



TRI-COUNTY
REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

The Practical Guide to All-Electric Residential Buildings (PART 2): Water Heating, HVAC, Laundry

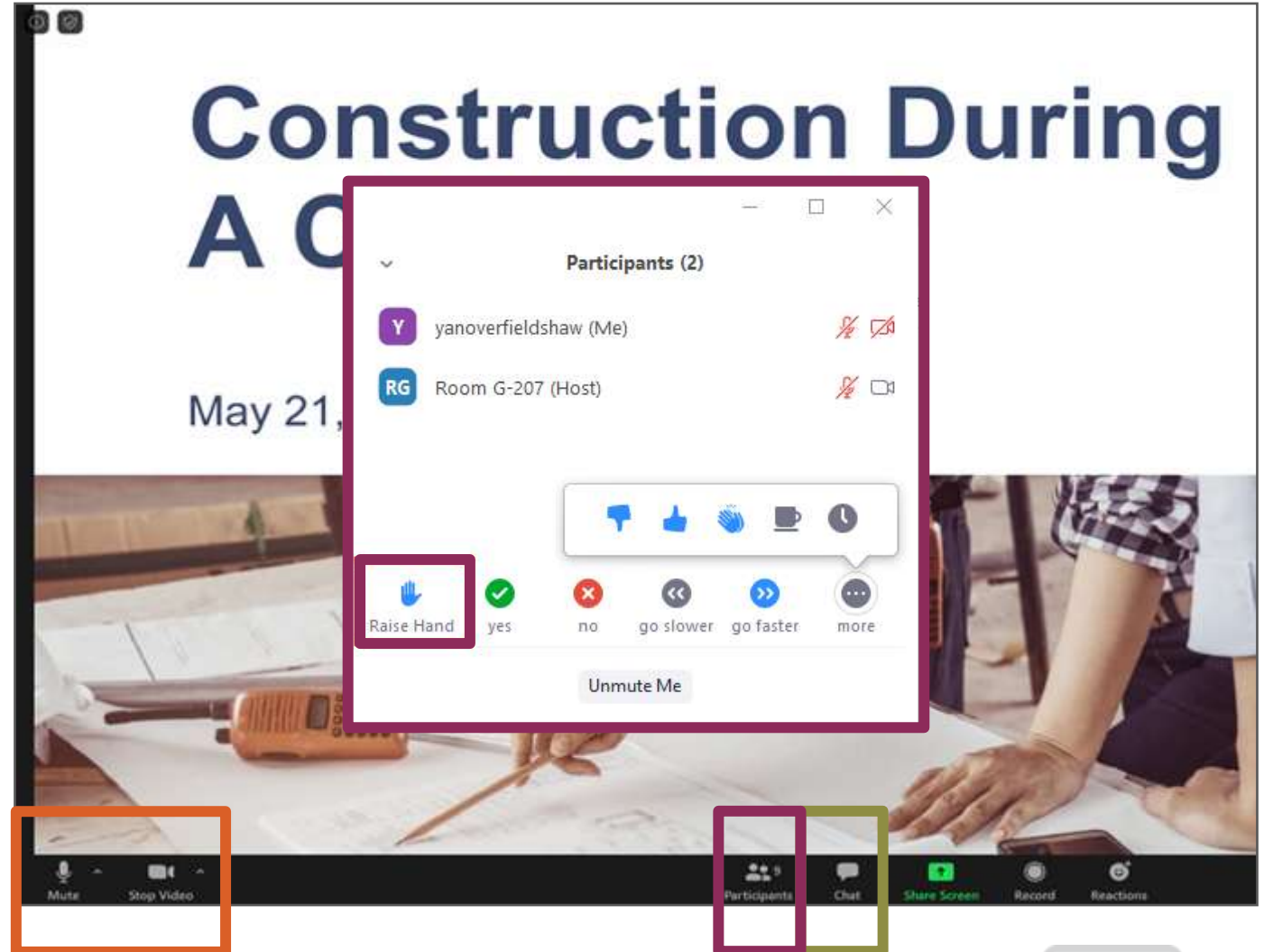
Nick Brown, Build Smart Group & Robert Fortunato, ForStrategy Consulting
June 11, 2026

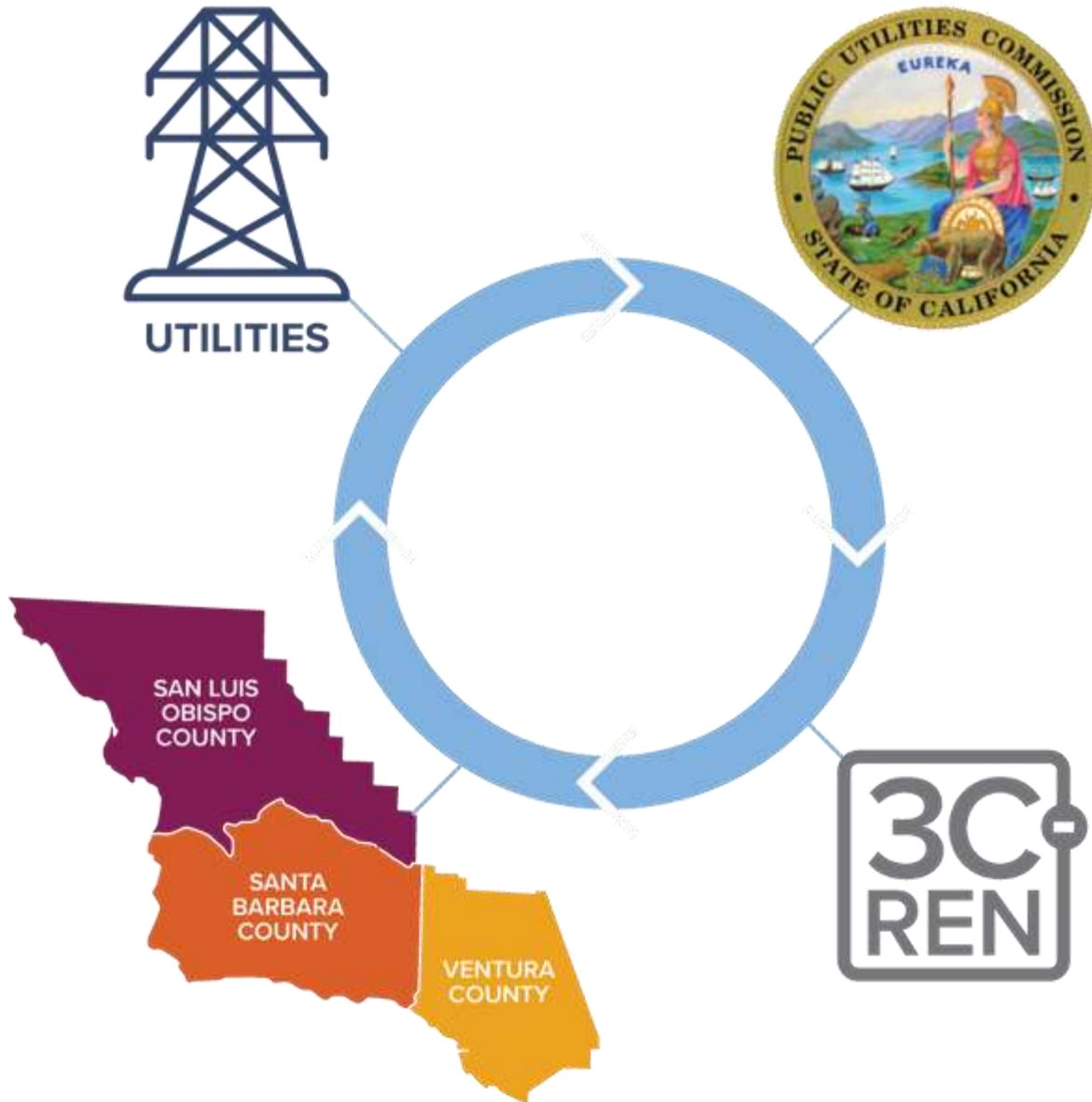


Before We Begin

Here are some quick reminders:

- Call in? Please **share** full name to confirm attendance
- To receive AIA LUs, you **must attend** at least 80% of the training. Attendance will be verified
- Use the "**Chat**" to share questions or comments
- Slides/recording are **shared** after most events and can be found on 3C-REN's on-demand page
- 3C-REN does **not** allow **AI notetakers**, unless used to accommodate a disability





Tri-County Regional Energy Network

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

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

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



Our Services

Incentives



HOME ENERGY SAVINGS

3c-ren.org/for-residents
3c-ren.org/multifamily



COMMERCIAL ENERGY SAVINGS

3c-ren.org/commercial

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

Training



BUILDING PERFORMANCE TRAINING

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



ENERGY CODE CONNECT

3c-ren.org/code

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

Technical Assistance



AGRICULTURE ENERGY SOLUTIONS

3c-ren.org/agriculture



ENERGY ASSURANCE SERVICES

3c-ren.org/assurance



Heat Pump HVAC Incentive Programs



Home Energy Savings

~ \$750/\$1,500

3c-ren.org

Available for Tri-County residents.



Air Pollution Control District

\$5,000/\$12,000

ourair.org and slocleanair.org

Available In SB & SLO counties.



3CE Electrify Your Home

\$2,000-\$4,000

3cenergy.org/rebates

Available for customers of Central Coast Community Energy (3CE).



Santa Barbara Clean Energy

\$1,000-\$7,500

santabarbaraca.gov/sbce

Available for SB Clean Energy customers, i.e. City of SB residents.



Tri-County Benefits of Electrification for Air Quality, Comfort, and Health (3C-BEACH)

Free Equipment + \$500

sustain.venturacounty.gov/3cbeach/

Available for Tri-County residents *Health and safety monitoring required. See program website for more information*

All programs can be combined with each other except 3CE and SBCE.
Higher incentives reflect equity, hard-to-reach, and project-specific adders.
Incentive amounts current as of May 2026



Heat Pump Water Heater Incentive Programs



Home Energy Savings

~ \$750/\$1,500

3c-ren.org

Available for Tri-County residents.



Golden State Rebates

\$400-\$700

goldenstaterrebates.com

Available throughout California.
Can't combine with 3C-REN.



3CE Electrify Your Home

\$1,000-\$2,500

3cenergy.org/rebates

Available for customers of Central Coast Community Energy (3CE).



Santa Barbara Clean Energy

\$500-\$7,500

santabarbaraca.gov/sbce

Available for SB Clean Energy customers, i.e. City of SB residents.



Tri-County Benefits of Electrification for Air Quality, Comfort, and Health (3C-BEACH)

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All programs can be combined with each other except 3C-REN and Golden State Rebates.

Higher incentives reflect equity, hard-to-reach, and project-specific adders.

Incentive amounts current as of May 2026



***NEW* Induction Incentive Program**



3CE Electrify Your Home

\$300-\$500

\$2,000 for rewiring

3cenergy.org/rebates

Available for customers of Central Coast Community Energy (3CE).



All programs can be combined with each other except 3C-REN and Golden State Rebates.
Higher incentives reflect equity, hard-to-reach, and project-specific adders.
Incentive amounts current as of May 2026



Utilize 3C-REN's Incentive Concierge



HOME
ENERGY
SAVINGS

- For San Luis Obispo, Santa Barbara and Ventura counties
- Find an enrolled contractor
- Resident Resource Library

www.3c-ren.org/for-residents/

3C-REN Incentive Concierge

Available in English & Spanish



Spanish: Call or Text (805) 767-1204

English: Call or Text (805)-957-7843

Or Email info@3c-ren.org



Something needs a refresh. Restart
PowerPoint and open the add-in again.

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Goals - This course was built to:

- Make the benefits of clean energy, all-electric buildings clear in terms of time, money, lifestyle, health, and safety.
- Make the technical understanding and modeling of Net Zero Energy/ Zero Carbon all electric buildings more accessible to architects, developers, contractors, engineers, planning officials and the general public.
- Introduce the all-electric technologies and proper design and installation techniques that makes switching easier.

IMPORTANT NOTICE!

Products/Procedures Not Approved or Endorsed

DISCLAIMER:

- Any products used in this presentation are just used as examples of options to convert a building to all-electric. This presentation does not recommend any specific products.
- Any estimates of costs, utility costs, incentives, and savings are rough estimates, not to be relied upon solely to justify a project. Experienced architects and engineers should be hired to do their own evaluation of all projects.
- Electrical projects should be done with licensed electrical professionals for your safety.



- RECAP -

The Practical Guide to All-Electric Residential Building Design PART 1

Nick Brown Robert Fortunato

May 28, 2026

Structure of Class

Part 1: Solar & Battery & Cooking

- :20 Why All-Electric?
- :20 Technologies to Go Electric-PV & Batteries
- :10 Energy Modeling for All-Electric
- :25 Technologies to Go Electric-Cooking & Appliances
- :10 Demo from Nick's Induction Cooktop

Part 2: Heat Pumps & Heat Pump Water Heaters

- :20 Technologies to Go Electric-HVAC Heat Pumps
- :25 Technologies to Go Electric-Water Heating
- :15 Demo from Robert's Heat Pump Water Heaters
- :10 Energy Modeling Results for All-Electric Designs
- :05 Avoiding Common Missteps
- :10 Summary

Nick Brown

Owner/Builder, Net Zero Nest
President, Build Smart Group



Net Zero Nest:

Completed in 2016
1,950 sf, 3 BR & 3 Bath
4.4 kW PV array (16 panels)
Now All Electric

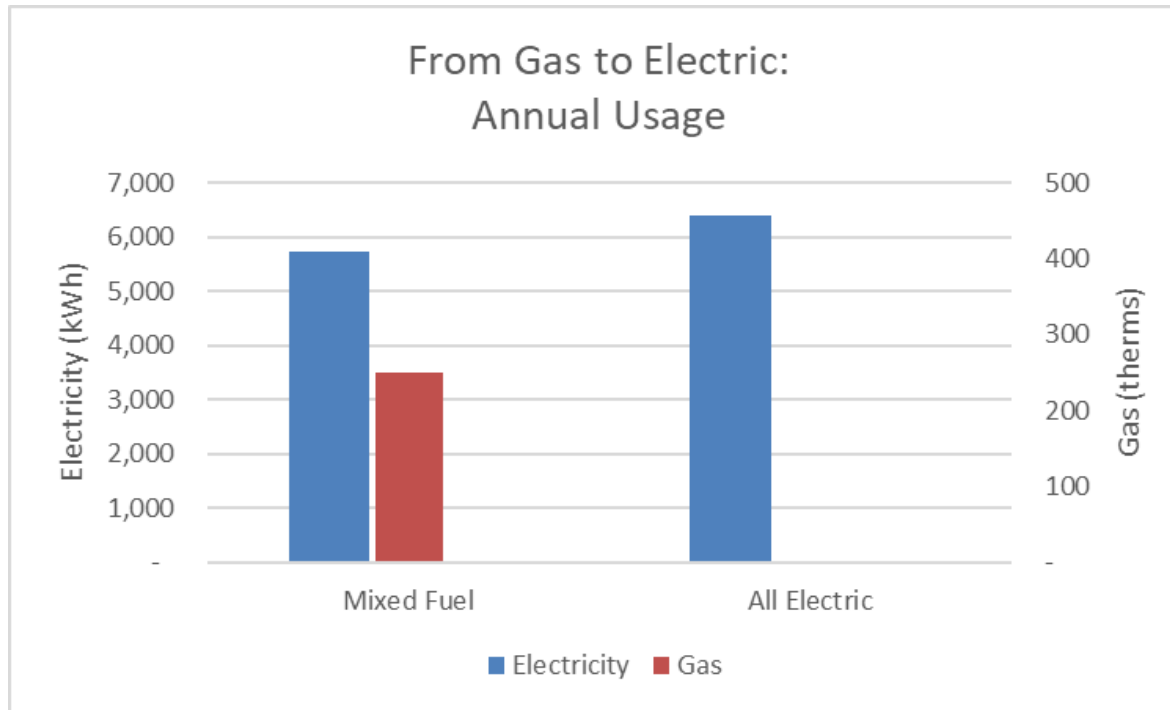
All-Electric ADU:

Completed in 2022
576 sf, 1 BR & 1 Bath
4.1 kW PV array (12 panels)
Net Zero Carbon

Instructor for various classes:

All-Electric Homes
Demyth-defying Heat Pumps
Energy Standards for Residential Architects
Heat Pump Water Heaters for Plumbers

Electrifying Saved \$400 in First Year

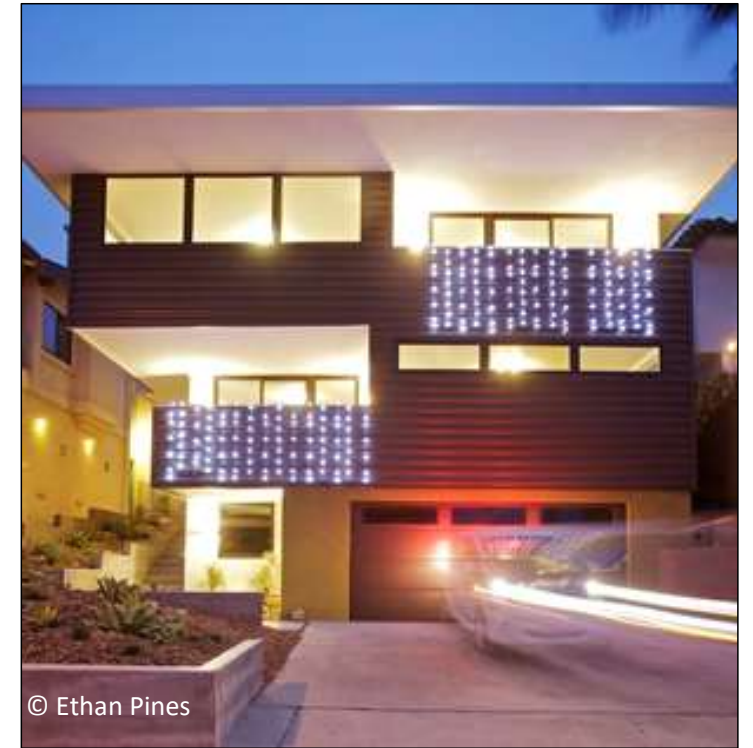


- House was Gas & Electric in 2023
 - Gas & Electric bills were \$1,400
 - Included 1,800 kWh for EV charging
 - 4.4 kW PV system, no battery
- House was All Electric in 2024
 - Electric bills were \$1,400
 - Included 2,800 kWh for EV charging

Robert Fortunato

Owner/Builder, Green Idea House

President, ForStrategy Consulting, Inc.



Green Idea House:

- Completed in 2012
- 2,150 sf, 2 BR & 2 Bath + 2 office/studies
- 6.5 kW PV array (26 panels)
- Green Point Rated, Living Building Challenge NZE Petal
- Living Lab still today!



Amount due \$24.07
Due by 02/02/26

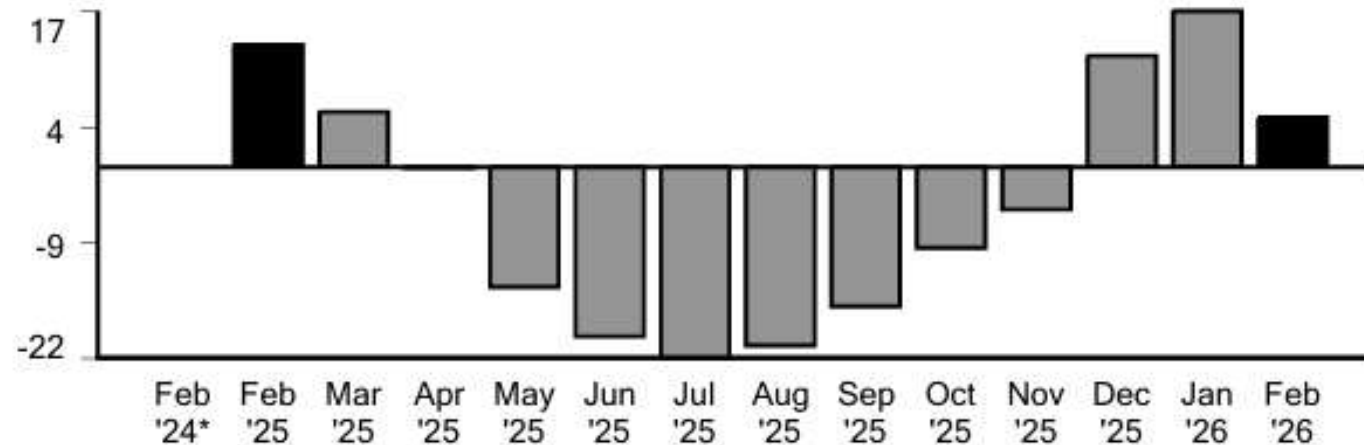
SETTLEMENT BILL

Your past and current electricity usage

Electricity (kWh)	
01/09/26 to 02/08/26	
Consumption	423
Net Generation	-253
Total electricity usage this month in kWh	170

Your daily average electricity usage (kWh)

2 Years ago: N/A Last year: 13.69 This year: 5.48



Additional information regarding your Net Consumption/Generation:

- Your year-to-date delivery and CRS energy charge total as of previous month: -\$532.75
- Your current month delivery and CRS energy charge total: \$112.26
- Your year-to-date delivery and CRS energy charges: -\$420.49 *
- Your year-to-date kWh: -1,641 kWh

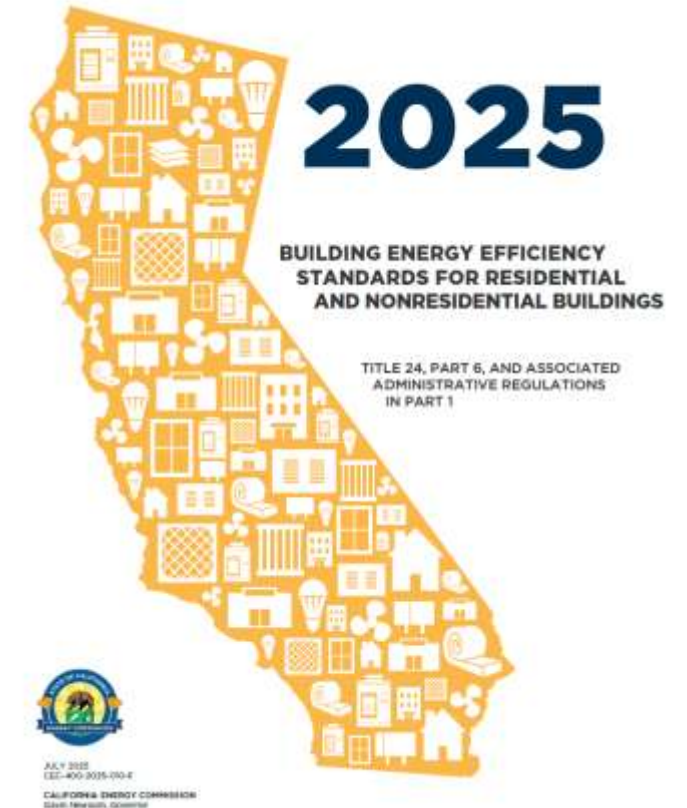
*If you earned a credit on your bill, the amount you receive may be less than your year-to-date energy Charge which is based on SCE's rates. Your "Compensation Total" is based on the year-to-date kWh shown above, which is then multiplied by a CPUC approved value per kWh.

Why All Electric?

What's in it for YOU?

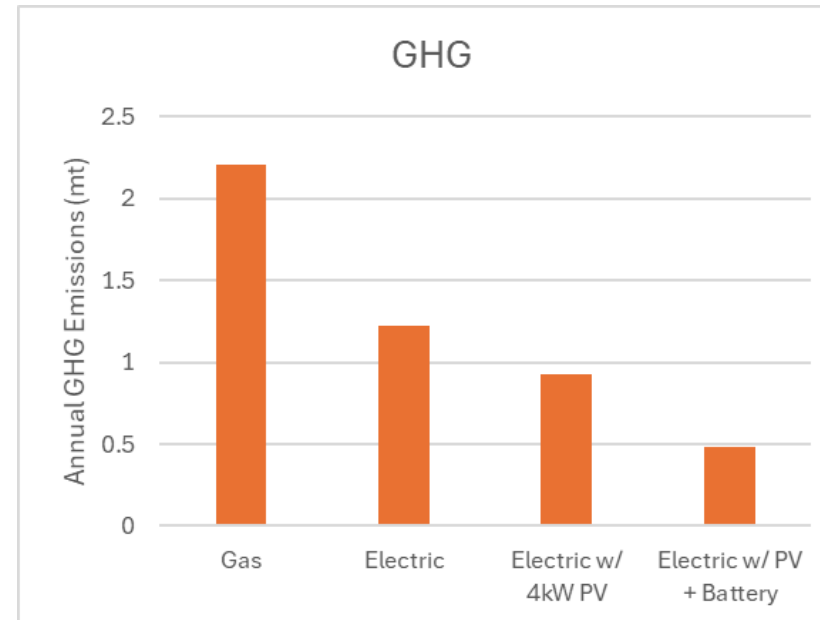
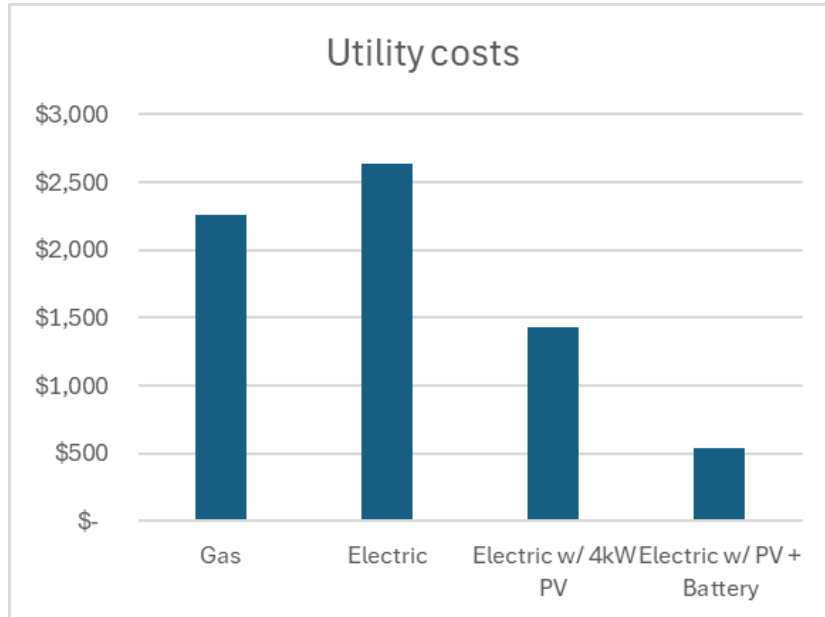
Reasons to Electrify Homes

- Simpler: only one utility in the building
- Easier energy code compliance
- Efficient: 300+% efficiency with heat pumps
- Safer: less risk of gas leakage, CO poisoning, and fire
- Health: Improve indoor environmental quality (IEQ) contributes to occupant health and productivity and the risk of childhood asthma
- Utility costs: all-electric buildings with PV can generate significant utility cost savings
- Self-sufficiency: Electric+PV+battery can run off-grid much of the time and in case of disaster
- Lower Carbon footprint: All-electric buildings have ½ the Greenhouse gas emissions (pollution) of mixed fuel buildings
- Better technologies: all-electric systems such as induction ranges and heat pump clothes dryers offer superior features
- Futureproof: gas systems are expected to be phased out in California in near future
- Reduced dependence on foreign energy



Solar & Battery Are Key to Electrification & Decarbonization

Southern California Example: CZ 6

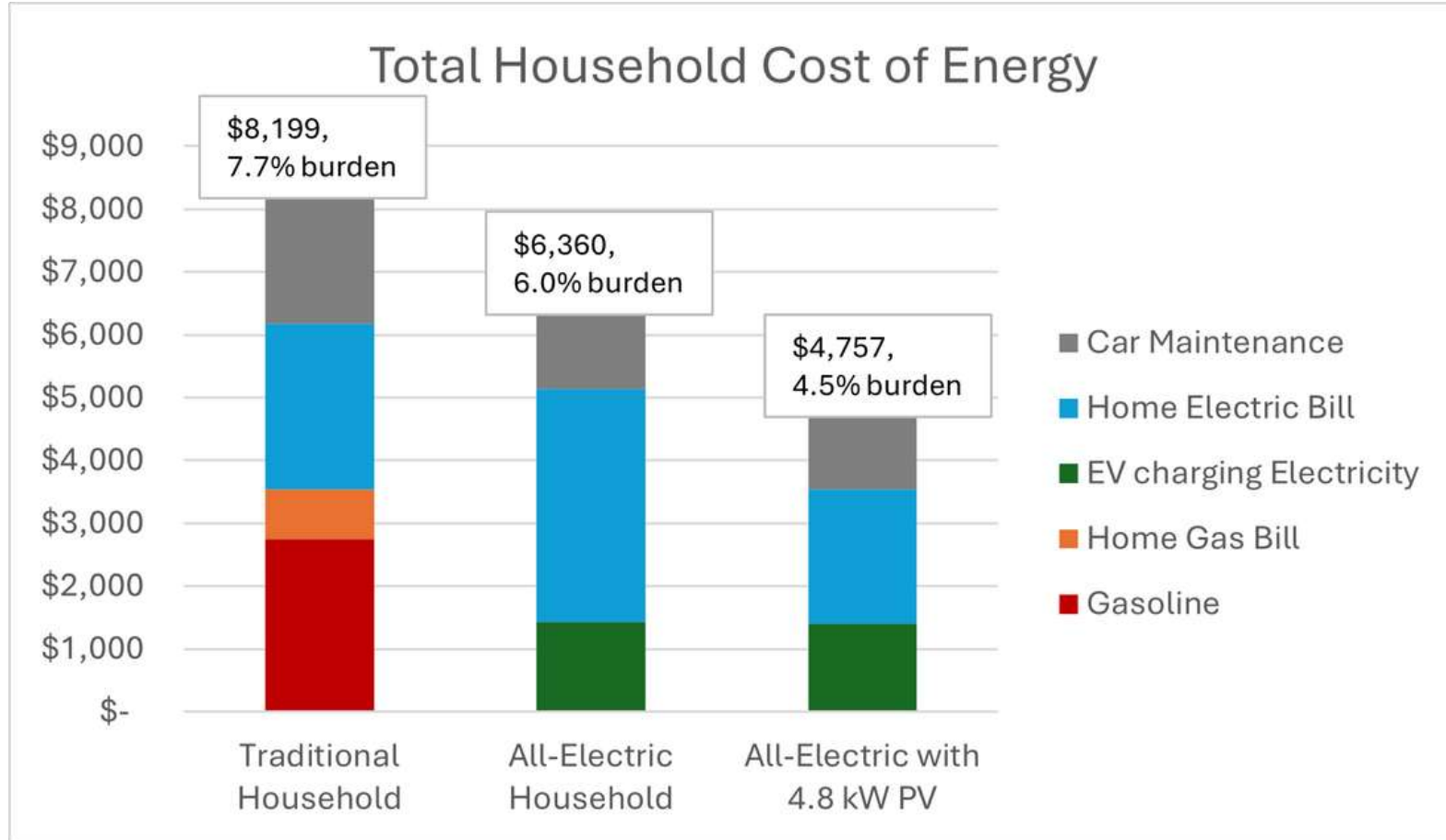


Modeled energy usage for 2-story existing/remodeled house in CZ6 (Coastal Los Angeles) under NEM3 with 2026 SCE/SCG rates. Battery modeled using Basic control.



