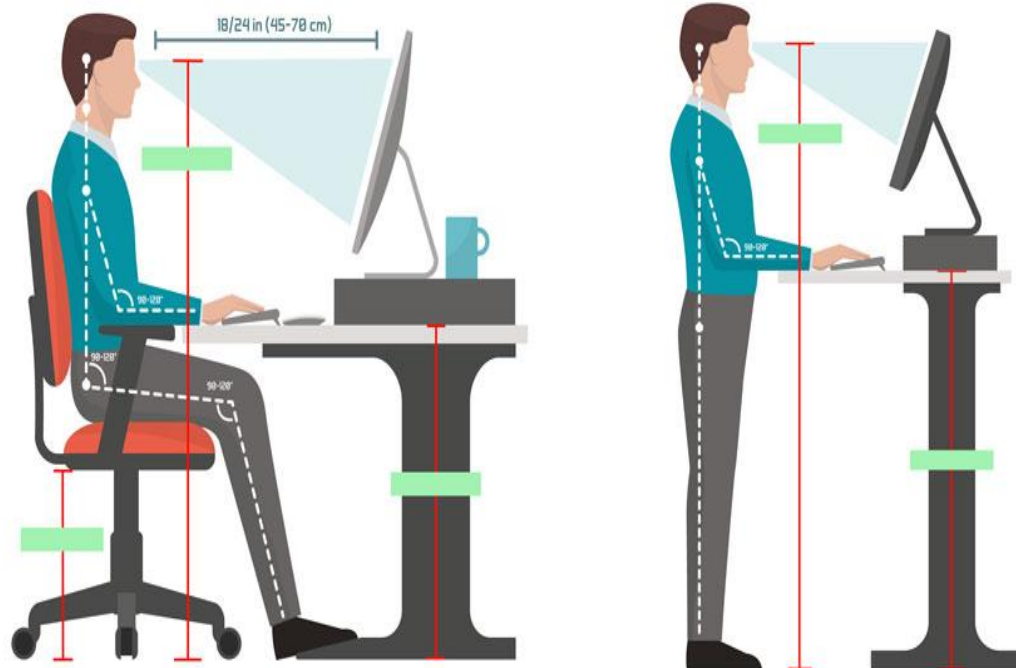




# Workshop Logistics

- Online only
  - Audio through computer or phone
  - Toll-free 1-855-282-6330
  - Access code: 146 978 7399
  - ***This workshop is being recorded***
- Hosts:
  - Commissioner Rechtschaffen
  - Energy Division Staff:
    - Nate Kinsey
    - Karin Sung
    - Rory Cox
    - Ankit Jain

- Ergonomic Check





# Today's Agenda

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**9:00 to 9:10 AM – Welcome and Webex Logistics**

**9:10 to 9:30 AM – Remarks from Commissioner Rechtschaffen**

**9:30 to 10:30 AM – Wildfire Rebuilds: Past Program Lessons and Proposal Moving Forward**

**10:30 to 10:45 AM – Q&A**

**10:45 to 11:00 AM – Break**

**11:00 to 12:00 PM – MHP Electrification Topics and Tenant Protections**

**12:00 to 12:15 PM – Q&A**

**12:15 to 1:00 PM – Lunch Break**

**1:00 to 2:00 PM – Electric Water Heating Baseline Allowance Adjustment**

**2:00 to 2:15 PM – Q&A**

**2:15 to 2:30 PM – Closing and Next Steps**



# Workshop Goals

- Inform all participants, including CPUC staff, on the facts of the three topics being discussed.
- Following the workshop the CPUC will issue a Ruling in each proceeding, R.19-01-011 and R.18-04-018, submitting the slides into record and asking parties to respond to questions.
  - The R.19-01-011 Ruling will also include questions on the incentive layering proposal in the Phase II Staff proposal.
  - The R. 18-04-018 Ruling will ask questions to inform the scope of the proceeding's second phase.



# Ground Rules

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- The workshop is structured to stimulate an honest dialogue and engage different perspectives.
- The workshop is structured to inform and educate all participants on three different topics in a thoughtful way.
- Please keep comments in the chat respectful.
- Verbal and written comments made during the workshop are not considered on record.



# Commissioner Rechtschaffen Remarks



# Wildfire Rebuild Panel Context

## 2020 Wildfire facts\*

- 7,718 wildfire incidents
- 3,154,107 acres burned
- 5,209 structures impacted
- 6 of CA's largest fires
- 20 fatalities



Noah Berger/AP Photo - <http://www.apimages.com/metadata/Index/Wildfires-Photo-Gallery/b1550eabacaa4d5595b97ecc65cf416f/50/0>

\*As of 11:00 PM 09/14/2020 according to Cal Fire's incident webpage: [fire.ca.gov/incidents](https://fire.ca.gov/incidents)





# Wildfire Rebuild Panel Context

## 2017 Wildfire Season

- 1,548,429 acres burned
- 10,280 structure impacted
- 47 fatalities

## 2018 Wildfire Season

- 1,975,086 acres burned
- 24,226 structures impacted
- 100 fatalities

## 2019 Wildfire Season

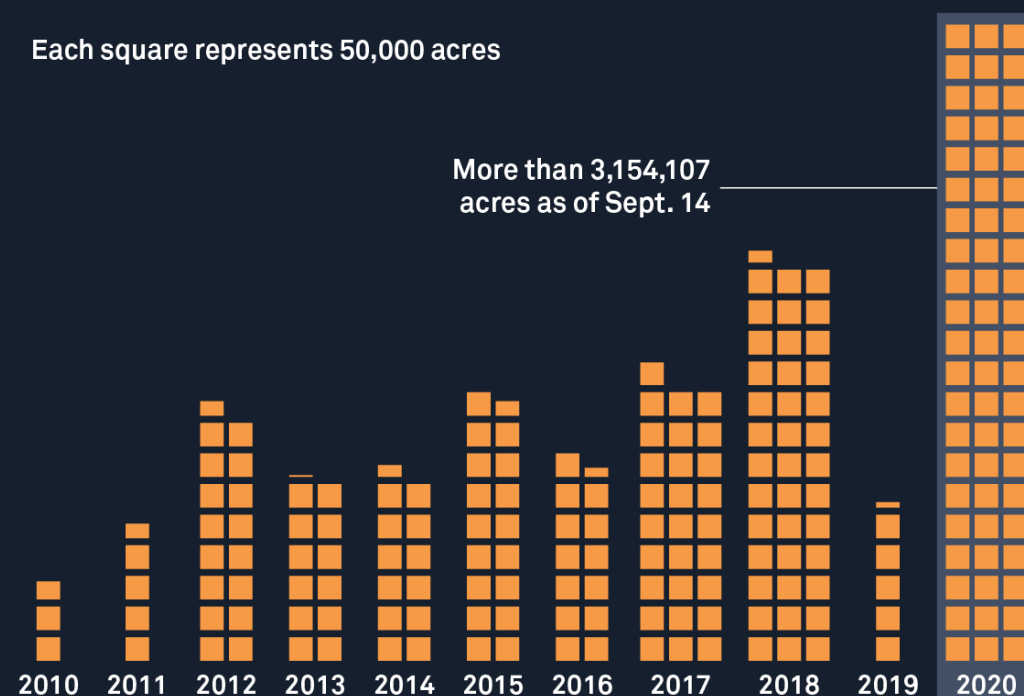
- 259,823 acres burned
- 732 structures impacted
- 3 fatalities

Annual wildfire season data from:  
[fire.ca.gov/incidents/2017](https://fire.ca.gov/incidents/2017)  
[fire.ca.gov/incidents/2018](https://fire.ca.gov/incidents/2018)  
[fire.ca.gov/incidents/2019](https://fire.ca.gov/incidents/2019)

## Number of acres burned annually in California wildfires



Each square represents 50,000 acres



Source: California Department of Forestry and Fire Protection

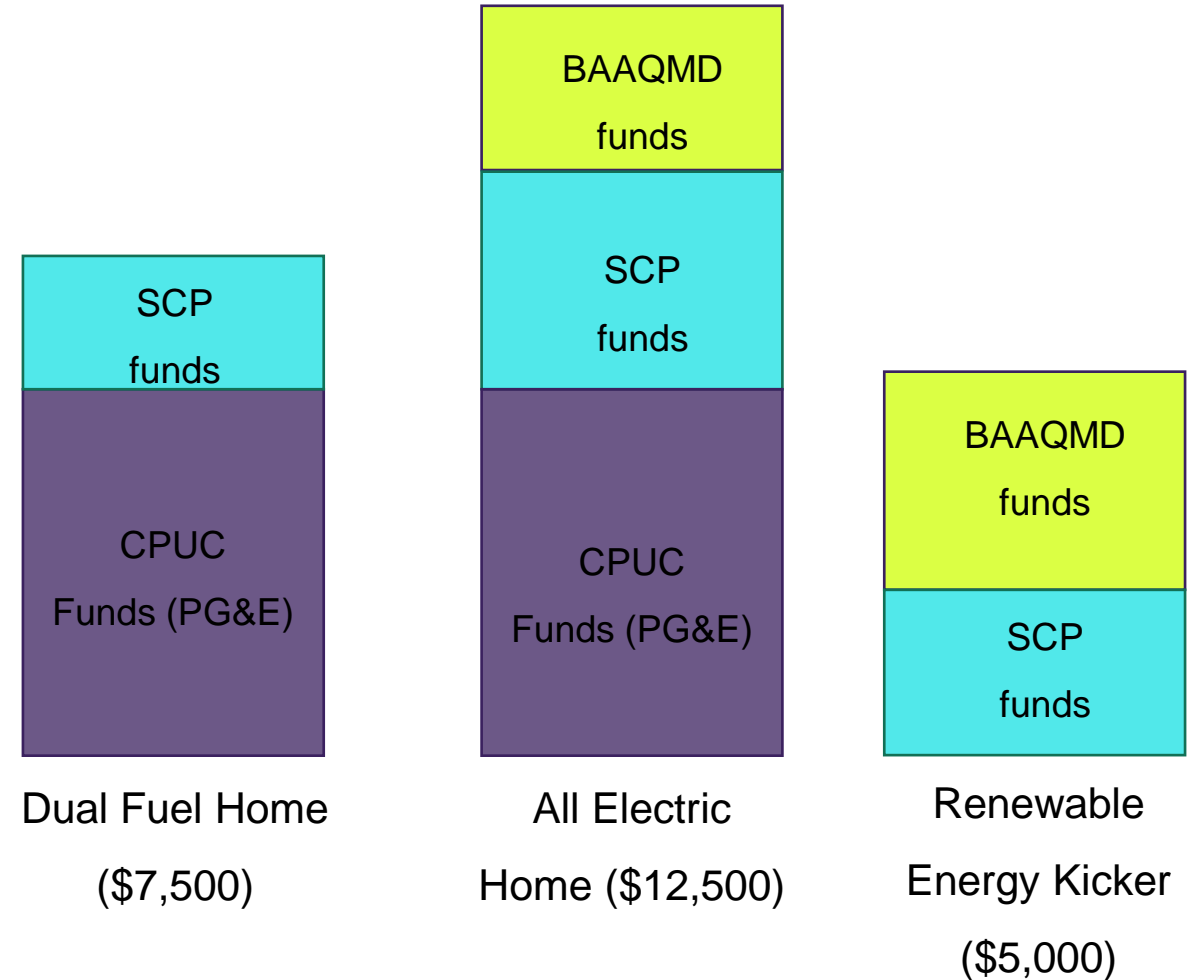
Source: <https://www.pbs.org/newshour/science/californias-catastrophic-wildfires-in-3-charts>



# Advanced Energy Rebuild – Lessons Learned in Wildfire Recovery Programs

# Advanced Energy Rebuild Program Overview

- Up to **\$17,500** in **customer incentives** with one easy online application.
- Pathways for both **all-electric and dual fuel homes**. Kicker incentive for renewable energy.
- Goes beyond existing program models by adding in **non-standard measures** like electric vehicle charging, grid responsiveness, battery storage, and water saving measures.





## PG&E

Resource funding for kWh and therm savings

Responsible for program administration cost

## SCP

Internal funding for GHG reduction

Marketing, Outreach, and Recruiting

## BAAQMD

Funding for specific GHG reducing technologies

## TRC

Program implementation, design consulting, and project processing infrastructure

Stakeholder education (HERS Raters, Energy Consultants, Builders)

## Oct 2017

Wildfires occur.  
PG&E and SCP  
separately begin  
work on designing  
recovery programs.

## Jan/Feb 2018

PG&E submits advice letter  
to CPUC.  
SCP attains additional  
funding through BAAQMD.

## Nov/Dec 2017

PG&E and SCP combine  
efforts.

- Didn't want to compete  
with each other or  
confuse homeowners.
- Allows for larger  
incentives, and more  
efficient, grid-friendly  
homes.

## May 2018

AER program  
launches.

288



**Projects Enrolled**

287 single family  
1 multifamily

383



**Total Homes**

287 single family  
96 multifamily

84



**All-Electric Projects**

81



**Projects Installing Solar PV + Battery**

98



**Projects Installing Heat Pump Water Heaters**

144



**Projects Installing Heat Pump Space Heating**



2.5



**Average  
Metric  
Tons/Year  
of GHG  
Savings Per  
Home**

24.4%



**Average %  
Better  
Than 2016  
Title 24**

\$650



**Average  
Projected  
Annual Bill  
Savings for  
Participants**



# Program Challenges



## Challenge 1 – Working with CEAs

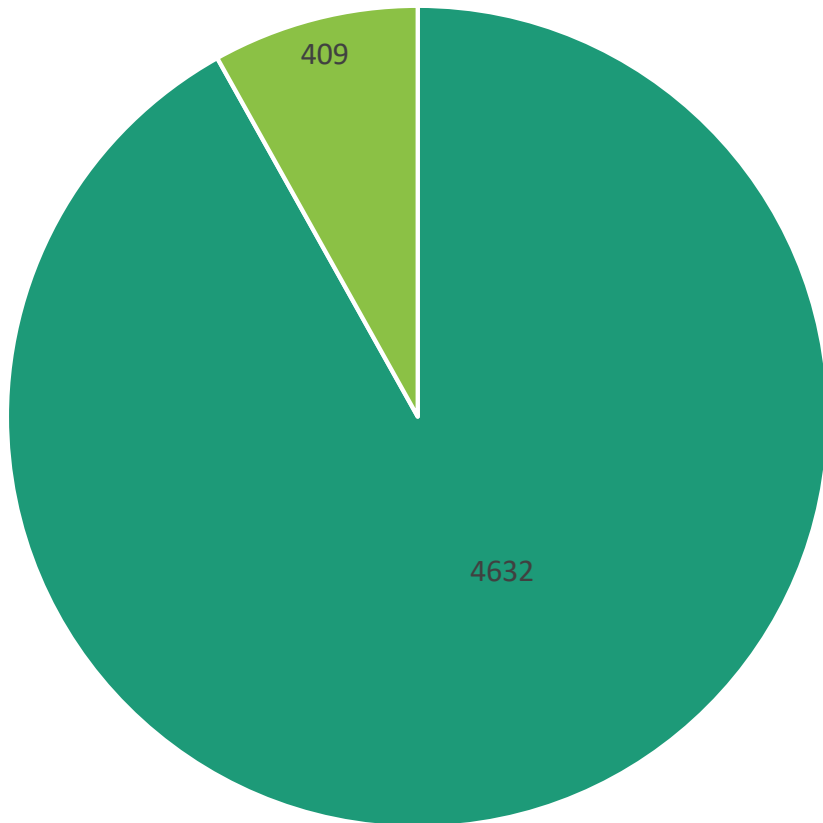


## Challenge 2 – Beating the Clock

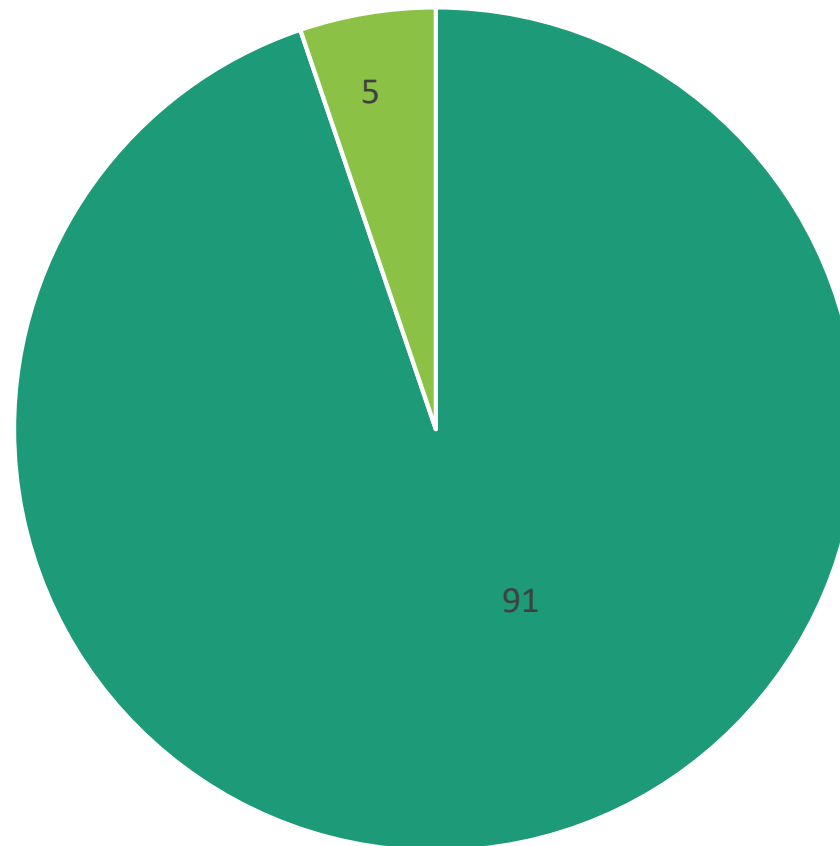


# Challenge 3 – Addressing Equity

SCP Customers Affected by Kincadee and Tubbs Wildfires



AER Program Participants



- Standard Customers
- Customers with CARE/FERA Indicator



# Program Successes

# Success 1 – Keep it Simple and Accessible

1

## Advanced Energy Home

**\$7,500**

### Flexible Performance Path

- 20% above Title 24 energy code
- 220V outlet at stove/range, water heater, and clothes dryer
- Design roof for additional structural loads associated with solar panels, and add conduit for future installation
- Electric Vehicle Charging Station - Equipment free from Sonoma Clean Power

2

## All Electric Home

**\$12,500**

### Flexible Performance Path

- 20% above Title 24 energy code, all electric end uses
- Design roof for additional structural loads associated with solar panels, and add conduit for future installation
- Electric Vehicle Charging Station - Equipment free from Sonoma Clean Power



## Add solar plus battery to either option

**\$5,000**

- Solar panel system designed to offset annual electric usage with 7.5 kWh battery storage system

OR

- Pre-purchase of 20-year premium on 100% local renewable power (e.g., EverGreen).

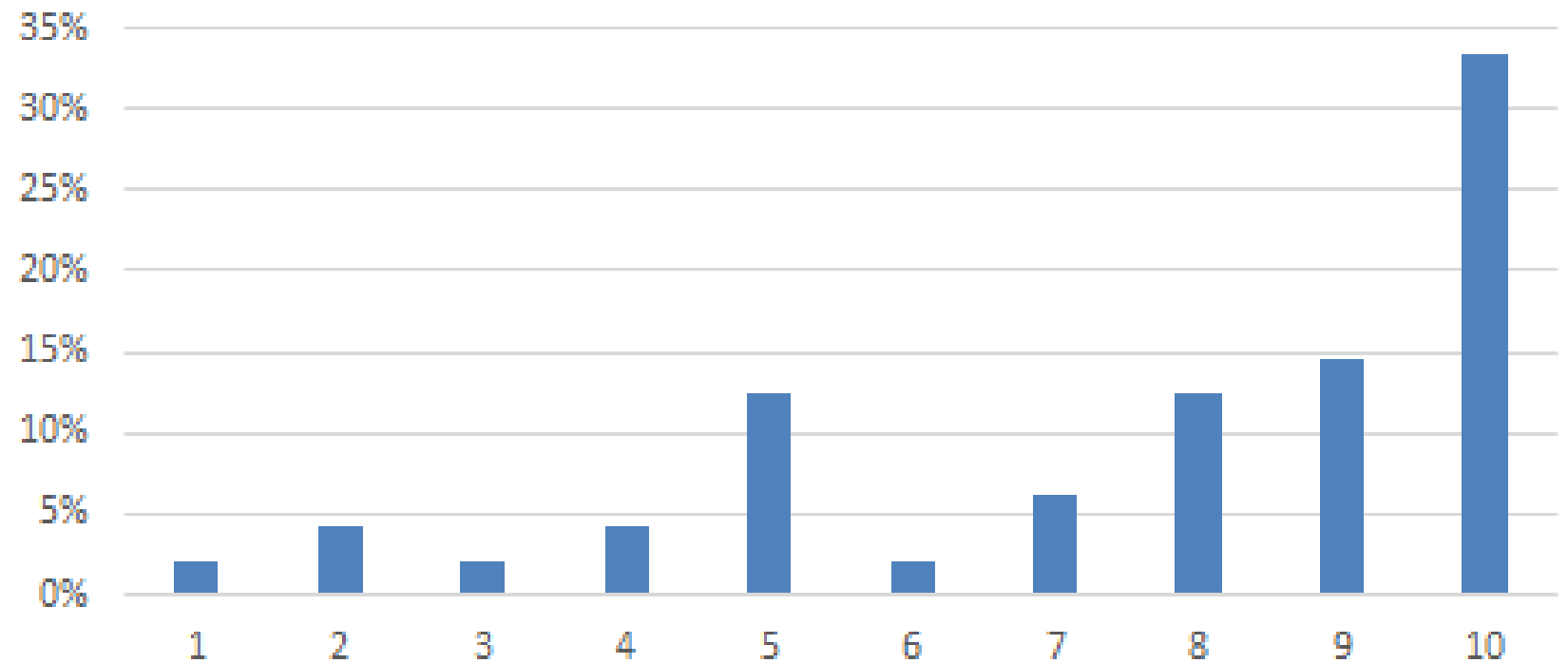
## Success 2 – Boots on the Ground Approach



## Success 3 – Offering Additional Classes/Resources



On a scale from 0 to 10, how likely are you to switch to induction cooking?(0 being extremely unlikely and 10 being extremely likely)



# Thank you!

Rachel Kuykendall  
Programs Manager  
[rkuykendall@sonomacleanpower.org](mailto:rkuykendall@sonomacleanpower.org)

<https://sonomacleanpower.org/>





# Wildfire Rebuild

R.19-01-011 Building Decarbonization Phase II OIR

Southern California Edison

Ruby Yopez

September 15, 2020

# Overview of SCE's Clean Energy And Resiliency (CLEAR) Rebuild Program

- Replicated PG&E AER program for customers impacted by 2017 - 2018 Thomas, Woolsey and Hill Wildfires
  - Serving customers in Los Angeles, Santa Barbara and Ventura County
  - Roughly 2,710 structures destroyed
- CLEAR was designed to help customers rebuild clean, energy efficient and resilient homes that would exceed 2016 energy code
- Program roll out February 2020
- Target goal of participation: 15% of customers impacted, approximately 400 homes
- Eligibility Requirement: Home is Red-tagged and Delta EDR 2 on 2016 Energy Code Report
- Funding Source: Double existing customer incentive programs CAHP & SBD utilizing approved energy efficiency funds and incentivizing resilient technologies

# Current Status with CLEAR

- Incentives
  - Dual Fuel Up to \$7,500
  - All-Electric Up To \$12,500
  - Resiliency (Solar PV + Battery Storage) Up To \$5,000
- 23 participating customers - 2 all-electric
- 4 interested customers permitting under 2019 Energy Code
- Outreach & Marketing:
  - Building Departments Collaborations: Malibu, Thousand Oaks, Los Angeles County, Ventura City, Ventura County, Santa Barbara County
  - Ventura County Regional Energy Alliance, United Policyholders, Ventura County Long Term Recovery group, AIA Local Chapters
  - SCE Local Planning and Local Public Affairs
  - Colina Vista Community Group

# Lessons Learned from CLEAR

- Relationships with building departments is key
- Community Based Organizations - essential resource for outreach
- Technical Assistance during project design phase and influencing energy efficiency streamlines customers' eligibility
- Energy Code updates impact customer participation
- Incentive payout timing is critical



# Recommendations for Wildfire and Natural Disaster Resiliency Rebuild (WNDRR)

- To best align with State's policy direction, programs that promote GHG-emitting options should be precluded from competing with WNDRR except in extenuating cases
- Due to the extended timeframe of WNDRR, and the potential for program closures/changes, regular "program check-ins" are important to coordinate incentives across available programs to ensure availability if/when needed
- Gas cap and trade funding contribution for WNDRR should resemble BUILD and TECH program; however, should include areas outside of gas IOU service area (I.e., Long Beach, etc.)
- Due to the 10-year duration of WNDRR, implementer's resources and readiness are paramount. Ensure readiness of implementer's resources and staffing in case of a major natural disaster or fire should include:
  - Implementer "readiness" check-ins
  - Five-year implementer contracts and a mid-point solicitation
  - Give administrators ability to direct-award an implementation contract (based on pre-determined criteria); should contracted implementer be unable to deliver WNDRR when needed
  - Until BUILD expires, leverage implementer instead of having WNDRR as a standalone program



# Wildfire and Natural Disaster Resiliency Rebuild (WNDRR) Program Proposal

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Nate Kinsey

Energy Division

Building Decarbonization and Renewable Natural Gas



# WNDRR Context

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The Building Decarbonization Assigned Commissioner's Scoping Memo and Ruling issued May 17, 2019 asked:

“Should the Commission implement any programs dedicated to support the construction of decarbonized buildings in communities affected by wildfires?”

