



TRI-COUNTY
REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

The Practical Guide to All-Electric Residential Buildings (PART 1): The Why, Solar, Cooking

Nick Brown, Build Smart Group & Robert Fortunato, ForStrategy Consulting

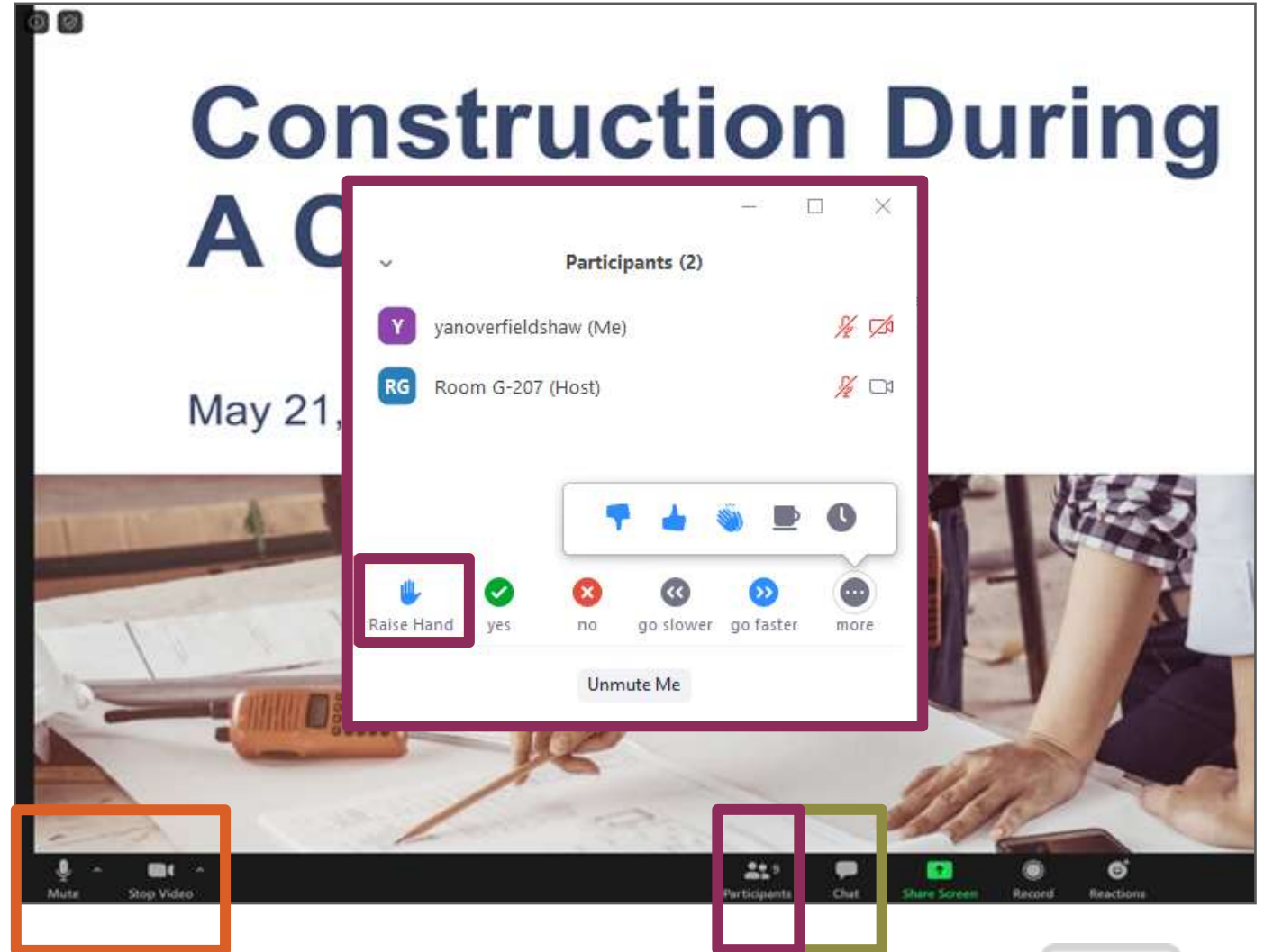
May 28, 2026

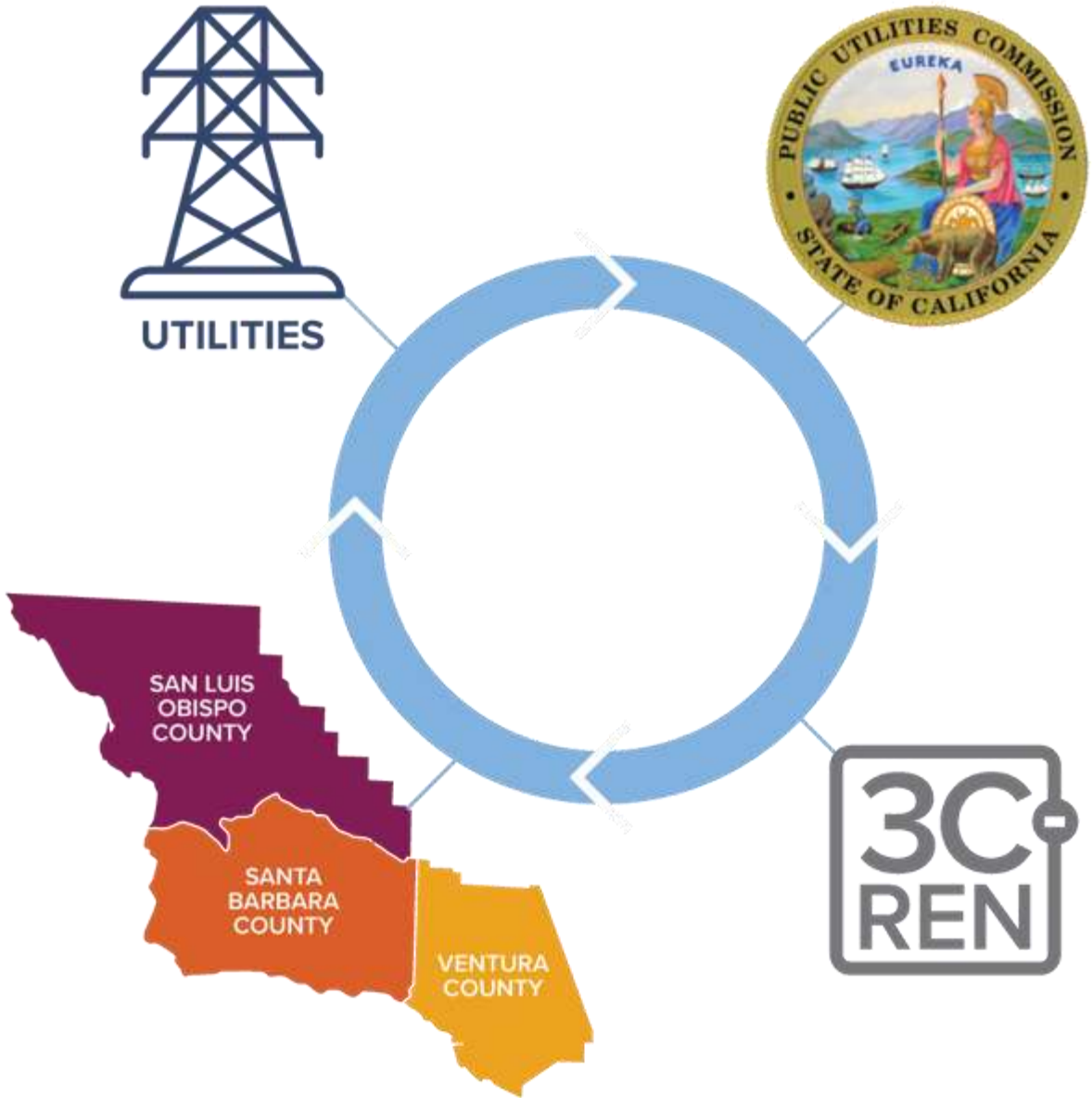


Before We Begin

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
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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 prewiring

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



- 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



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

Nick Brown Robert Fortunato

May 28, 2026

Energy for What's Ahead[®]

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.

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

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.

Where are you joining us from today?

Mentimeter IB ▼

Replace this slide ↺

Open Menti to edit ↗

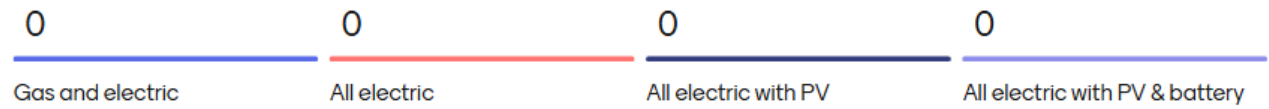


menti.com
5540 6292

Waiting for participants



How do you power your house?



Mentimeter

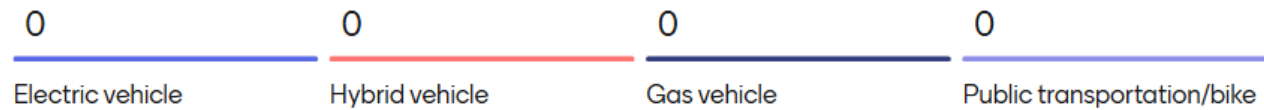
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How do you power your transportation?



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What do you want to learn today