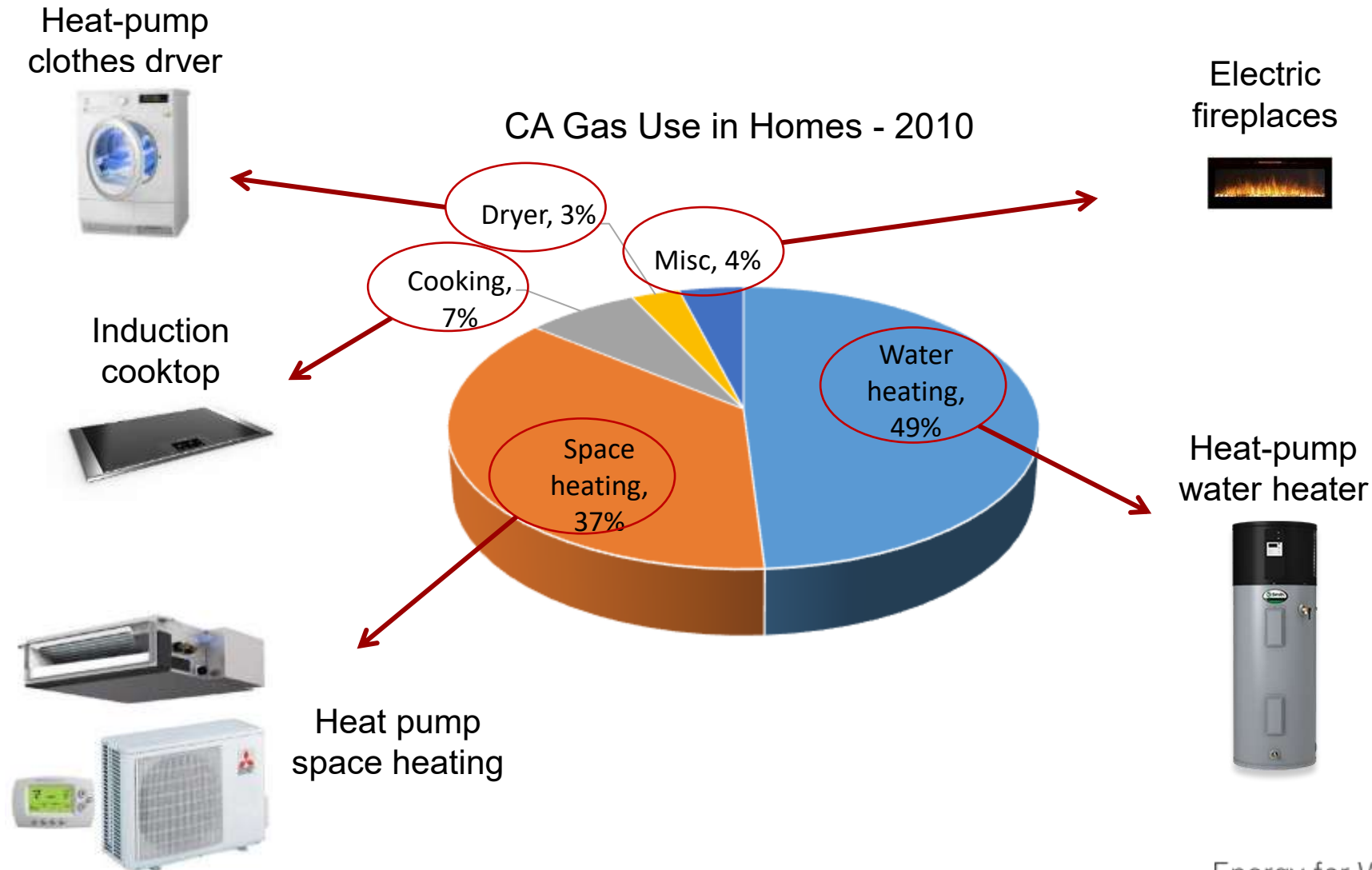
See also: Build Smart blog: [Total Household Cost of Energy](#)

Electric Homes with EVs and PV



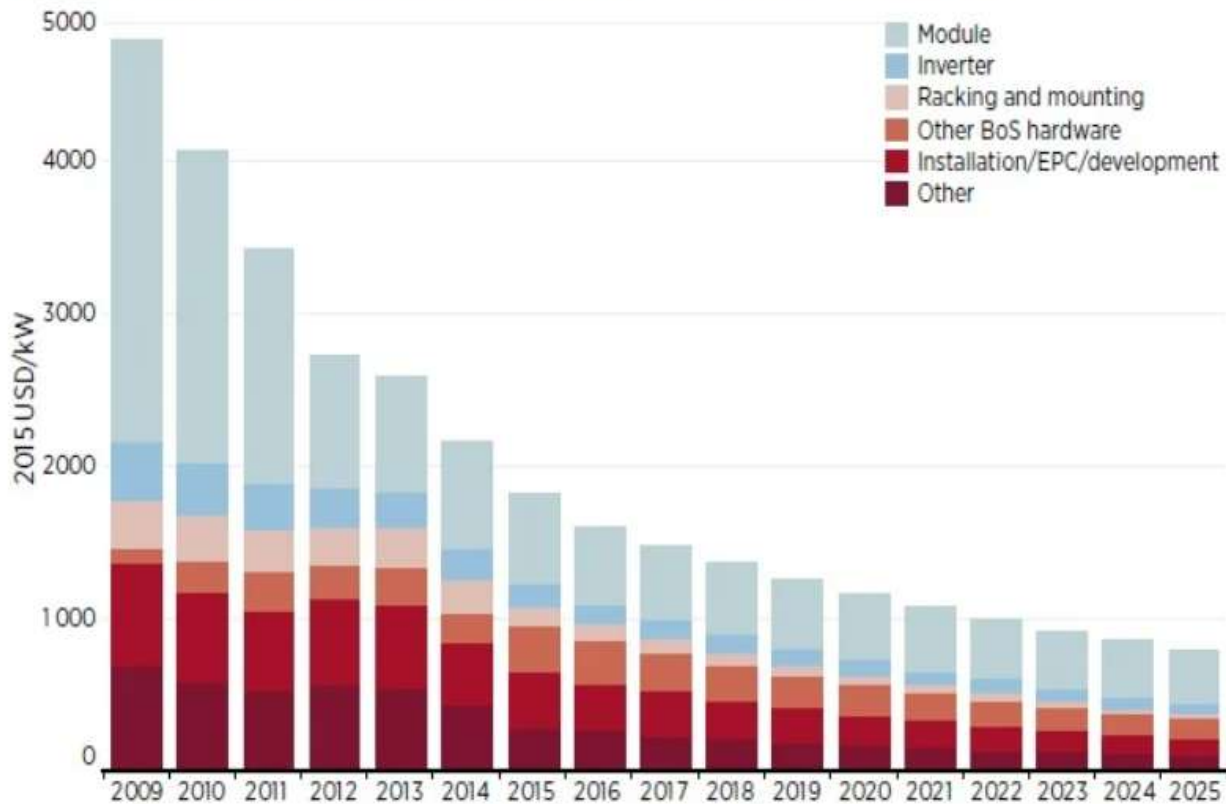
Source: <https://www.buildsmartgroup.com/blog/why-all-electric-total-household-cost-of-energy>

High-efficiency Electric Alternatives to Gas Use in Residential Buildings



Cost of Solar PV and Batteries

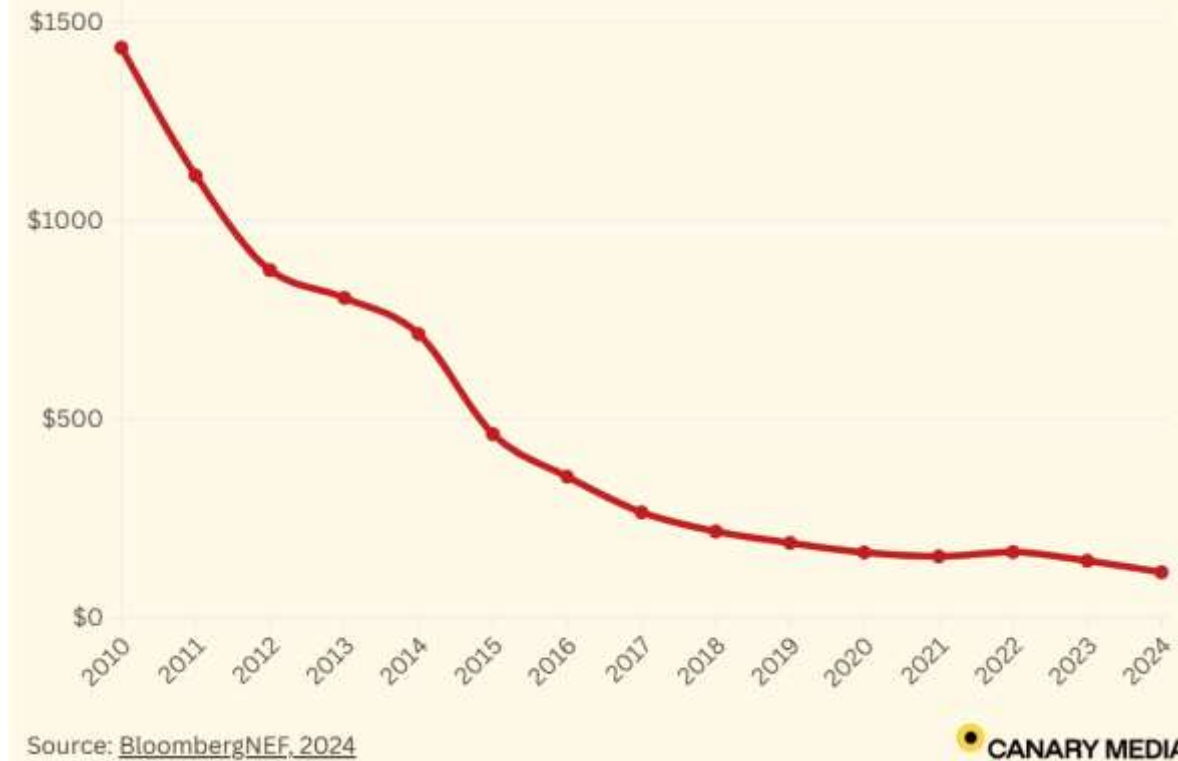
FIGURE ES 1: GLOBAL WEIGHTED AVERAGE UTILITY-SCALE SOLAR PV TOTAL INSTALLED COSTS, 2009-2025



<https://www.pv-tech.org/balance-of-system-costs-key-to-further-solar-system-cost-reductions-says-ir/>

Battery prices dropped yet again in 2024

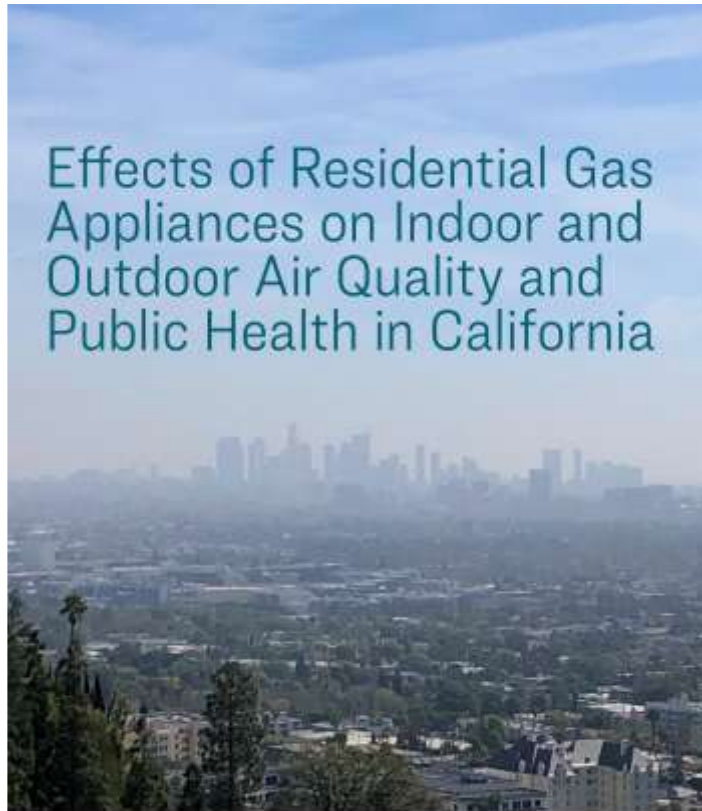
Average lithium-ion battery pack price, in dollars per kilowatt-hour



<https://www.canarymedia.com/articles/batteries/chart-lithium-ion-battery-prices-fall-yet-again>

Embrace Better Technologies: Induction Cooking

IAQ Better Without Natural Gas in the Home



UCLA Fielding School of Public Health
Department of Environmental Health Sciences
April 2020

UCLA Fielding
School of Public Health

- AMA Study – Gas appliances increase risk of childhood asthma.
- UCLA study found that 90% of homes exceed NOx limits after one hour of cooking
- 4 out of 9 natural gas cooktops exceeded NOx concentrations of 100 ppb
- RMI Study - 20% of childhood asthma in CA due to gas cooking
 - Children living in homes with gas cooking are 34% more likely to have asthma



Energy for What's AheadSM



The Practical Guide to All-Electric Residential Building Design

END of RECAP PART 1



The Practical Guide to All-Electric Residential Building Design Part 2

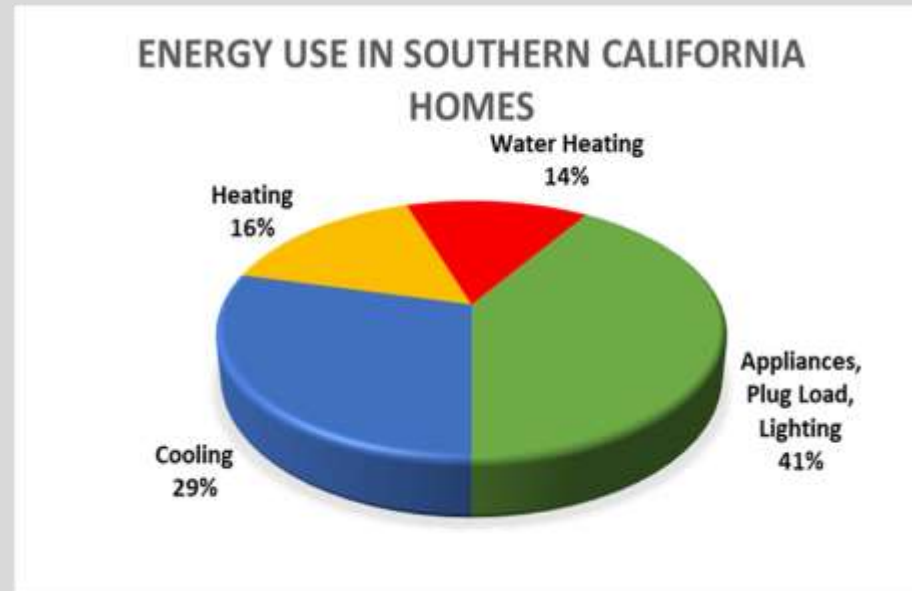
Nick Brown Robert Fortunato

June 11, 2026

Energy for What's Ahead™

Technologies to Go Electric

- Solar & Batteries
- Induction Cooking
- **Heat Pumps for HVAC**
- Heat Pump Water Heaters
- Electric & Heat Pump Clothes Dryers
- Pool Heaters
- Fireplaces



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PowerPoint and open the add-in again.