- 2017 and 2018 Wildfire Rebuild Efforts were ongoing:
  - PG&E received approval for AER on April 27, 2018, via AL-3892-G/5219-E
  - PG&E received approval for expansion of AER on March 19, 2019, via AL-4068/5479-E
  - SCE had filed AL 3993-E requesting approval of the CLEAR program on April 25, 2019
- 2019 wildfire season had not started



# WNDRR Context

- Wildfires are not California's only natural disaster threat.
  - ~27,000 structures were damaged or destroyed in the Loma Prieta earthquake
- Floods and storms are historically common

Figure 1

## Major Types of Disasters in California

1950-2017

Type of Disaster	Types of Disaster Declarations <sup>a</sup>		
	State Emergency	Federal Major Disaster or Emergency	Federal Fire Management
Floods and storms	127	52	—
Fire	96	23	189
Earthquake	22	13	—
Other <sup>b</sup>	64	7	—
<b>Totals</b>	<b>309</b>	<b>95</b>	<b>189</b>

<sup>a</sup>A disaster may receive more than one type of disaster declaration.

<sup>b</sup>Includes droughts, freezes, tsunamis, and all other types of disasters.

Source: <https://lao.ca.gov/Publications/Report/3918>





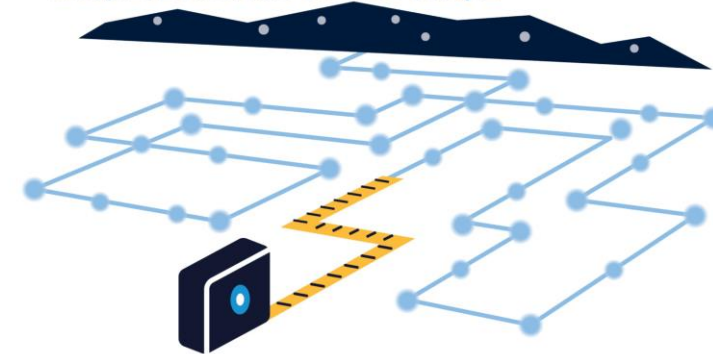
# WNDRR Context

- Feedback and early lessons learned from AER and CLEAR on a statewide program:
  - Keep the program simple,
  - Focus on greenhouse gas (GHG) reductions,
  - Reaching participants early in the design process is essential,
  - Acknowledge impacted communities want to return to normal
- Challenges:
  - Advice Letter regulatory approval *can* have long time horizons,
  - California Advanced Homes Program (CAHP) focuses on production builders,
  - Recovery and rebuild process is long,
  - Incentive levels vary by service territory



## Sonoma Clean Power and PG&E's Advanced Energy Rebuild Program

Group B, Deliverable 33 Case Study 2



August 27, 2019



Source:  
[https://pda.energydataweb.com/api/view/2415/08.27.2019\\_Group%20B%20D33.1%20ZNE%20Case%20Study%20%20FINAL%2008-27-2019-1.pdf](https://pda.energydataweb.com/api/view/2415/08.27.2019_Group%20B%20D33.1%20ZNE%20Case%20Study%20%20FINAL%2008-27-2019-1.pdf)



# WNDRR Proposal Snap-Shot

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- Program Principles: Customers First, Regulatory Simplicity, Dedicated Funding
- Program Eligibility: All red tagged residential buildings impacted by any type of natural disasters.
- Program Incentives: Administered in tiers based on only GHG reductions above a modeled code baseline.
- Program Funding: \$50 million over 10 years
- Program Implementation Team: Community focused and designed to respond swiftly to natural disasters.
- Program Evaluation and Cost Effectiveness: Ex-post and based on metered data.



# WNDRR Program Eligibility

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- Program Eligibility was designed bottom up to enable top down funding to ensure natural disasters of all sizes are eligible.
- WNDRR program eligibility requires two criteria be met:
  - A Local Emergency Proclamation must be made by a local governing body (city, county, or city and county).
  - A single-family or multi-family residential building must be red-tagged or determined to be unsafe for occupancy by the local building authority.



# WNDRR Program Incentives

- Program Incentives: Based on calculated GHG emission reductions compared to a dual fuel (electricity and natural gas) code compliant building using either CBECC-Res or CBECC-Com.
- This approach takes into consideration:
  - Building design dimensions
  - Climate Zone
  - Appliance Efficiency
- Adaptable to code changes





# WNDRR Program Incentives

- Program Incentives: GHG reductions were valued using the 2020 Avoided Cost Calculator (ACC) GHG values. Incentives were established in tiers and rounded to simplify administration.

<b>Annual GHG Avoided Tier (metric tons/year)</b>	<b>WNDRR Incentive Value (\$)</b>
1.00 – 1.99	\$11,000
2.00 – 2.99	\$22,000
3.00 – 3.99	\$33,000
4.00 – 4.99	\$44,000
5.00 – 5.99	\$55,000

<b>Annual GHG Avoided Tier (metric tons/year)</b>	<b>WNDRR Equity Incentive Value (\$)</b>
1.00 – 1.99	\$16,500
2.00 – 2.99	\$33,000
3.00 – 3.99	\$49,500
4.00 – 4.99	\$66,000
5.00 – 5.99	\$82,500



# WNDRR Program Incentives

- Passive House Kicker Incentive available to residential properties that complete a passive house certification.
  - Incentive covers 75% of the certification process
  - Offered based on the ability of passive house to achieve both short and long term state goals, like winter “peak heat”
  - Additional health and resiliency benefits

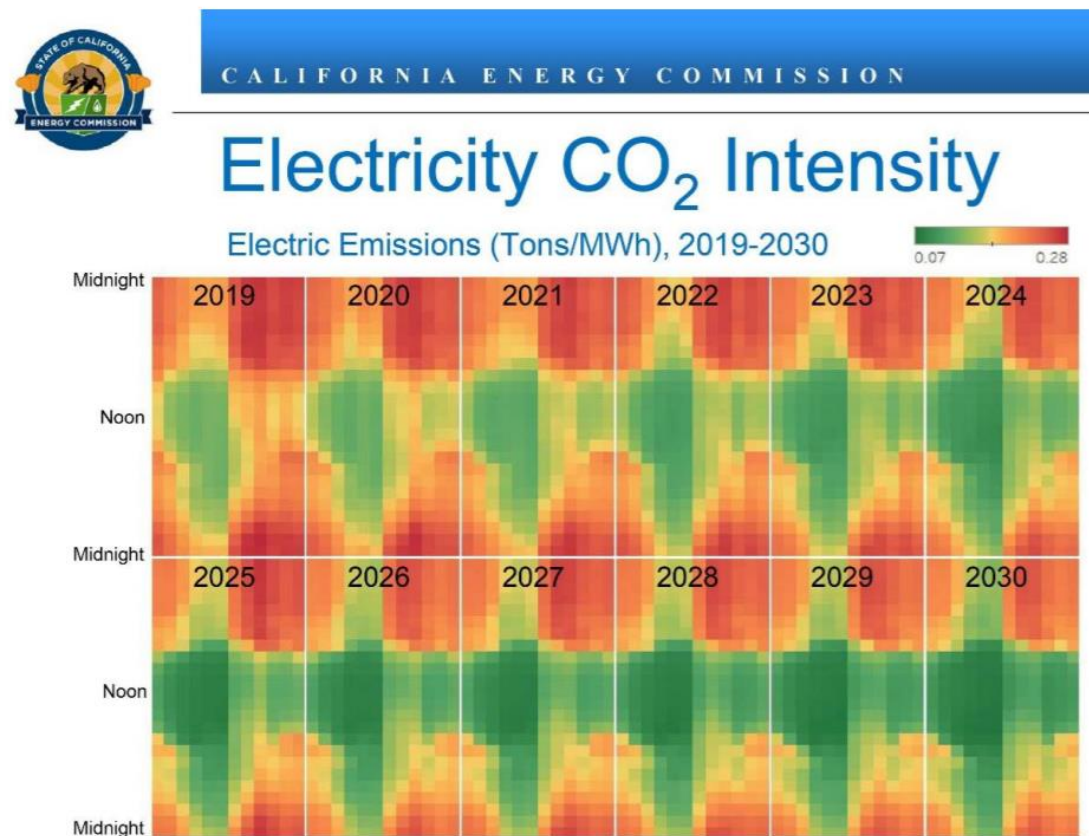


Figure 1: This heatmap visualizes the change in Electricity CO<sub>2</sub> intensity from 2019 to 2030. Green represents lower CO<sub>2</sub> emissions while red represented higher CO<sub>2</sub> emission levels. Electricity CO<sub>2</sub> intensity is anticipated to the greatest during the morning and evening hours in winter.



# WNDRR Program Funding

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- Program Funding challenges:
  - Unknown size and scale of funding needed on an annual basis
  - Funds could be collected and not used (ideal scenario)
- Program Funding:
  - \$50 million over 10-year period
  - Funds collected quarterly from proceeds from the gas corporation Cap-and-Trade allowance auction. First year funds remitted in full by 06/01/2021.
  - Southern California Edison serve as the “contracting agent” and administrator of the WNDRR Balancing Account
  - Funds administered to electric IOUs annually for work completed
  - Unspent funds returned to ratepayers by July 1, 2033



# WNDRR Program Implementation Team

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- Program Implementation Team consists of four key stakeholders consider essential to enabling a swift response to a natural disaster:
  - Electrical IOU (Administrator)
  - Third-party program implementer (Technical expert)
  - Local jurisdictional member (Local coordination)
  - Community Based Organization (Community development and organizing)





# WNDRR Program Evaluation

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- Program Evaluation:

- Cost-Effectiveness calculated on an ex-post in alignment with decarbonization framework developed for BUILD/TECH programs
- Completed every 5 years by third-party program evaluator
- Evaluation report shall use normalized meter-based consumption data to calculate actual annual GHG emissions and average cost per metric of avoided GHG.
- Propose additional program recommendation



# WNDRR Program: Outstanding Questions

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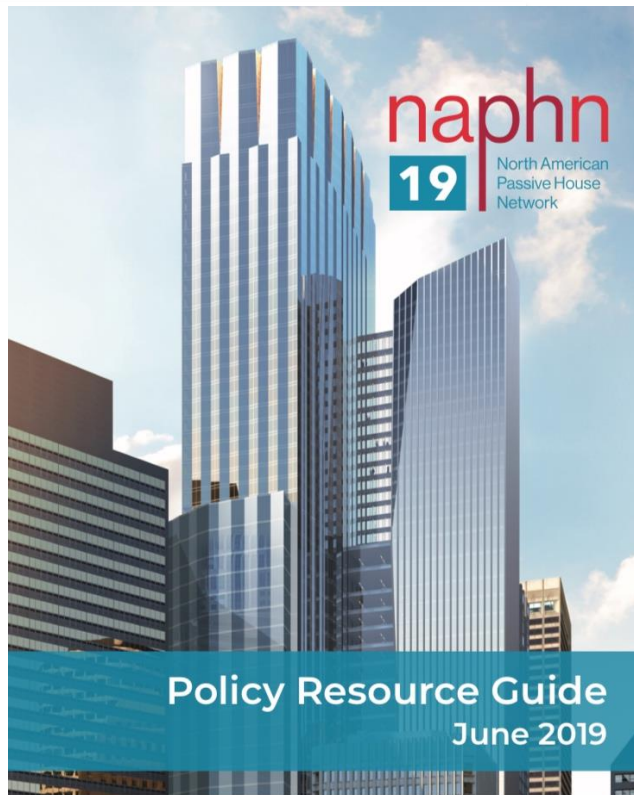
- How to provide incentives to homeowners who rebuild outside of their originally impacted community?
- How to provide incentives for manufactured homeowners when the code is federally regulated?
- Should the WNDRR program consider supporting local building departments post disaster?
- Given the scale of recent wildfire seasons alone are additional funds necessary?



Thank You

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Nate Kinsey  
nk2@cpuc.ca.gov



# The Song of Fire & Ice

## Using Passive House to Rebuild a Resilient California



to this!



Image Credit: Copyright NAPHN 2019, based on illustrations by B. Barry

Bronwyn Barry, RA, CPHD

Sept. 2020

# CARMEL VALLEY 2020: Passive Survivability



# AUSTRALIA'S bushfires: Passive Survivability

## Keeping the smoke out

Date published:  
20 Apr 2020

Author:  
Cameron Munro & Joel  
Seagren

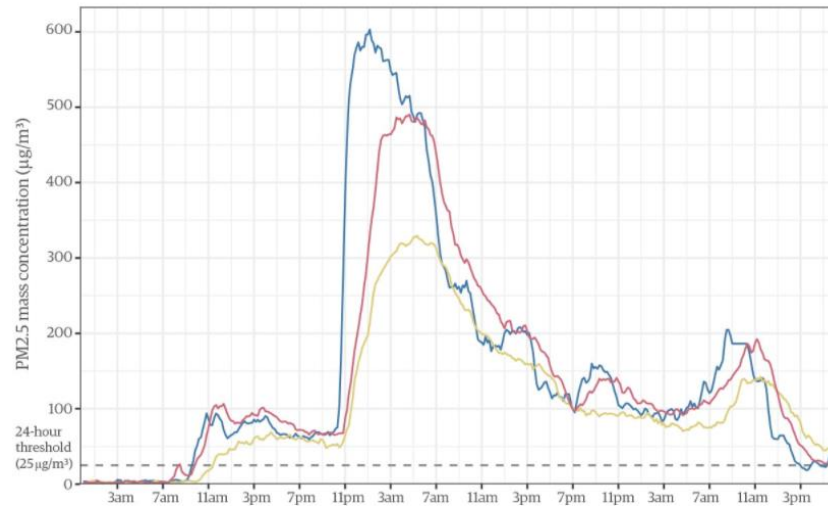


Figure 2: Performance of airtight and standard buildings during a recent smoke event in Melbourne. Blue is outdoor air quality, red is a leaky house and yellow is an airtight home.

- ❑ Airtight buildings reduce indoor PM2.5 by HALF
- ❑ Mechanical Ventilation (high efficiency HRV's) is a baseline, and needs additional filtration

Passive House provides BOTH and delivers the One-Two PUNCH!

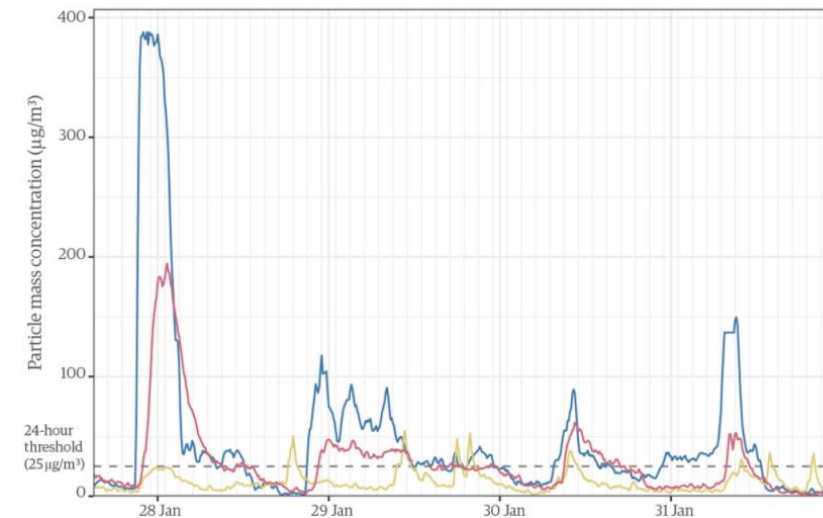


Figure 4: Two identical airtight homes with mechanical ventilation in Canberra, one with a standard F7 filter on the ventilation system (red line) and the other with an additional HEPA filter (yellow line). Blue is the outdoor air quality.

# THE ICE BOX COMETH...



< NO ICE  
LEFT  
UNIHABITAB  
LE 1/2 ICE LEFT  
STILL  
COOL >

# PASSIVE HOUSED WORK WITHOUT A/C



- ❑ PH box kept over HALF it's ice
- ❑ Code box melted all and overheated

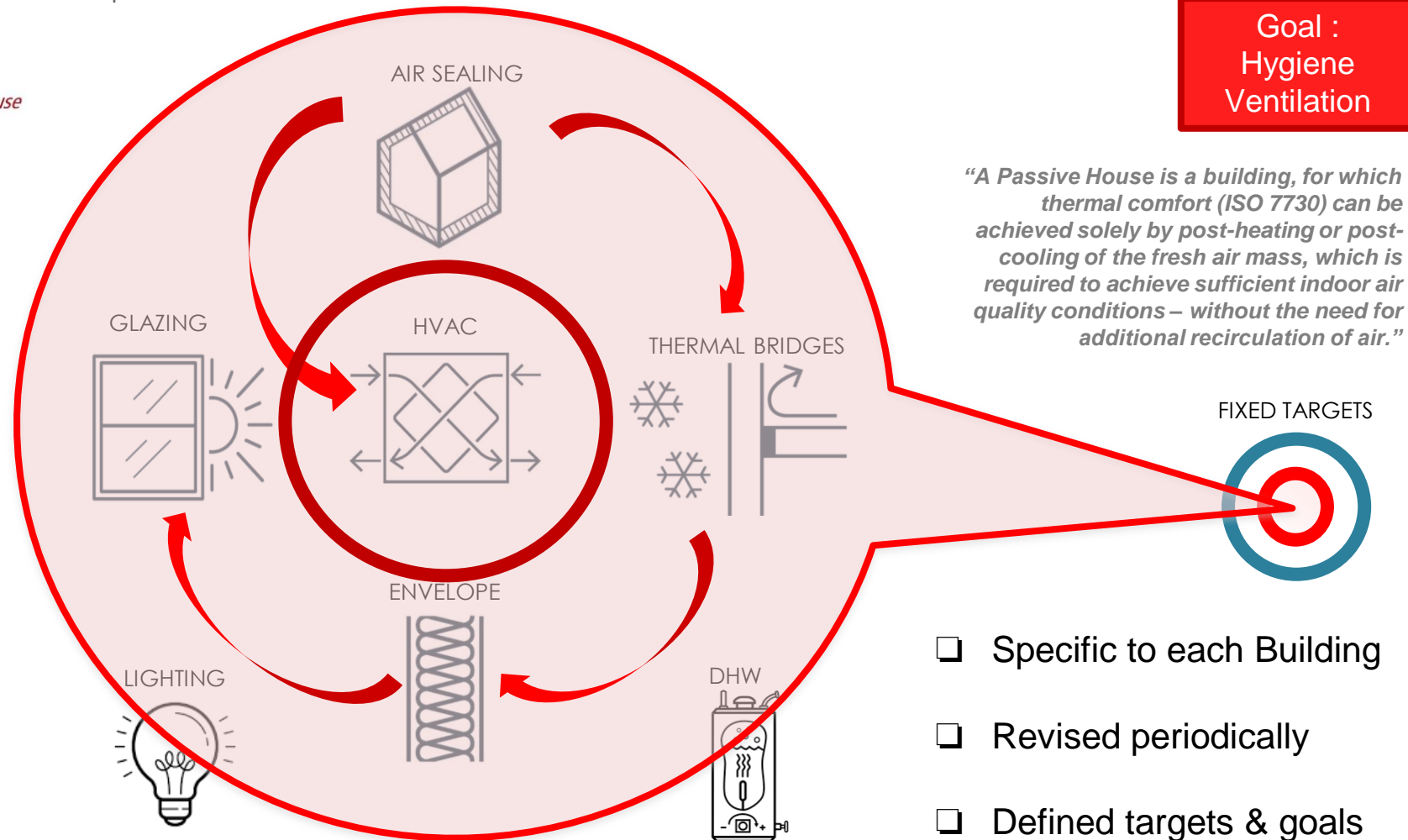
Passive House stays cool & provides resiliency for when we need it..