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Introductions

Nick Brown
Robert Fortunato

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

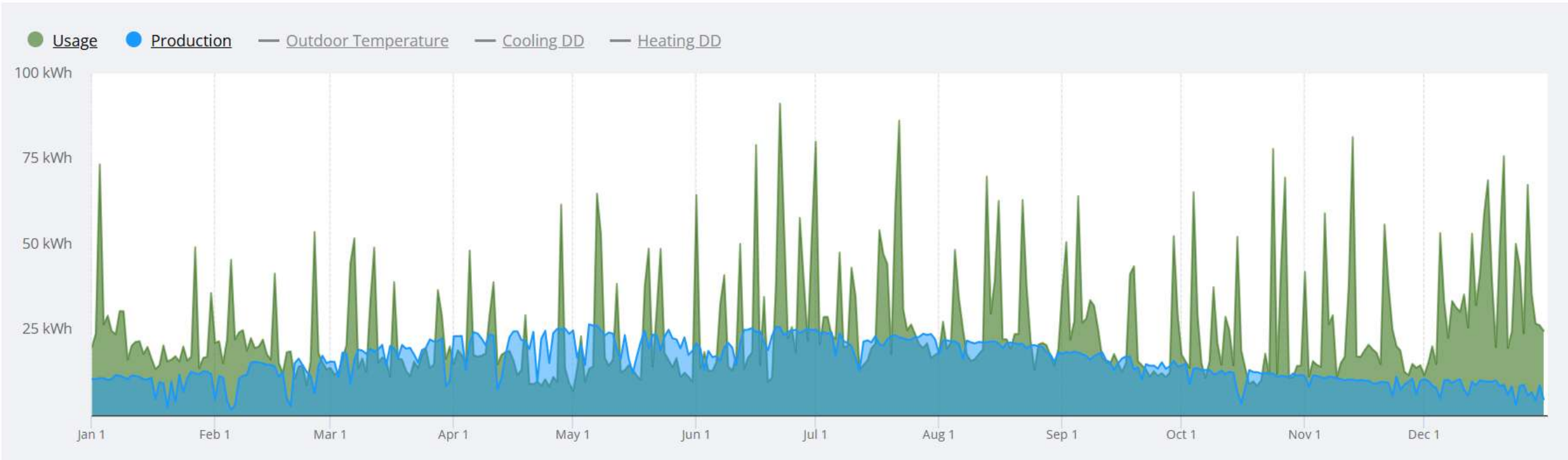
Location Usage

- Usage
- Cost
- Daily Summary
- Monthly Summary

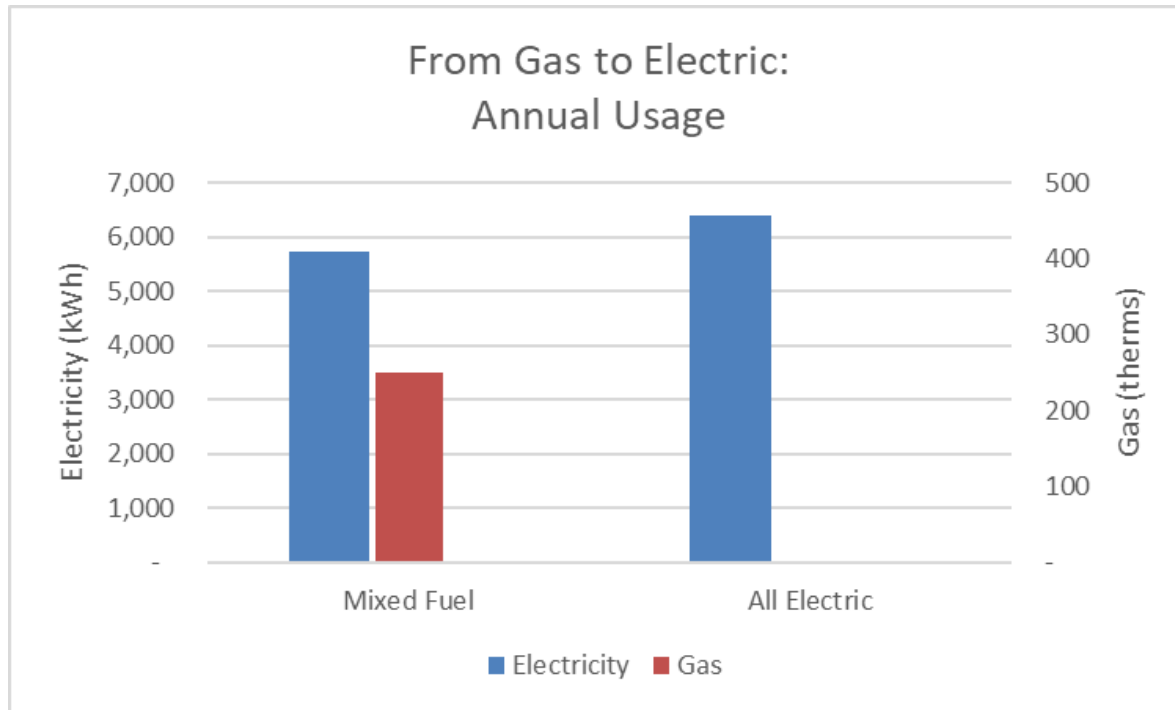
- Past Day
- Past Week
- Custom

Start Date *
1/1/2024

End Date *
12/31/2024



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

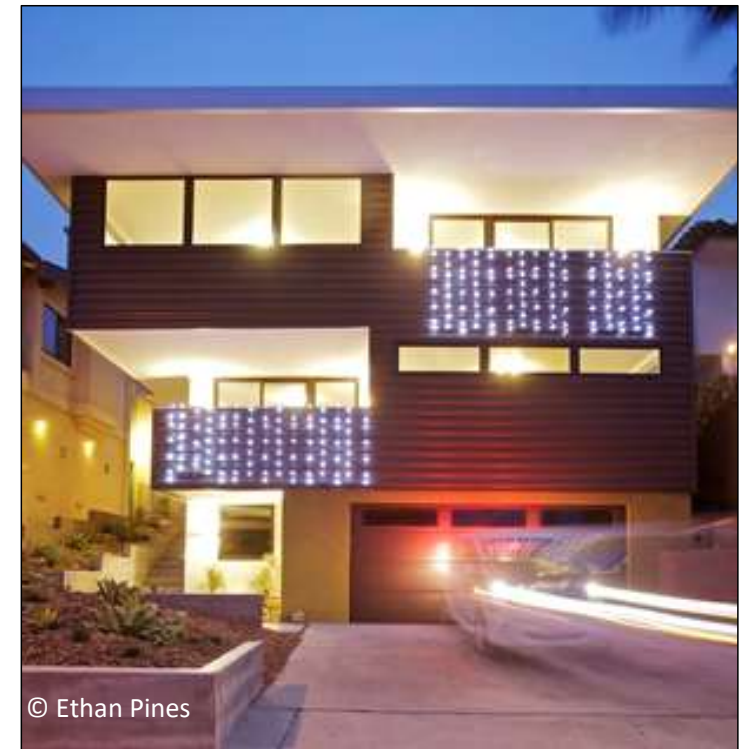
Robert Fortunato

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

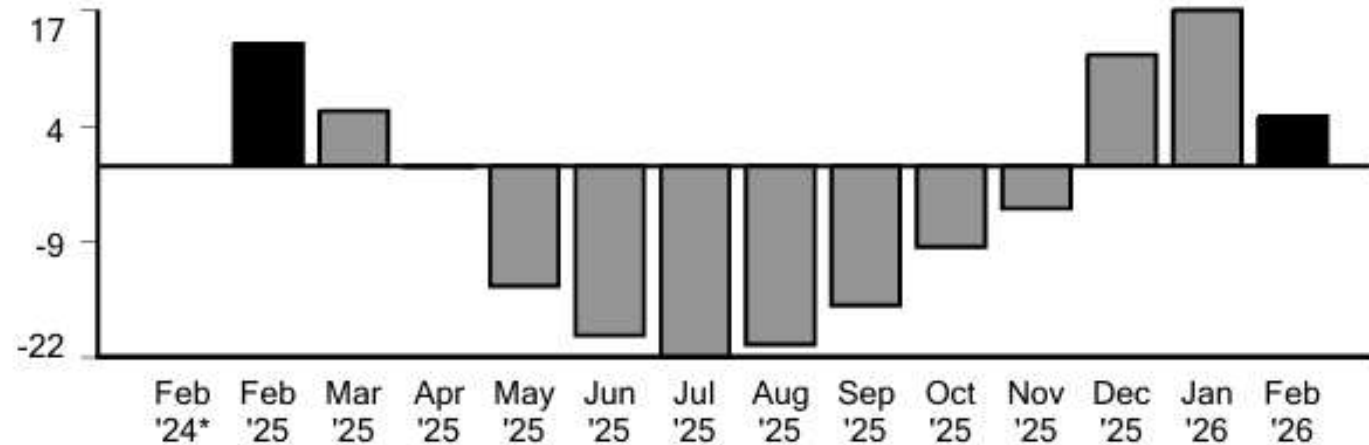
SETTLEMENT BILL

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



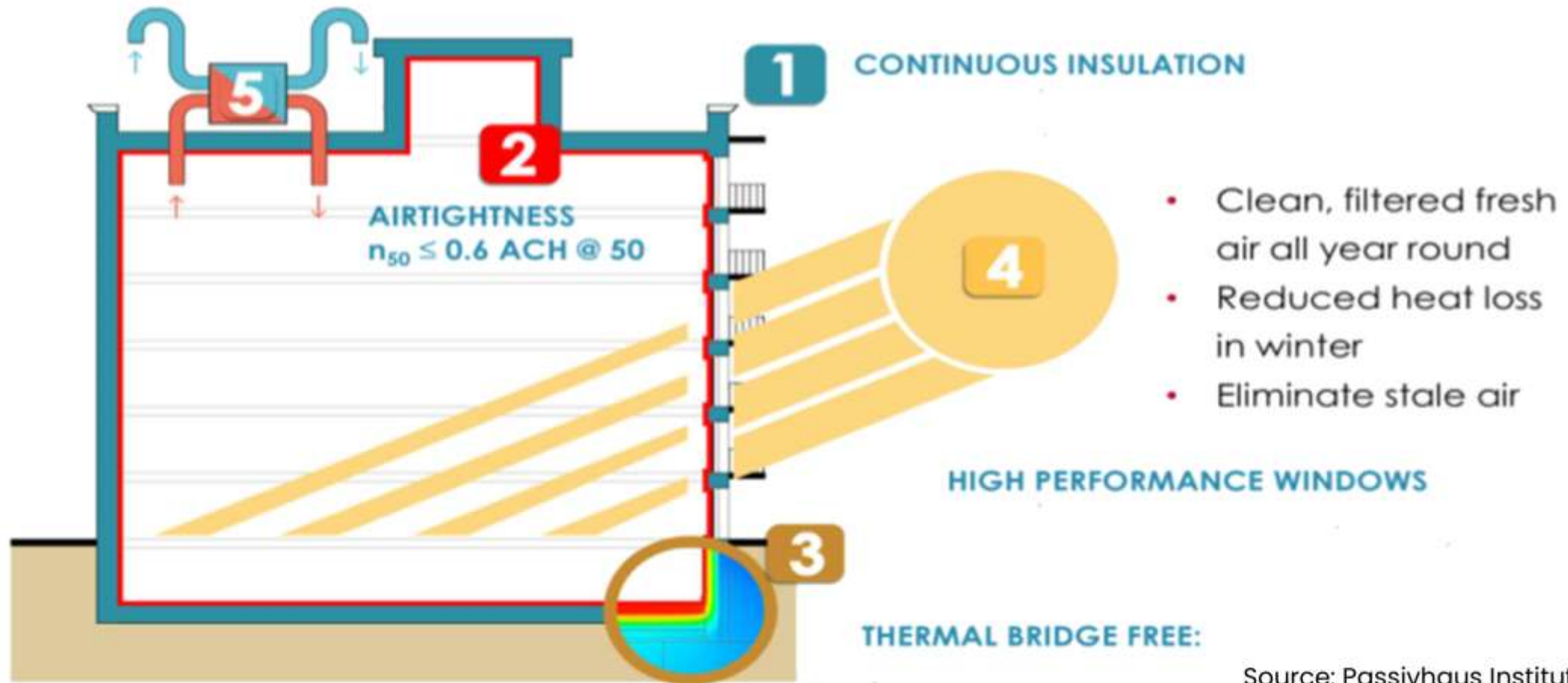
Additional information regarding your Net Consumption/Generation:

- 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.