Heat Pumps: Reversible Air Conditioners

<https://vimeo.com/438351346>



Heat Pumps: Reversible Air Conditioners

- Efficient All-Electric Heating & Cooling in One System
- Heat pumps are often simpler/less expensive to install
- Wide variety of configurations possible (ductless, ducted, ceiling cassettes)
- Often no ducting and no HERS inspections



Ductless Minisplit Heat Pumps

- Move heat with refrigerant
- No energy loss from ductwork
- Can link multiple indoor units to one outdoor (multisplit)
- Maximum use of modulating technology



HVAC Heat Pump Advantages

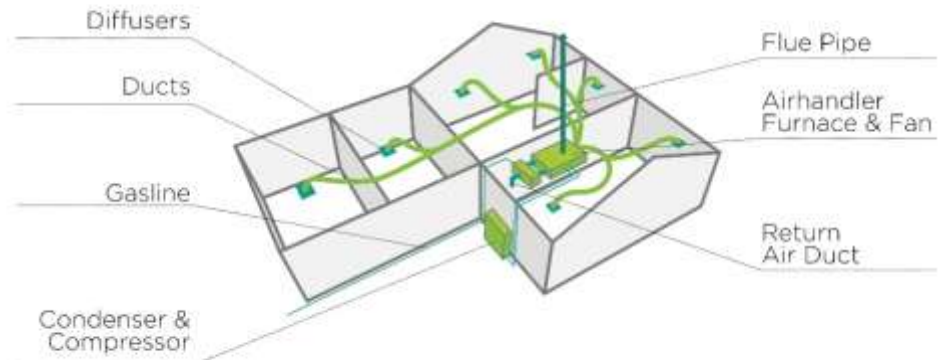
- No separate furnace
- No gas lines
- No flue vent pipes
- No combustion gases inside building
- Quieter
- Space-saving
- Utility bill savings



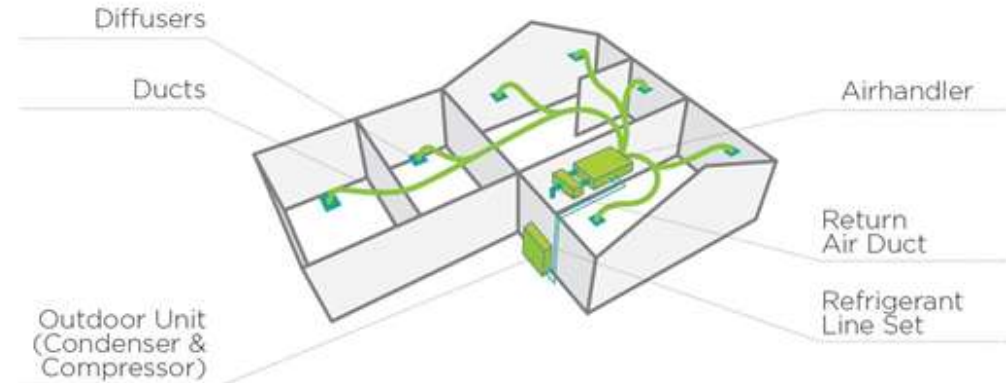
Ducted Minisplit HPs provide high efficiency in space-saving cost-effective configurations

Typical HVAC Designs

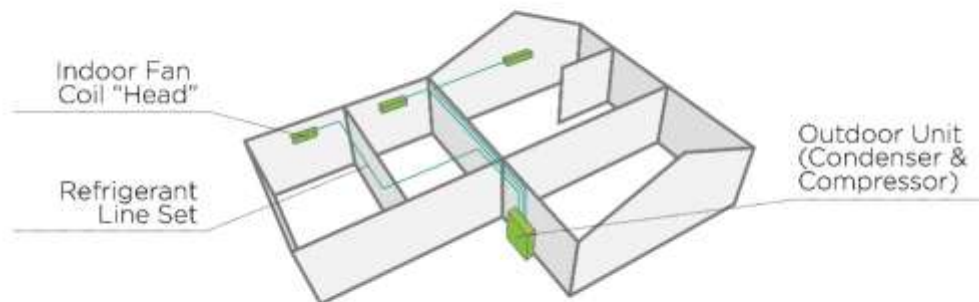
No. 1: Conventional Gas/Electric Split System



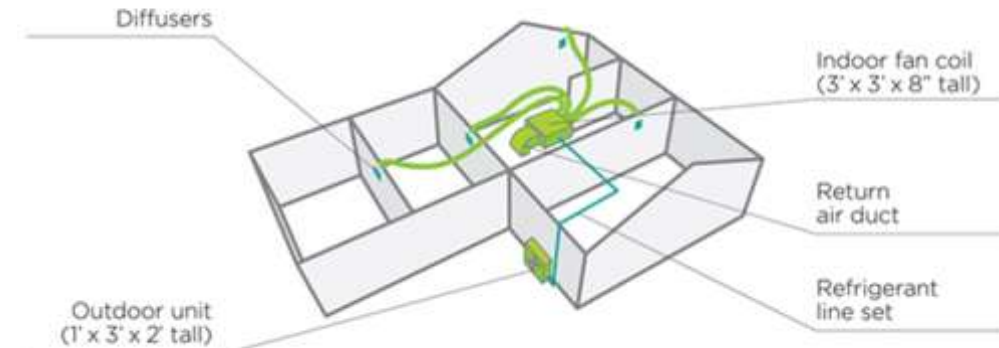
No. 2: Conventional Heat Pump



No. 3: Ductless Mini-Split



No. 4: Ducted Mini Split System



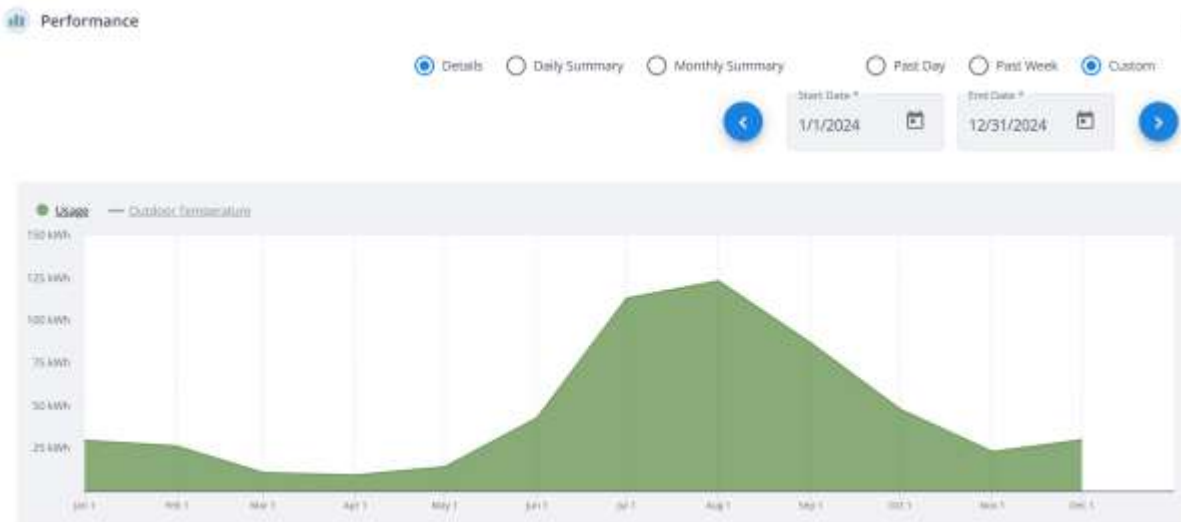
Ceiling Cassettes: Alternative to High Wall Indoor Units



Ducted Minisplit Heat Pumps



Variable Capacity Heat Pumps Very Efficient



ADU's Ductless minisplit used 544 kWh in 2024



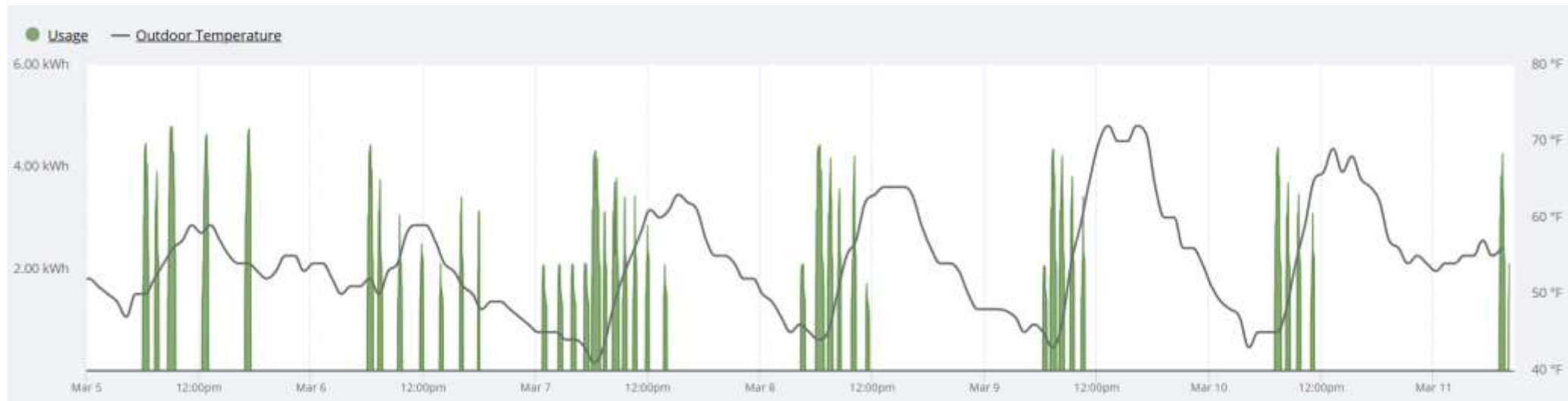
Main house Ducted minisplit used 1,880 kWh in 2024

Variable Capacity Heat Pumps Very Efficient

Gas Furnace
2023:
Cycled on 128
times in 6 days



Variable Capacity
Heat Pump 2025:
Cycled on 37
times in 6 days



What's Happening with Refrigerants?

- ★ The **California Air Resources Board (CARB)** [Refrigerant Management Program](#):
 - ✧ Supports California's Global Warming Solutions Act of 2006
 - ✧ Requires leak inspections, repairs, and record keeping indicating how greenhouse gas (GHG) emissions have been reduced from equipment
 - ✧ Began prohibiting the use of certain hydrofluorocarbons (HFC) in [new air conditioning equipment](#), [refrigeration equipment](#), and [chillers](#).

*Systems Required to be Charged with Low Global Warming Potential (GWP) Refrigerant from the Factory**

End-Use (New Equipment)	Prohibited Refrigerants	Effective Date
Room/wall/window air-conditioning equipment, PTACs, PTHPs, portable air-conditioning equipment, and residential dehumidifiers	≥ 750 GWP	1/1/2023
Other air-conditioning equipment (Residential and Nonresidential)	≥ 750 GWP	1/1/2025
Variable Refrigerant Flow (VRF) system	≥ 750 GWP	1/1/2026
Chillers: • Air-conditioning, process refrigeration designed for chilled fluid leaving the chiller at temperatures > 35°F (2°C)	≥ 750 GWP	1/1/2024
• Process refrigeration designed for chilled fluid leaving the chiller at temperatures ≤ 35°F (2°C) and > -10°F (-23°C)	≥ 1,500 GWP	1/1/2024
• Process refrigeration designed for chilled fluid leaving the chiller at temperatures ≤ -10°F (-23°C) and > -58°F (-50°C)	≥ 2,200 GWP	1/1/2024
Refrigeration equipment containing > 50 pounds refrigerant	≥ 150 GWP	1/1/2022

**Other programs within California may have additional requirements for stationary refrigeration systems, such as the South Coast Air Quality Management District (AQMD) [Rule 1415.1](#)*

Heat Pumps Cost less

We surveyed Southern California HVAC Contractors: 600 square foot addition scenario

What would you bid for a gas furnace 80 AFUE Ultra Low-NOx and 14 SEER condensing unit with new R-6 ductwork and smart thermostat? Assume a 2-ton unit. Include all plumbing, electrical, and HVAC costs.

Range of Estimates Provided by Contractors – Gas Split System

\$6,000	\$15,000
---------	----------

What would you bid for a heat pump 8.2 HSPF and 14 SEER? Assume a 2-ton unit and include all plumbing, electrical, and HVAC costs.

Range of Estimates Provided by Contractors – Heat Pump

\$6,000	\$13,000
---------	----------

100% of contractors gave an equal or lower bid for heat pumps than gas split systems in this scenario.

Packaged Unit Heat Pumps



Could be traditional PTAC – make sure it is a PTHP



Ephoca PTHP

Window Heat Pumps Going in At Scale in New York City

HVAC RESIDENTIAL MARKET | AIR-SOURCE HEAT PUMPS | HVAC BREAKING NEWS

Window Heat-Pump Units Planned for NYC Public Housing



A Gradient Comfort window-mounted heat pump. The startup has a contract to provide 10,000 window-mounted heat pumps to be installed at public housing units in New York City.

Photo courtesy of Gradient Comfort

- [Gradient](#) will provide 10,000 window-mounted Heat Pumps to NYC Housing Authority (NYCHA)!
- Reduces cost (no electrical system upgrade, lengthy refrigerant piping, or drilling through walls)
- Residents expressed increase in comfort, air quality, easy cleaning/maintenance, control of indoor temperature
- 120 Volt plug-in has 9,000 btu heating & cooling and 10.8 CEER



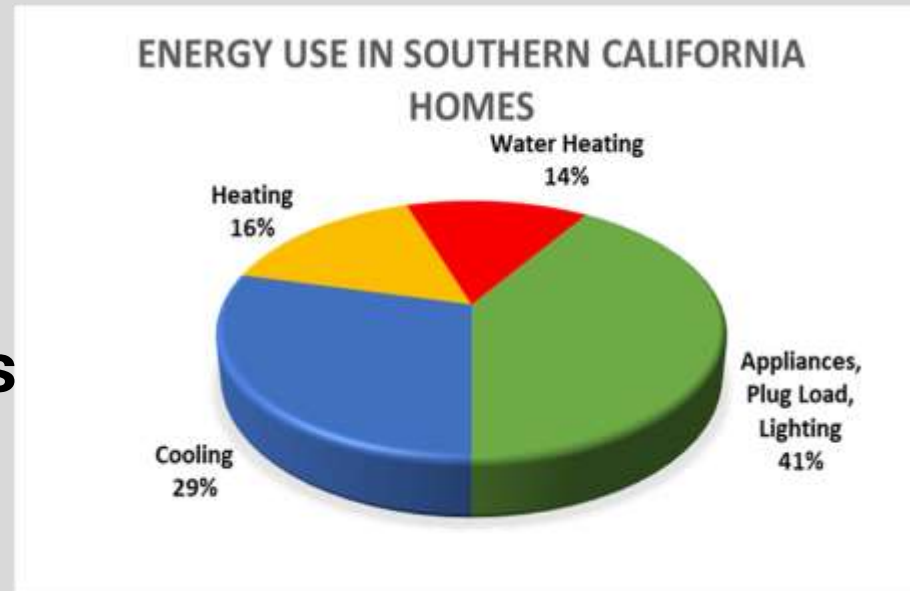
Recovery Ventilators a Great Upgrade for Indoor Air Quality

- HRVs & ERVs temper incoming air to reduce space conditioning energy required
- Provide enhanced circulation of fresh air throughout home
- Significant compliance credit



Technologies to Go Electric

- Solar & Batteries
- Induction Cooking
- Heat Pumps for HVAC
- **Heat Pump Water Heaters**
- **Electric & Heat Pump Clothes Dryers**
- **Pool Heaters**
- **Fireplaces**



Something needs a refresh. Restart
PowerPoint and open the add-in again.