# PASSIVE HOUSE STANDARD STRUCTURE

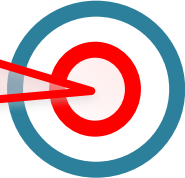
Passive House Development Structure:



Goal :  
Hygiene  
Ventilation

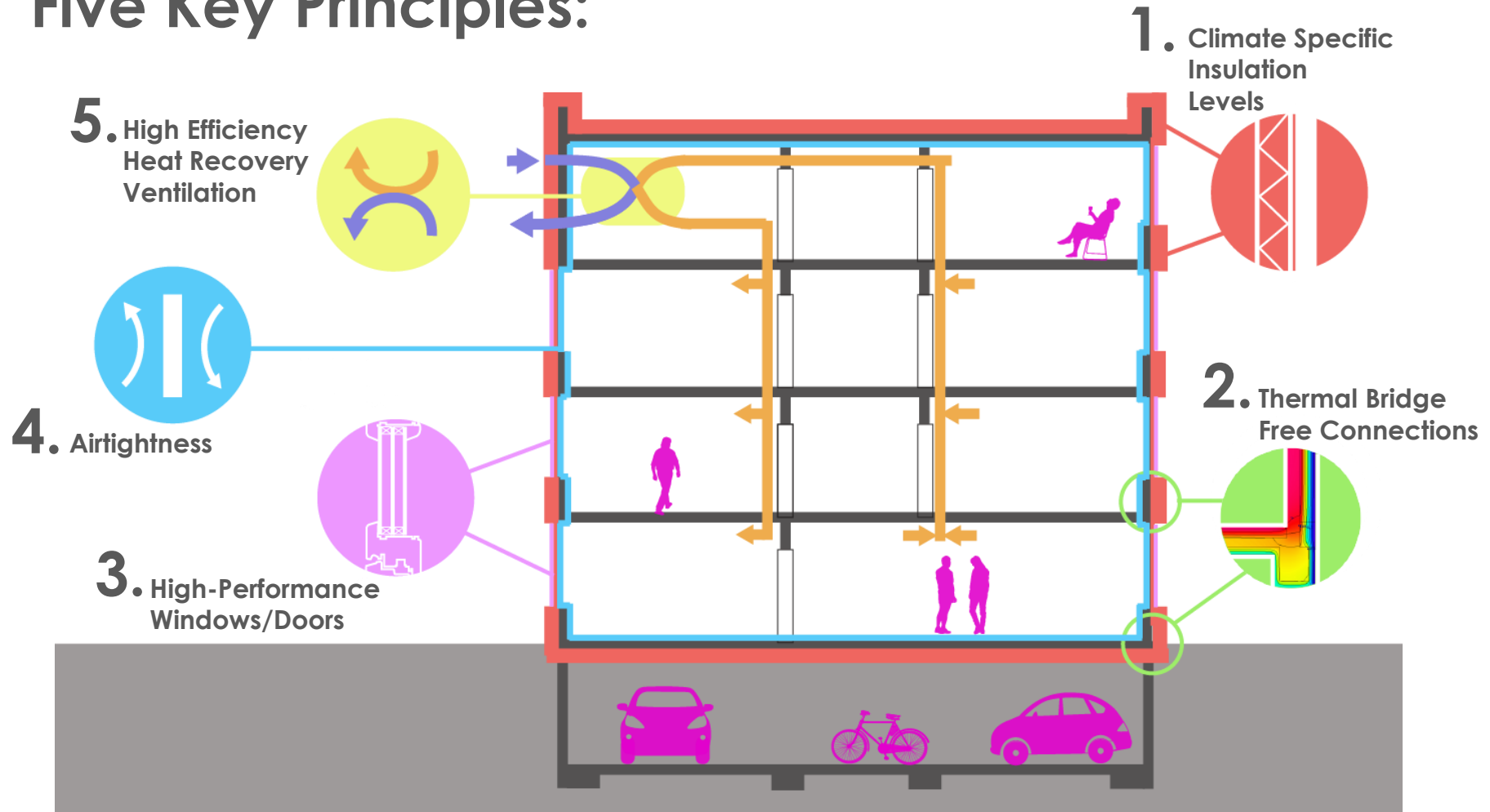
*“A Passive House is a building, for which thermal comfort (ISO 7730) can be achieved solely by post-heating or post-cooling of the fresh air mass, which is required to achieve sufficient indoor air quality conditions – without the need for additional recirculation of air.”*

FIXED TARGETS



- ❑ Specific to each Building
- ❑ Revised periodically
- ❑ Defined targets & goals

## Five Key Principles:

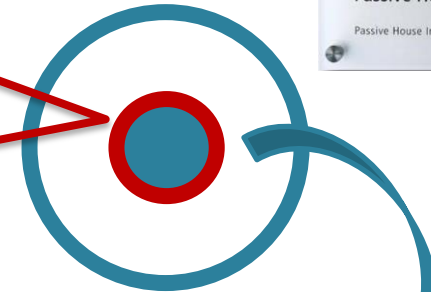


# SETS A CLEAR TARGETS FOR

Peak Heat Load:	4.75 kBtu/hr.ft <sup>2</sup> ·yr or 15 kWh/m <sup>2</sup> ·yr
OR	
Heating/Cooling Demand:	3.2 BTU/hr.ft <sup>2</sup> or 10 W/m <sup>2</sup>
Air-tightness:	n <sub>50</sub> < 0.6 ACH
Total Primary Energy:	(PER SLIDING SCALE)



SETS A TARGET



PROVIDES THE TOOLS

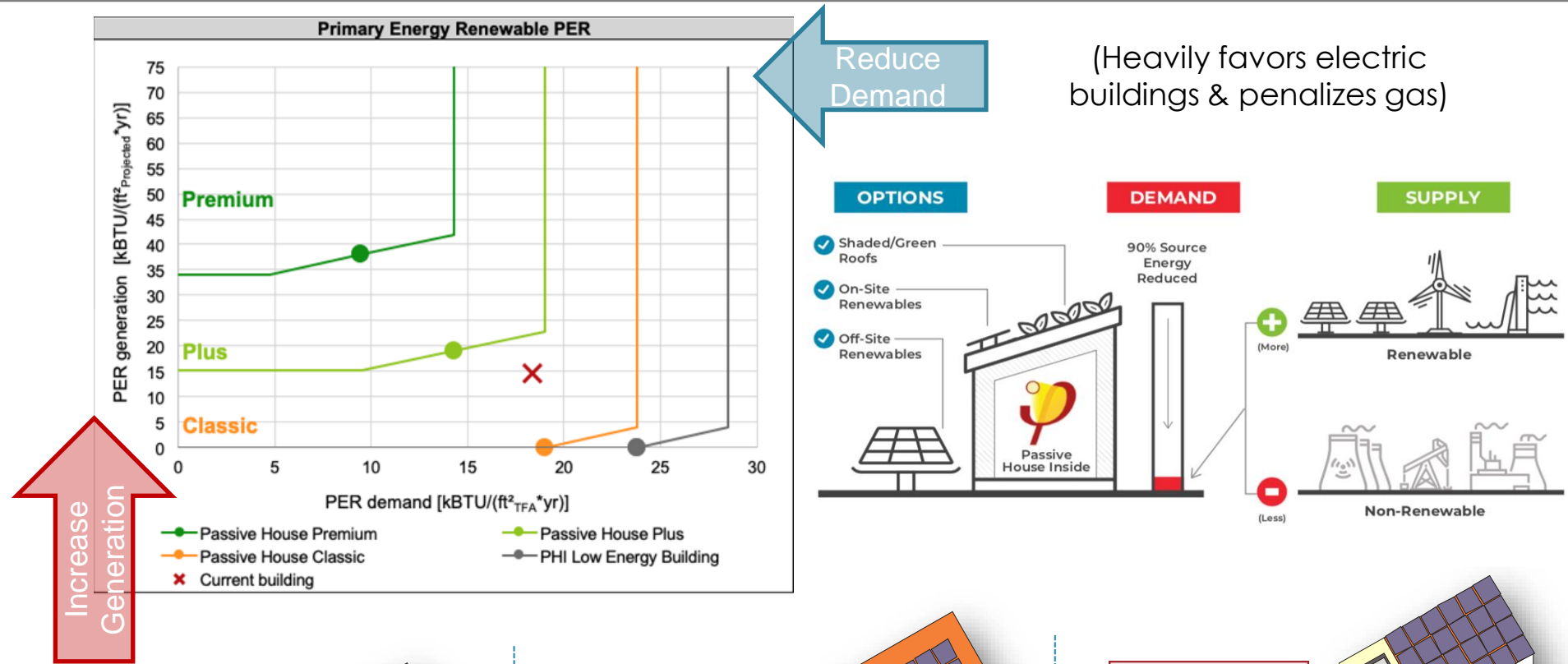


OFFERS TRAINING

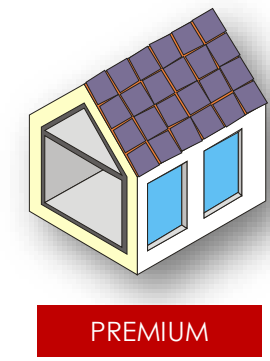
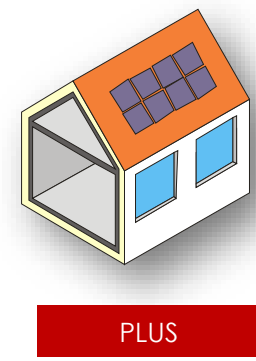
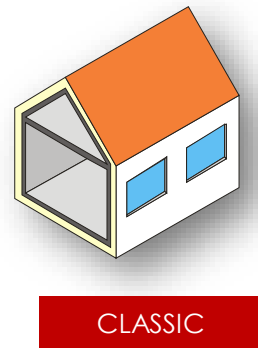
Three certifications that support 100% RENEWABLE ENERGY GRID



# THREE CERTIFICATION PATHWAYS



Increase Generation

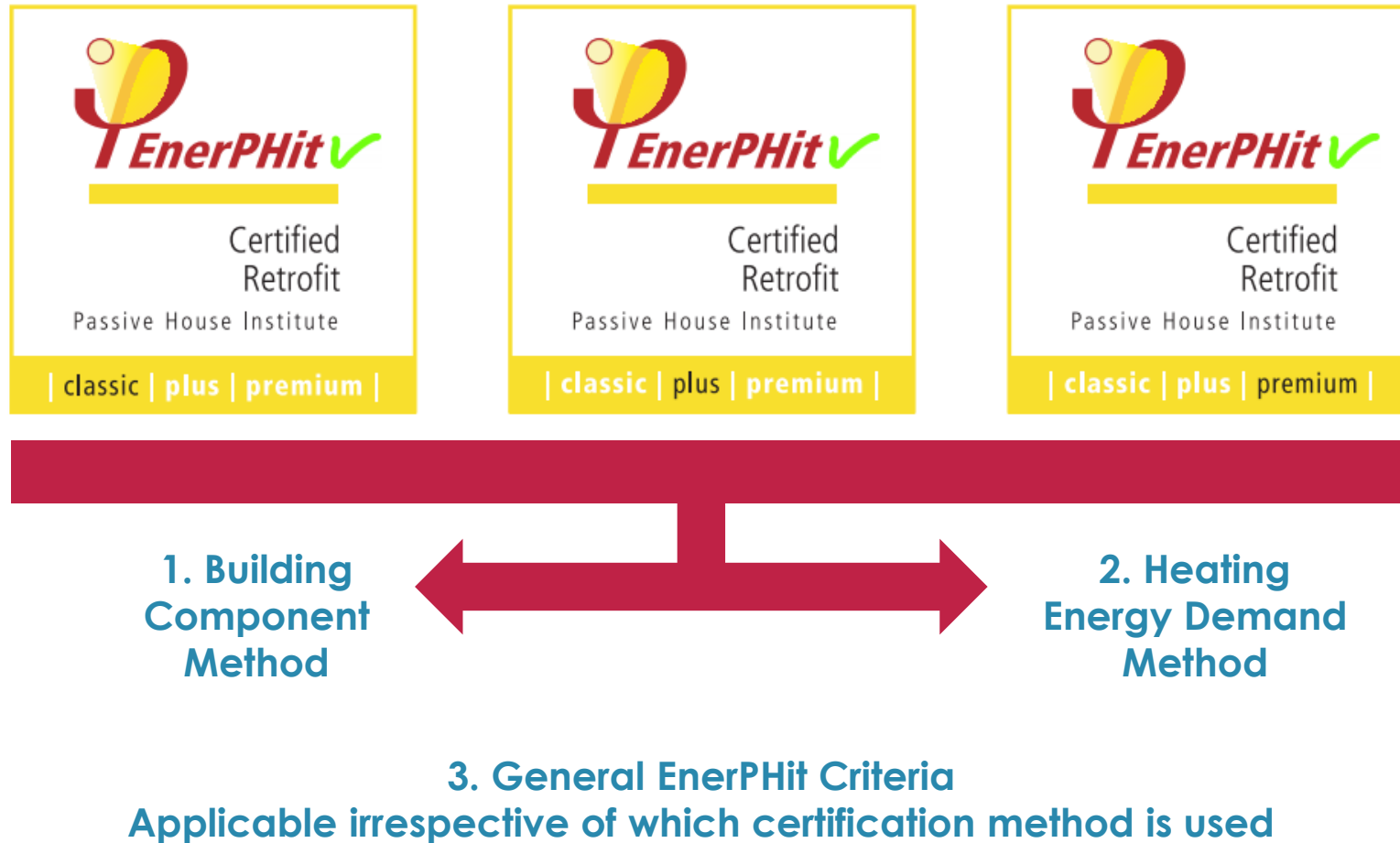


# THREE RETROFIT PASSIVE HOUSE CLASSES



- EnerPHit standard first introduced by PHI in 2010
- Can be reached in one step, or several steps
- If phased, follow an EnerPHit Retrofit Plan (ERP)
- When PER (primary energy renewable) has been reduced by 20%, first 'pre-certification' can be issued by the certifier