High Performance Building Attributes

MECHANICAL VENTILATION



Source: Passivhaus Institute

- TEDx Talk 2014.
- Initiated one of the first NZE Schools in Hermosa Beach.
- Work with affordable housing developers on portfolio audits, retrofits and new building pipeline.
- Completed year long commercial and multifamily commissioning class.
- Built a team that won CEC's EPIC \$1mm Grant to design most sustainable affordable housing development.
- Won additional \$9mm in funding based on report to CEC.
- Accredited Passive House Consultant.
- High Performance buildings instructor for USGBC-CA, SCE and 3C-REN.
- [Recently featured on NPR !](#)



CLIMATE

5 lessons from a house that generates more energy than it uses

SEPTEMBER 20, 2025 · 6:30 AM ET

HEARD ON WEEKEND EDITION SATURDAY



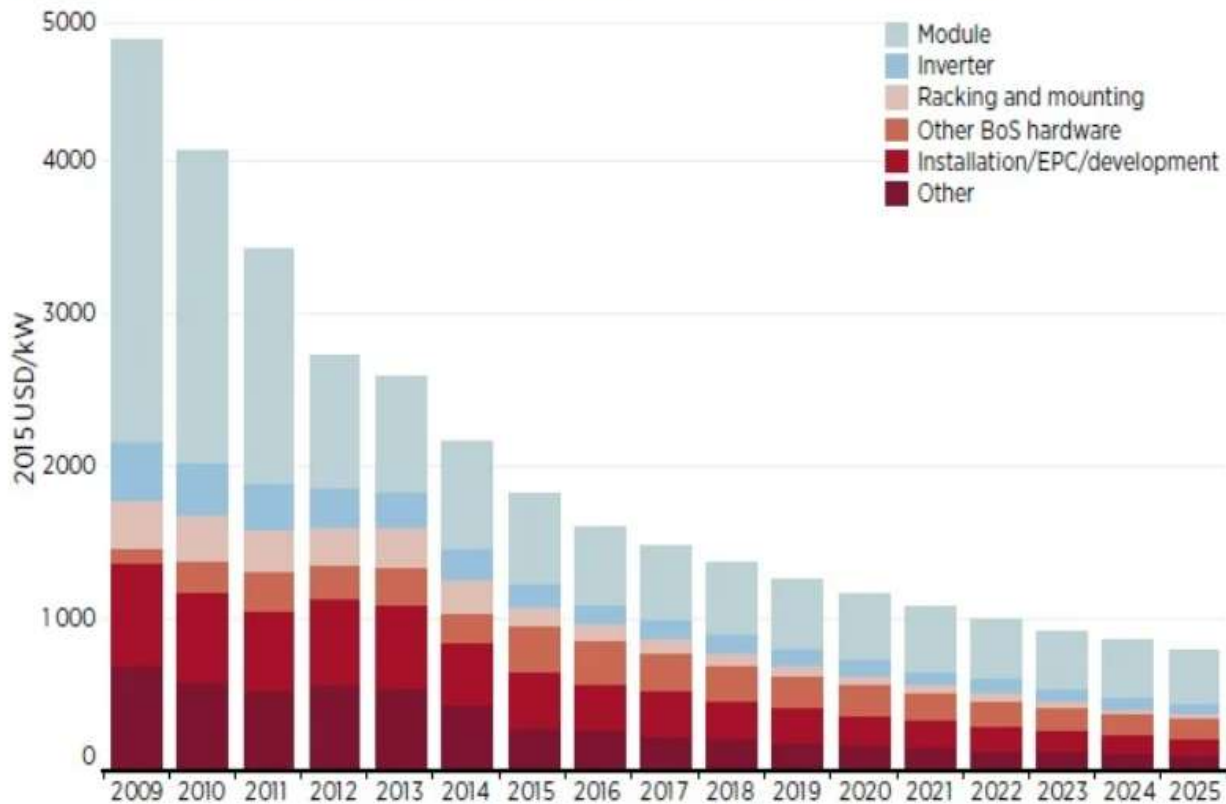
Energy for What's Ahead™ |

Why All Electric?

What's in it for YOU?

Cost of Solar PV and Batteries

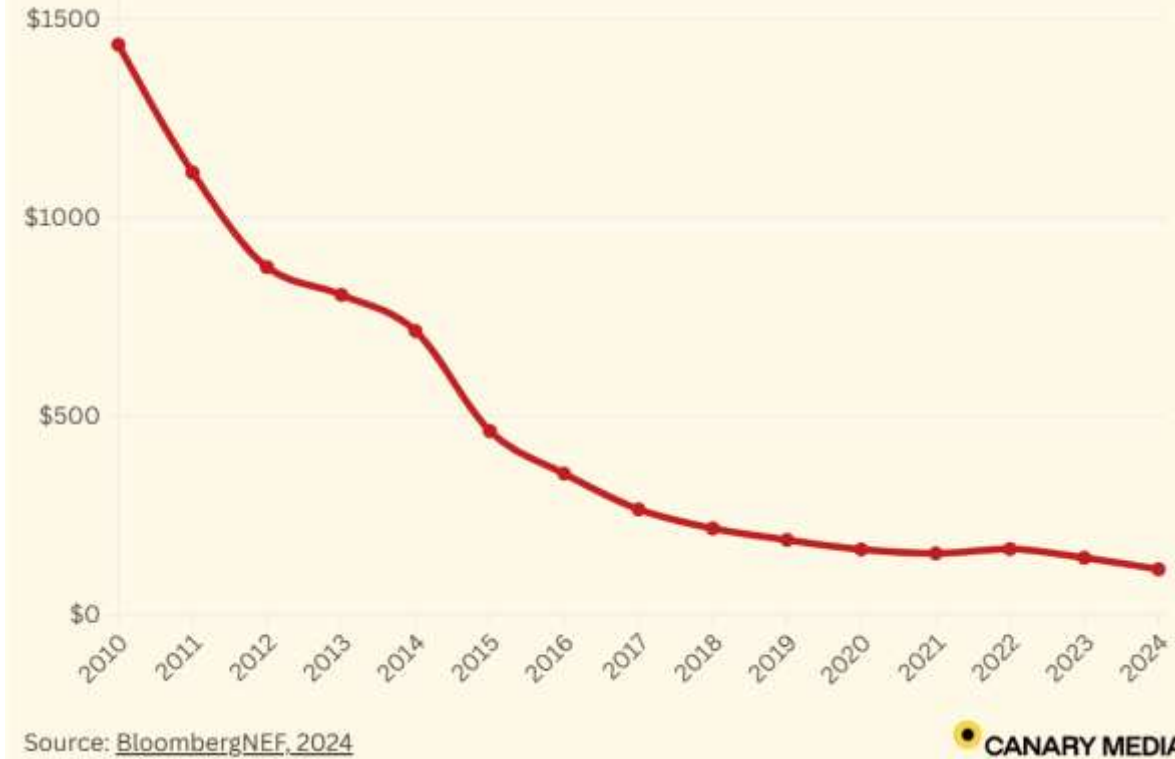
FIGURE ES 1: GLOBAL WEIGHTED AVERAGE UTILITY-SCALE SOLAR PV TOTAL INSTALLED COSTS, 2009-2025



<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

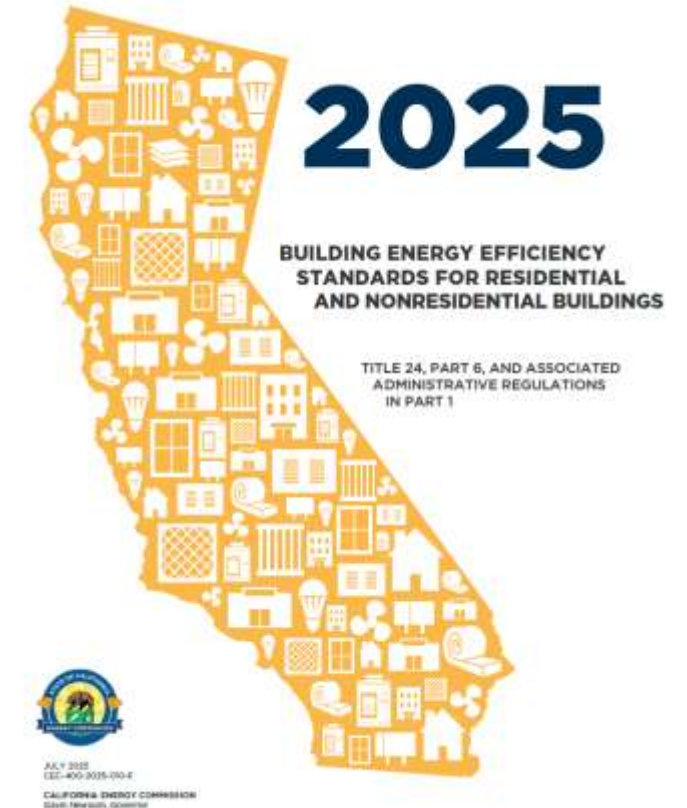
Average lithium-ion battery pack price, in dollars per kilowatt-hour



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

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



The 2025 California Energy Code: Compliance Easier with All-Electric Systems

- 2025 code makes HVAC heat pumps & heat pump water heaters prescriptive standard statewide
- Dedicated electrical circuits, plumbing etc. are required to backup every gas appliance installed
 - Except central HW in multifamily.
- Source compliance metric favors electric systems
- Gas cooktops require additional mechanical ventilation than electric



California Has Strong Climate Commitment

- 40% GHG reduction by 2030

SB 32 (2016)



- Electric sector:
- 60% renewables by 2030
 - 100% carbon-free by 2045

SB 100 (2018)



- Carbon neutrality by 2045

Gov. Exec Order (2018)



- 26% GHG reduction by 2025
- 1.5 deg C goal

PARIS (2016)



- 40% GHG reductions in buildings by 2030

AB 3232



- \$200M/4yrs incentives for building decarb
- TECH/BUILD

SB 1477

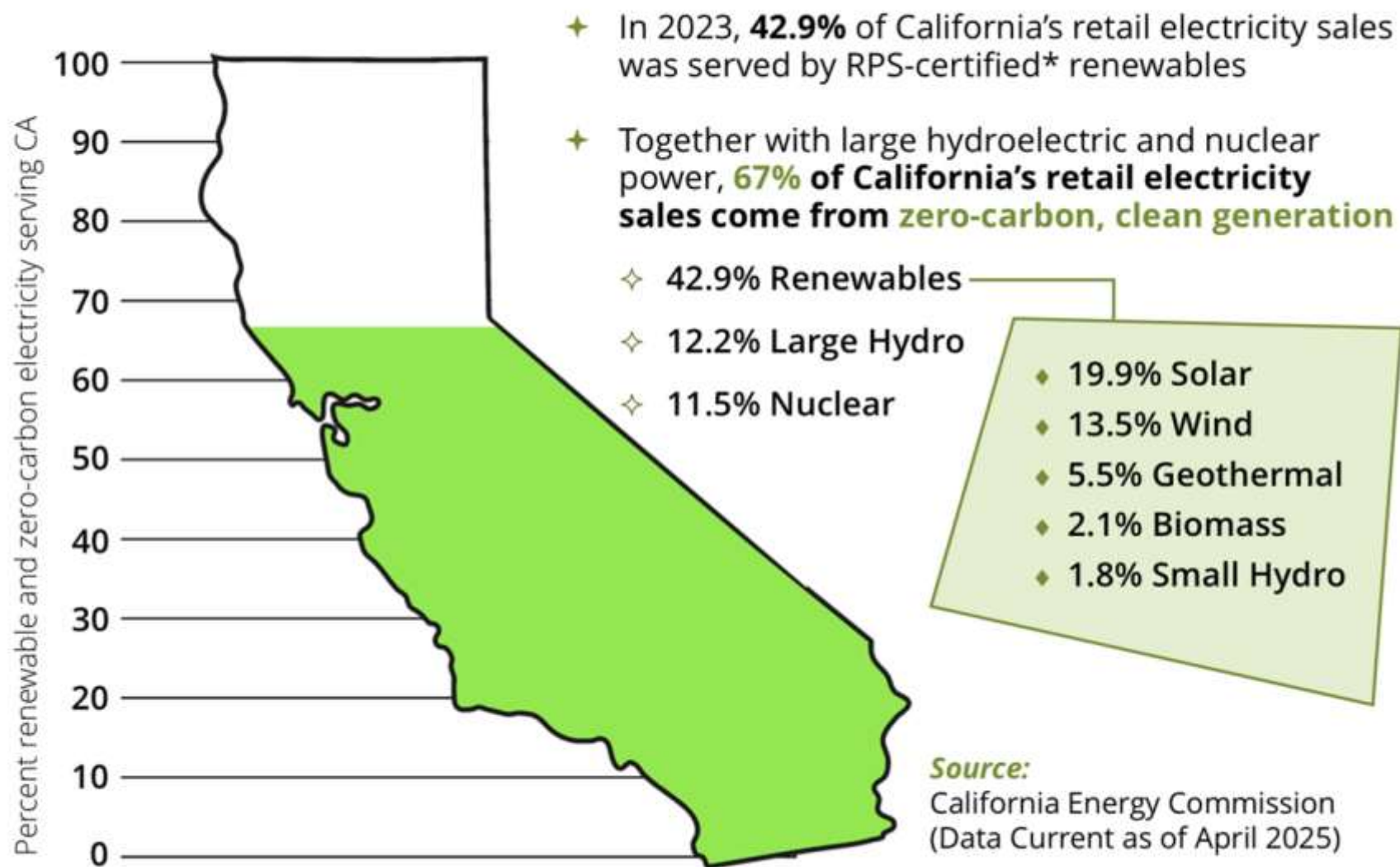


- No ICE Car Sales by 2035

Gov. Exec Order (2020)