Electric Heat Pump Water Heaters

- Less expensive to install, operate and maintain
- 3x more efficient than tankless
- Demand response/ Timer capacity acts as a thermal battery
- 240V units & now 120V retrofit units available
- Stores 50 gal. fresh drinking water
- Dehumidifies & cools garages and surrounding spaces
- Requires careful placement for air volume and sound



Best Practices

Code Corner 2025 §110.3(c)7:

- (A) Backup: Backup heat is required for systems when inlet air is unconditioned, unless the compressor cut-off temperature is below the Heating Winter Median of Extremes
- (B) HPWHs required to have adequate access to air

- Consider mixing valve to heat to higher temperature and boost capacity
- Upsize tank size to account for slower recovery rate than gas
- Use compact hot water distribution system with insulated pipes and low-flow fixtures to minimize time for hot water to get to tap
- 120V dedicated circuit models may have larger compressors (~12,000 btu/hr) and reduce pressure on electrical panel capacity
 - But don't have backup heat source, which limits locations that will stay above compressor cut-off temperature, typically about 40 deg F
- In closet installs: use fully louvered door OR high and low vents OR ducts to ensure adequate access to air

Clayton Homes Installed 24,000 HPWHs in under 1 year!



One Home Builder Grows the Entire Heat Pump Water Heater Market by 30%

- Clayton Homes committed to HPWHs in all their new homes
- HPWHs made ZNE homes and \$5,000 rebates possible
- Clayton homeowner reported their energy bill went from \$250→\$75 in January after switching to Clayton eBuilt home



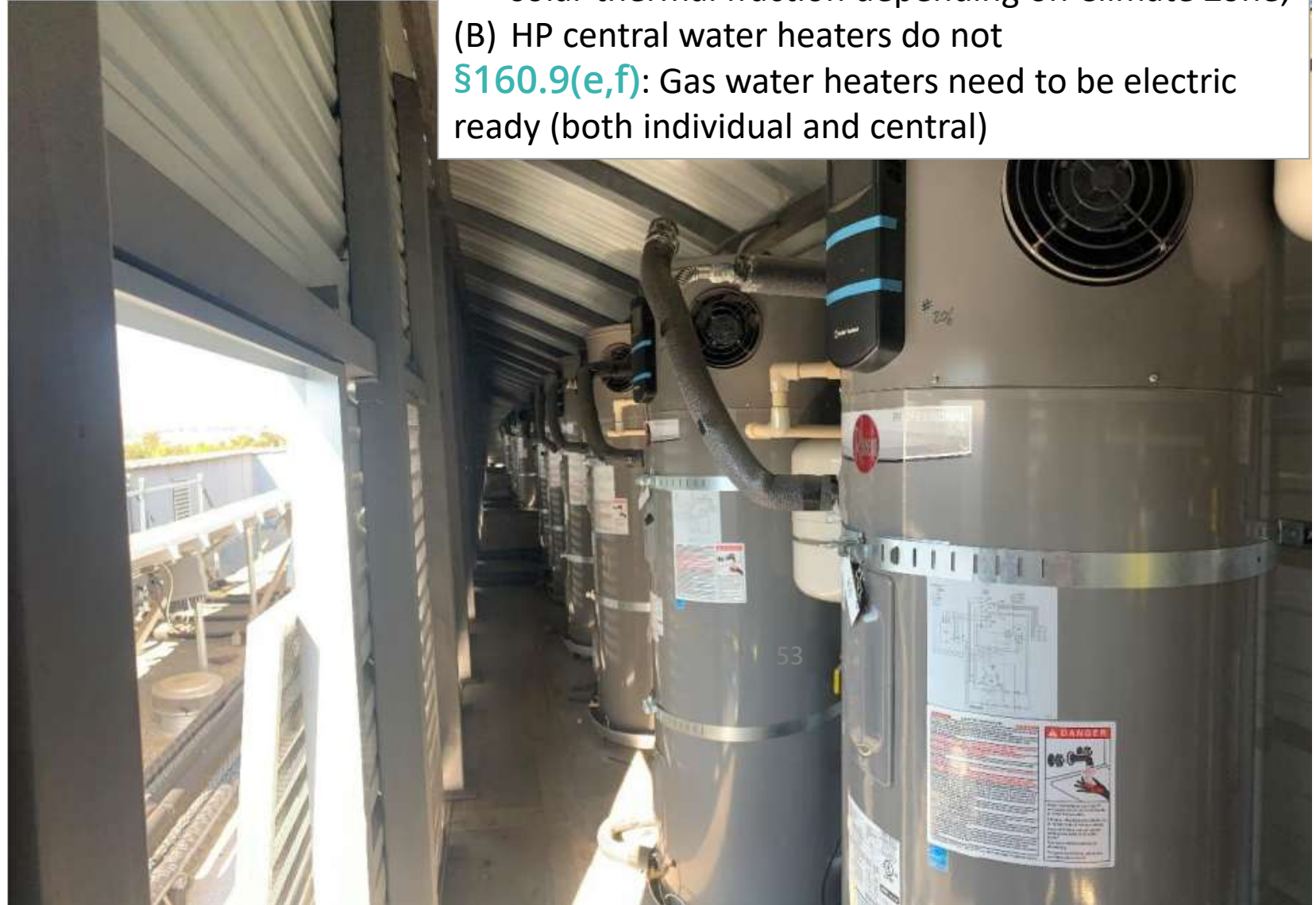
Click on Image
for YouTube video

Location, Location, Location



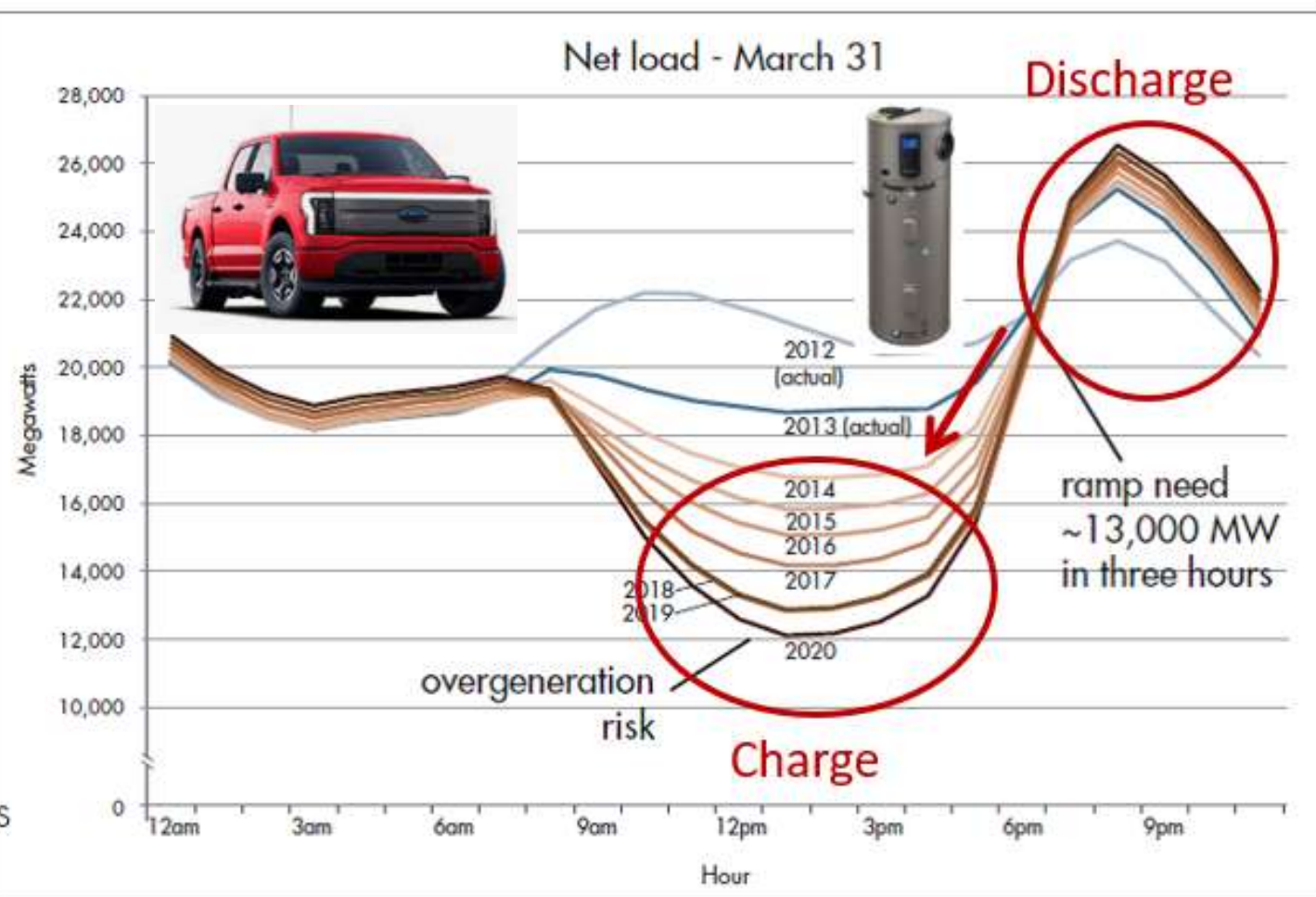
Location, Location, Location

Code Corner 2025 Multifamily §170.2(d)2:
(A) Gas central water heaters require 20% or 35% solar thermal fraction depending on Climate Zone;
(B) HP central water heaters do not
§160.9(e,f): Gas water heaters need to be electric ready (both individual and central)

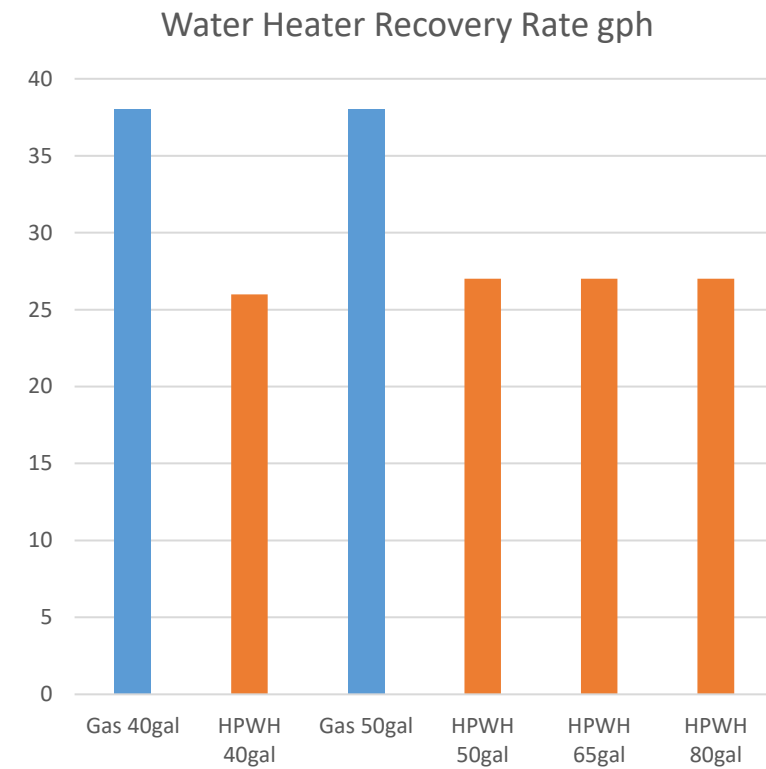
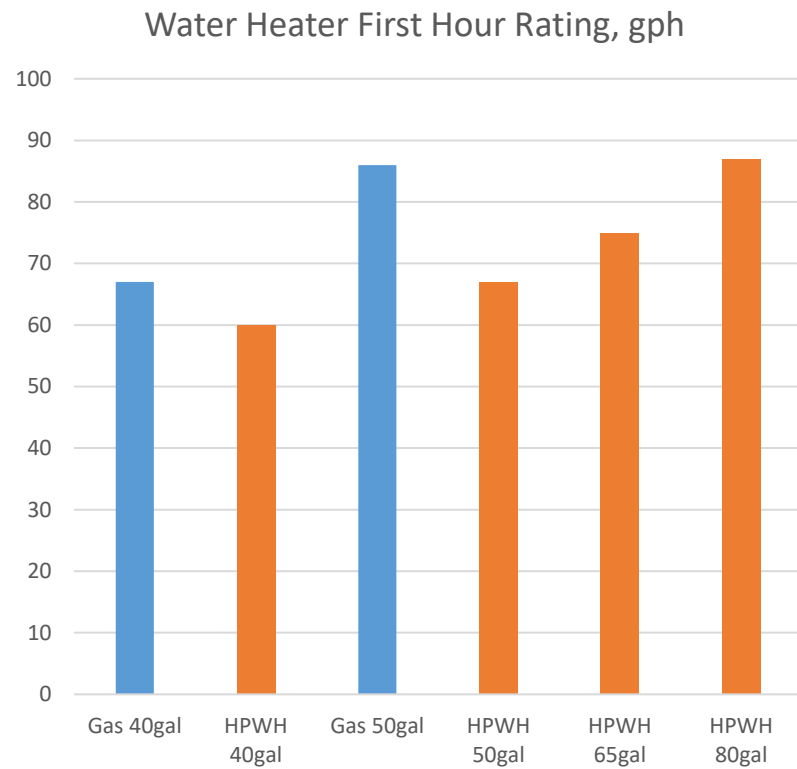


Heat Pump Water Heaters And EVs Can Soak Up Low-Carbon, Low-Cost Electricity Off-Peak, Without Adding Load On-Peak