# TWO PATHS TO ENERPHIT CERTIFICATION



# COMPLEX BUILDINGS IN VARIED CLIMATES

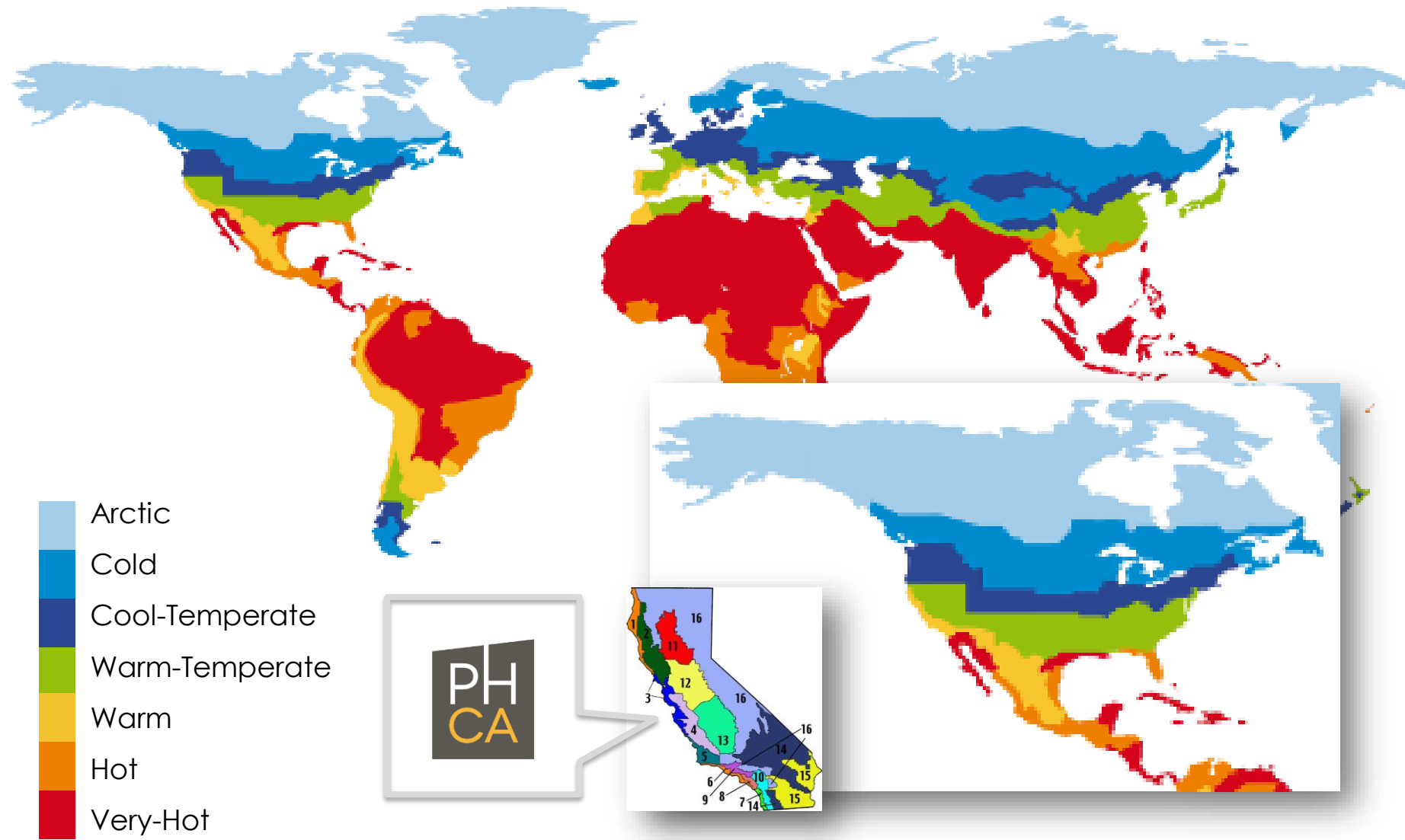


# WORKS FOR RETROFITS (& CAN BE PHASED)



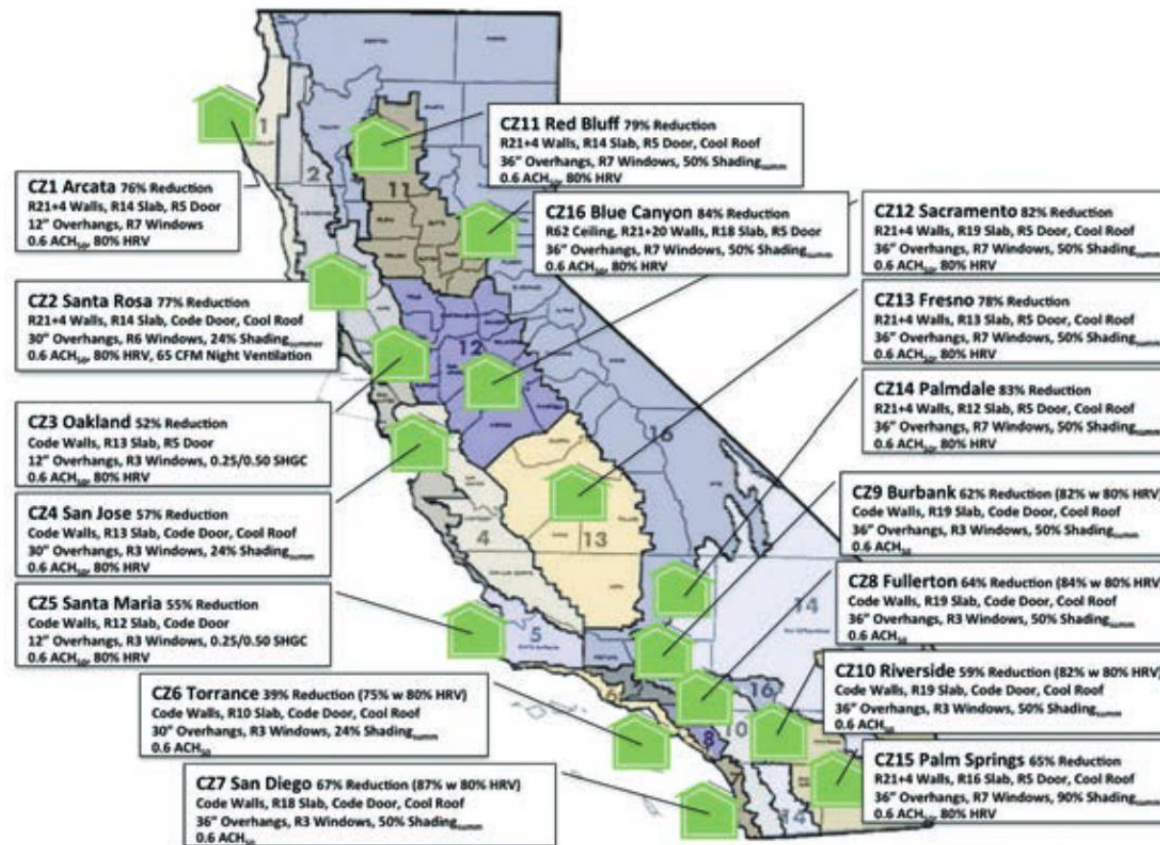


# PH CLIMATE ZONES (available for all 16 CA CZ's)



# RESULTING IN DRAMATIC ENERGY SAVINGS

In California, this means  
~**39%** to ~**83%** reduction in heating & cooling



## Which option do you want?



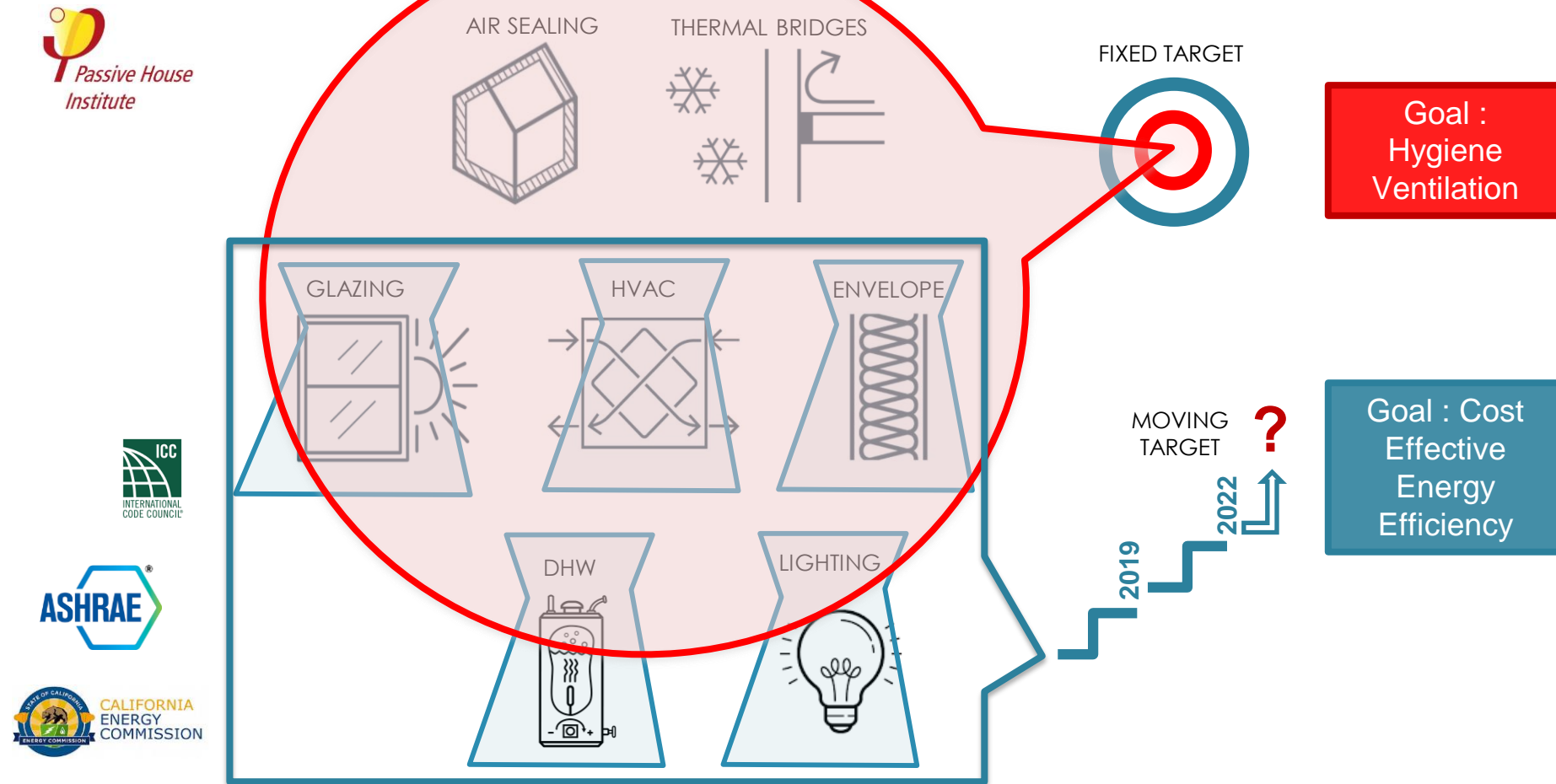
Business  
as usual



Passive  
House

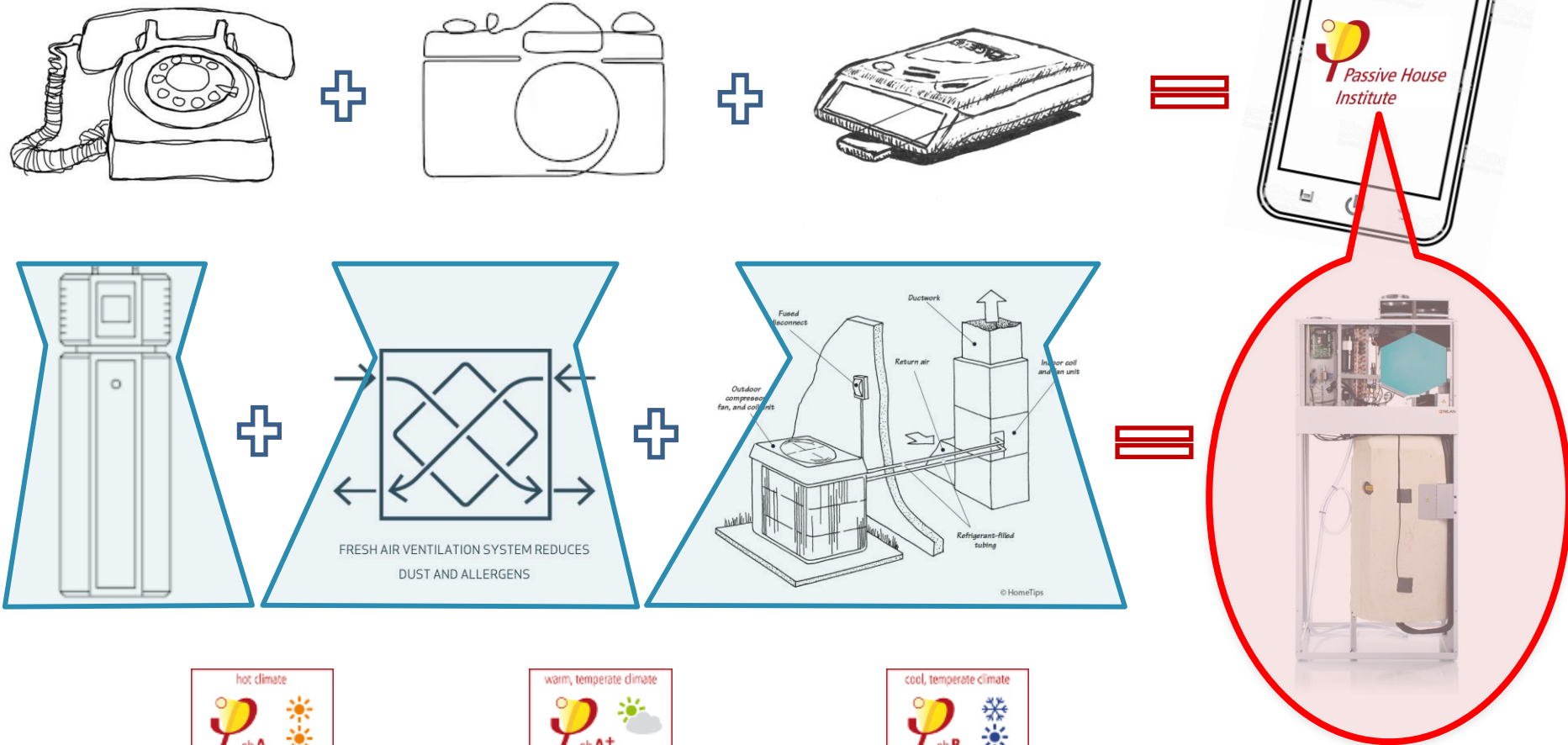
# CAN THESE FRAMEWORKS BE MERGED?

Passive House and Typical Benchmark Energy code overlay:



# PASSIVE HOUSE WORKS AS A SYSTEM!

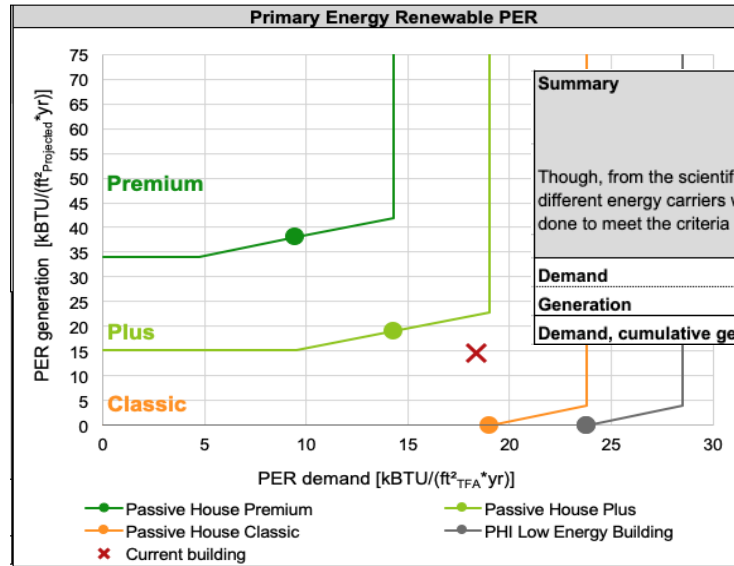
DRIVES HOLISTIC DESIGN, DRIVES HIGH PERFORMANCE BUILDING PRODUCTS,  
DRIVES MARKET TRANSFORMATION



# HOW DOES THIS WORK IN CALI?



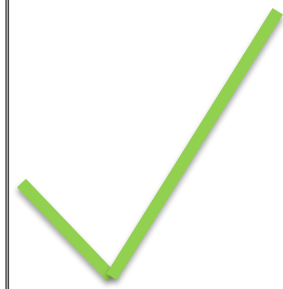
Meets Classic Certification  
As all-electric 740 sf ADU



<b>Summary</b>	Though, from the scientific point of view, not entirely correct, different energy carriers will be added together here. This is done to meet the criteria of other energy standards.
<b>Demand</b>	
<b>Generation</b>	
<b>Demand, cumulative generation (annual balance)</b>	
<b>CO<sub>2</sub>eq substitution balance</b>	1-CO <sub>2</sub> factors GEMIS 4.6 (Germany) lb/yr
	4069
	-3246
	823

PHPP provides  
GHG #'s!

Specific building characteristics with reference to the treated floor area				Criteria	Alternative criteria	Fullfilled? <sup>2</sup>
<b>Space heating</b>	Treated floor area ft <sup>2</sup>	703				
	Heating demand kBTU/(ft <sup>2</sup> *yr)	4.23	≤	4.75	-	yes
	Heating load BTU/(hr.ft <sup>2</sup> )	3.08	≤	-	3.17	yes
<b>Space cooling</b>	Cooling & dehum. demand kBTU/(ft <sup>2</sup> *yr)	3.93	≤	4.75	4.75	yes
	Cooling load BTU/(hr.ft <sup>2</sup> )	2.32	≤	-	3.41	yes
	Frequency of overheating (> 77 °F) %	-	≤	-	-	-
	Frequency of excessively high humidity (> 0.012 lb/lb) %	0.3	≤	3.17	-	yes
<b>Airtightness</b>	Pressurization test result n <sub>50</sub> 1/hr	0.6	≤	0.19	-	yes
<b>Non-renewable Primary Energy (PE)</b>	PE demand kBTU/(ft <sup>2</sup> *yr)	39.56	≤	-	-	-
<b>Primary Energy Renewable (PER)</b>	PER demand kBTU/(ft <sup>2</sup> *yr)	18.34	≤	19	19	yes
	Generation of renewable energy (in relation to pro-jected building footprint area) kBTU/(ft <sup>2</sup> *yr)	14.63	≥	-	-	yes



<sup>2</sup> Empty field: Data missing; '-': No requirement

# HOW DOES THIS WORK IN CALI?

**CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD**

**CF1R-PRF-01**

**Project Name:** 15 Phillips Road

**Calculation Date/Time:** 13:45, Thu, Dec 13, 2018

**Page 1 of 8**

**Calculation Description:** Title 24 Analysis

**Input File Name:** 15 Phillips.ribd16x



05	<b>Standards Version</b>	Compliance 2017
07	<b>Compliance Manager Version</b>	BEMCmpMgr 2016.3.1 (1149)
09	<b>Software Version</b>	EnergyPro 7.2
11	<b>Front Orientation (deg/Cardinal)</b>	0
13	<b>Number of Dwelling Units</b>	1
15	<b>Number of Zones</b>	1
17	<b>Number of Stories</b>	1
19	<b>Natural Gas Available</b>	Yes
21	<b>Glazing Percentage (%)</b>	25.0%

COMPLIANCE RESULTS	
01	Building Complies with Computer Performance
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.
03	This building incorporates one or more Special Features shown below

ENERGY USE SUMMARY				
04	05	06	07	08
Energy Use (kTDV/ft <sup>2</sup> -yr)	Standard Design	Proposed Design	Compliance Margin	Percent Improvement
Space Heating	28.99	5.21	23.78	82.0%
Space Cooling	7.78	6.80	0.98	12.6%
IAQ Ventilation	4.83	4.83	0.00	0.0%
Water Heating	18.91	28.13	-9.22	-48.8%
Photovoltaic Offset	----	-10.71	10.71	----
<b>Compliance Energy Total</b>	<b>60.51</b>	<b>34.26</b>	<b>26.25</b>	<b>43.4%</b>

# My SUNNYVALE ALL ELECTRIC RETROFIT



ENERGY USE SUMMARY				
	05	06	07	08
	Standard Design	Proposed Design	Compliance Margin	Percent Improvement
Heating (kWh/ft <sup>2</sup> -yr)	14.83	6.31	8.52	57.5%
Space Cooling	17.94	13.66	4.28	23.9%
IAQ Ventilation	0.00	0.00	0.00	0.0% (For HRV)
Water Heating	18.64	18.64	0.00	0.0% (For Heat Pump water Heater)
Photovoltaic Offset	---	0.00	0.00	---
<b>Compliance Energy Total</b>	<b>51.41</b>	<b>38.61</b>	<b>12.80</b>	<b>24.9%</b>

2015 Code cycle:

- 57% better Space Heating
- 23.9% better Space Cooling
- 0.0% IAQ Ventilation
- 0.0% Water Heating

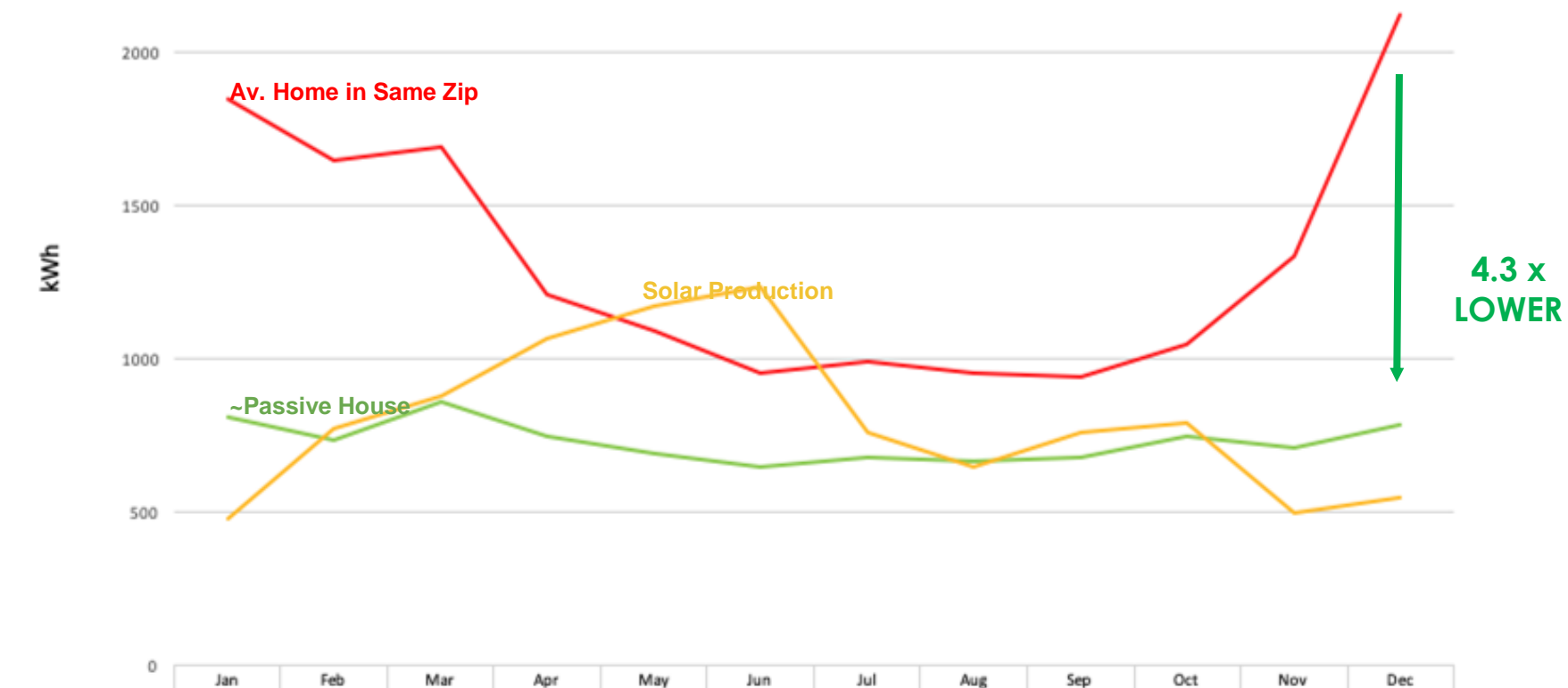
OVERALL: 24.9% better

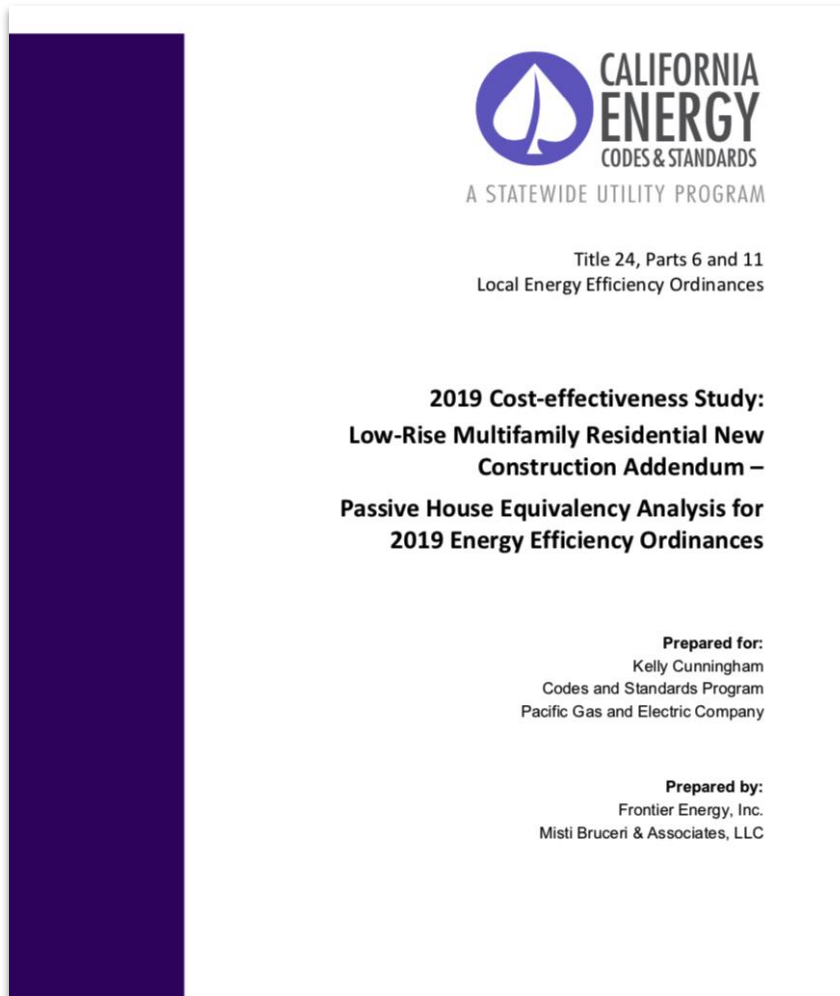
Specific building demands with reference to the treated floor area			
		Treated floor area	126.1 m <sup>2</sup>
Space heating		Heating demand	10 kWh/(m <sup>2</sup> a)
		Heating load	10 W/m <sup>2</sup>
Space cooling	Overall specif. space cooling demand		9 kWh/(m <sup>2</sup> a)
		Cooling load	6 W/m <sup>2</sup>
		Frequency of overheating (> 25 °C)	%
Primary energy	Heating, cooling, dehumidification, DHW, auxiliary electricity, lighting, electrical appliances		77 kWh/(m <sup>2</sup> a)
	DHW, space heating and auxiliary electricity		17 kWh/(m <sup>2</sup> a)
	Specific primary energy reduction through solar electricity		kWh/(m <sup>2</sup> a)
Airtightness		Pressurization test result n <sub>50</sub>	0.6 1/h



# ELECTRIFICATION + PASSIVE = BFF's

The best 'demand response strategy' is to  
**TOTALLY FLATTEN demand.**





## Reaching for a Passive House Code

California's Nascent Adoption Journey

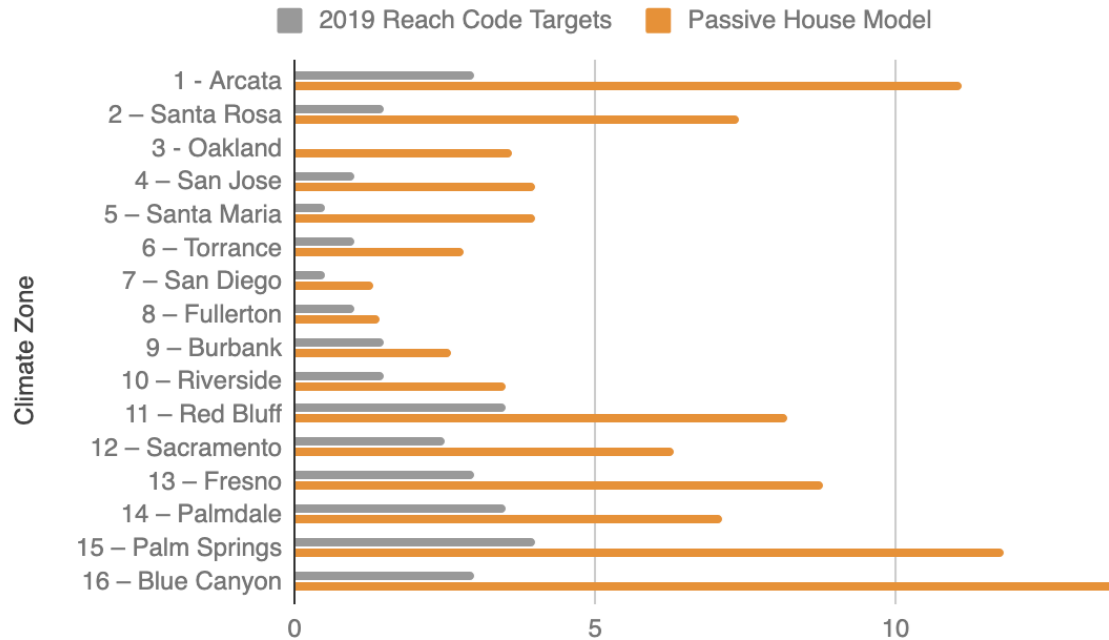


by Steve Mann  
Home Energy Services

- ❑ **Confirmed Passive House Planning Package (PHPP) energy model outputs** via the ASHRAE 140 protocol
- ❑ Initiated a **Low-Rise Multifamily Study** to compare Passive House with current code
- ❑ Worked with Santa Monica to initiate a **REACH CODE** Cost-Effectiveness Study

# CODES & STANDARDS CONFIRMED

## All-Electric Passive House Reach Code EDR Margin



- Confirms Passive House efficiency is a SIGNIFICANT IMPROVEMENT
- Supports Electrification
- Adds a CLEAR TARGET for Efficiency

All-Electric EDR Margin			
	2019 Reach Code Targets	Passive House Model	% Improvement
<b>1 - Arcata</b>	3	11.1	270%
<b>2 - Santa Rosa</b>	1.5	7.4	393%
<b>3 - Oakland</b>	0.00	3.6	NA
<b>4 - San Jose</b>	1	4	300%
<b>5 - Santa Maria</b>	0.5	4	700%
<b>6 - Torrance</b>	1	2.8	180%
<b>7 - San Diego</b>	0.5	1.3	160%
<b>8 - Fullerton</b>	1	1.4	40%
<b>9 - Burbank</b>	1.5	2.6	73%
<b>10 - Riverside</b>	1.5	3.5	133%
<b>11 - Red Bluff</b>	3.5	8.2	134%
<b>12 - Sacramento</b>	2.5	6.3	152%
<b>13 - Fresno</b>	3	8.8	193%
<b>14 - Palmdale</b>	3.5	7.1	103%
<b>15 - Palm Springs</b>	4	11.8	195%
<b>16 - Blue Canyon</b>	3	13.8	360%

# WHO ELSE IS ALREADY DOING THIS?

**CITY OF VANCOUVER** Jobs and careers 3-1-1 Guides

Green Vancouver Your government About Vancouver Parks, recreation, and culture Home, property, and development People and programs Streets and transportation Doing business

Find city information, services and more...