California's Progress Toward Clean Energy



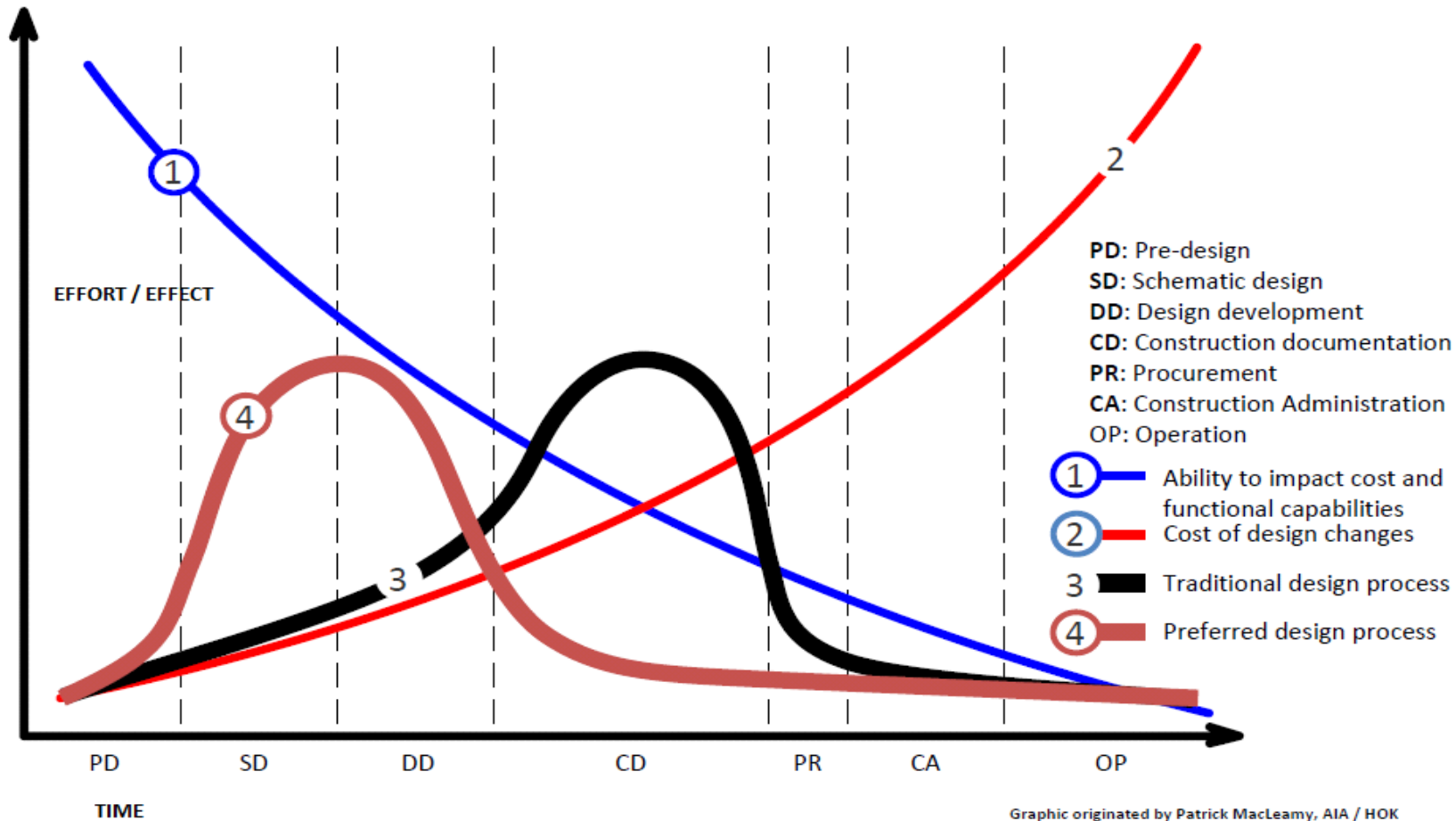
*RPS = Renewables Portfolio Standard

Electrical Infrastructure Example

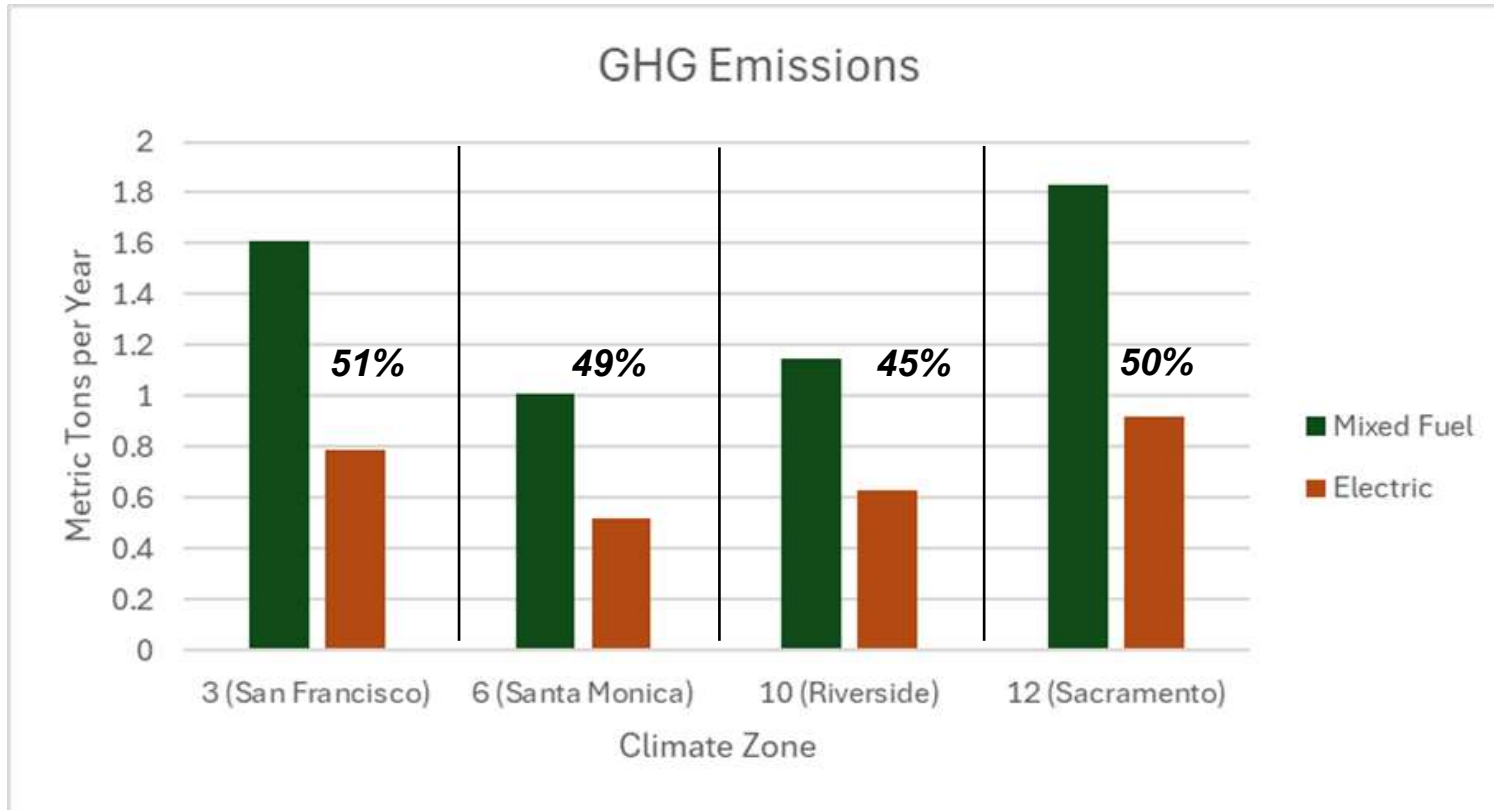
- Some single-family projects will need Panel upgrades
- Many multifamily projects will need transformer upgrades especially for sites with EV chargers
- Calculate loads & do site planning EARLY
- Typically, utility pays for transformers, not customer
 - Need a 10'x10' footprint for typical MF building
- All-electric peaks typically slightly higher than mixed fuel
- Plan for 2X transformer size for future EV charging loads



How/When Do We Fix it?



All-Electric Designs Reduce GHG Emissions ~50%



- **TIP: Use your compliance models to design for lower GHG emissions and Zero Net Carbon**

GHG figures based on 2025 CBECC-RES modeling of prototype 2,700 sf home with compliant features. Gas model has upgraded furnace/AC and 0.95 UEF gas tankless water heater with gas appliances, unvented R-38 attic, whole house fan, 10 kWh battery, and Heat Recovery Ventilator. Electric model has code minimum 14.3 SEER2 heat pump and 50-gallon heat pump water heater with electric appliances. See concluding case study for details.

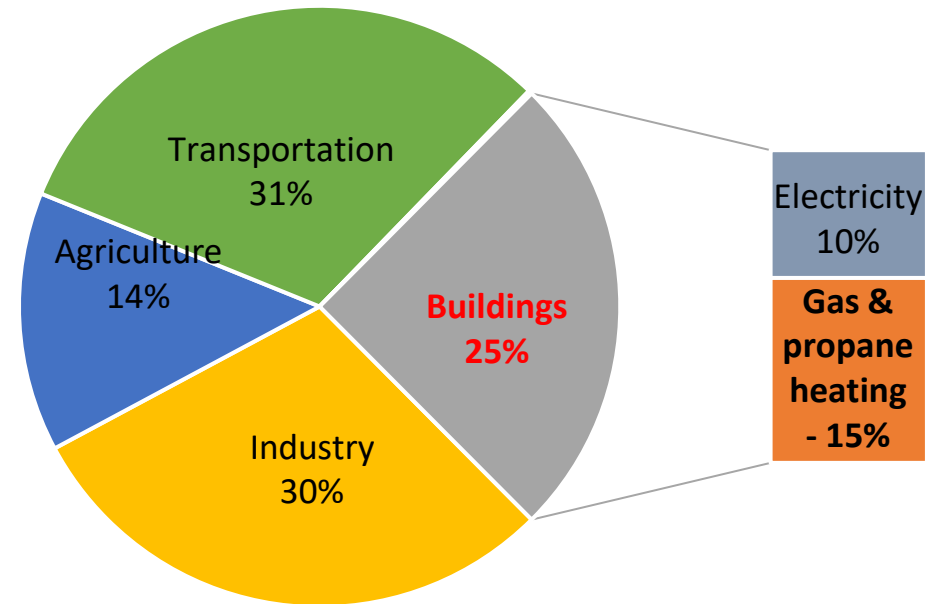
The Grid Can Handle It

- Foundation of All-electric homes is Greening of Electric Grid
- Multiple studies show how 100% renewable grid will be achieved
 - Intermittency included
 - Uncertainty included
 - California & the entire U.S.
 - Without higher utility costs
 - While creating jobs
- Solar/Wind/Battery is likely to be 95% of Grid additions nationwide