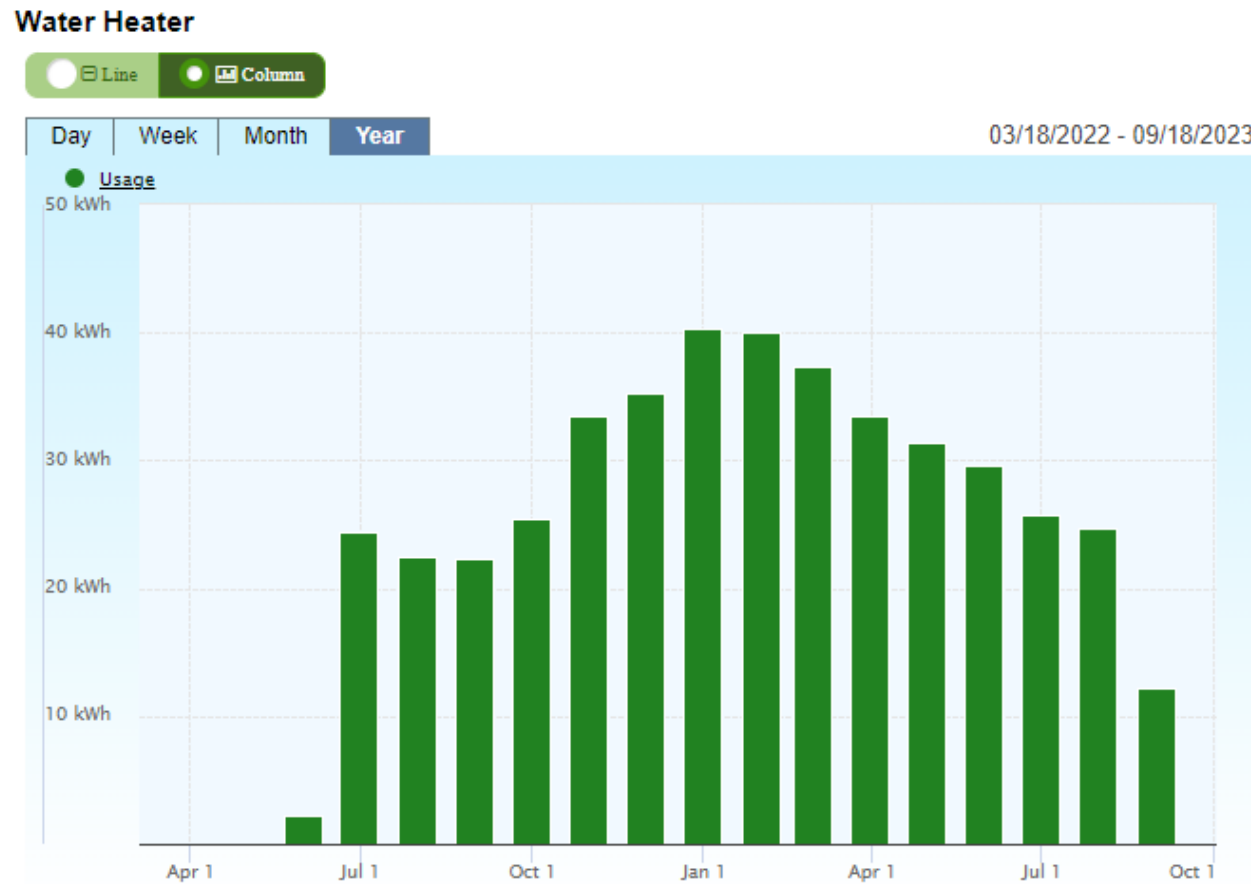
SCE TOU-D-PRIME Rates Have 4-9 pm Peak



HPWHs are Energy Sippers

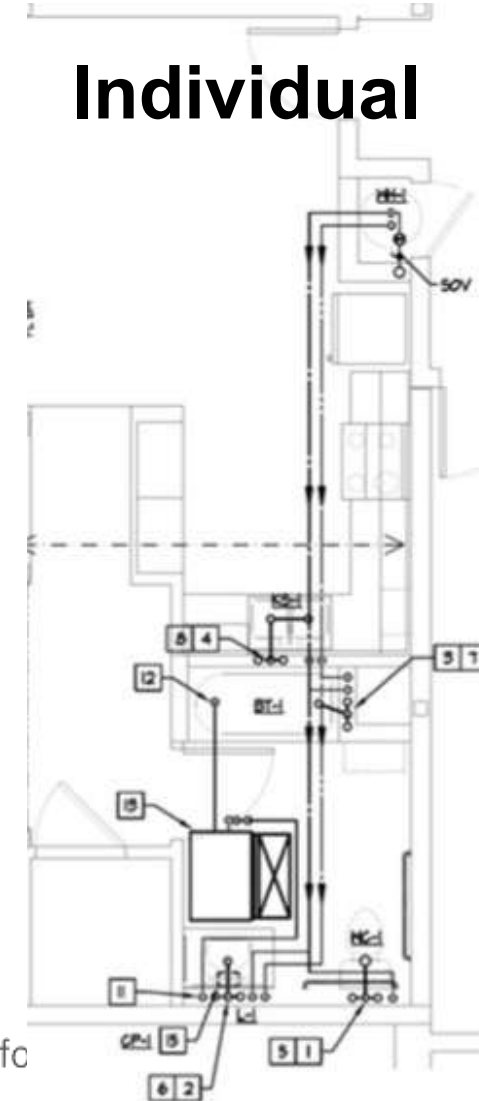
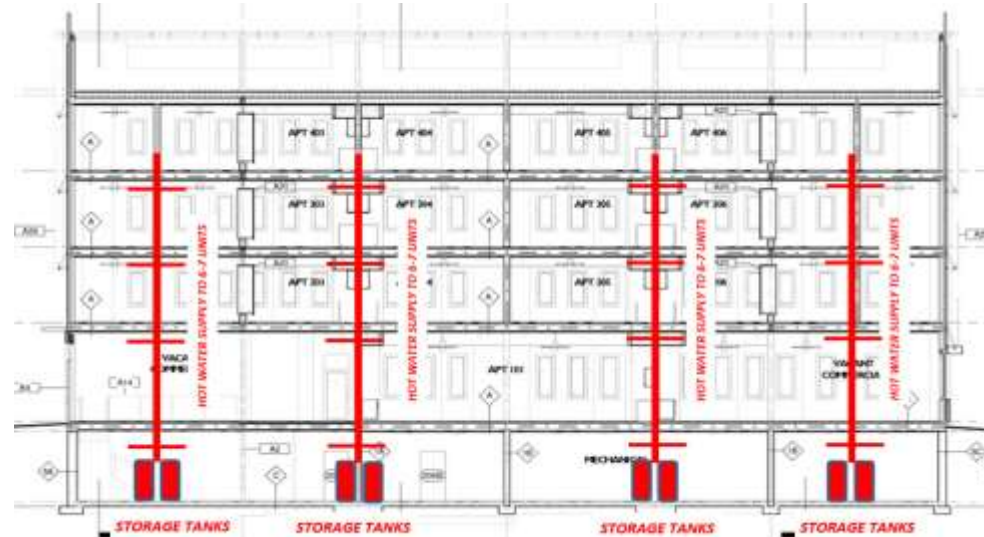


HPWH Averages 1 kWh per day in an ADU with 2 people



Individual

Shared



Energy fo

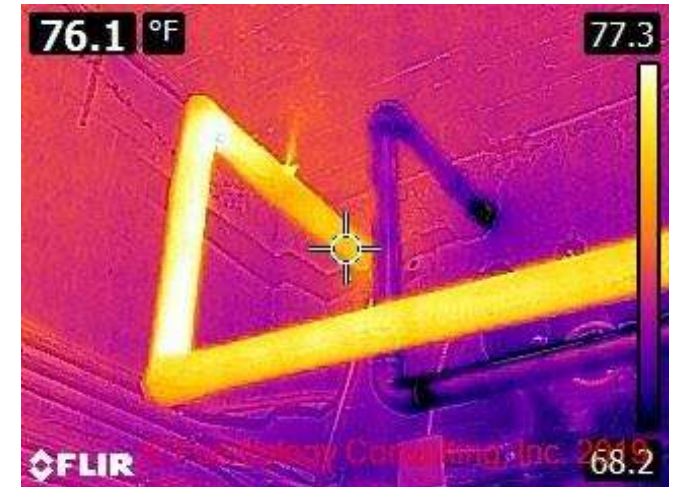
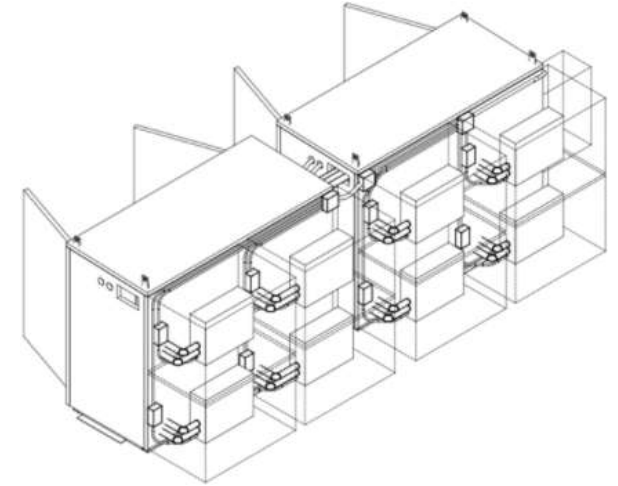
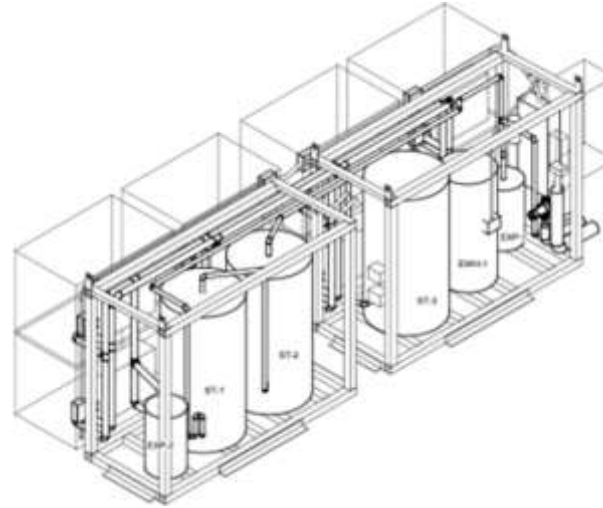
Embrace Better Technologies for Multifamily: Centralized HPHW

Pros:

- **Doesn't take up rentable floor space**
- **Can be centrally monitored and serviced**
- Sizing assistance with ECOSIZER
- Water Drop Palletized Units coming

Cons:

- **Owner is responsible for all water heating**
- **One year warranty**
- **If it fails, the whole building goes down**
- Service contract required
- Dual plumbing
- **Significant recirculation line loss**
- Separate tanks
- Roof area
- Structural implications
- Crane required



Embrace Better Technologies for Multifamily:

Shared HPHW

Pros:

- **Warranty 3 years**
- **When it fails, that segment of the building goes down**
- Less dual plumbing
- **Less recirculation line loss**
- No Separate Tanks
- **Doesn't use roof area**
- No structural implications
- No crane required
- May not need service contract

Cons:

- **May take up rentable floor space**
- **Owner is responsible for all water heating**
- Requires careful venting
- Requires primed floor drains



2 – 80 gallon HPWH for 6-7 Apartments

Embrace Better Technologies for Multifamily:

Individual HPHWs

Pros:

- **Warranty 10 years**
- **When it fails, only one unit goes down**
- **Tenant is responsible for water heating bill**
- No dual plumbing
- No recirculation line loss
- No Separate Tanks
- **Doesn't use roof area**
- No structural implications
- No crane required
- No service contract needed

Cons:

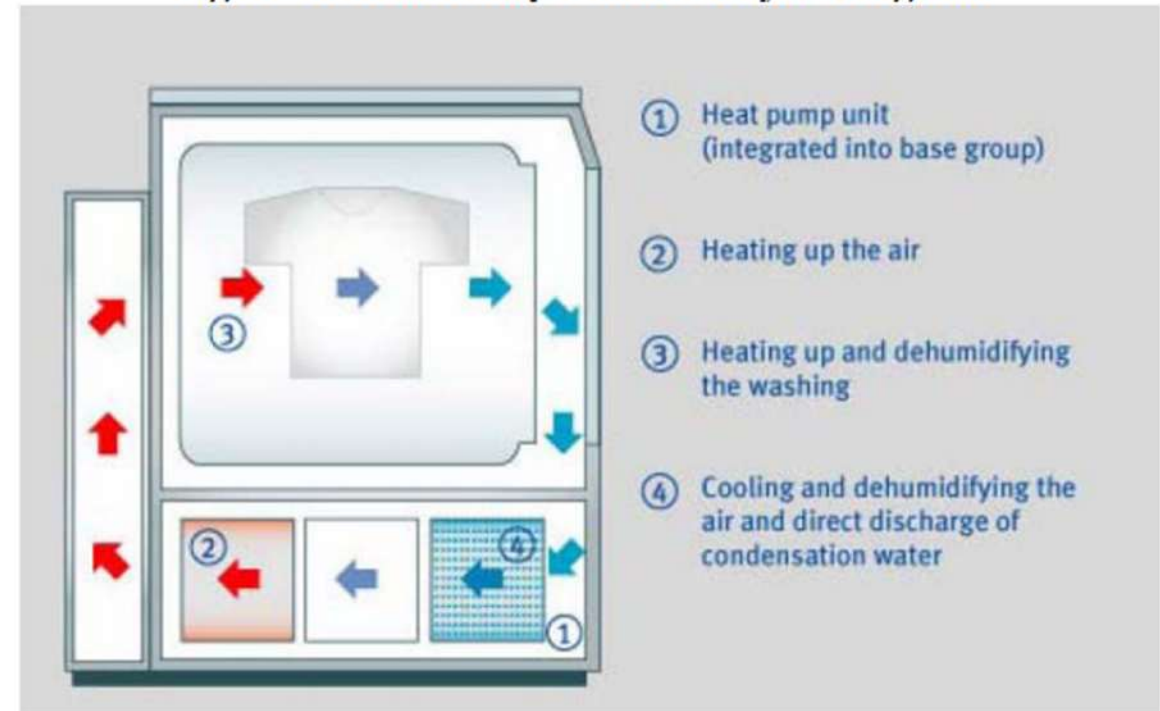
- **Takes up rentable floor space**
- Requires careful venting
- Requires primed floor drains



Heat Pump Clothes Dryers

- Closed loop heat pump
- Removes moisture from air in drum
- Heats air going back to drum
- No penetrations of building envelope to vent hot air
- Water goes down the drain
- Gentler on clothes
- 33-60% lower energy use than gas dryer

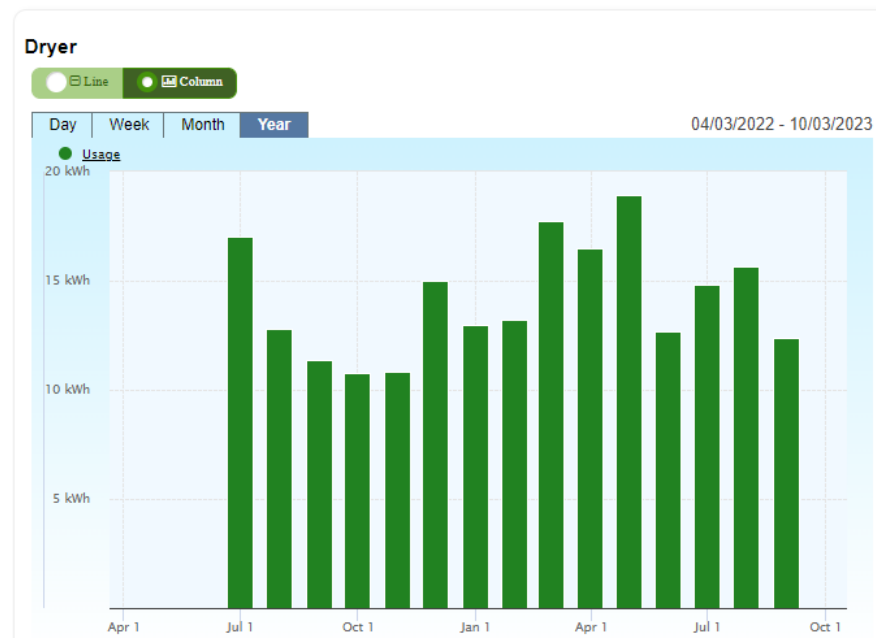
Figure 1. Heat Pump Clothes Dryer Diagram³



Heat Pump Dryer Actual Energy Use



- 4 cubic feet
- Uses 1.5 kWh per load & 15 kWh per month for Family of 2
- 65 minutes per load
- \$3 per month
- 900 Watts peak is less than a hair dryer



Code Corner 2025 §110.4(c):

Pool heating systems limited to heat pump primary, solar thermal primary, with gas only as backup:

Pool Heating

- Heat pump pool heaters are capable
- This 120,000 btu model costs \$4,000
- Comparable gas models are between \$1000 - \$2,000
- Run year round, ***this unit is estimated to save \$5,000 in the first year*** or 64% in L.A. climate
- It would run 9 hours on the coldest day of the year
- Receive payback in 1 year