Home > Green Vancouver > Zero emissions buildings > Build a Passive House

**Green Vancouver**

- Greenest City Action Plan
- Renewable City Action Plan
- Zero emissions buildings**
  - Build a Passive House**
  - Building catalyst tools
  - Multi-family building energy resources and programs
- Zero Waste 2040
- Climate Change Adaptation Strategy
- Climate Emergency Response
- Neighbourhood Energy Strategy
- How we are greening City operations

## Build a Passive House

### How to get Passive House certification

Passive House certification is a quality assurance process determines whether a project meets all of the requirements of the Passive House standard.

It confirms that the building has been designed to achieve a level of occupant comfort and energy performance.

The primary criteria for achieving Passive House certification are:

- **Space Heat Demand:** Maximum 15 kWh/m<sup>2</sup>a or heating maximum 10 W/m<sup>2</sup>
- **Air Tightness:** Maximum 0.6 ACH @ 50 Pa (pressurizing, depressurizing)
- **Total Primary Energy Renewable (PER):** Maximum 60 kWh/m<sup>2</sup>a

Learn more about the [Passive House standard](#) and [certification process](#).

**City of Vancouver General Info:**  
<https://vancouver.ca/green-vancouver/build-a-passive-house.aspx>

British Columbia,  
CANADA

**NYC Housing Preservation & Development** 311 Search all NYC.gov websites

NYC Housing Preservation & Development

About Renter Owner **Developer** Vendor Community Sec. 8 Search

## Passive House

**About Passive House**

Passive House is a high performance building standard developed by the Passive House Institute (PHI) originally in 1990 and by the Passive House Institute US (PHIUS) in 2007.

Buildings certified to Passive House standards reliably provide reduction in energy needed for heating and cooling of up to 90%, and up to 75% reduction in overall energy use, compared to existing buildings. It focuses on passive measures and building components such as insulation, airtightness and heat recovery to provide tenants with superior quality residences, while increasing long term viability for building owners through lower utility bills.

Residents benefit from great indoor air quality, comfortable and even temperatures, significantly reduced energy bills and acoustically superior homes from reduced noise attenuation from neighbors and street noise.

### HPD Passive House Projects

HPD has completed a number of Passive House projects and have many others under construction or in development. See some of our built projects below.

Knickerbocker Commons Beach Green Dunes HANAC Corona Senior Residence

**NYC General Info:**  
<https://www1.nyc.gov/site/hpd/developers/passive-house.page>

NEW YORK STATE

**Residential New Homes and Renovations Initiative** D.P.U. 18-110 – D.P.U. 18-119  
 Three-Year Plan 2019-2021  
 October 31, 2018  
 Exhibit 1  
 Page 44 of 209

Passive House Incentives		
Incentives	Recipient	Details
Energy Subsidy	Owner	Cost-share of Warme Und Feuchte Instationar or Passive House Planning Package modeling costs or early feasibility study
Team Incentive	Architect, Design Team	\$/kWh and \$/therm incentives for projects achieving precertification and certification (if applicable)
Charrette	Architect, Design Team	Sustainability charrette incentive in either Programming and Schematic or Design Development design phases, directed to design team lead
Energy Subsidy	Owner	Adder per multi-family unit for achieving PHIUS or PHI certification
Energy Incentive*	Owner	\$/kWh and \$/therm incentives for savings where projects are performing more efficient than the User Defined Reference Home for the residential portion and Mass Save baseline for the commercial spaces.

actively working to include infiltration incentives for High Rise buildings to better quantify performance savings. The PAs are committed to changing the process by which savings are claimed to be a more whole building performance based approach for the offer. The PAs and DOER will work expeditiously with EM&V to pursue this change using Passive House certification modeling to quantify savings.

**Coordination**

A working group of residential and commercial sector experts from each Program Administrator collaborate to oversee the Low-Rise and Master-Metered/High-Rise strategies with the statewide lead vendor. The lead vendor provides the direct field support.

The lead vendor is responsible for developing and deploying training, education, and outreach efforts, as well as tracking and reporting program activity to each Program Administrator. The lead vendor has principal responsibility for recruiting and enrolling projects. Many Program Administrators maintain additional account representatives and field personnel that also help support project recruitment and maintain relationships with the target market and allies. HERS raters, as noted above, play a key role in the Low-Rise path for recruiting and enrolling projects.

**MassSave Program:**

44 <http://ma-eeac.org/wordpress/wp-content/uploads/Exh.-1-Final-Plan-10-31-18-With-Appendices-no-bulk.pdf>

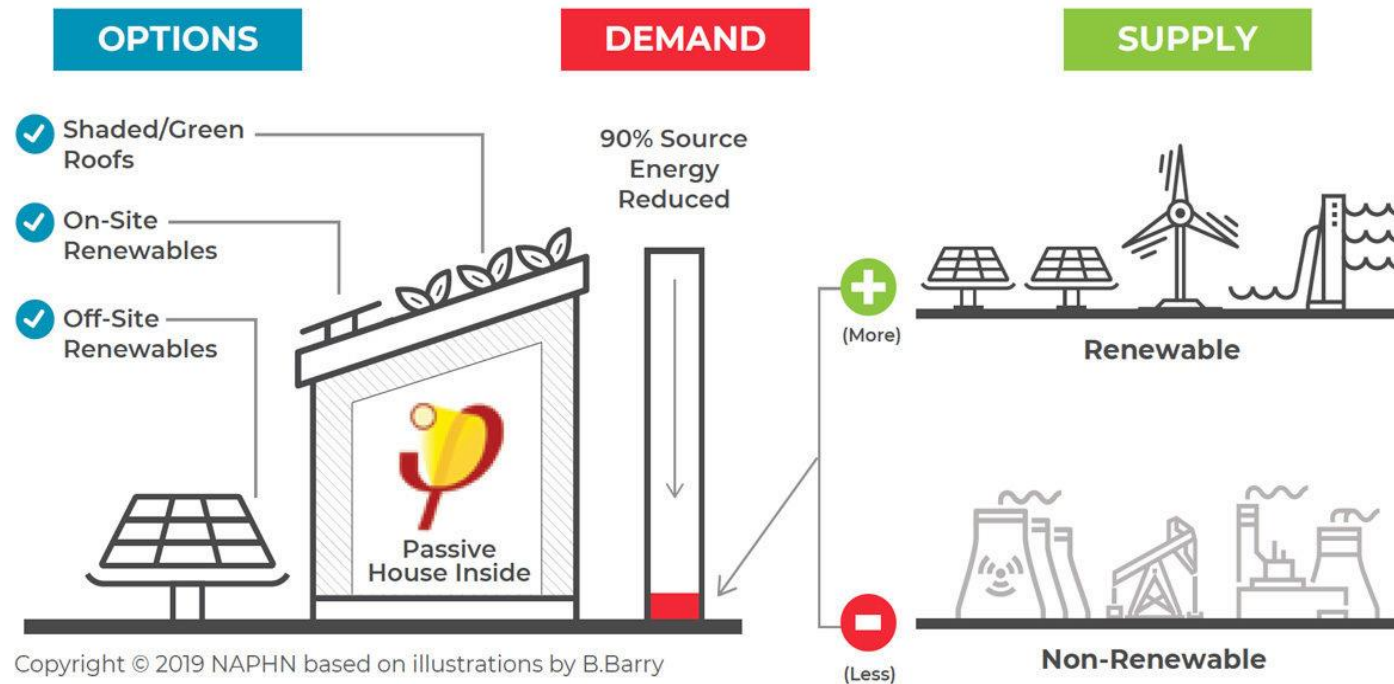
MASSACHUSETTS

# LET'S GET SPECIFIC to this Program?

- Fund ALL ELECTRIC ONLY certifications
- Allow PHPP energy model outputs to prevail (Decouple CBECC-RES – especially for MF)
- Ask for GHG reporting (let's use this to establish good benchmarking?)
- Consider supporting TRAINING



# CHOOSE YOUR FUTURE.... carefully!



Bronwyn Barry, RA, CPHD

bronwyn@naphnetwork.org  
@passivehouseBB



Thank You



# Q&A & Open Discussion

---

## Q&A Reminder:

- Submit questions in the Q&A box and specify a panelists, or slide number.
- Questions will be read aloud by Energy Division staff
- Participant will be unmuted for discussion and clarity. Afterwards the participant will be re-muted.



# Stretch Break

---

Please return at 11:15 AM for our next panel.



*Image Source: iamthinks.blogspot.com*





# MHP Panel Context

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D. 20-04-004, Ordering Paragraph 15:

“Within 180 days of the issuance of this decision, it is reasonable for ED, in cooperation with SED, HCD, the utilities and industry stakeholders, to convene a workshop to discuss mobilehome electrification topics across various Commission proceedings that are pursuing electrification goals.”

D. 20-04-004 also stated that:

“...it is reasonable explore a variety of solutions that parties propose to limit unreasonable MHP rent increases...” P. 99

# Southern California Edison (SCE) Electrification of MHPs

Stakeholder Workshop: On R.19-01-011 Phase II Staff Proposal and Mobilehome Park Electrification  
Topics and Economic Challenges  
(R.18-04-018, R.13-11-005, R.15-03-010, R.19-01-011)

September 15, 2020

# Agenda

- SCE Electric System Overview
- Background
- SCE's Existing MHP Conversion Program Design
  - What does the Current Design Accommodate?
  - How MHP Owners/Tenants Engage With The Project
  - How MHP Owners/Tenants Benefit From The Project
- Changes Necessary to Remodel/Retrofit Existing MHP to Accommodate some All-Electric Units
  - SCE's Unique Challenge for Electrification
  - MHP Owner/Tenant Unique Challenges for Electrification
- MHPs Impacted by Wildfires
- SCE's Recommendations
- Q&A

# SCE Electric System Overview

- SCE serves over 4.9 million electric customers in our 50,000 square mile service territory
  - Includes both master-metered submetered and non-submetered Mobilehome Parks (MHPs) in over 200 cities
    - Approximately 110,500 tenant spaces



# Background

- **Regulatory Directive:** D.20-04-004, Ordering Paragraph 15 directs within 180 days of the issuance of this decision, the Commission's Energy Division, in cooperation with the Safety and Enforcement Division, the California Department of Housing and Community Development, the utilities and industry stakeholders, shall convene a workshop to discuss Mobile Home electrification topics.
- **Goal:** Commission is committed to further understanding the legal issues and technical barriers of achieving full electrification in the Mobile Home building sector. (P. 92)
- **Scope:** "...Shall keep this proceeding open to explore the narrow issue of standardizing MHP 200 AMP electric service system upgrades "to the meter," and potentially "beyond the meter" from a cost, technical, legal, and public policy perspective." (P. 87)

# SCE's Current Design Practices

Energy for What's Ahead<sup>SM</sup>



# SCE's Existing MHP Conversion Program Design

SCE designs/sizes structures for 10 years out while Service and Cabling is sized based on loading with a minimum size of 1/0 AWG service cable and 350 secondaries. This meets the current requirements based on an electric and gas conversion.

- Transformers
  - Adequately sized for traditional gas and electric parks
- Meter Panels
  - Minimum service panel of 100 Amp<sup>1</sup>
  - Breaker sizes are installed like for like required by NEC code
  - Plug-in receptacles for home connections – 30/40/50 Amp; 120v/240v
- Cable/Conductor
  - SCE installs cabling based on a 5-year loading plan
  - Cable size calculations are based on ampacity, flicker, and voltage drop

# What Does The Current Design Accommodate?

- Load for existing gas and electric Mobilehomes
- Additional Incremental loads (e.g., Furnaces, A/C, and ancillary circuits)
- Current design practices may allow for the addition of 1-2 all electric units throughout the park per transformer.



# How MHP Owners/Tenants Engage With The Project

After a MHP has been selected to participate in the program, a representative from SCE and the gas utility will contact the park owner and assist with the following:

- Completing the detailed application and answering questions about construction, costs and other items
- Executing an agreement between park owner and partnering utilities to complete the project
- Coordinating construction planning
- Conducting onsite informational meetings with residents (Due to COVID, video presentations have replaced onsite meetings)
- Acquiring general construction permitting
- Performing construction project management

# How MHP Owners/Tenants Benefit From The Project

- Owner Benefits:
  - Enhanced safety and reliability
  - Peace of mind
  - Saves time and less hassle
  - Improves resident relationships
  - Majority of costs paid by the utilities
- Tenant Benefits:
  - Enhanced safety and reliability
  - Access to customer programs and services
  - Access to individual customer usage information via [sce.com](http://sce.com)

# SCE's Proposed Design Practices for Electrification

Energy for What's Ahead<sup>SM</sup>



# Changes Necessary to Remodel/Retrofit Existing MHPs to Accommodate some All-Electric Units

- Transformers
  - Potential upsizing to existing transformers
  - Potential to cut in additional transformers
- Meter Panels
  - Minimum service panel of 200 Amp
  - Breaker size should match the panel size
- Cable/Conductor
  - Service cable to be sized based on load schedule provided by homeowner
  - Service and Secondary Cable calculations based on ampacity, flicker, and voltage drop
- If the park is served by a 4kV/2.4kV system, an engineering review is required to determine available circuit capacity

# SCE's Unique Challenges for Electrification

- Retrofit wiring for older units will increase beyond-the-meter (BTM) cost (e.g., today units interior wiring are rated for 30-50 amps)
- 100 Amp panels may not have capacity to support an all-electric unit
- Feasibility of transformer/design and space
- Potential need to revamp/rebuild entire park – New Construction
- More transformer and/or line extension due to added load requirements
- Existing community electric grids may have to be upgraded (electrical system outside the mobile home park)
- Additional HCD permit required due to breaker size upgrade
- Cost increases due to added equipment

# MHP Owner/Tenant Unique Challenges for Electrification

- MHP Owner:
  - Retrofit wiring for older units will increase Beyond-the-Meter (BTM) cost (e.g., today units interior wiring are rated for 30-50 amps)
  - Potential out-of-pocket costs for MHP owner
  - Rate impacts
  - Obtaining 100% agreement from all MHP residents to convert all gas appliances may be unlikely
- Tenants:
  - Potential out-of-pocket costs for MHP Tenant
  - Bill impacts
  - Objection to electrifying the MHPs could hold up conversions
  - Rental units would require the approval of the homeowner to make modifications or replacements
  - Feasibility of entering homes to complete work
  - Cost of appliance replacements
  - Single unit solar options (e.g., typical mobilehome rooftops are 20 lbs. rated, must have a minimum of 30 lbs. in order to support solar, unless carport options exist)

# MHPs Impacted by Wildfires

- Villa Calimesa, located in Calimesa, California
- Mostly destroyed by the Sandalwood Fire
- 104 units affected
- Park owner plans to bring in all new units vs. individual unit owner replacement
- Status of ongoing rebuild efforts
  - Assessment site walk completed
  - Identified restoration of any damaged SCE facilities feeding the park
  - Planning efforts to begin once 80% of mobilehome units are set
  - Increased timelines before resident occupancy

## SCE's Recommendation

- SCE supports the Commission considering an electrification option which is consistent with our company position on the need for electrification to support state goals; however, SCE recommends the Commission consider the following issues related to electrification:
  - Policies (e.g., incentive layering) being developed under the Building Decarbonization Proceeding which may assist MHP Owners/Tenants to reduce cost
  - Increased safety, affordability and reliability as we work towards California clean air climate goals
  - Although retrofit viability is possible, determining who pays for the retrofits should be considered
  - Community outreach and workshops that help to identify and address owner/resident concerns such as: electric reliability (power outages and PSPS), increased electric bills, and owner/tenant potential out-of-pocket costs for rewiring and/or applicable upgrades to existing units.



## MHP Contacts

- Jeffrey Jenkins, MHP Manager, [Jeffrey.Jenkins@sce.com](mailto:Jeffrey.Jenkins@sce.com)
- Joni Key, MHP Regulatory Advisor, [joni.key@sce.com](mailto:joni.key@sce.com)

# Appendix

## Costs incurred in converting to all-electric?<sup>1</sup>

Referenced WMA's detailed cost analysis from the 2018 MHP Workshop:

- Adding a 200 AMP panel: \$1,500 to \$3,000
- Replacing appliances: Electric stove: \$320 to \$500 for conventional, \$1,000-1,500 for induction/convection
- Water heater: \$350-\$450 for resistance, \$2,000-3,000 for heat pump
- Furnace: \$500-\$1,000 for resistance, \$5,000-\$8,000 for heat pump (with AC)
- Rewiring HUD-compliant home for 200 AMP: \$12,000
- Replacing pre-HUD home (35% of mobile homes): More than \$60,000 for single-wide, more than \$110,000 for double wide
- Cost = \$10 to \$15 billion

1- [https://www.cpuc.ca.gov/uploadedFiles/CPUC\\_Public\\_Website/Content/Safety/Mobile\\_Home\\_Parks/MHP%20Electrification%20%20\(WMA\).pdf](https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/Mobile_Home_Parks/MHP%20Electrification%20%20(WMA).pdf)

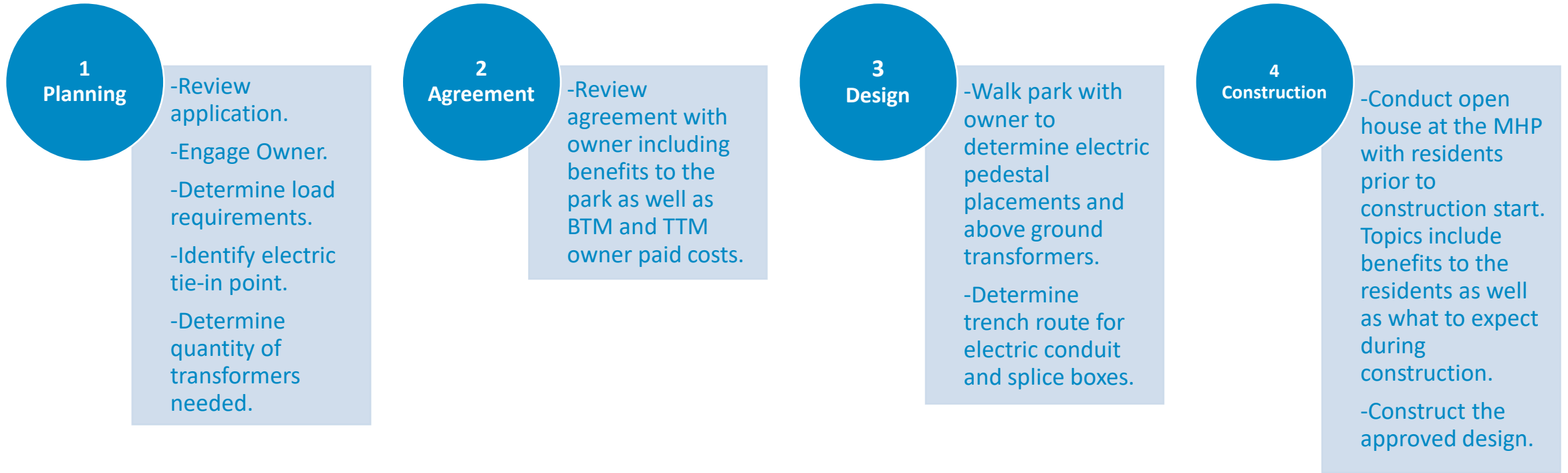
# PG&E MHP Electrification

CPUC MHP Decarbonization Workshop 9.15.2020





# To The Meter Electric MHP Conversion Process and Design Considerations

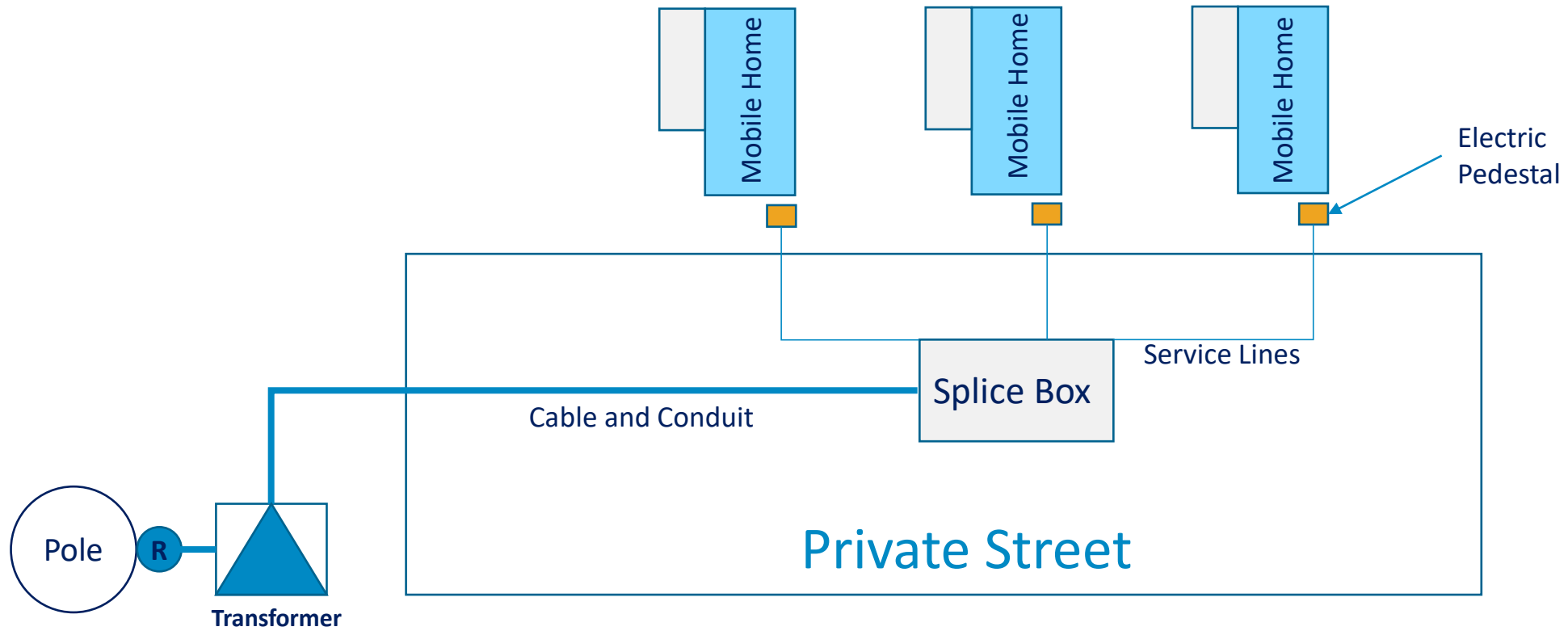


## Design considerations:

- Estimated residential load (location, historical use, park layout, and the number of mobile home spaces).
- Identify electric tie-in point.
- Install electric pedestals in the most cost efficient code compliant location.



# Electric Infrastructure for MHP Conversion





# Electrification Implications

## **To the Meter (TTM) changes:**

- Cost increase due to upsized electric infrastructure (cable, conduit, transformers, etc.).
- Cost reduction due to removal of gas conversion scope.

## **Challenges with park owner and resident acceptance:**

- Owners have revenue concerns about not providing gas service to residents.
- Residents may not want electric appliances, or construction/people inside their homes.

## **Parks that are potentially well suited for electrification:**

- Park owner wants all electric service.
- Park owner owns the mobilehomes in the park.
- MHP not currently served with natural gas and may be on a propane distribution system.