Buildings ≈ a Quarter of CA GHG Emissions

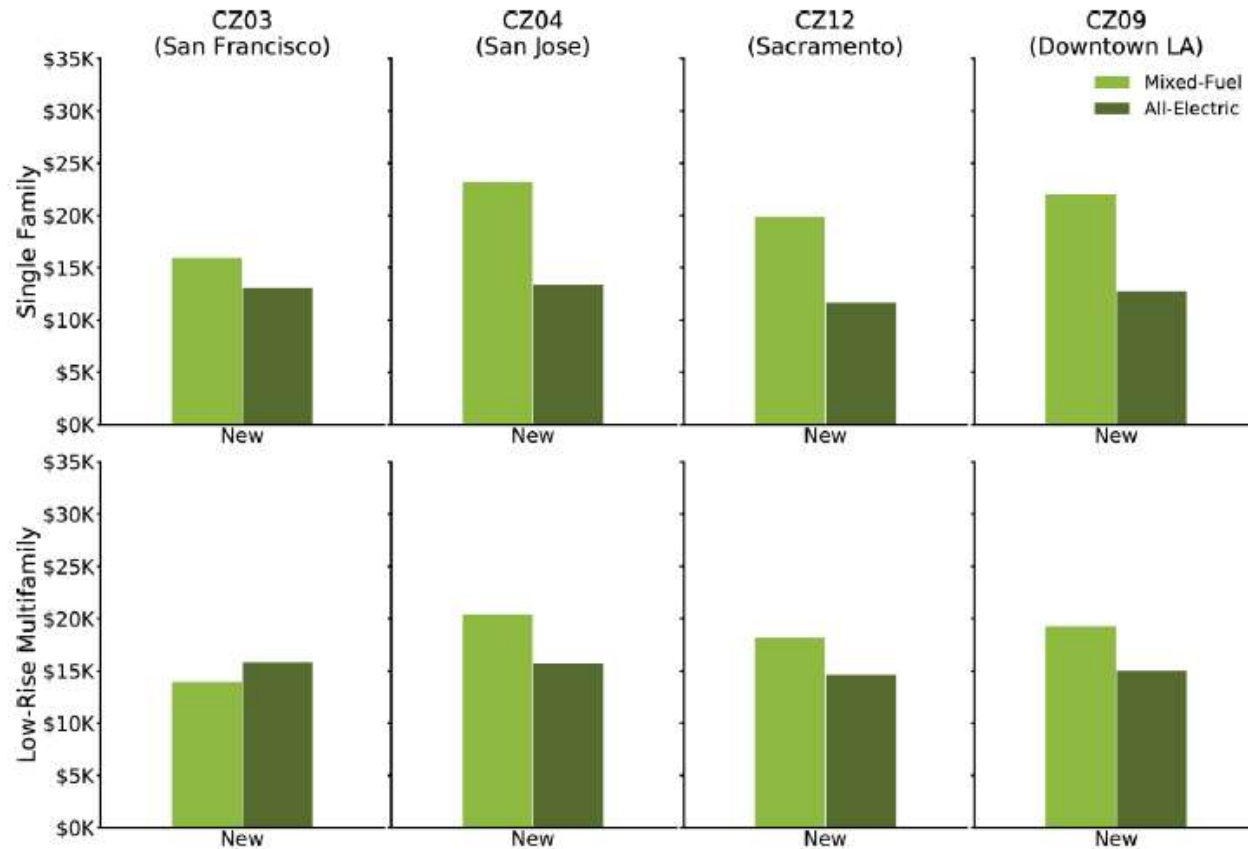
CA Greenhouse Gas Emissions (2016)
Demand View



Source: NRDC analysis based on Air Resource Board 2016 GHG inventory, including fugitive methane emissions

All-Electric Homes Can be Lower Cost

Figure 3-8 Capital costs per unit of all appliances (HVAC, water heater, stove, and clothes dryer) and infrastructure (including gas connection costs) for new construction



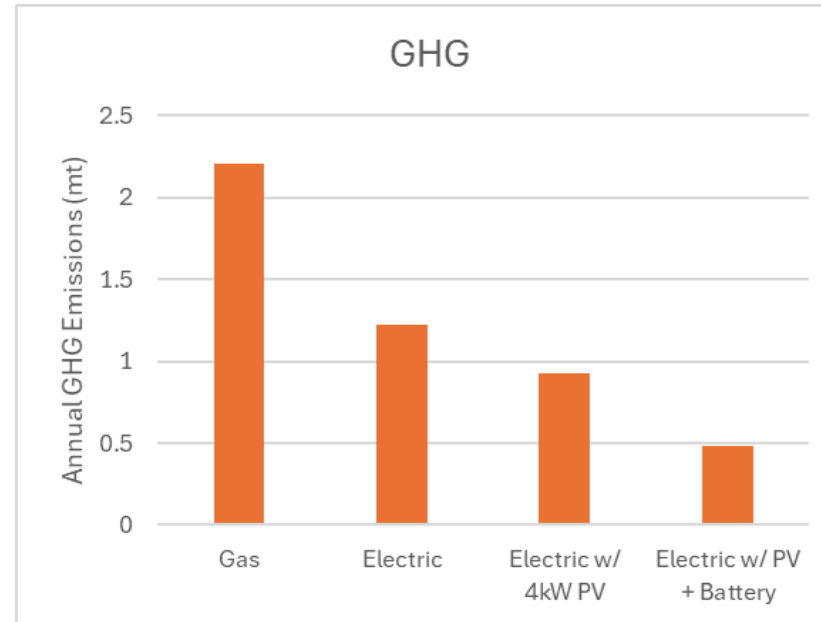
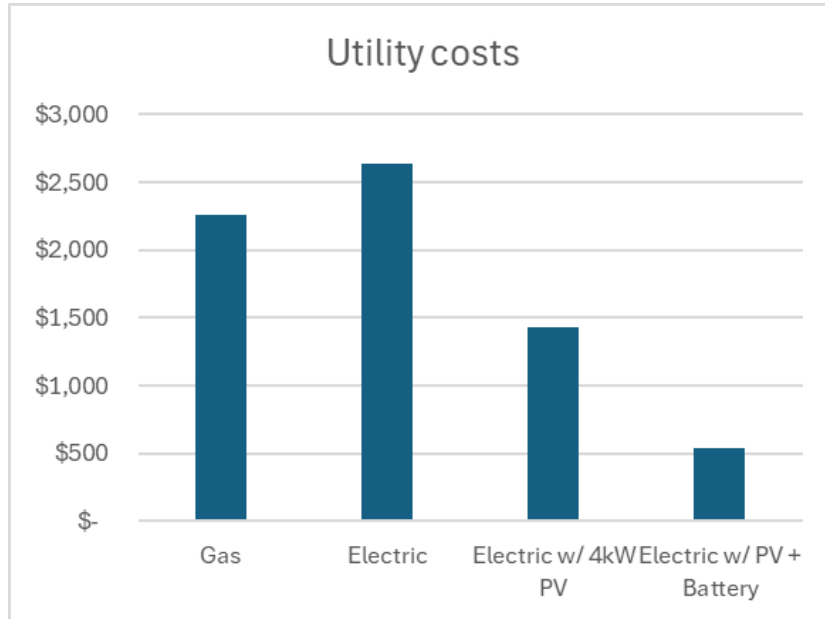
“Residential Building Electrification in California”, E3, April 2019

ADU Cost Comparison-Gas vs Electric

End Use	Cost Gas	Cost Electric
Heating & Cooling	Central Gas furnace + A/C \$10,000	Ductless Minisplit Heat Pump \$10,000
Water Heating	Gas Tankless \$2,600	Heat Pump WH \$2,900
Cooking	Frigidaire Gallery Gas Range w/ Air Fry 30” \$2,000	Frigidaire Gallery Induction Range w/ Air Fry 30” \$2,100
Clothes Drying	Gas Dryer \$800	Heat Pump Dryer \$1,300
Total	\$15,400	\$16,300

Solar & Battery Are Key to Electrification & Decarbonization

Southern California Example: CZ 6

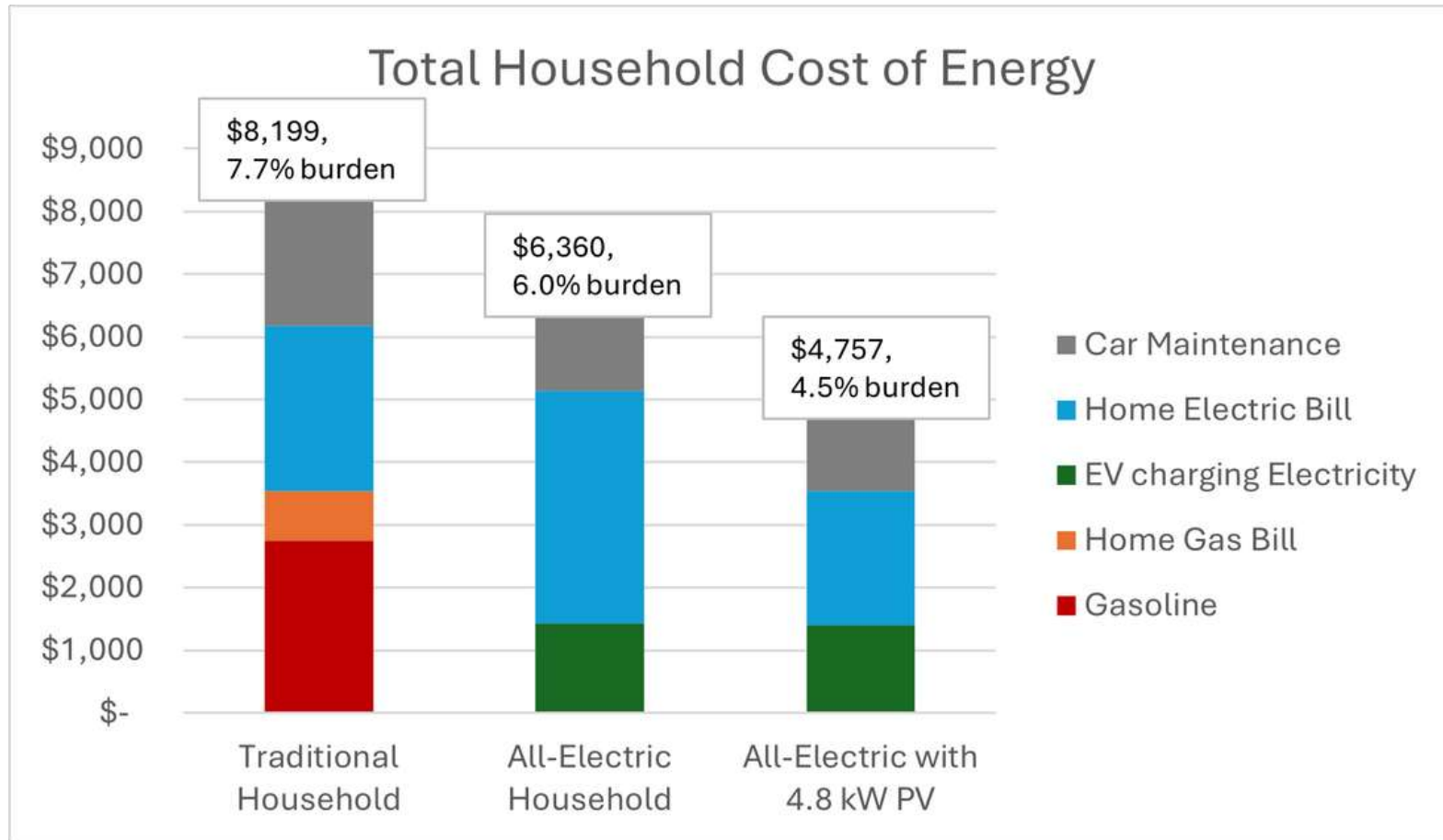


Modeled energy usage for 2-story existing/remodeled house in CZ6 (Coastal Los Angeles) under NEM3 with 2026 SCE/SCG rates. Battery modeled using Basic control.