Fireplaces

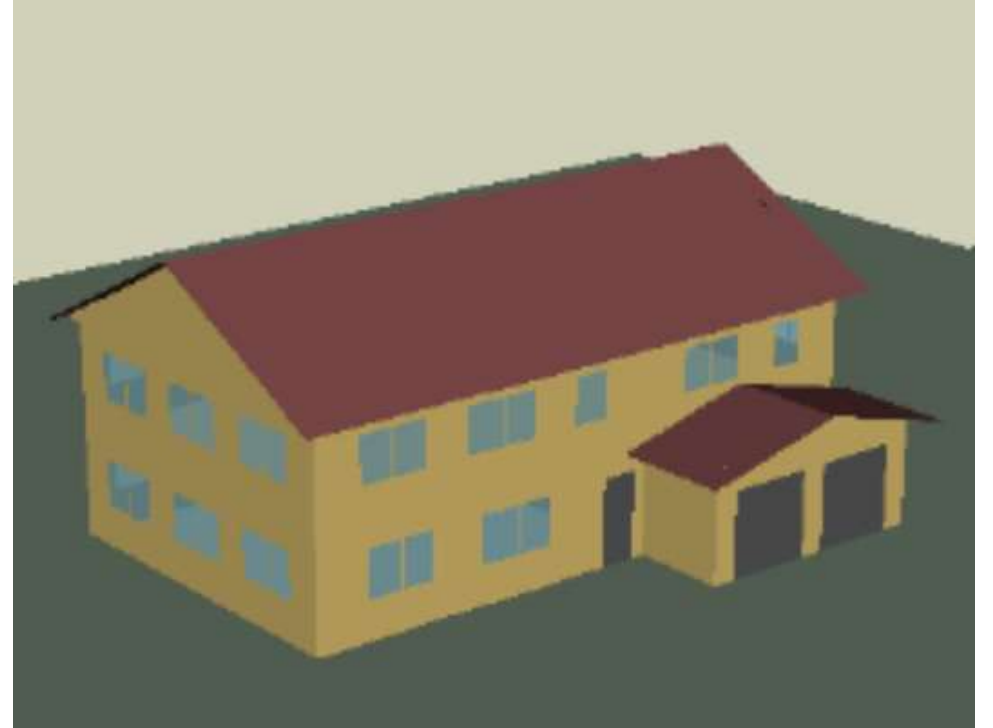


Energy Modeling for All-Electric Homes

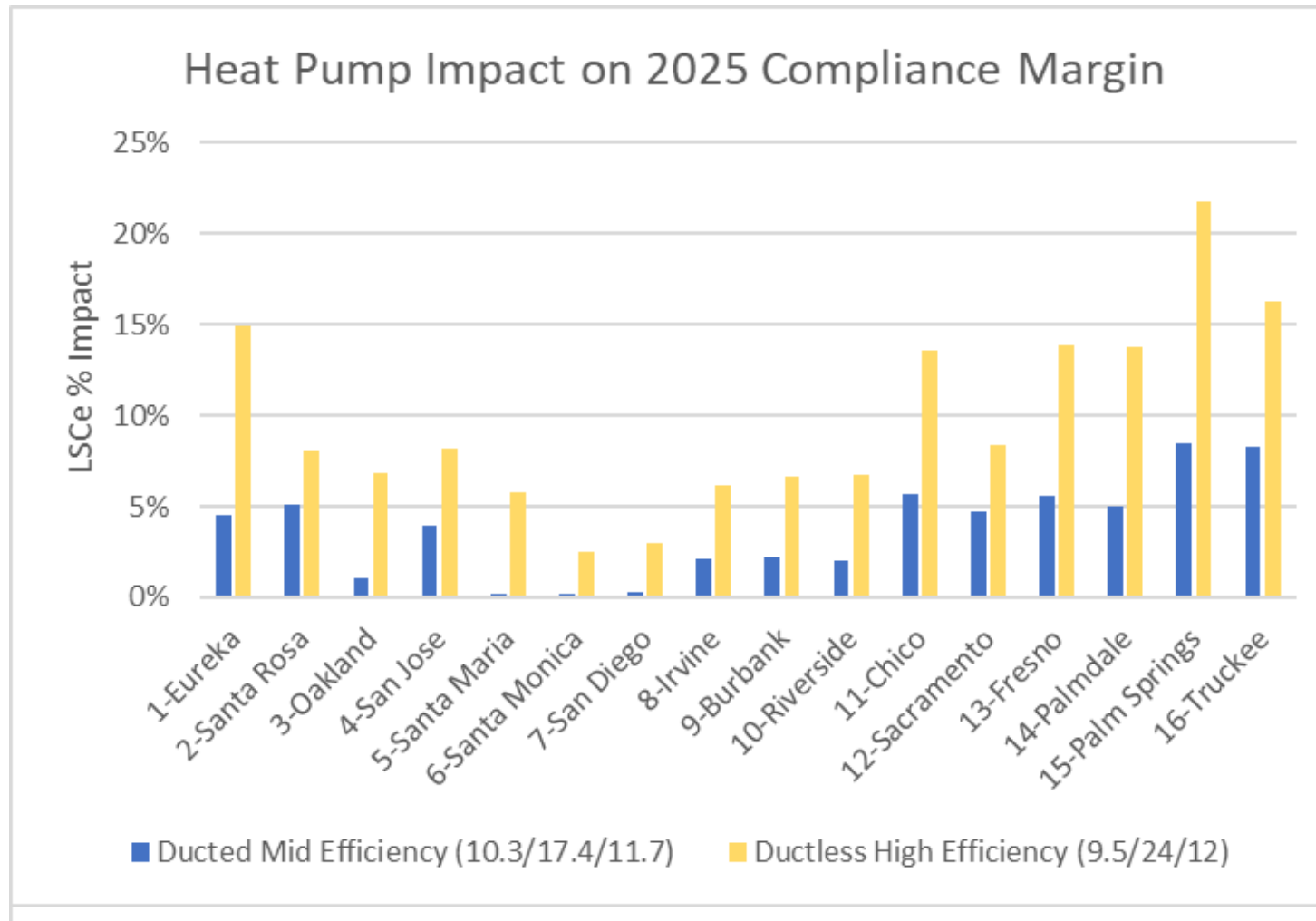
- Heat Pump Water Heaters
- Heat Pumps
- Electric Cooking
- Electric Clothes Drying

Energy Code Encourages All-Electric More than Ever

- Heat pumps prescriptive standard
- Source metric favors electric systems
- Gas systems require electric-retrofit-ready circuits
- Compliance credit possible with advanced heat pumps (VCHP credit)



HVAC Heat Pumps Perform Well for Compliance



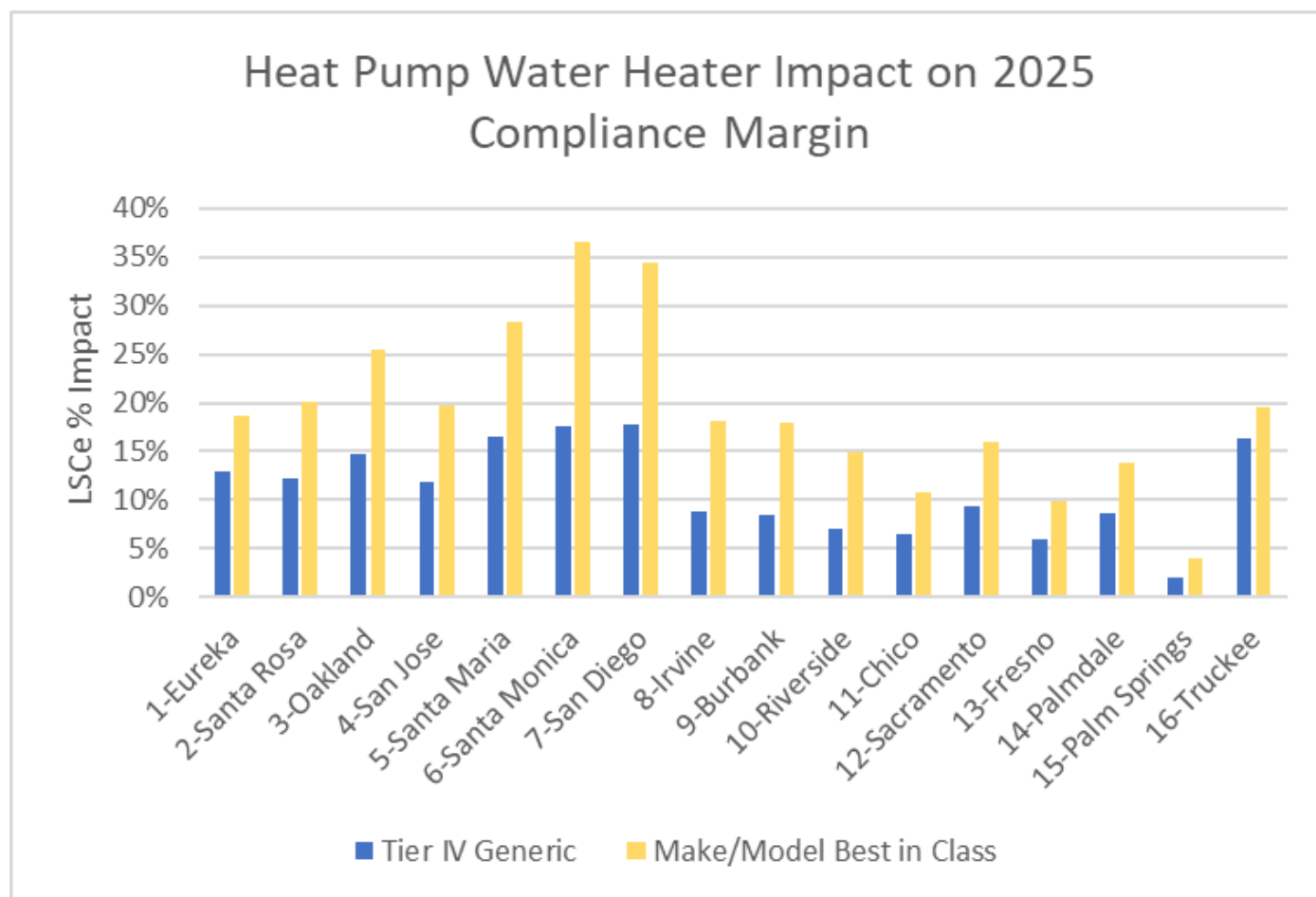
Average Compliance Impact:

- Efficiency LSC:
 - Ducted Minisplit Mid Efficiency (3.7%)
 - Ductless Minisplit High Efficiency (9.8%)
 - Gas Furnace: -15.9%

Talking to People About Heat Pumps

- Comfort
- Heat strips: can erase energy savings if used carelessly
 - Not necessary in large parts of California, especially with high-performance envelope
- Heat pump clothes dryers:
 - Trade off higher first costs for energy savings and gentle treatment of clothes
- Heat pump water heaters:
 - Careful with heat strips – run in Heat Pump Only mode
 - Use tank one size larger than typical gas tank
 - Ideal for peak shifting 4-9 pm = added value
 - Overcoming objections: space required & recovery rate

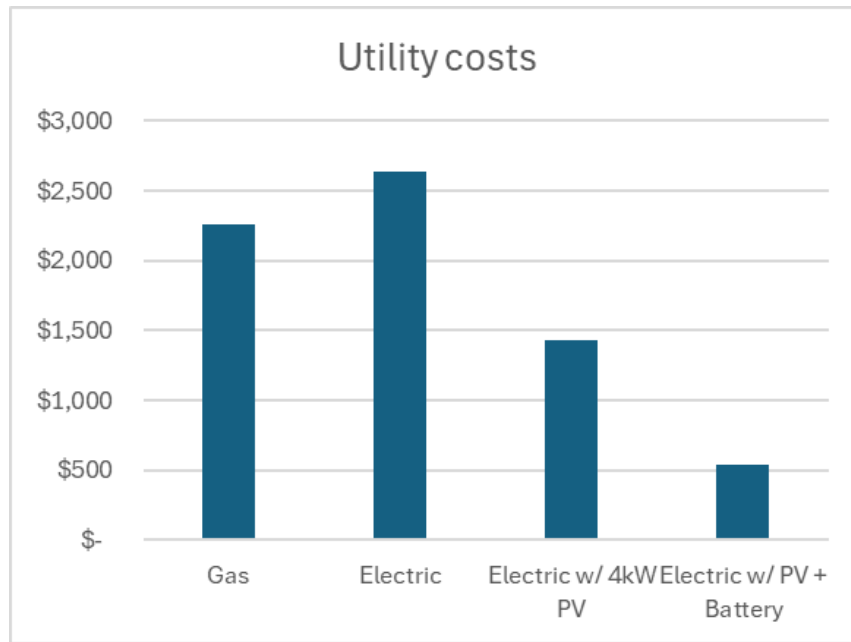
NEEA HPWHs Model Better than Gas



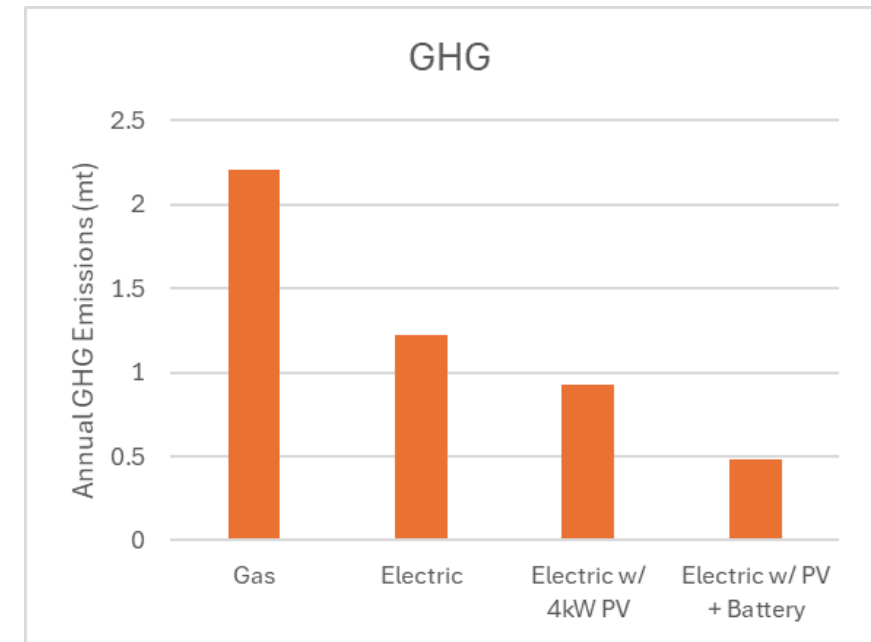
Average Compliance Impact:

- Efficiency LSC:
 - Generic Tier IV 11.1%
 - Make/Model Specific 19.3%
 - Gas Tankless -20.9%

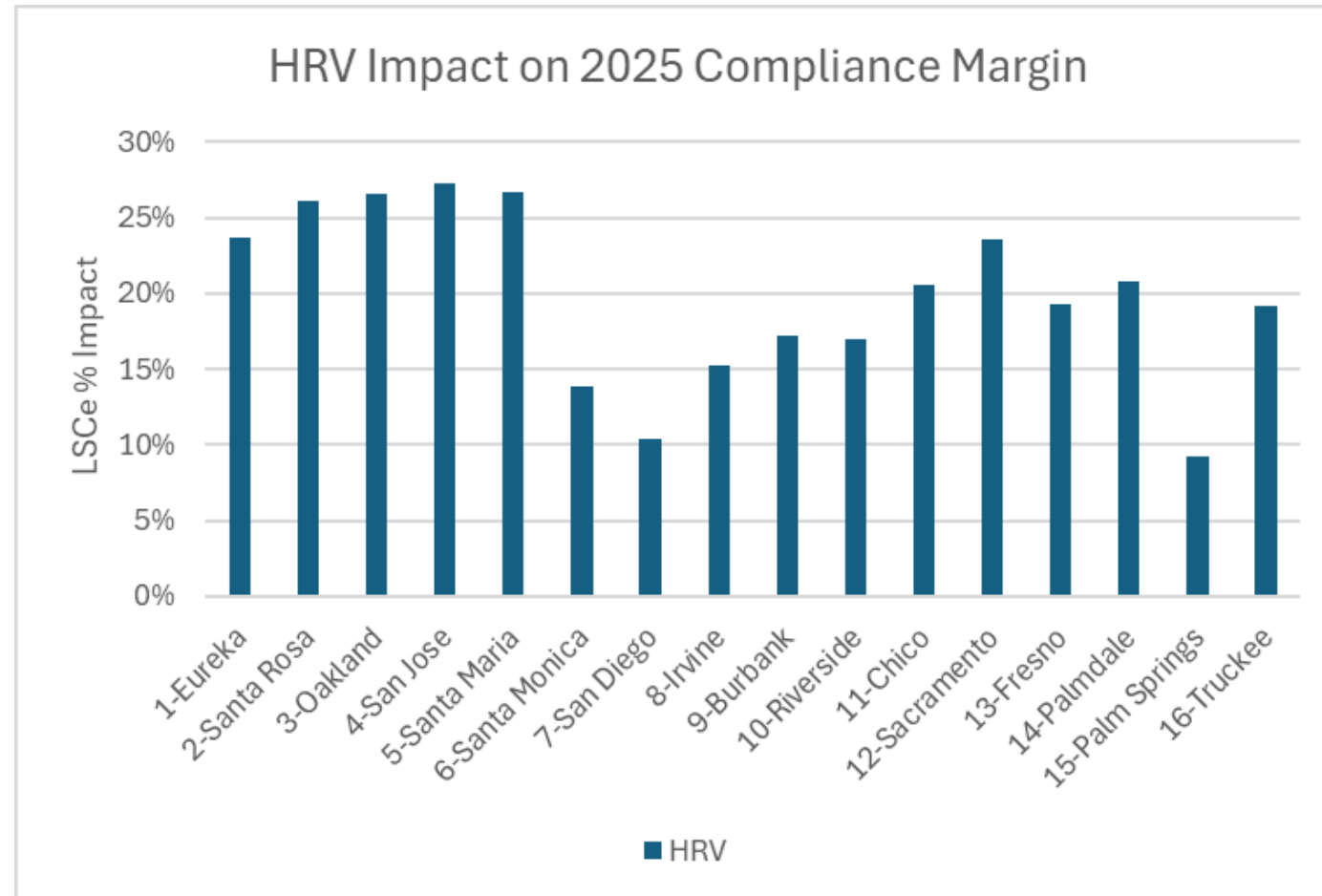
All-Electric Homes with PV Have Much Lower Operating Costs to Gas



Modeled energy usage for 2-story existing/remodeled house in CZ6 (Coastal Los Angeles) under NEM3 with current SCE/SCG rates as of May 2026. Battery modeled using Basic control.