# Cost Comparison: 100A vs 200A

- MHP has 45 HCD permitted spaces.
- Difference between 100A and 200A is approximately \$18k.
- Difference per space is approximately \$407.

100A		
Mcode/Unit ID	Description	Total
M360153	2" Rigid Plastic Conduit DB-120	\$ 2,824.58
M294462	2C #1/0, Al, #2N	\$ 6,756.63
CTTM-CONGP-1	2" PVC cellular core conduit	\$ 5,925.00
		\$15,506.21
200A		
Mcode/Unit ID	Description	Total
M016471	3" Rigid Plastic Conduit DB-120	\$ 3,566.79
M294371	WI M294371 4/0-2/C W/ 1/0 NEUTRAL	\$ 9,902.80
	200A Pedestal Difference	\$ 7,255.35
CTTM-CONGP-2	3", DB120 conduit	\$13,114.00
		\$33,838.94

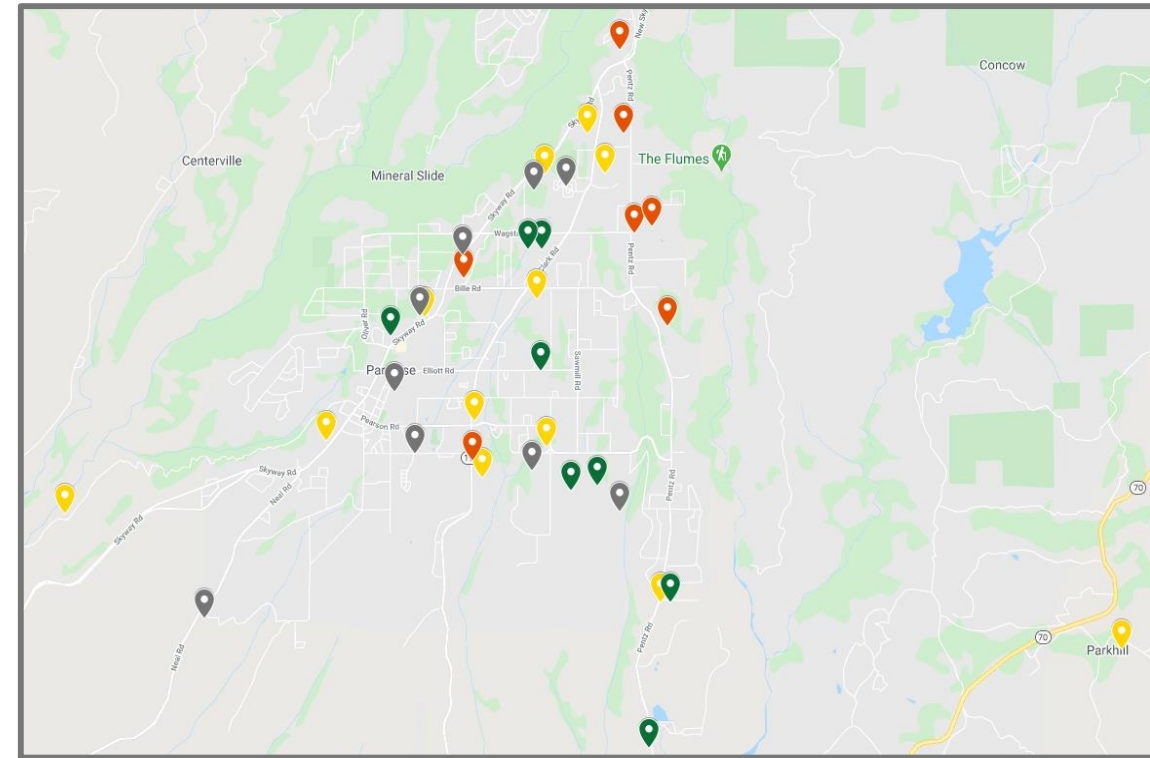




# Wildfire Impacts

## 2018 Camp Fire

- On November 8<sup>th</sup> 2018, 36 mobilehome parks (1,652 spaces) located in Paradise, Oroville and Chico were affected.
- PG&E filed AL-4116-G/5581-E in July 2019 to establish the Butte County Mobilehome Park Rebuild Program.
- PG&E has received 29 applications (1,305 spaces) to participate in the MHP Rebuild Program.
- PG&E's Customer Impact Team is reaching out to the remaining MHP owners.
- PG&E has completed construction on two mobilehome parks.
- Current portfolio has construction through Q2 of 2022.
- PG&E's service territory is currently facing wildfires which is a safety concern, and impacts construction schedules.





# The Untapped Potential of the Manufactured Housing Market

September 14, 2020

Nic Dunfee

Senior Project Manager

# Agenda



- Background
- The market
- Current standards
- ENERGY STAR V2
- NEEM+
- Savings potential

# What are we talking about?



- **Modular home**
- **Mobile home**
- **Manufactured home**
- **Pre-fabricated home**



# Modular Homes



**Modular home:** Similar construction methods to a site-built home except it is built in a factory and transported to the site, in pieces.

Typically must meet the same requirements/codes as its site-built counterpart, being built in the same jurisdiction.



SICA modular homes

# Mobile Homes



**Mobile home (trailer home):** factory-built housing units produced prior to 6/15/1976.



MobileHomeIdeas.com



MobileHomeIdeas.com

The Manufactured Home Construction and Safety Standards Act was passed in 1974 and went into effect in June of 1976, legally changing the term.

# Manufactured Homes



**Manufactured home:** factory-built housing units produced after 6/15/1976 under the HUD code. These homes are exempt from most local codes and building ordinances.



# HUD Standard



Since 06/17/1976 this red HUD certification label is required to be adorned to the exterior of each transportable unit of all manufactured homes



Manufactured homes are built entirely in factory affixed to a chassis with wheels



# Prefabricated Homes



**Prefabricated home:** All of the above

Any home that is built in a factory setting. Typically prefab homes are built in sections and assembled at the site.



Sfgate.com



Nsnews.com

# Manufactured Homes



**Manufactured home:**  
Today we are going to focus on  
manufactured housing.



Urban.org



Manufacturedhomes.com

# Manufactured Housing

## General Profile

**22 million**

people live in  
manufactured homes

**10%**

of new single-family  
home starts

**\$71,900**

average new home  
sales price

**\$30,000**

median household  
income

**77%**

of new manufactured  
homes titled as personal  
property (chattel)

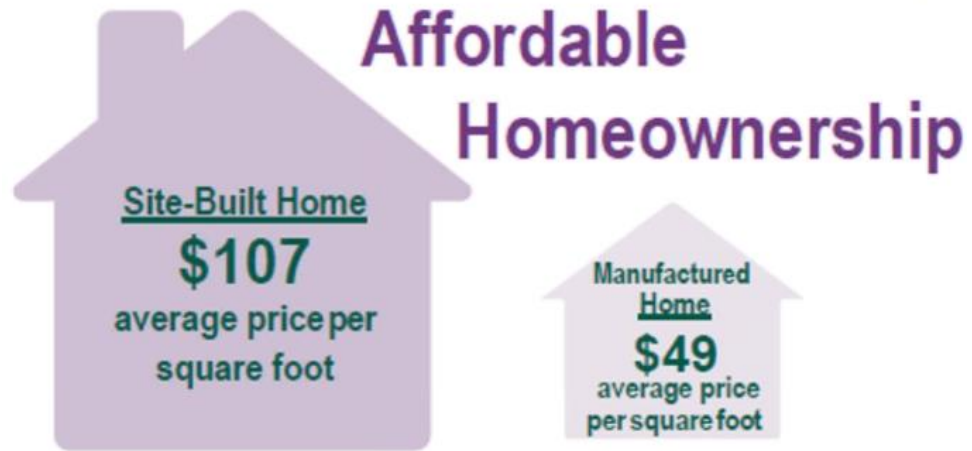


Source: US Census Bureau and MHI, 2018

# Manufactured Housing



## More Affordable



- Affordability is due to the efficiencies of the factory-building process benefitting from the economies of scale
- Can cost up to 50% less per sq. ft. than conventional site-built homes

## Faster Construction Timeline

- Site work can happen while home is being built in the factory

## Less Wastage

- Since these are factory built, the waste can be set aside as scrap and can be re-used in other projects

## Flexible Size and Aesthetic

- Many options available when it comes to design, layout and size

# Manufactured Housing in California



- ~ 4,000 units delivered across the state in 2019
  - ~50% all-electric (resistance)
- ~3.5% of all CA housing
  - ~85% owner occupied

Chart 1: Average Sales Price of New Manufactured Homes by Size of Home in the Western Region 2018-2019

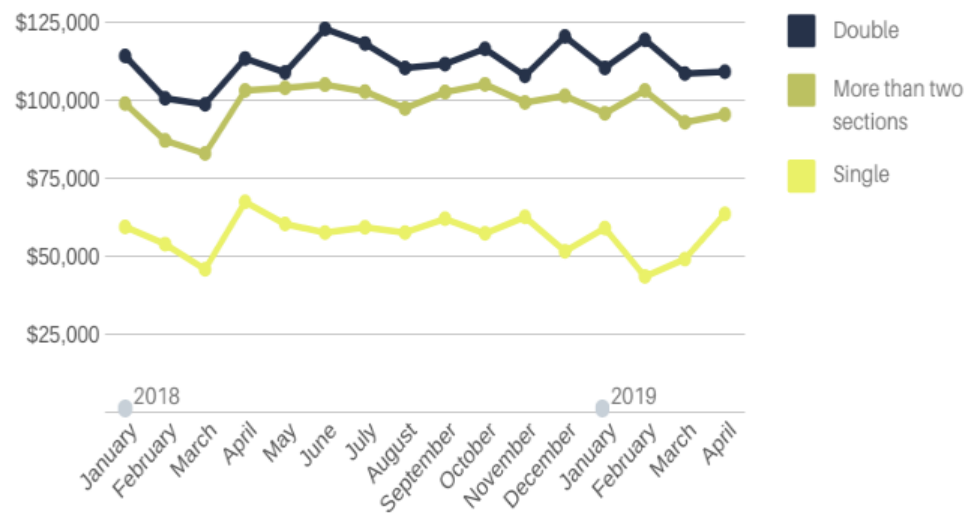
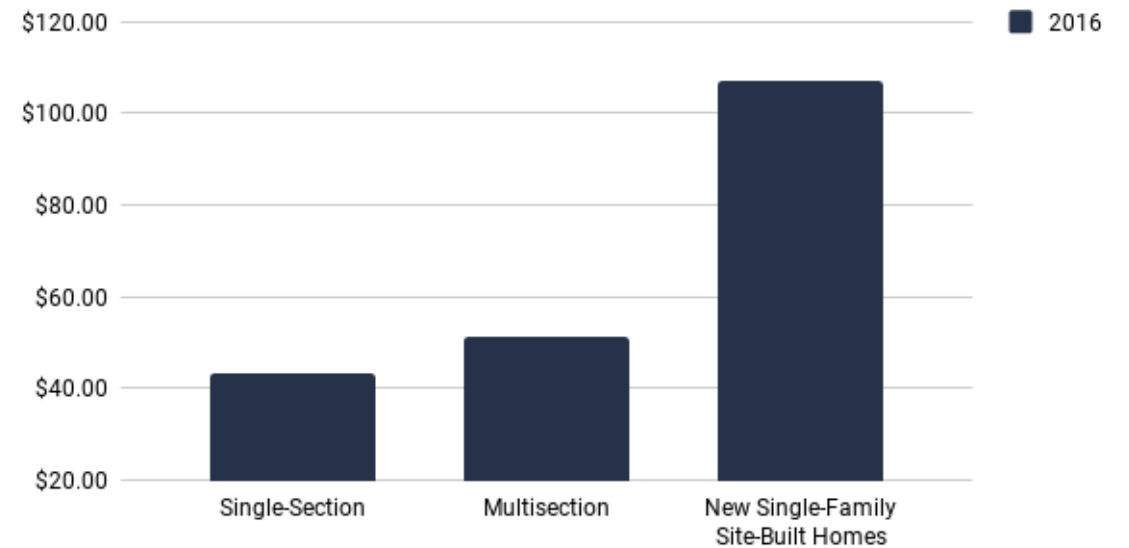


Chart 3: Cost Per Square Foot Comparisons of New Manufactured & New Single-Family Site-Built Homes



# Issues driving the market



**Housing Crisis:** Rapidly growing population coupled with the cost of housing



ABCNewsGo.com



Minnesota.CBSLocal.com

**Natural Disasters:** Following natural disasters, homeowners are choosing to purchase a MH as opposed to rebuilding on-site.

# HUD Standards



- Governs the standards for manufactured housing for all of the United States
- The Standards covers Body and Frame Requirements, Thermal Protection, Plumbing, Electrical, Fire Safety and other aspects of the home
- Last updated in 1993



# HUD Standards



- Exempt from **most** local and/or state building codes
- Require the home be permanently affixed to a chassis and fully constructed in the factory
- **Last updated in 1993!!**



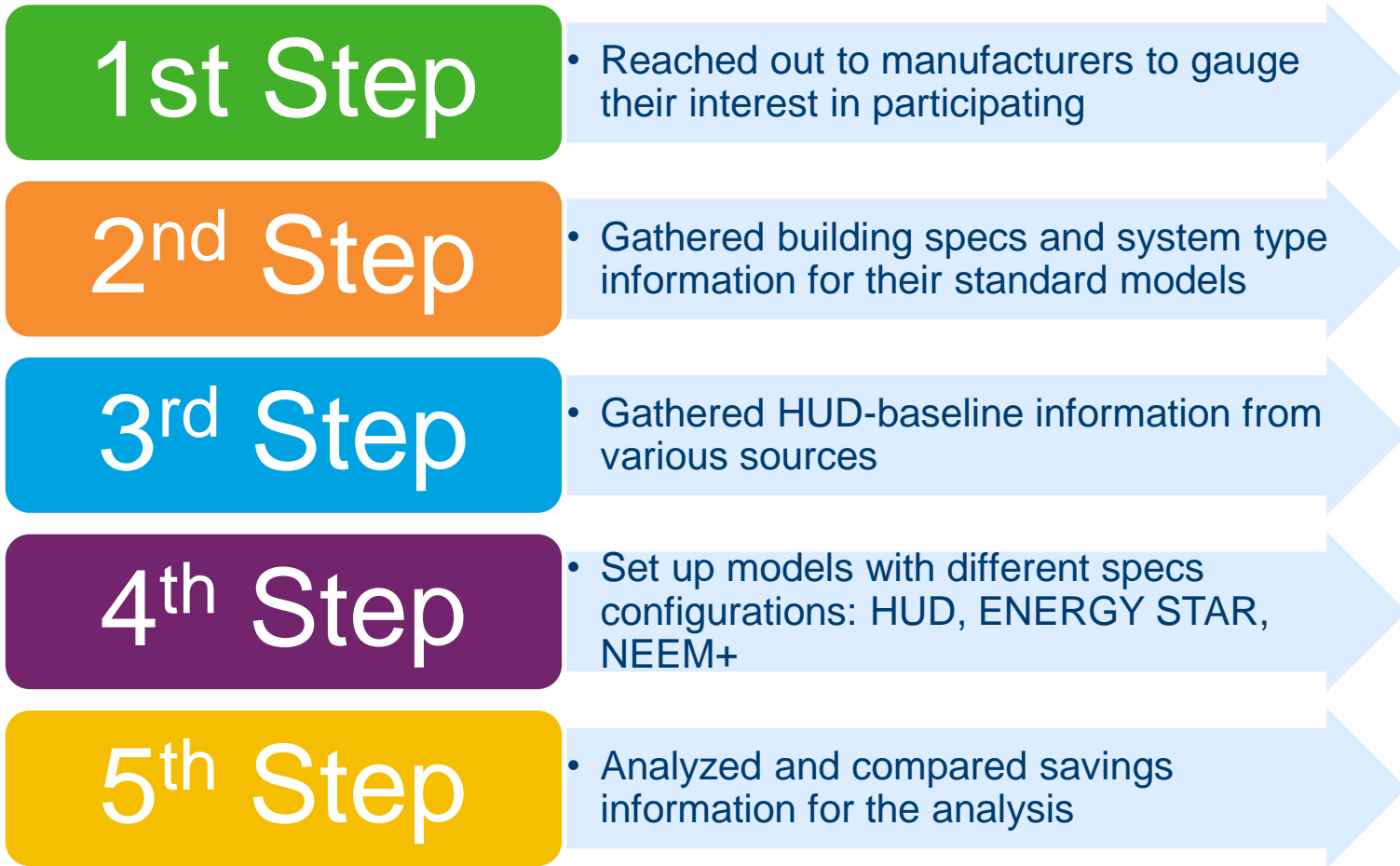


# HUD vs CA Title 24



<ul style="list-style-type: none"><li>• Scope: All states in the US</li><li>• Consists of 3 Thermal Zones (TZ) <i>CA is in TZ-2</i></li></ul>	<ul style="list-style-type: none"><li>• Scope: California only</li><li>• Consists of 16 Climate Zones within CA alone</li></ul>
<ul style="list-style-type: none"><li>• Code-minimum U-value for the envelope is listed as combined entity</li><li>• U-Value max for envelope in CA is 0.096</li></ul>	<ul style="list-style-type: none"><li>• Every part of the building envelope has its own U-value code requirement</li></ul>
<ul style="list-style-type: none"><li>• System efficiency is addressed as ranges, which depend on the sizes and usage patterns</li></ul>	<ul style="list-style-type: none"><li>• System efficiency is fixed according to the types and input ratings.</li></ul>

# Research Analysis



# HUD Requirements



Measures	HUD Thermal Zone 2 (All-Electric)	HUD Thermal Zone 2 (Mixed Fuel)
All-Electric	Yes	No
Ceiling	R-22	R-22
Floor	R-22	R-22
Wall	R-11	R-11
Window U-Value/SHGC	0.48/0.32	0.48/0.32
Ducts, Crossover	R-4	R-4
Heating System	Electric Forced Air Furnace	Gas Furnace; $\geq 0.80$ AFUE
Cooling System	Central AC; 13 SEER, 11 EER	Central AC; 13 SEER, 11 EER
Domestic Hot Water	Resistance 0.95 EF	Gas 0.62 EF
Ventilation	N/A	N/A
Cooking Fuel Type	Electric	Gas
Dryer Fuel Type	Electric	Gas

California HUD Code Requirements - All-Electric vs. Mixed Fuel

# Issues with Moving to More Efficient MH



- Manufacturers are averse to changing the process
  - Holds up assembly line
  - Requires retraining of staff
- Nationwide standard designs
- National, long-term procurement contracts



Claytonhomes.com

# Issues with Moving to More Efficient MH



- No standardized process across manufacturers or sometimes even factories



Howtolookataouse.com



Mobilehomeliving.org

# Energy Star V2 Requirement



Measures	E STAR V2 aka NEEM 1.1 <sup>1</sup>	E STAR V2 aka NEEM 1.1 <sup>1</sup>	E STAR V2 aka NEEM 1.1 <sup>1</sup>
<b>Fuel</b>	<b>All-Electric</b>	<b>All-Electric</b>	<b>Mixed-Fuel</b>
<b>Ceiling</b>	R-40	R-40	R-40
<b>Floor</b>	R-33	R-33	R-33
<b>Wall</b>	R-21	R-21	R-21
<b>Window U-Value/SHGC</b>	0.34/0.32	0.34/0.32	0.34/0.32
<b>Ducts, crossover</b>	R-8	R-8	R-8
<b>Heating system</b>	Electric Forced Air Furnace	Heat Pump, 13 SEER, 8.0 HSPF	Gas Furnace; ≥0.80 AFUE
<b>Cooling system</b>	Central AC; 13 SEER, 11 EER	Heat Pump, 13 SEER, 8.0 HSPF	Central AC; 13 SEER, 11 EER
<b>DHW</b>	Resistance 0.95 EF	HPWH 2.0 EF	Gas 0.62 EF <sup>2</sup>
<b>Ventilation</b>	Whole house fan	Whole house fan	Whole house fan
<b>Cooking Fuel Type</b>	Electric	Electric	Gas
<b>Dryer Fuel Type</b>	Electric	Electric	Gas

## Thermostat & Ductwork

- Programmable thermostat shall be installed.
- Ducts in floor cavities shall be enclosed by floor insulation. Ducts in attics shall be fully buried in attic insulation.
- Crossover ducts and other ducts in unconditioned space shall be insulated to R-8.