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>

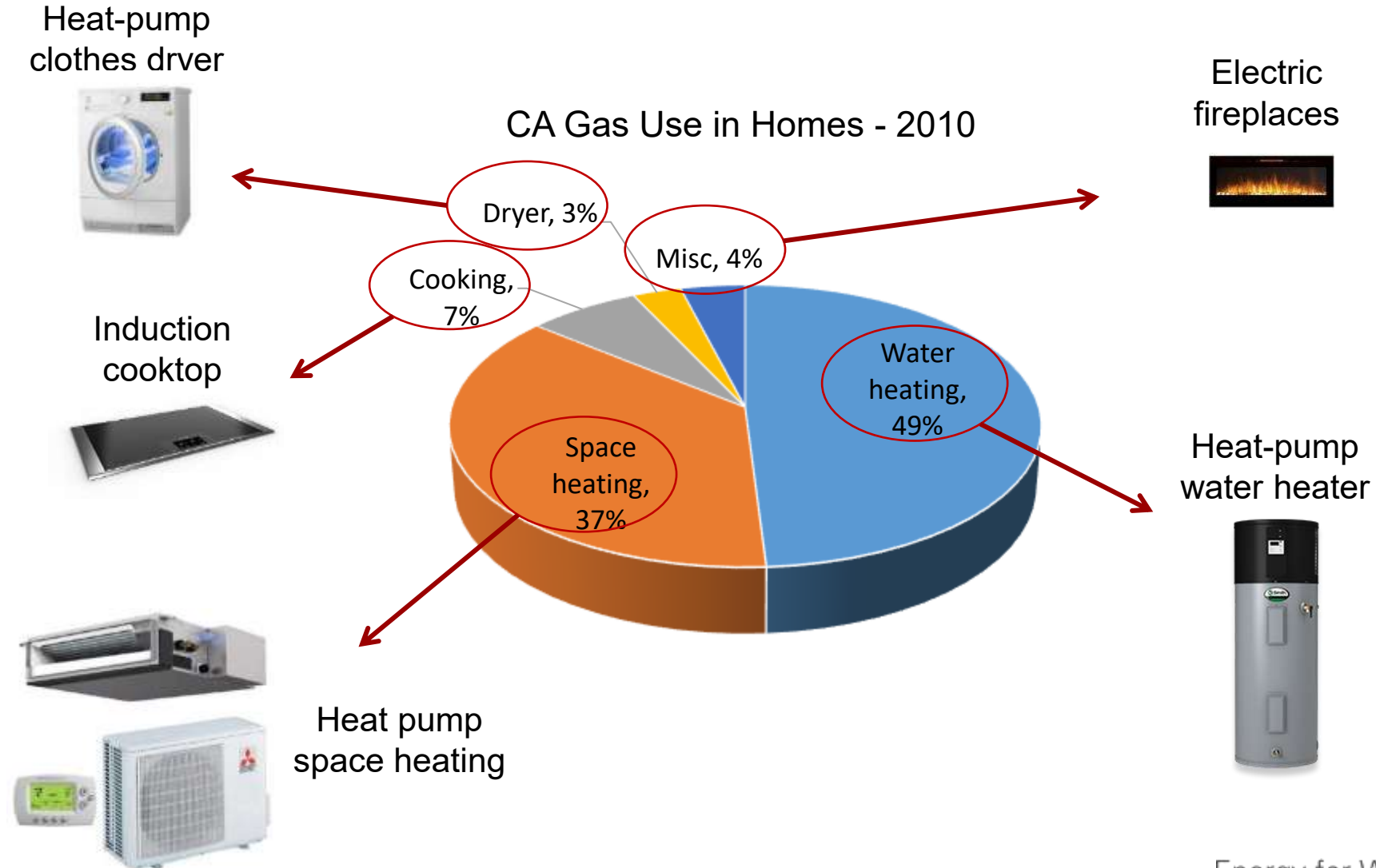
Project Spotlight: Jefferson 17-unit in Los Angeles



“It just doesn’t make any sense to me to run all those gas lines through my building... just from a financial perspective. We hope to save money and permitting by having one less trade.”
- Steve Kraemer, Rock Development

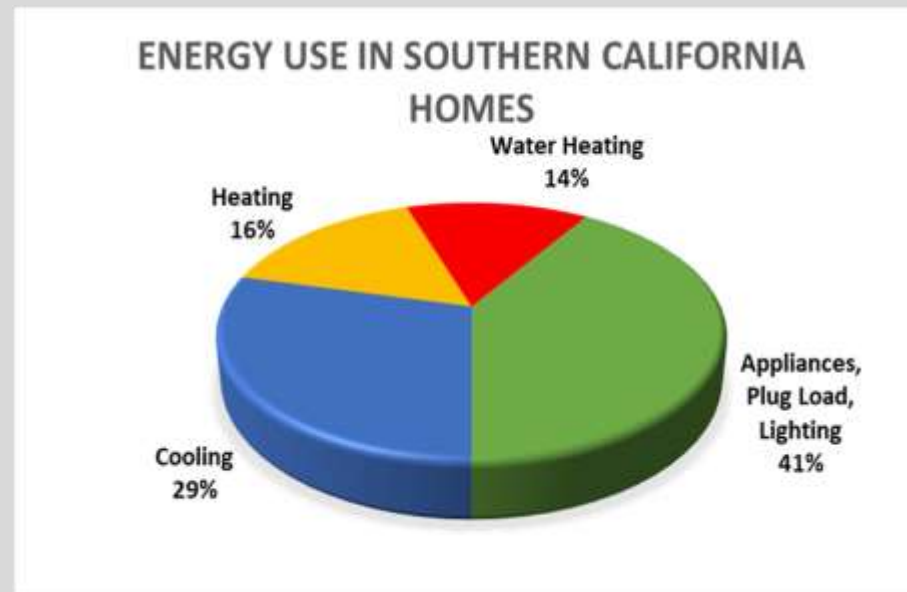
- All-Electric
- HPWH in each unit/hallway
- Ductless mini in each unit; condensers on the roof
- Required electrical upgrades through LADWP
- Complied with Non-residential energy code

High-efficiency Electric Alternatives to Gas Use in Residential Buildings

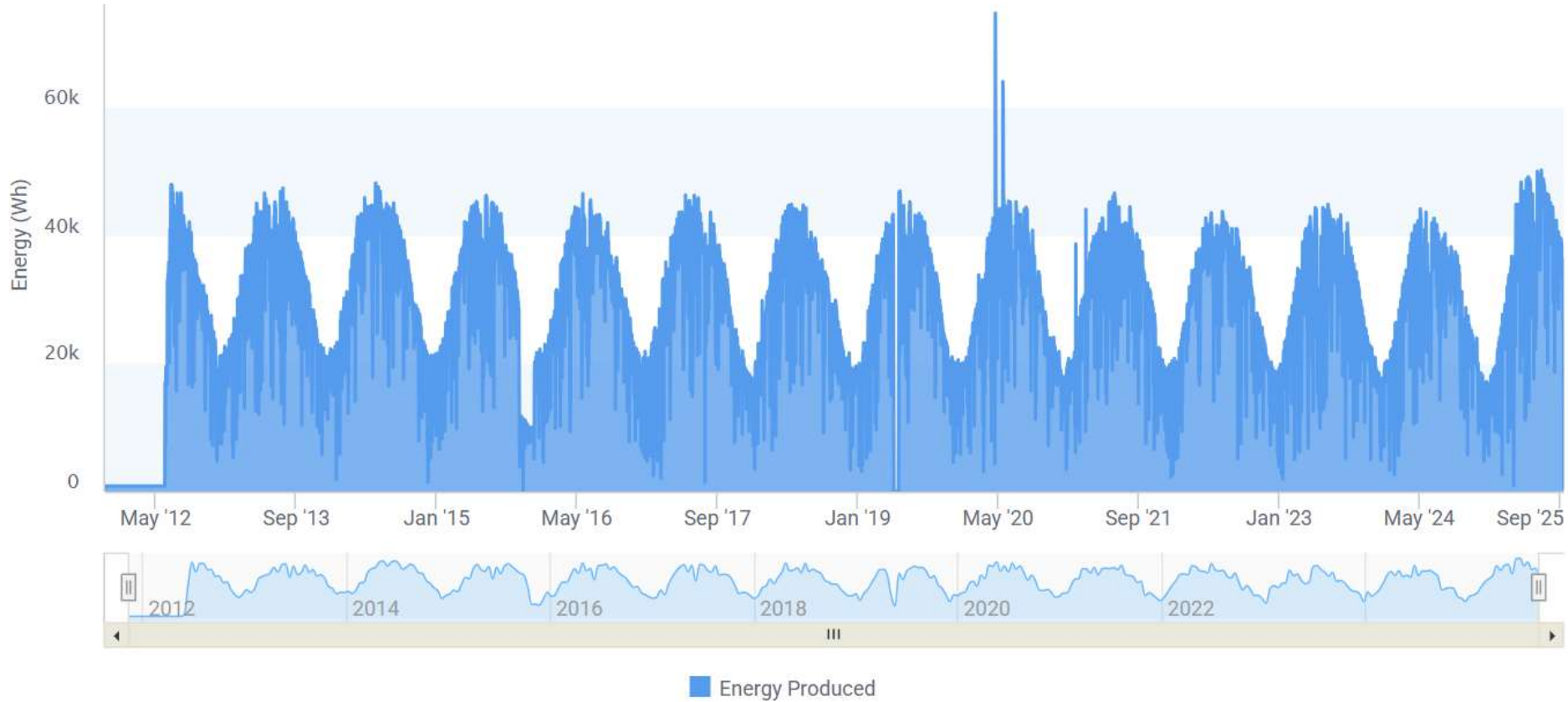


Technologies to Go Electric

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



Talkin' Bout My Generation



Maximum
Produced
74.5 kWh

Total
Produced
139 MWh

Full System

Energy

Status

Today

558.00 Wh

Peak: **653.00 W** at 8:40 AM

Latest: **9.00 W** at 8:55 AM

Past 7 Days

192.31 kWh

Month To Date

495.40 kWh

Lifetime

139.41 MWh

Microinverter AC Voltage

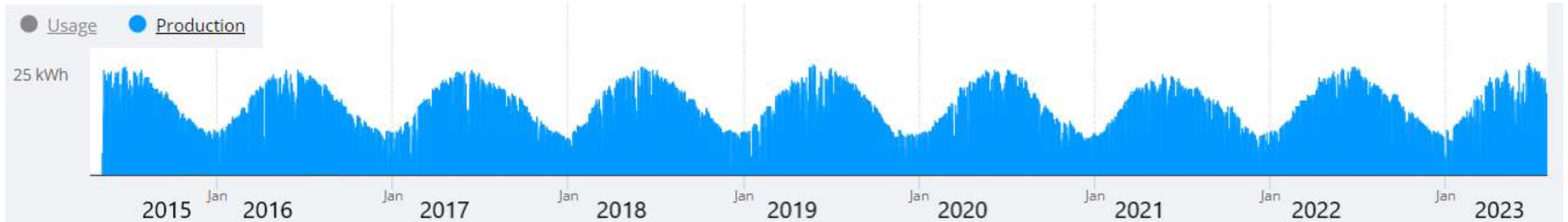
245.0 V



Talkin' Bout My Generation

- Saves over \$62,400 over the past 13 years in fossil fuels charges - \$400/mo. x 13years (\$200/mo for house and \$100/mo for each car)
- Payback period 3.75 years @ \$18k for 6.5kw system
- \$.06/kWh over the 25 year warranty period
- System payback of carbon = 6 years, system could last 40+ years
- Additional savings because EVs and all-electric appliances need less maintenance

Talkin' Bout Nick's Generation



- 4.4 kW system faces East & West (South roof shaded)
- Fully offset electric usage over course of the year
- Covered charging for one EV
- No electric bills for first 5 years