Compliance Credit for Recovery Ventilators



Average Compliance Impact:

- Efficiency LSC:
 - Typical HRV 19.8%
 - Best in CZ 1-5,12
 - Less in mild CZ 6-10 &15

Gas vs Electric Comparison 2025 Code: CZ 10 (Corona)



Dual Fuel

All Electric

	Standard Design	Proposed Design	Compliance Margins	
Long-term System Cost ¹				
Efficiency ² (\$/ft ² -yr)	8.09	12.66	-4.57	Fail
Total ³ (\$/ft ² -yr)	15.82	20.35	-4.53	Fail
Source Energy				
Total ³ (kBtu/ft ² -yr)	8.72	10.26	-1.54	Fail
Peak Cooling ^{**}				
Electricity (kWh)	621	624	-3	Fail
Result*:			DOES NOT COMPLY	

	Standard Design	Proposed Design	Compliance Margins	
Long-term System Cost¹				
Efficiency² (\$/ft²-yr)	8.09	6.71	1.38	Pass
Total³ (\$/ft²-yr)	14.96	13.70	1.26	Pass
Source Energy				
Total³ (kBtu/ft²-yr)	7.74	4.18	3.56	Pass
Peak Cooling**				
Electricity (kWh)	616	438	178	Pass
Result*:			COMPLIES	



Case Study Project: New 2,700 sf 4-Bedroom Home

Showing Compliance with the 2025 Energy Code

Energy Features		Option 1 – Gas/Gas			Option 2 – All Electric		
Compliance Margins Both PASS		Source	Eff. LSC	Total LSC	Source	Eff. LSC	Total LSC
		5.5%	3.4%	26.1%	33.7%	0.1%	0.2%
Building Envelope							
Wall Insulation		R-21+R-5			R-21		
Attic Insulation	Roof	R-38 Unvented Attic			R-19 under roof deck		
	Ceiling	N/A			R-38 at ceiling		
Fenestration		NFRC U=0.27/SHGC=0.23			Same		
HERS verified QII*		Required			Not Required		
Solar PV		4.0 kW			3.4 kW		
Battery Storage		10 kWh Battery			None		
Air Tightness		3 ACH50 verified			No verification required		
Mechanical System							
Heating	Central Split AC	95% AFUE Furnace			7.5 HSPF2 (min. efficiency)		
Cooling		14.3 SEER2 (min. Efficiency)			Same		
Ducts		R-8 Ducts in Attic			Same		
Ventilation Cooling		Default whole house fan			None		
IAQ Fan		Heat Recovery Ventilator			Exhaust code minimum		
Hot Water (HW) Heater		0.95 UEF Tankless Gas			Name brand 50gal HPWH		
HW Distribution		Compact distribution credit			None		

RED = More expensive than the Prescriptive Design feature

GREEN = Less expensive than the Prescriptive Design feature

*Quality Insulation Installation Breaker: Talking With Clients About Electrification

- The gas design requires extensive upgrades to meet compliance to the Energy Code
- The all-electric design requires no feature upgrades to meet compliance to the Energy Code

Key Questions to Ask Your Energy Consultant

- Are you using current 2025 software?
- Is all-electric now significantly better than gas?
- Are you taking credit for upgraded heat pumps?
- Did you model a specific NEEA rated Heat Pump Water heater?
- How far away from compliance are we?
 - What part of the building has a compliance deficit?
 - Heating
 - Cooling
 - Water Heating
 - Other
 - What could we do to close the compliance gap?

Homebuilders Already Building All-Electric in SoCal



All-Electric Affordable 101-unit in Ontario, CA: Built for \$127 per square foot

- Individual unit HPWHs
- Individual unit heating and cooling minisplit HPs
- Builder makes use of incentives:
 - SOMAH
 - TECH
 - CALIFORNIA ENERGY SMART HOMES
 - BUILD
 - LIWEAP
 - MAHEP



More Marketable Buildings:

Can Charge Higher Rent With Lower Utility Bills

- 101-unit affordable multifamily building in Southern California
- Typical utility bills: \$134 - \$175 per month
- With upgrades & PV: \$13 - \$17 per month
- **Savings applied to rent add up to \$160,000 per year in added revenue to building owner**

STATE OF CALIFORNIA

CALIFORNIA ENERGY COMMISSION

UTILITY Allowance Calculation Tool

Annual Submittal Report



12/29/2020 12:03:47 AM

Page 2 of 3

Tool Version: 2.0.0 11/30/2020

Tables Version: 1.1.0 11/30/2020

Printed Timestamp: 12/29/2020 12:03:51 AM

Project Name: Vista Verde

Site Street Address: 110 North Virginia Avenue, Ontario, 91764

Site Contact: Zoe Kraneman

Electric Utility: SCE

Gas Utility: No Gas

Tariff Type: CARE

Electric Territory: 10 - Electric

Gas Territory: All

Affordable Housing: Yes

Utility Allowance Calculator Results

			Monthly Usage (\$/month)				
Apartment Type	Units		Electric	Gas	Water	Trash	Total
	Affordable Housing	Market Rate					
Two Bedroom	69	0	\$13.43	\$0.00	\$0.00	\$0.00	\$13.43
Three Bedroom	32	0	\$17.15	\$0.00	\$0.00	\$0.00	\$17.15

With Upgrades & PV

\$ 13

\$ 17

0

0

0

Without Upgrades & PV

\$134

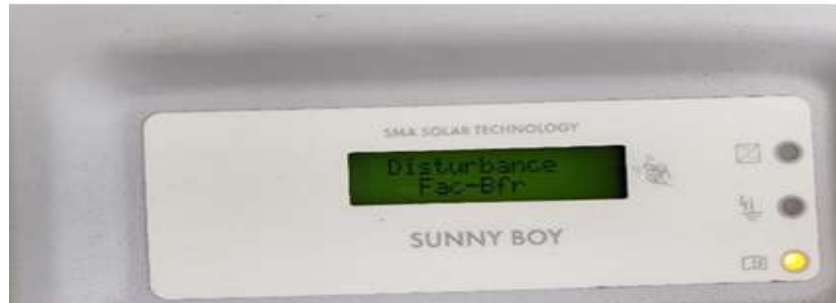
\$175

Proper Solar And HVAC Placement Optimizes *The Roof As The Engine Of The Building*

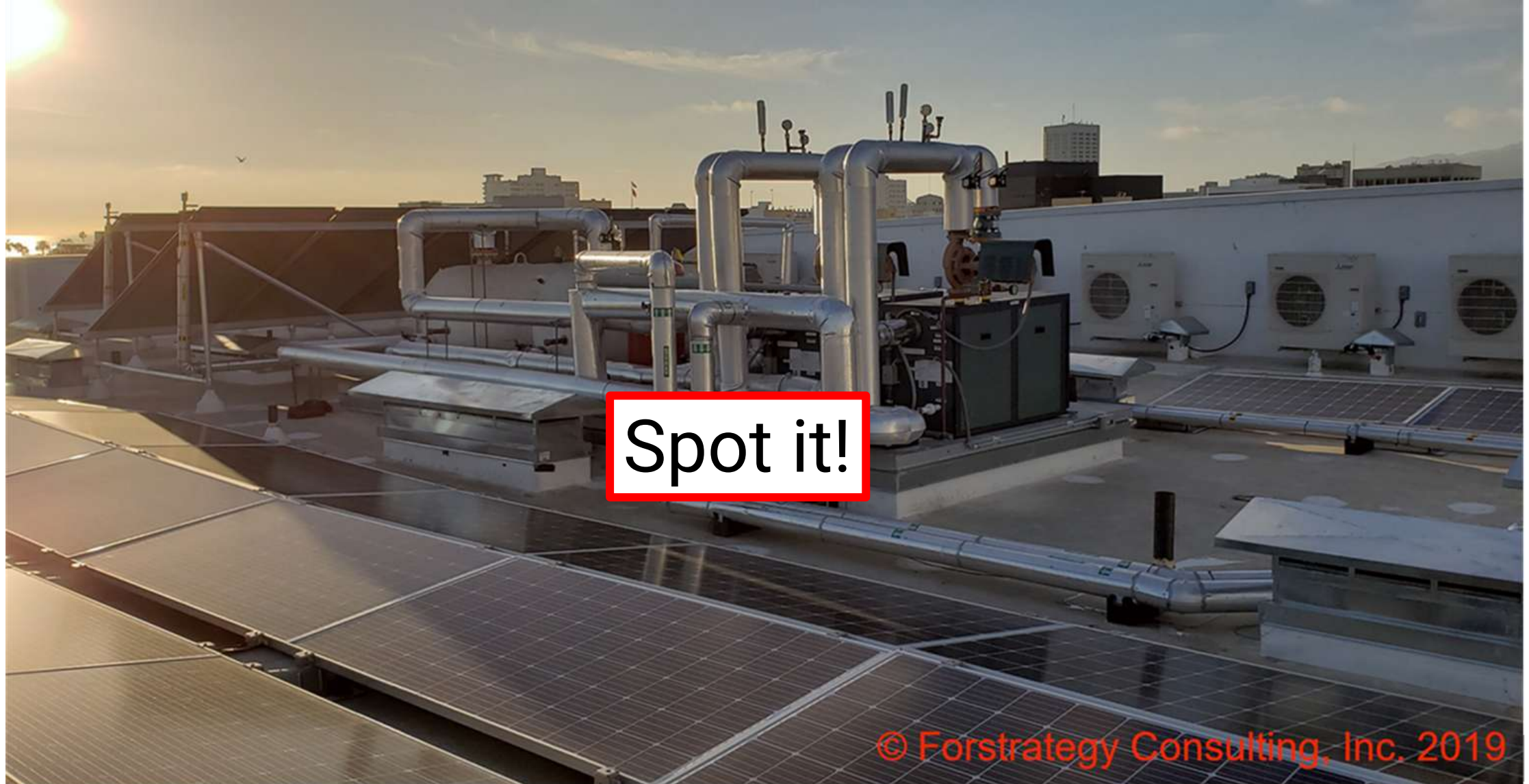


Avoid Common Missteps

- Continuous commissioning
- Occupant behavior



Avoid Common Missteps



Spot it!

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Spot it?



Visual Blight?



End

Built-in Solutions



Amenities!



Ideal All-Electric Home Design

- High-performance envelope
 - Well-sealed
 - High performance walls & attics with continuous insulation
- Passive Solar Orientation & Shading
- High-efficiency Ductless Minisplit Heat Pump
- NEEA-rated Heat Pump Water Heater
- Heat Pump clothes dryer
- Induction cooktop and electric oven
- Recovery Ventilator for fresh air
- LED lighting
- Size PV and battery to cover electricity use & EV charging



All-Electric Summary

- Technologies are ready
- Systems are lower cost
- 45% GHG emissions reduction vs dual fuel
- Healthier indoor air
- Title 24 compliance requires costly upgrades to use gas
- Compatible with PV panels
- Safe from natural gas hazards

Resources

- Net Zero Nest www.netzeronest.com
- Green Idea House www.greenideahouse.com
- Residential solar demand shifts from incentives to infrastructure as homeowners seek control – pv magazine USA <https://share.google/EpD7IdeHcZfpFzvMj>
- AMA: [Informing Physicians, Health Care Providers, and the Public That Cooking with a Gas Stove Increases Household Air Pollution and the Risk of Childhood Asthma](#)
- Building Decarbonization Coalition www.buildingdecarb.org
- Rocky Mountain Institute www.rmi.org
- Energy Vanguard www.energyvanguard.com
- Green Building Advisor www.greenbuildingadvisor.com
- Architecture 2030 www.architecture2030.org
- “Residential Building Electrification in California”, E-3, www.ethree.com
- [“Induction Cooking-Here’s Why You should Make the Switch”](#), reviewed.com
- Tony Seba Rethinking the Future: <https://www.youtube.com/watch?v=duWFnukFJhQ>

Additional Tools & Resources

[SCE – Building All-Electric](#)

[Build Smart Group Blog: What Really Happened](#)
[Building Electrification Action Plan for Climate](#)
[Leaders](#)

[Building Decarbonization Coalition](#)

[Building Electrification](#)

[A Roadmap to Decarbonize California's Buildings](#)

[Redwood Energy Watt Diet Calculator](#)

[Lazard Cost of Energy Analysis](#)

[SCE Rebate Savings](#)

[SCE Rate Plan Comparison Tool](#)

[Electric Vehicle Charging Association](#)

[New Buildings Institute](#)

[National Core](#)

[Indoor Air Pollution](#)

[Los Angeles Better buildings Challenge](#)

[Gas Stove Pollution](#)

[Onion Flats Projects](#)

[A Zero Emissions All-Electric Multifamily](#)
[Construction Guide Redwood Energy 2019](#)
[Ecotope HW Sizing tool](#)

For Additional Learning Opportunities:

[https://www.sce.com/business/consulting-](https://www.sce.com/business/consulting-services/energy-education-centers)
[services/energy-education-centers](https://www.sce.com/business/consulting-services/energy-education-centers)

Questions??

Nick

Robert



nick@buildsmartgroup.com



fortunato@forstrategy.com



Energy for What's AheadSM



Questions about Title 24?

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



Online:
3c-ren.org/code

Call:
805.781.1201

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

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

Thanks for coming!



Continuing Education Units Available

- Contact nnewman@countyofsb.org with any questions

Today's Slides and Recording are Coming to Your Inbox Soon!

Upcoming Courses:

- [6/16 - Natural Insulation for Low Carbon Builds](#)
- [6/17 - Home Electrification Contractor Boot Camp in SLO](#)
- [7/7 - What is a Load Calculation and Why One is So Important](#)
- [7/8 - 2025 Cal Green - Residential](#)

Any phone numbers who joined? Please share your name!