# NEEM+ Standards



NEEM ver. 2.0, branded as ENERGY STAR with NEEM+	
<b>Reference Path Insulation</b>	
Ceiling	R-44 (or R-40 with improved floor)
Walls	R-21 Intermediate framing w/insulated headers
Floor	R-33 (or R-33/52 with R-40 ceiling)
Windows	U-0.25 (or U-0.28 w/ added insulation)
Skylights	U-0.50
Entry Doors	U-0.19
Overall Average U-value	0.049
<b>Building Tightness</b>	4.0 ACH @ 50 Pa, via expanded air sealing measures

<b>HVAC Measures</b>	
Duct System	Mastic, 0.06 CFM50/ft3 total
Crossover duct	R-8, elbows, tensioned straps
Thermostat	Wi-Fi Connected "Smart"
Whole house ventilation	17 Watts, <1 Sone
<b>Lighting</b>	LED Throughout
<b>Appliances, ENERGY STAR</b>	Dishwasher and Refrigerator
<b>Moisture Management</b>	Building wrap & door/window flashing

# Split-Commodity Savings



California Climate Zone 12	HUD	Energy Star V2	E STAR V2 with NEEM+	E STAR V2 with NEEM+ (High eff eqpt)
<b>Fuel Selection</b>	Split-commodity	Split-commodity	Split-commodity	Split-commodity
<b>Noteworthy features</b>	Fed min equipment	Fed min equipment, WHF	Fed min equipment, WHF	HEF, 14 SEER split AC, Instant DHW, WHF
<b>Avg kWh Proposed</b>	4,721	4,585	4,530	4,496
<i>Change in kWh</i>	-	-136	-191	-225
<b>Avg therms Proposed</b>	380	301	292	231
<i>Change in therms</i>	-	-80	-89	-149
<b>Avg kW Proposed</b>	2.51	2.26	2.17	2
<i>Change in kWh</i>	-	-0.25	-0.34	-0



# All-Electric Savings

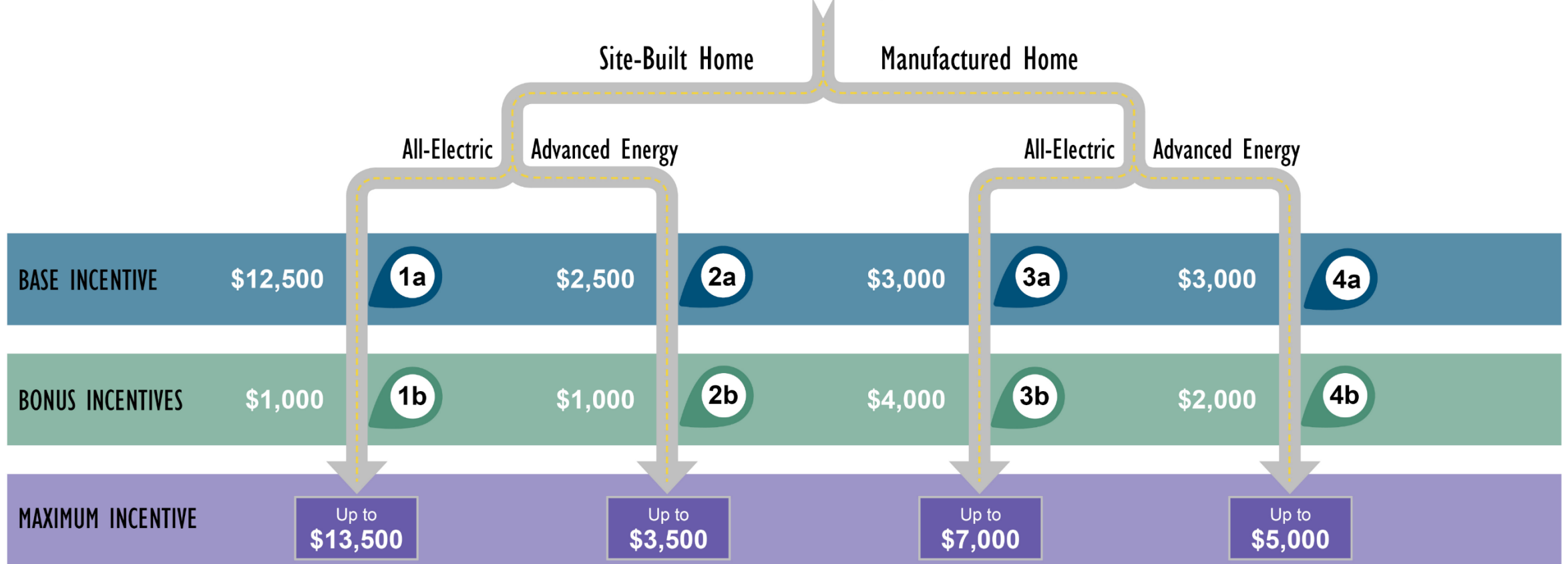


California Climate Zone 12	HUD	Energy Star V2 (Resistance)	Energy Star V2	E STAR V2 w/ NEEM+ (Resistance)	E STAR V2 with NEEM+	E STAR V2 with NEEM+	E STAR V2 with NEEM+ (Resistance)
<b>Fuel Selection</b>	All-Electric	All-Electric	All-Electric	All-Electric	All-Electric	All-Electric	All-Electric
<b>Note-worthy features</b>	Resistance heating, ER DHW	ER Heating, ER DHW, WHF	HP HVAC, HPWH, WHF	ER Heating, ER DHW, WHF	HP HVAC, HPWH, WHF	Mini-split HP HVAC, HPWH, WHF	Mini-split HP HVAC, ER DHW, WHF
<b>Avg kWh Proposed</b>	12,783	10,538	7,879	10,277	7,729	7,673	8,938
<b>Change in kWh</b>	-	-2,245	-4,904	-2,506	-5,053	-5,109	-3,845
<b>Avg kW Proposed</b>	2.80	2.59	2.36	2.50	2.26	2.18	2.47
<b>Change in kWh</b>	-	-0.21	-0.44	-0.30	-0.54	-0.62	-0.33

# Current Program Pathways



## 2020 AER Program



# Financial Incentives



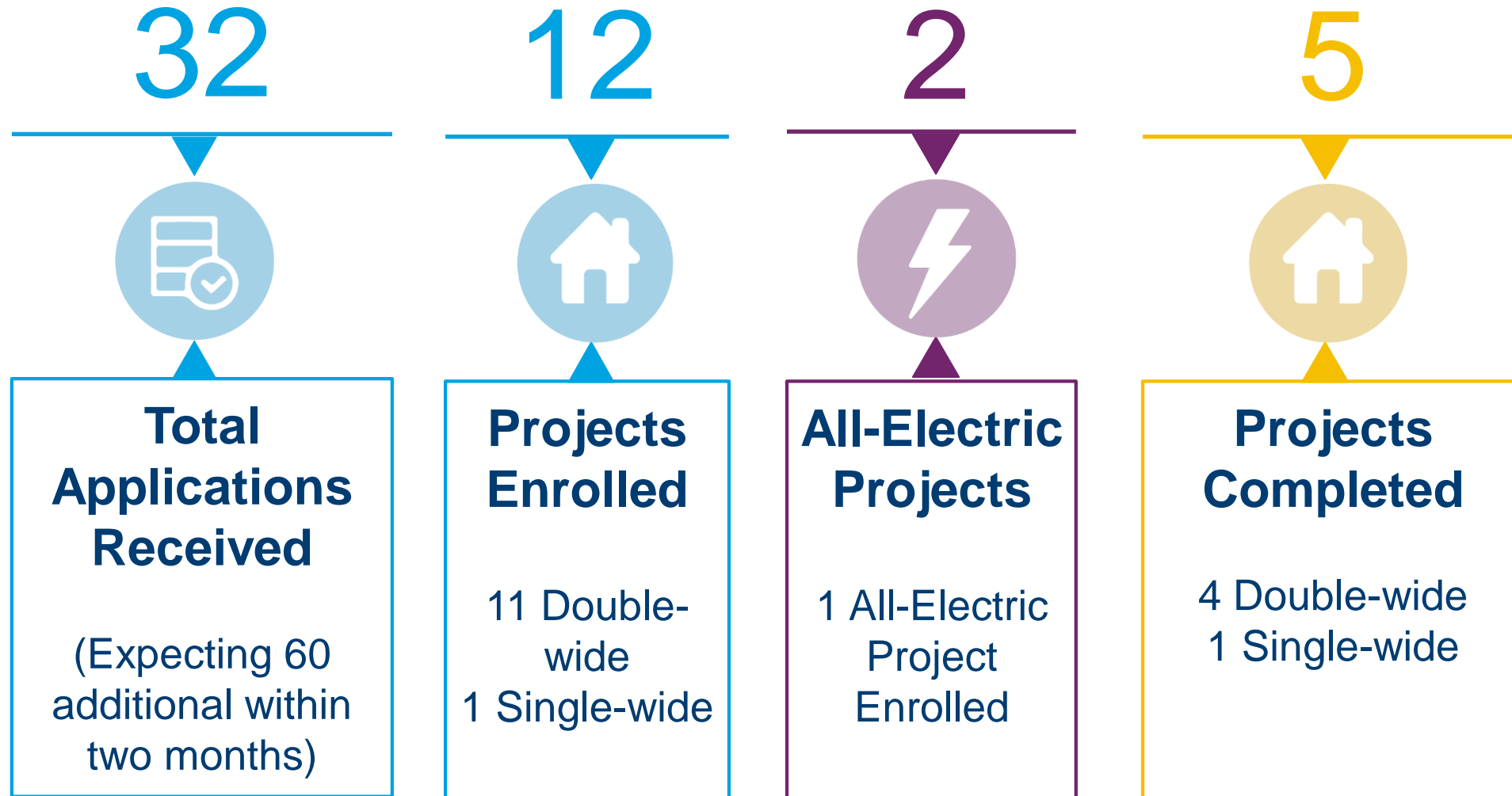
Project Type	Advanced Energy Home	All-Electric Home	Bonus for Battery Storage
Single Family Home, Duplex, or Townhome	\$2,500	\$12,500	\$1,000
Accessory Dwelling Unit (ADU)	\$1,250	\$6,250	\$500

Table 1. Site-built Home and ADU Incentives

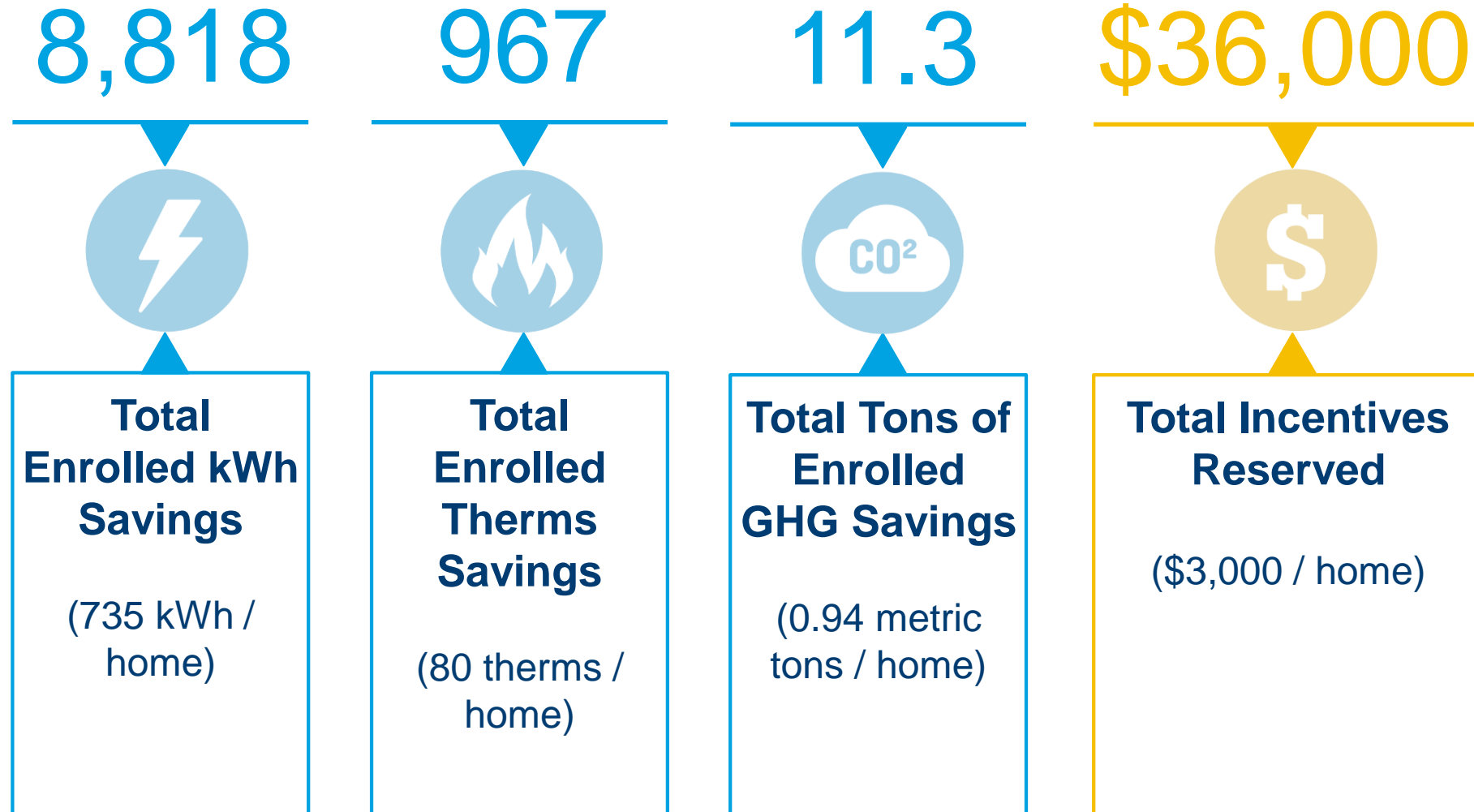
Project Type	ENERGY STAR V.2	Bonus for NEEM+	Bonus for Battery Storage	Bonus Options for All-Electric Homes		
				Heat Pump HVAC	Heat Pump Water Heater	Induction Cooking
Single Family Home, Duplex, or Townhome	\$3,000	\$1,000	\$1,000	\$500	\$1,000	\$500
Accessory Dwelling Unit (ADU)	\$1,500	\$500	\$500	\$250	\$500	\$250

Table 2. Manufactured Home Incentives

# AER Manufactured Homes Program Statistics



# AER Manufactured Homes Program Statistics



# Financing Opportunities



- Freddie and Fannie have MH offerings
  - Freddie – Choice Home Mortgages
  - Fannie – MH Advantage



FannieMae.com

# What's next?



- Lots of research going on and funding opportunities available
  - Disaster Resiliency
  - Advanced Efficiency
- New factories are planned to keep up with demand
- Programs' Opportunity

# Mobile Homes in the San Joaquin Valley

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ABIGAIL SOLIS  
SUSTAINABLE ENERGY SOLUTIONS  
SELF-HELP ENTERPRISES

MOBILE HOME PARK ELECTRIFICATION  
TOPICS AND ECONOMIC CHALLENGES  
R 18-04-018



# Mobile Homes Across the State

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## California

350,000 – 450,000 spaces in mobile home parks

Located in urban and rural areas

Usually require maintenance and upkeep



## San Joaquin Valley

Rural, unincorporated communities have more mobile homes than other areas

Low income, disadvantaged communities have more mobile homes

Few mobile homes are in mobile home parks

Most mobile homes are on single lots

Some lots have 2-3 mobile homes

Maintenance not required

# Tulare County

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## **Mobile Homes**

Unincorporated Tulare County 14.5 % Mobile Homes

## **Home Conditions**

Unincorporated Tulare County

Deteriorated 45%

Dilapidated 10%

## **Poverty**

Tulare County 23.8 % of families live below the poverty level

Unincorporated Tulare County 30.8% average

In some areas that increases to over 50%

# Fresno County

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## **Mobile Homes**

Fresno County 4.7% Mobile Homes

Unincorporated Fresno County 11.3 % Mobile Homes

## **Home Conditions**

Almost 70% of the housing stock in Unincorporated Fresno County is over 30 years old

## **Poverty**

Fresno County 19.5 % of families live below the poverty level

In some Fresno County Unincorporated Communities that increases to over 51 %

# Allensworth and West Goshen

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## Allensworth

85% of SJV Applications are for mobile homes

### Home Conditions

13% Sound

38% Deteriorated

50% Dilapidated

## West Goshen

58% of SJV Applications are for mobile homes

### Home Conditions

23% Sound

77% Deteriorated

SJV Pilot Communities  
with the most mobile homes



# Lessons from MH in SJV Pilot Project

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- Many lack insulation to keep home warm/cool
- Old inefficient doors and windows
- Whole house swamp coolers are old and broken
- Many use an evaporative window cooler
- Old furnace/heater is inefficient or broken heater
- Many use a plug in space heater
- Many experience extreme indoor heat/cold



# Energy Use and Costs

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Mobile homes in deteriorated and dilapidated conditions are not energy efficient

Families may experience:

- Higher energy cost
- Curtailing energy
- Hazard/Safety issues

Energy efficiency measures and some home repairs can help lower energy cost

Leveraging other technologies like Solar Thermal Water Heating can help lower energy cost



# Housing Affordability and COVID-19

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There are many low income families in the SJV

More low income families live in unincorporated areas

Unincorporated areas have more mobile homes

Unincorporated areas have more renters

COVID-19 causes increased housing insecurity in SJV and across the State

- Job loss
- Threat of eviction
- Higher utility bills
- High cost to feed family



# SJV Pilot Tenant Protections Landlord – Tenant Agreement

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## Rent Increases

For 5 years Property Owner will not increase rent by more than 3.6% per year  
may increase only due to an increase in property taxes, operating and maintenance costs, or amortizing costs of other improvements

## Evictions

For 5 years the Property Owner will not evict any tenant from the dwelling unless:  
The tenant has failed to pay rent  
The tenant has violated the lease  
The tenant has used the property for illegal purposes  
The property owner or immediate family member reoccupies the property

## Remedies and Enforcement

- a. The Community Energy Navigator will have the authority to investigate complaints made by the tenant and conclude if the property owner violated the agreement.
- b. If agreement is breached the Property Owner will not be eligible for future participation in the San Joaquin Valley Affordable Energy Project.
- c. The Parties acknowledge that the tenant is the intended beneficiary of the agreement and shall have a private right of enforcement.

## SJV Participation

Agreement has not caused a major barrier in participation  
Landlords see the value in participation  
Very small percentage have declined to sign



Abigail Solis  
Self-Help Enterprises  
[abigails@selfhelpenterprises.org](mailto:abigails@selfhelpenterprises.org)  
559-802-1659

Thank you



# Q&A & Open Discussion

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## Q&A Reminder:

- Submit questions in the Q&A box and specify a panelists, or slide number.
- Questions will be read aloud by Energy Division staff
- Participant will be unmuted for discussion and clarity. Afterwards the participant will be re-muted.



# Stakeholder Workshop: Building Decarbonization Phase II Staff Proposal and Mobilehome Park Electrification and Tenant Protection Topics

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**Lunch Break**

**Please return at 1:30 PM.**

For those just joining please note we are behind schedule.

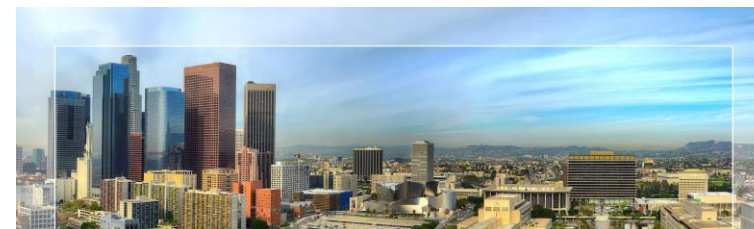


# Electric Water Heating Baseline Context

The Building Decarbonization Assigned Commissioner's Scoping Memo and Ruling issued May 17, 2019, asked:

“What policies, rules, and procedures should the Commission adopt to facilitate the decarbonization of buildings?”

- BDC identified rate adjustments both baselines and designs as a key consideration to ensure customers a good value for adopting electrification measures.
- Staff identified over \$400 million of electrification funding spread across multiple proceedings and programs.



A ROADMAP  
TO DECARBONIZE  
CALIFORNIA BUILDINGS



Source: <http://www.buildingdecarb.org/archived/a-roadmap-to-decarbonize-californias-buildings#:~:text=In%20A%20Roadmap%20to%20Decarbonize,buildings%20by%202025%20and%202027>



# Building Decarb Phase 2 Workshop: Electric Water Heating Baseline Allowance Adjustment



September 15, 2020





# Baseline Statute

- Current statute (Public Utilities Code Section 739):
  - “The commission shall designate a baseline quantity of gas and electricity which is necessary to supply a significant portion of the reasonable energy needs of the average residential customer”
  - “The baseline rates shall apply to the first or lowest block of an increasing block rate structure which shall be the baseline quantity.”
  - “[T]he commission shall ensure that the rates are sufficient to enable the electrical corporation or gas corporation to recover a just and reasonable amount of revenue...while observing the principle that electricity and gas services are necessities, for which a low affordable rate is desirable”





# Basic vs. All-Electric Baselines

- “Baseline quantity” means:
  - For gas customers and for all-electric customers, 60 to 70 percent of average residential consumption during the winter heating season
  - 50 to 60 percent of average residential consumption for all other customers, and for gas and all-electric customers in the summer
- “All-electric customers” are residential customers having electrical service only or whose space heating is provided by electricity, or both





# All-Electric Enrollment

IOU	Basic Service Customers*		All-Electric Customers*		All-Electric Customers with Natural Gas Service**	
	Count	Percent	Count	Percent	Count	Percent of All-Electric
PG&E	3,457,476	84.0%	657,059	16.0%	111,143	16.9%
SDG&E	1,021,577	78.2%	285,199	21.8%	44,500	15.6%
SCE	3,972,911	88.8%	502,393	11.2%	N/A	N/A

\* Average customer counts in calendar year 2019

\*\* As of August 10, 2020 for PG&E and July 2020 for SDG&E







# Essential Usage Study

- Joint-IOU study scoped in the PG&E GRC Phase II
- IOUs' stated purpose for EUS: evaluate reasonableness of current baselines (some parties disagree with this)
- Change in statute will be needed to adjust baseline methodology if desired
- Study will use a bottom-up approach based on usage profiles of specific end-uses and on a forthcoming appliance saturation study (RASS)
- Specific customer segments – NEM, CARE/FERA, Medical Baseline
- Climate zones – hot, warm, and cool





# Staff Proposal

- Direct IOUs to offer a baseline allowance for electric water heating equipment
  - Allowance should be available to basic and all-electric customers
  - Modification should be part of next GRC Phase II or RDW application
  - IOUs should also file Tier III advice letters to implement interim baseline allowance since next GRC/RDW opportunity may be years away
- Implement additional screening process for new customers seeking all-electric baseline to ensure they do not use propane to supplement electricity (unless they have electric space heating equipment)





# Implementation Considerations

- IT system upgrades in the near-term may complicate implementation for SCE and SDG&E
  - Both IOUs are currently upgrading billing systems which will require a period of stabilization in early 2021
  - Baseline allowance modifications may require manual implementation until stabilization period is complete



# Baseline Allowance Modification

R.19-01-011 Building Decarbonization Phase II OIR

Southern California Edison

Hank Elgin

September 15, 2020

# Background

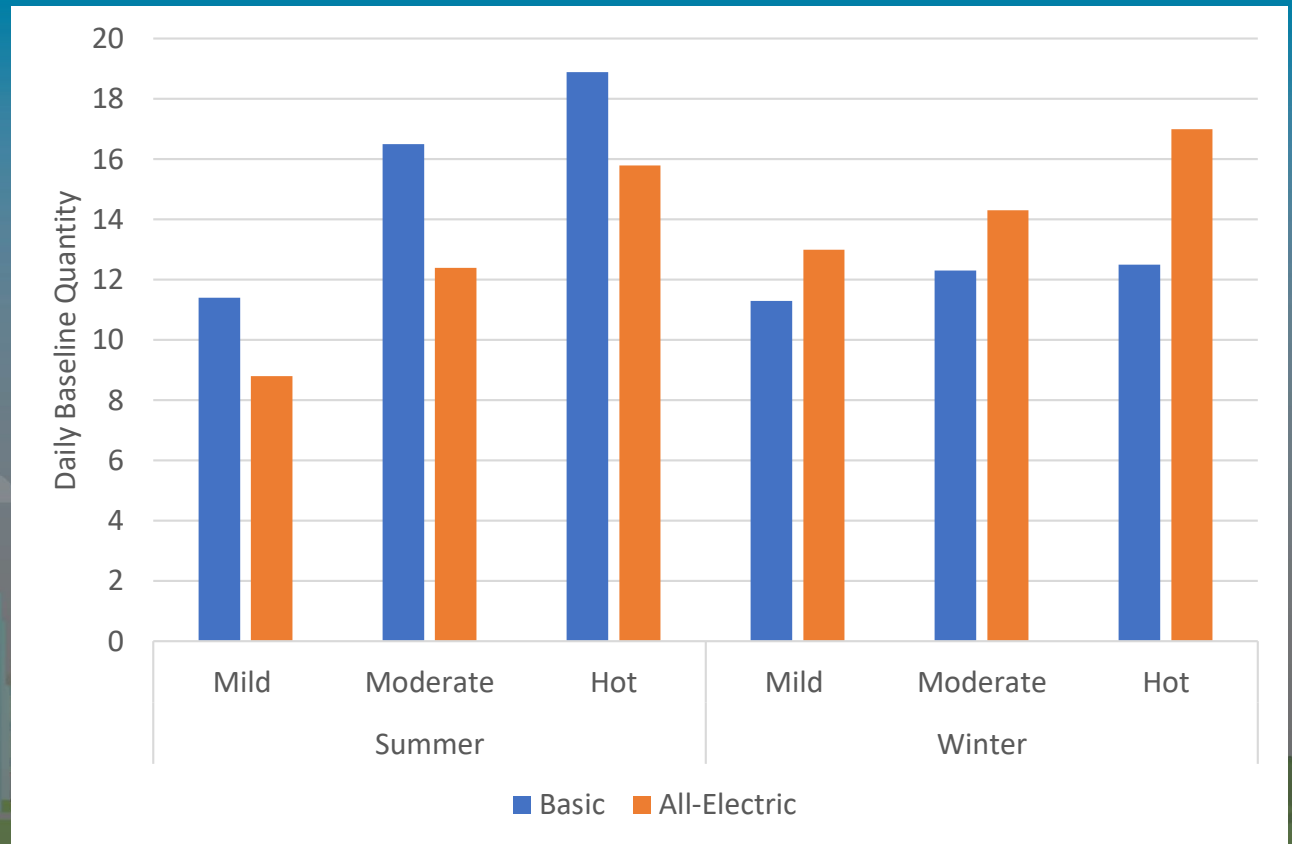
- SCE conducted a study on the applicability of all-electric baseline to customers with heat pump water heaters.
  - Initiated by SCE's 2018 GRC Phase 2 settlement agreement (D.18-11-027).
  - Filed in SCE's 2019 Rate Design Window (A.19-12-008).
- California Public Utilities Code Section 739 establishes separate baseline quantities for Basic customers (those with both electric and gas service) and for All-electric customers. Eligibility for baseline quantities is set by the statute.
  - Customers are eligible for All-electric baseline quantities if they:
    - 1) have electric service only
    - 2) have electric space heating

The Basic customers have baseline quantities “based on from 50 to 60 percent of average residential consumption” whereas the All-electric baseline quantities are “established at 60 to 70 percent of average residential consumption during the winter season.”