Talkin' Bout Nick's Generation

Location Usage

Usage Cost Daily Summary Monthly Summary

Past Day Past Week Custom

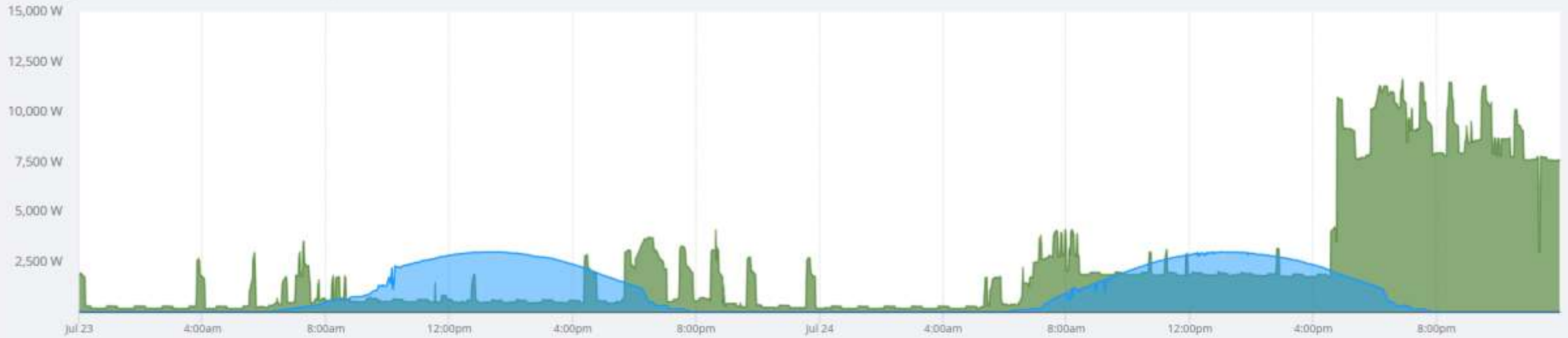
Start Date*

7/23/2025

End Date*

7/24/2025

● Usage ● Production — Outdoor Temperature



NEC Code Changes – Game Change



Section 625.42

Recognizes modern electric vehicle supply equipment (EVSE) with adjustable settings and energy management systems (EMS), which allows for more flexible and cost-effective installations.



The roof is the “Engine of the Building”

- Understand shading – Google Maps Satellite view
- Understand orientation – maximize the 4p – 9p period
- Side benefit – solar reduces radiant heat gain through roof assembly
- If building new, minimize roof penetrations and mechanical systems on prime roof area
- Roof should last beyond solar system warranty – Install new roof first?
- Install stanchions first so roofing warranty covers solar system
- Install 4” of polyiso insulation on exterior, if possible



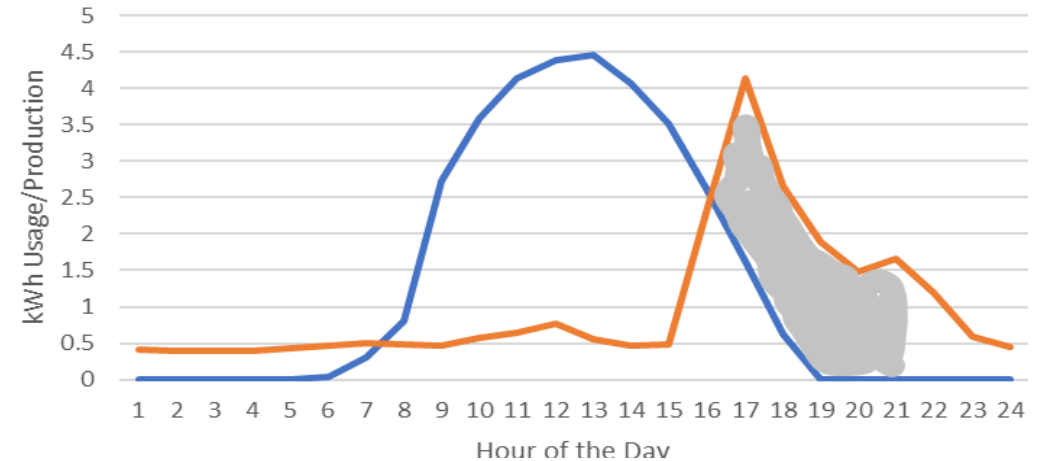
Efficiency + Solar is the Key

- Electricity used “under the mountain” is virtually free
- Advanced homes will move more of usage under the mountain and have less usage “on the plains”

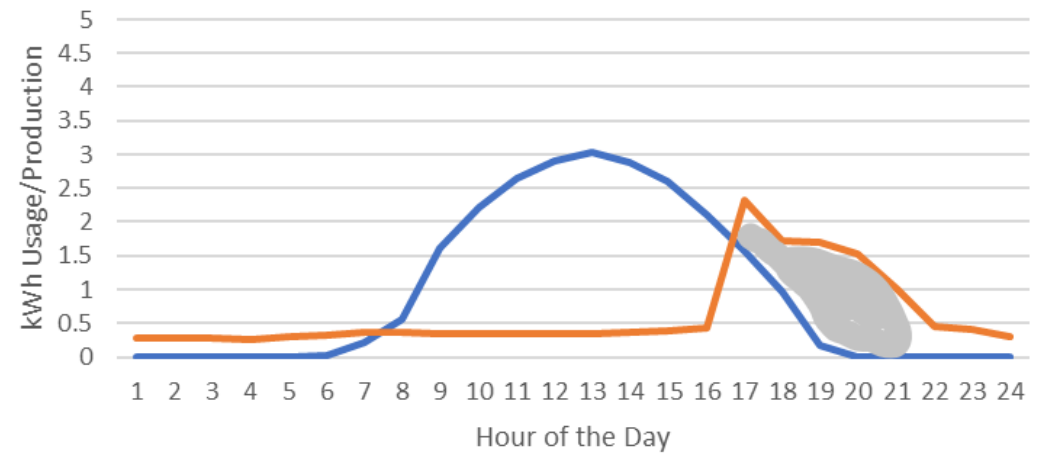
Grid Burden 4-9 pm:

- Mansion ZNE: 2.5 kW, 8.5 kWh
- Performance ZNE: 1.5 kW, 4.2 kWh

Usage vs Production on August 1 – Go Big & Offset



Usage vs Production on August 1 – Net Zero Nest

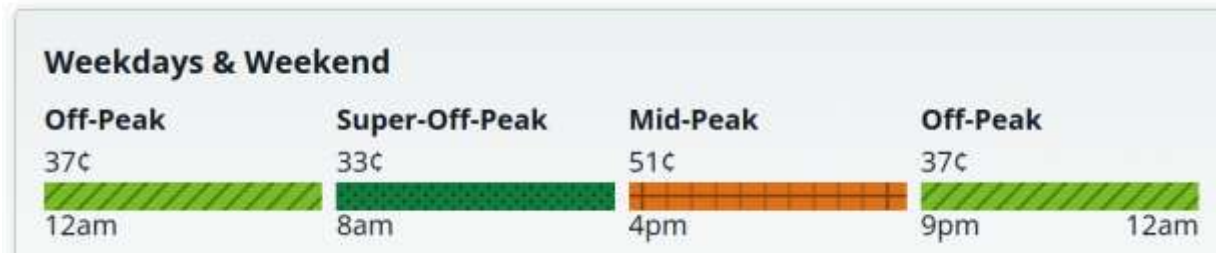


— Production — Usage

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

Residential Time of Use Rates – SoCal Edison

October - May



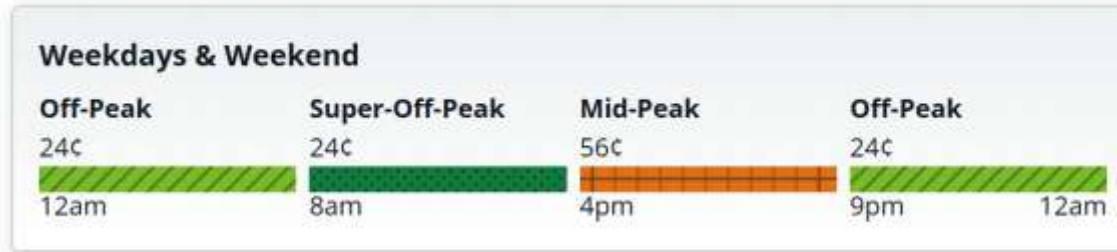
June - September



TOU-D-4-9 PM (rate plan as of 3/1/2026)

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

October - May



June - September



TOU-PRIME (HPs, EVs eligible)

Battery Storage

- A good answer to the usage-production mismatch of solar homes
- Concept: Store surplus solar in the day & release in evening peak
 - Reduces excess on grid for utility to manage
 - Reduces ramp-up required by grid in summer evening peak periods
- Title 24 compliance credit for new homes with batteries
- Enhanced financial payback under Net Billing rates for Solar with Storage
- Complex analysis makes investment decision difficult
- All-electric Homes + Battery + EV = compatible



Recent Battery Project Example



Electric Vehicles & Bi-Directional Charging



- HUGE future potential synergies:
 - EV to home
 - EV to grid
 - Home to EV to home
- EV charging can use excess solar power
 - \$0.01 per mile

Electric Vehicles & Bi-Directional Charging

Vehicle to Building (V2B) technology, also called two-way charging, promises to revolutionize resiliency and the potential use of EVs as grid assets

A veterinarian kept her clinic open after a hurricane in Florida using her Ford F-150 EV.

"She consulted an electrician who installed a generator transfer switch on the clinic's breaker box. When Hurricane Helene hit, we were able to literally just pull up, shut off the main breaker, plug in the truck, and then start turning on things from the breaker box."



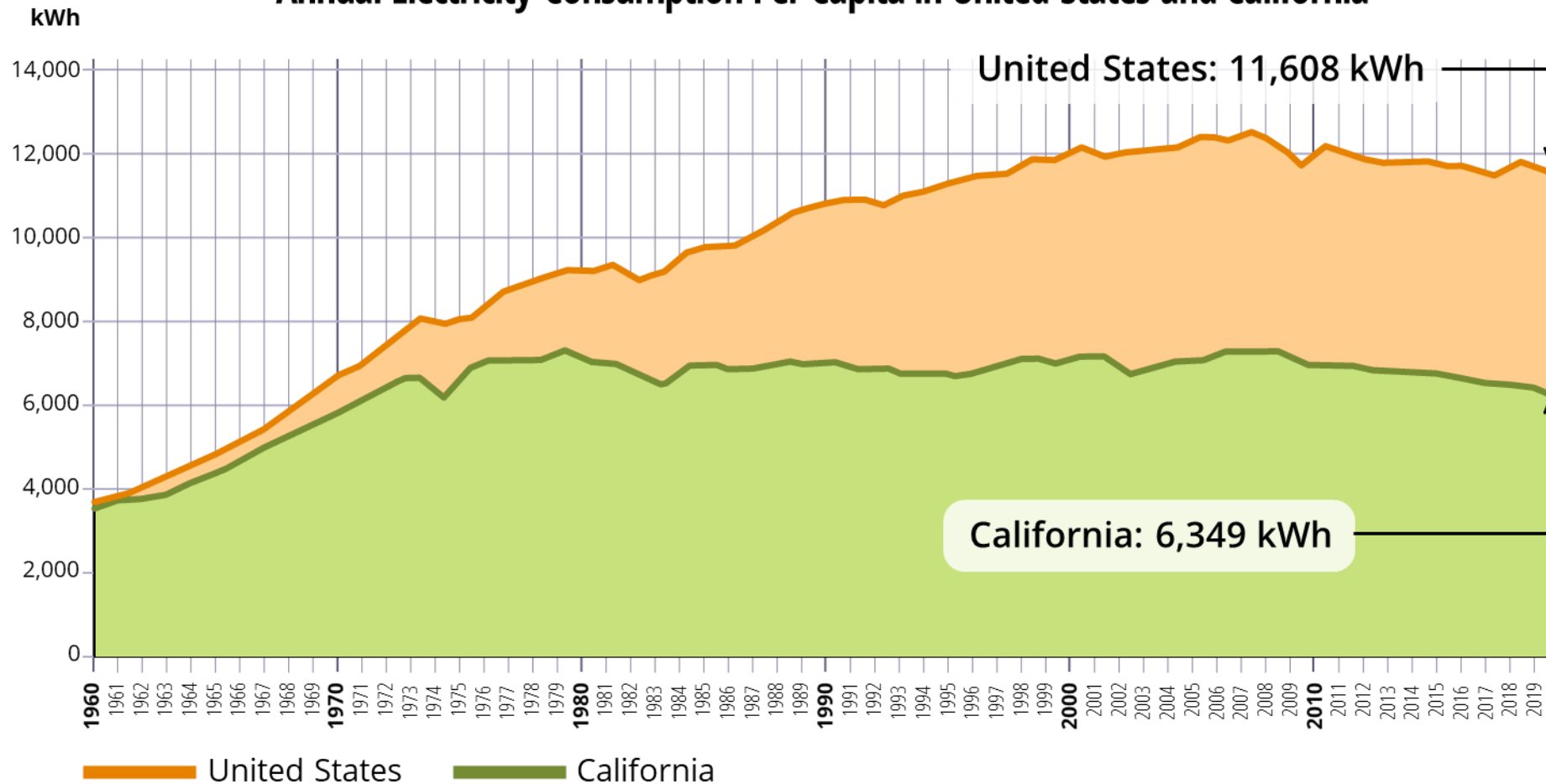
[Article from Inc. Magazine](#)