- The Baseline statute also provides for an additional standard allowance, commonly referred to as Medical Baseline, for residential customers dependent on life support equipment or who are being treated for a life-threatening illness or have a compromised immune system.

# Current Seasonal Baseline Quantities

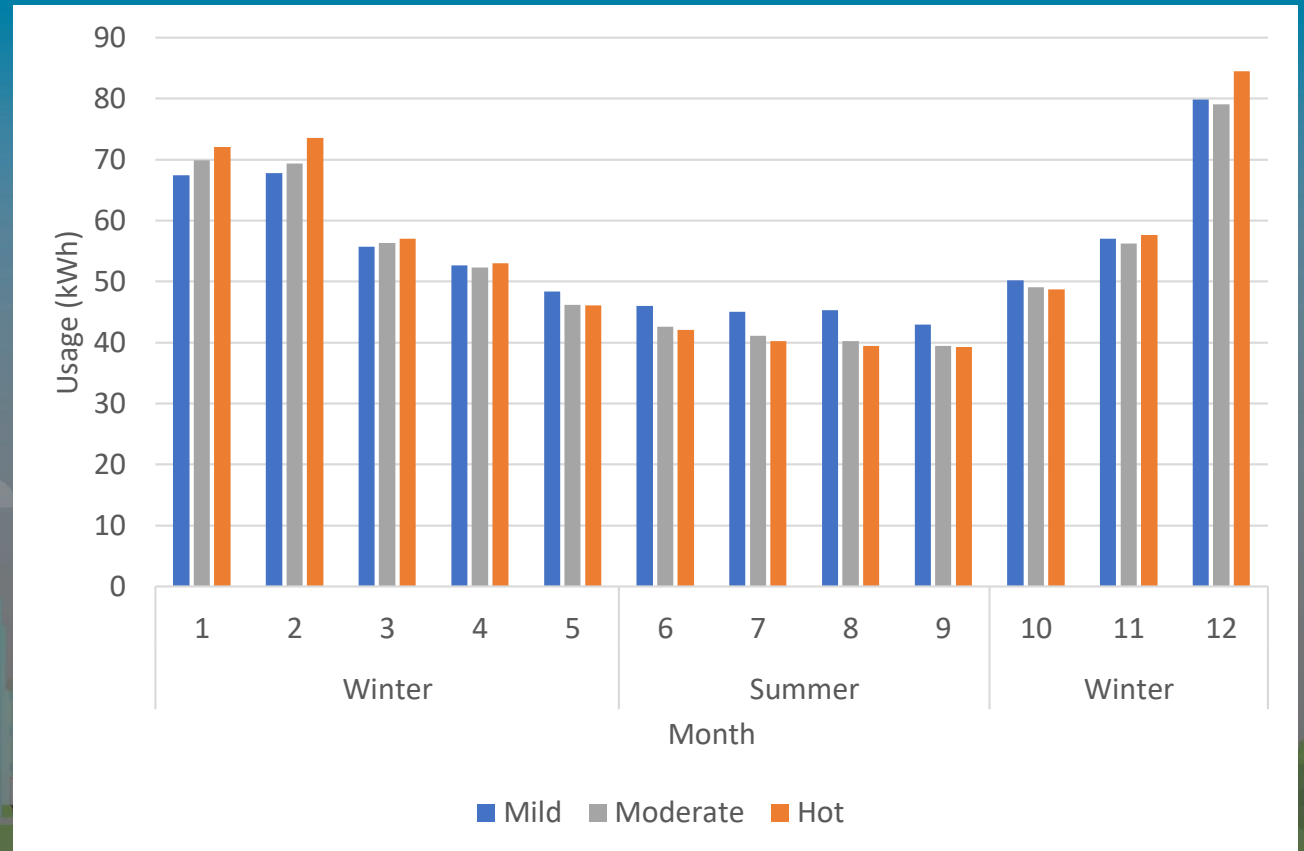
- Baseline quantities are computed separately for each subgroup of the population by baseline region\*, season and fuel source.
- All-electric Baseline quantities are lower in summer than Basic.
- Current quantities indicate greater variability in seasonal loads for basic customers compared to All-electric



\*The service territory of Southern California Edison ranges 9 climate zones however only 3 are presented here for illustration.

# Monthly Heat Pump Water Heater Usage

- Heat pump water heaters have seasonal usage\* trends.
- Hotter climates have greater variability.
- Heat pump water heater usage is approximately 10% of the average residential customer's annual usage.



\*Annual hourly HPWH load shapes from E3 as developed for the "Residential Building Electrification in California" study. Shapes for climate zones 6, 9, and 10 were estimated.

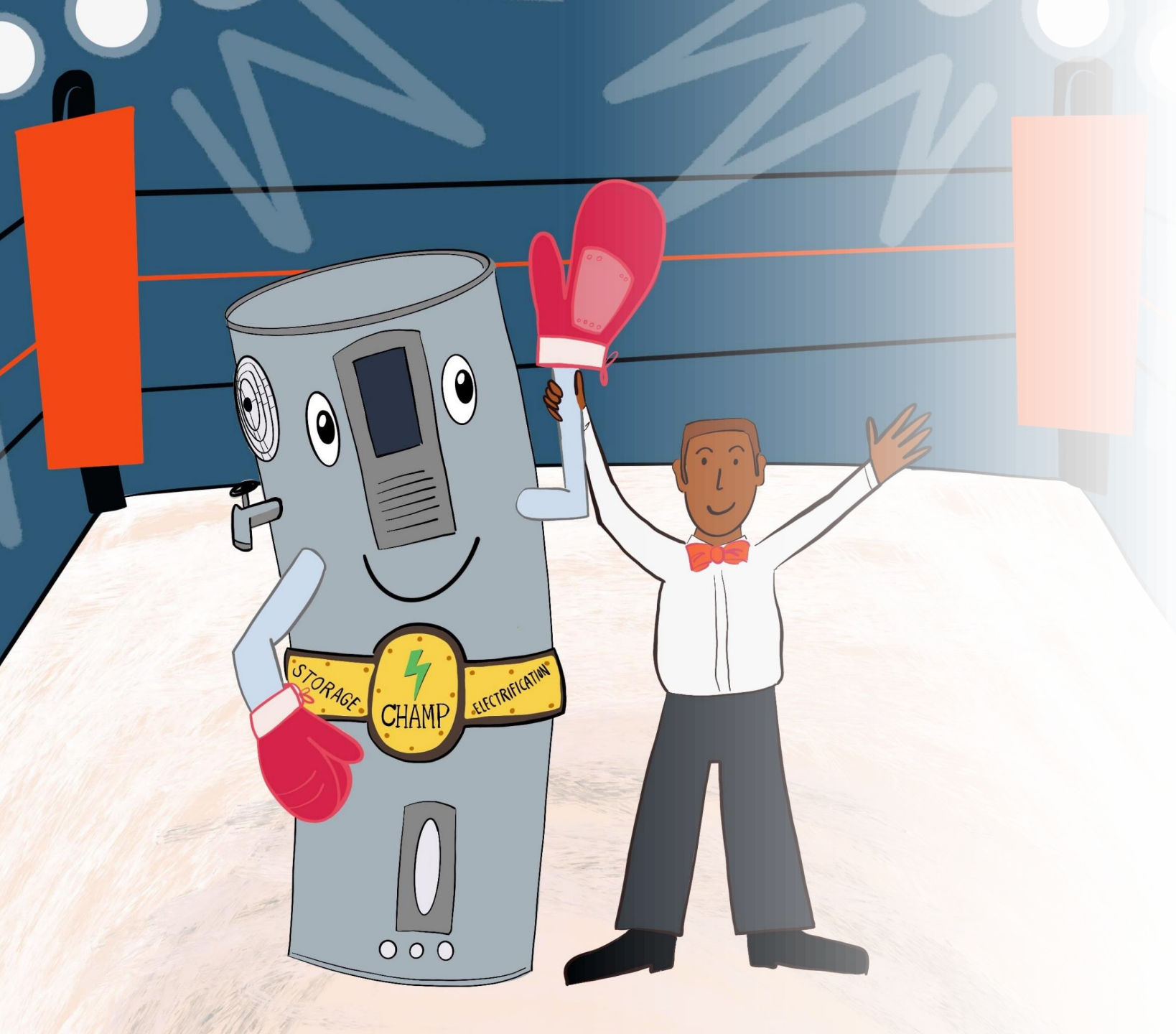
# Compensatory Baseline Quantity Options

- All-electric Baseline eligibility
  - Generally generates small annual net bill savings.
  - Creates bill volatility by increasing summer bills and lowering winter bills.
  - Uneven benefits across baseline regions.
- Calculate the Baseline quantity for HPWH customers at 60% (Subgroup)
  - Aligns with the current allocations provided to Basic customers and All-electric customers in summer.
- Calculate the Baseline quantity for HPWH customers at 70% (Subgroup)
  - Aligns with the current allocations provided to All-electric customers in winter.
  - All of a customer's usage is used to determine the 70% threshold which means the increased Baseline quantity is largely driven by appliance usage other than the heat pump water heater.
- Incremental Baseline
  - Incremental Baseline allowance provided such that the average rate remains unchanged after adding heat pump water heater usage.



# Eligibility and Applicability

- Providing an incremental Baseline allowance appears to be a workable, near-term solution.
  - Offer to both Basic and All-electric customers who attest to having a water heater with heat pump technology as this technology is most efficient.
- Long-term, technology agnostic rates such as TOU-D-PRIME (SCE) or E-ELEC (PG&E) should be pursued.
- Approximately 11% (500k/4,500k) of SCE's residential customers are All-electric.
- The heat pump water heater shapes do not assume load shifting.
  - A scenario in which 33% of the HPWH usage during the on-peak is shifted to the super off-peak during the middle of the day was explored by SCE in the study however this would require time-of-use pricing or demand response programs in order to encourage the employment of control software.



# Making Electrification Work for All Californians

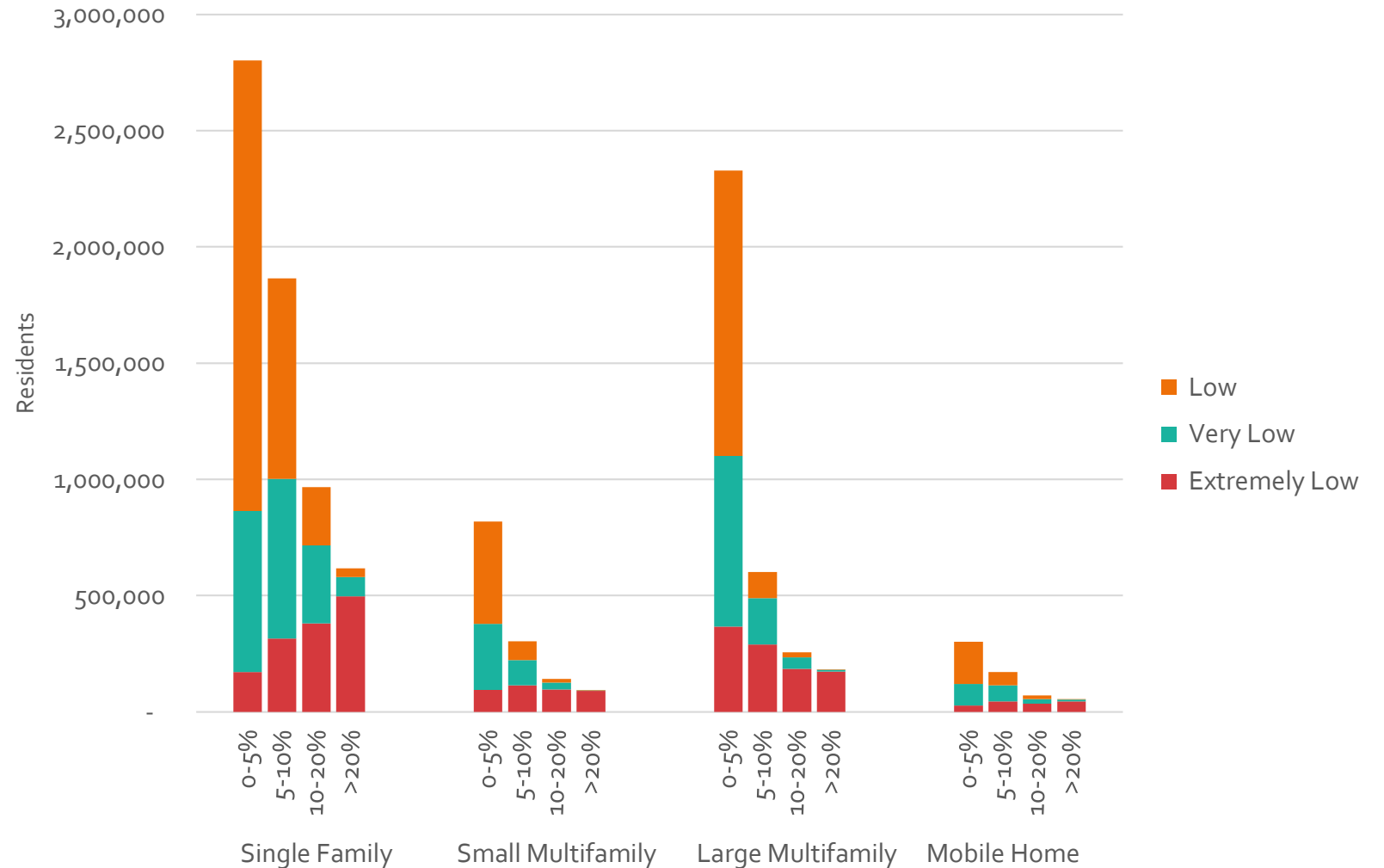
Alejandra Mejia  
September 15, 2020



## Extremely Low Income Californians Have Highest Energy Burdens

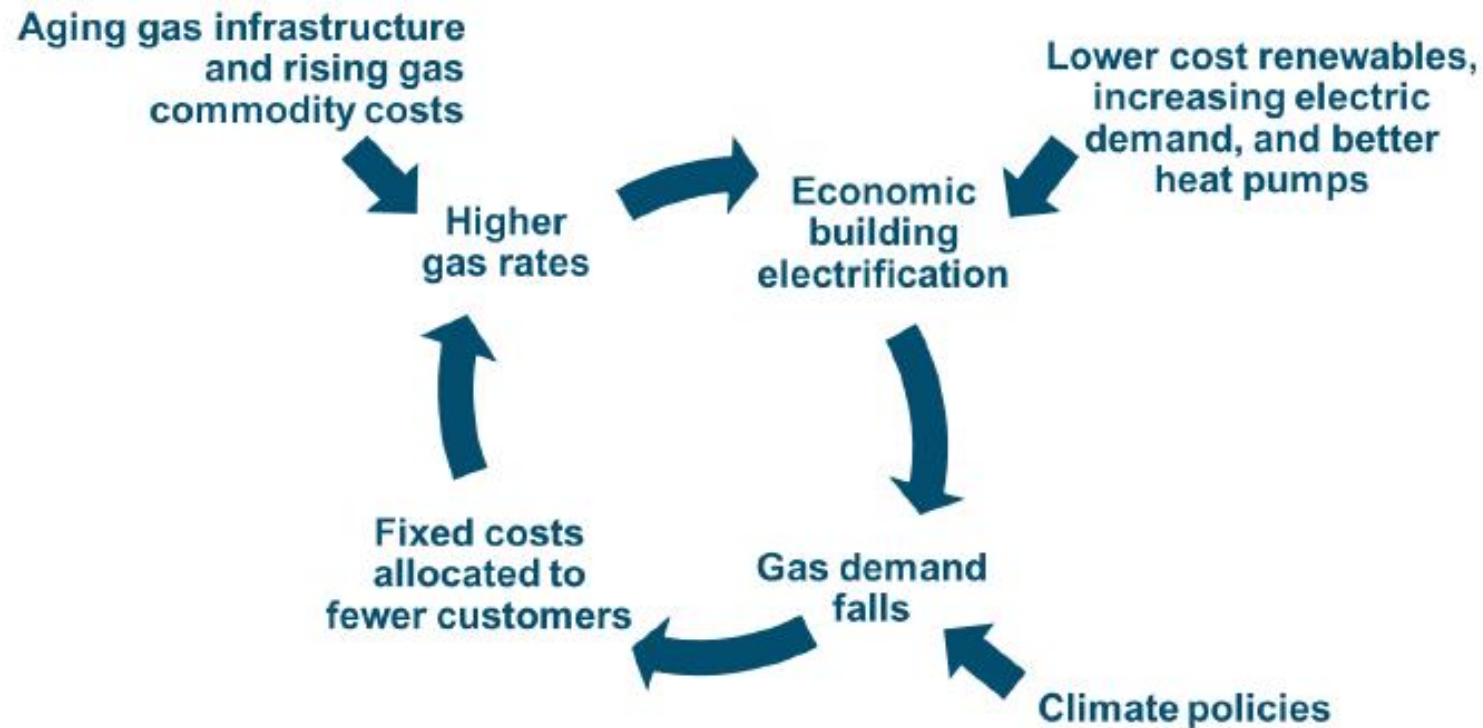
- Regardless of housing type, most Californians live in households that devote 5 percent or less of household income to energy expenditures.
- As income decreases, likelihood of living in a more energy cost burdened household increases.
- Nearly all households devoting over 20 percent of household income to energy costs are considered Extremely Low Income.

**Fig 15. Energy Cost Burden By Building Type & Income Level**

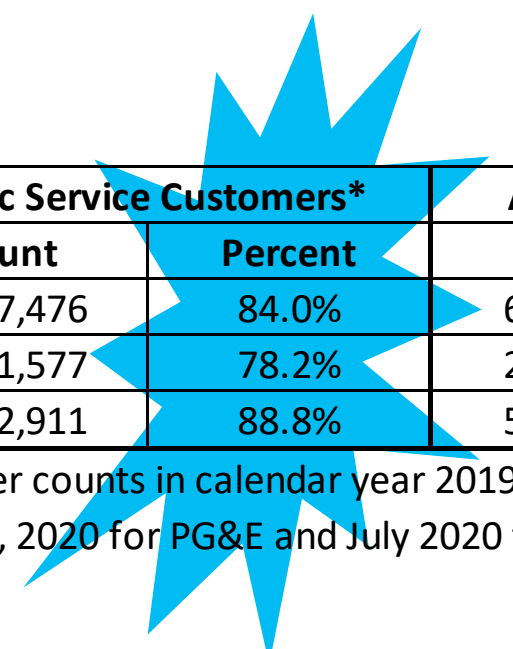


# Gas Bill Cost Spiral

Gas customer costs will spiral upward as rising costs must be recovered on declining sales



# Adjusting Baseline to Avoid Punishing Early Adopters



IOU	Basic Service Customers*		All-Electric Customers*		All-Electric Customers with Natural Gas Service**	
	Count	Percent	Count	Percent	Count	Percent of All-Electric
PG&E	3,457,476	84.0%	657,059	16.0%	111,143	16.9%
SDG&E	1,021,577	78.2%	285,199	21.8%	44,500	15.6%
SCE	3,972,911	88.8%	502,393	11.2%	N/A	N/A

\* Average customer counts in calendar year 2019

\*\* As of August 10, 2020 for PG&E and July 2020 for SDG&E



# Other Rate Design Elements to Consider

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- ❑ Volumetric rates that better reflect value of demand flexibility
- ❑ Make high usage charge time dependent?
- ❑ Reform non-coincident demand charges?

# What is California's Long-Term Rate Design Vision?

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- ❑ Stable and affordable rates for all
- ❑ Designed for an electric system that powers an increasing share of California's economy
  - ❑ Appropriately values and compensates demand flexibility
- ❑ Rates for grid harmonization?
  
- ❑ **Can we work backwards from a shared vision?**



Thank you!

Alejandra Mejia Cunningham  
[amejia-cunningham@nrdc.org](mailto:amejia-cunningham@nrdc.org)





# Q&A & Open Discussion

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## Q&A Reminder:

- Submit questions in the Q&A box and specify a panelists, or slide number.
- Questions will be read aloud by Energy Division staff
- Participant will be unmuted for discussion and clarity. Afterwards the participant will be re-muted.



# Next Steps

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- R. 19-01-011 – Building Decarbonization
  - CPUC staff will debrief and work to issue a ruling by September 25<sup>th</sup>
  - Opening Comments due Friday, October 9<sup>th</sup>
  - Reply Comments due Friday, October 16<sup>th</sup>
  - Proposed Decision issued for comment in December
- R. 18-04-018 – MHP Utility Conversion Program
  - CPUC staff will debrief and work to issue a ruling in the coming weeks
  - Anticipating Opening and Reply Comments
  - Phase II Scoping Memo will be issued before the end of the 2020 calendar year
- Become a party to the proceeding:  
[https://www.cpuc.ca.gov/party\\_to\\_a\\_proceeding/](https://www.cpuc.ca.gov/party_to_a_proceeding/)



# Next Steps

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- Workshop slides and recording will be posted within 7 days of today on both the CPUC's:
  - Building Decarbonization and Renewable Gas page – <https://www.cpuc.ca.gov/BuildingDecarb/>
  - Mobilehome Utility Conversion Program page – <https://www.cpuc.ca.gov/mhpupgrade/>
- Reach out with comments and questions: [nk2@cpuc.ca.gov](mailto:nk2@cpuc.ca.gov)
- Thank you for participating!