Energy Modeling for All-Electric Homes

- Introduction to Modeling
- Solar PV
- Batteries

California: Energy Policy Leading the Nation

Annual Electricity Consumption Per Capita in United States and California



Why Understand Modeling?

- Impacts cost
- Can delay a project
- Identifies energy saving options
- Required for permits
- Sizes solar system to the house
- Know what questions to ask your consultant



Title 24 Built Around Performance Modeling

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

Project Name: 2025 Prototype

Calculation Description: vchpx2-CZ06

Calculation Date/Time: 2025-09-14T07:50:43-07:00

Input File Name: vchpx2-CZ06.ribd25

CF1R-PRF-01-E

(Page 2 of 11)

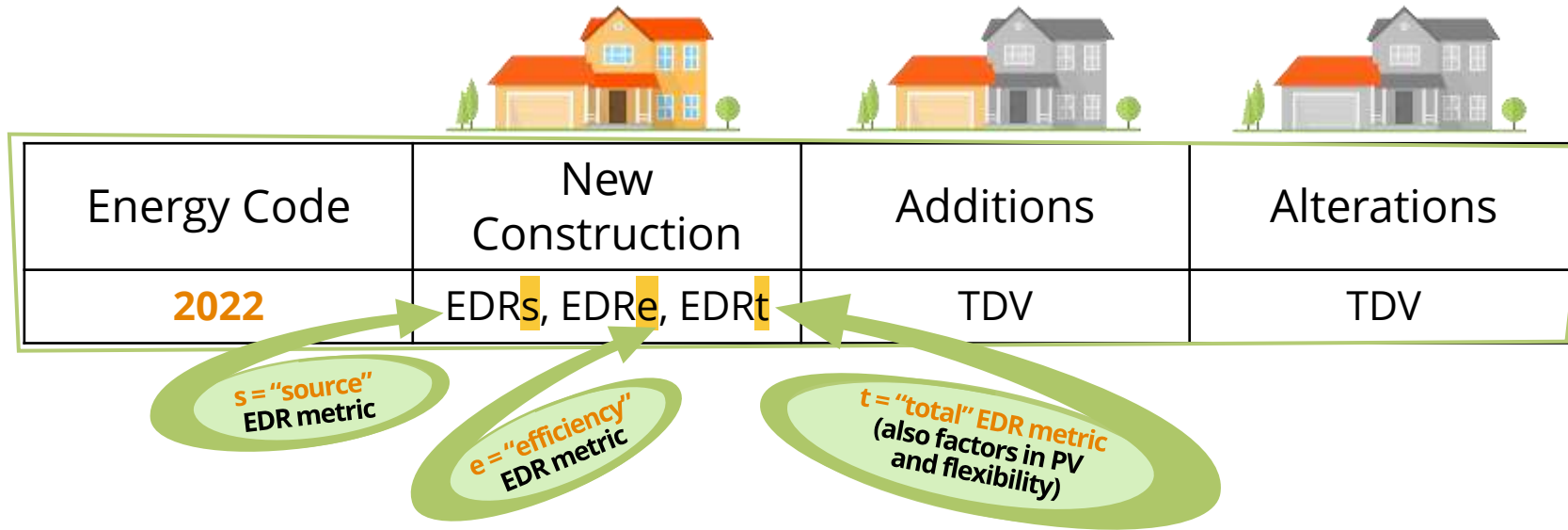
- Gives designers flexibility to meet energy budget their way
- Most value-added features will get selected
- Allows for what-if analysis
- Prescriptive Method also
 - Used for small projects, ADUs
 - Must meet every requirement

Compliance Summary				
	Long Term System Cost (LSC) ¹		Source Energy Use	Peak Cooling**
	Efficiency ² (\$/ft ² -yr)	Total ³ (\$/ft ² -yr)	Total ³ (kBtu/ft ² -yr)	Electricity (kWh)
Standard Design	5.14	13.13	8.34	31
Proposed Design	4.63	12.39	4.68	18
Compliance Margins	0.51	0.74	3.66	0
	Pass	Pass	Pass	n/a
RESULT*: Complies				
¹ Long-term System Cost (LSC) is a 30-year present value cost to California's energy system. LSC is not a predicted utility bill. ² Efficiency measures include energy efficient improvements such as better building envelope and more efficient mechanical equipment ³ Total includes the sum of efficiency measures, solar photovoltaic (PV) measures and battery storage measures * Building complies when Proposed Design is equal to or less than Standard Design in all three compliance categories ** Peak cooling target represents 120% of the standard design building peak cooling energy use.				

Evolving Building Energy Efficiency Ratings



For Single-family Construction



Energy Design Rating (EDR):

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

Source Energy Design Rating (EDRs):

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

Time Dependent Valuation (TDV):

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

Evolving Building Energy Efficiency Ratings



For Single-family Construction

Energy Code	New Construction	Additions	Alterations
2022	EDRs, EDRe, EDRT	TDV	TDV
2025	Source, LSCe, LSCt	LSCe	LSCe

Annotations:

- New: "LSC" (orange arrow pointing to 2025)
- t = "total" LSC metric (also factors in PV and flexibility) (green oval pointing to LSCt)
- e = "efficiency" LSC metric (green oval pointing to LSCe)

Source Energy (Source):

The long run marginal source energy of fossil fuels that are combusted as a result of building energy consumed either directly at the building site or to meet the electrical demand of the building considering the long-term marginal hourly resources of Commission-projected electric system resource procurement. For a given hour, the value in that hour for each forecasted year is averaged to get a lifetime average source energy.

Long-term System Cost (LSC):

CEC-projected present value of costs to California's energy systems over a period of 30 years. Does not represent a prediction of individual utility bills. Ensures that all modeled building features are specified on a one-for-one equivalent energy use or equivalent energy cost basis. Consists of large data sets that convert electricity, gas and propane to LSC energy. The rate of conversion varies for each hour of the year, climate zone, energy type (electricity, natural gas and propane), and building type (low-rise residential, high-rise residential, nonresidential, and hotel/motel).



LSC as a Compliance Metric (2025)



Efficiency LSC
a score representing the building energy efficiency expressed in terms of LSC based metric

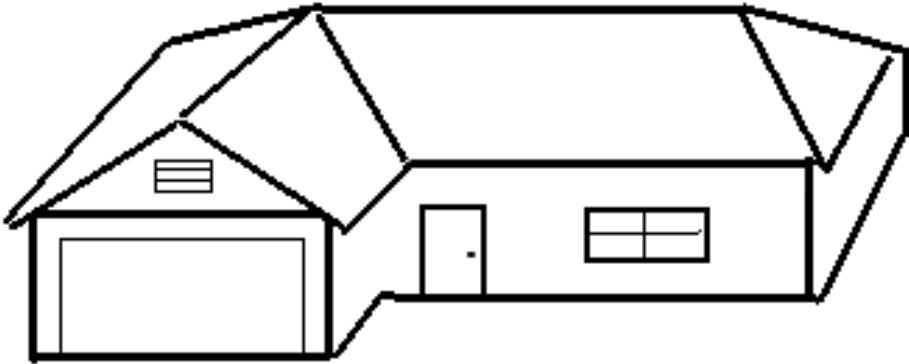
Total LSC
a score representing the building's Total LSC while also factoring in PV + Flexibility

Source
a score representing the building energy efficiency expressed in terms of an hourly source carbon based metric

Compliance Summary				
	Long Term System Cost (LSC) ¹		Source Energy Use	Peak Cooling**
	Efficiency ² (\$/ft ² -yr)	Total ³ (\$/ft ² -yr)	Total ³ (kBtu/ft ² -yr)	Electricity (kWh)
Standard Design	5.14	13.13	8.34	31
Proposed Design	4.63	12.39	4.68	18
Compliance Margins	0.51	0.74	3.66	0
	Pass	Pass	Pass	n/a
RESULT*: Complies				

A building complies **ONLY** if **all three** compliance scores (and peak cooling) are met (**each** Proposed Design score is **lower or equal** to Standard Design score)

Title 24 Modeling in 2 Slides

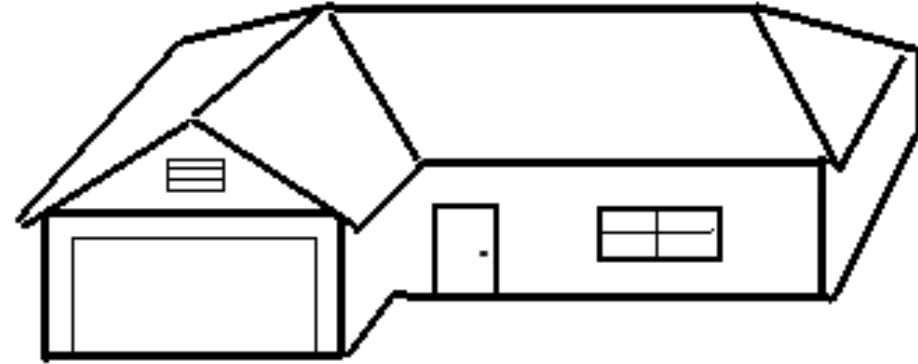


Proposed House

Climate Zone 10 (Riverside)

Actual Features

- 2x6 R-21 walls
- R-38+R-13 attic
- QII & Refrigerant Charge HERS
- Ducted Heat Pump 14 SEER, 8.2 HSPF
- Heat Pump Water Heater Rheem 50 gal 3.5 UEF
- Windows .32/.29, 28% glazing
- No Whole House Fan
- 3.6 kW PV array



Standard House

Climate Zone 10

Prescriptive Package Features

- 2x6 R-21+R-5 walls
- R-38+R-19 attic, cool roof tile
- QII & Refrigerant Charge HERS
- 13.4 SEER2, 80 AFUE gas furnace split system
- Heat Pump Water Heater 2.0 UEF
- Windows .30/.23, 20% glazing
- Whole House fan
- Prescriptive Standard PV array

How Modeling Software Works

1,962 kWh net of PV

0 therms

39.1 LSC Efficiency

25.7 LSC Total with PV

29.5 Source

BUILDING COMPLIES

992 kWh net of PV

112 therms

39.8 LSC Efficiency

26.9 LSC Total with PV

36.1 Source

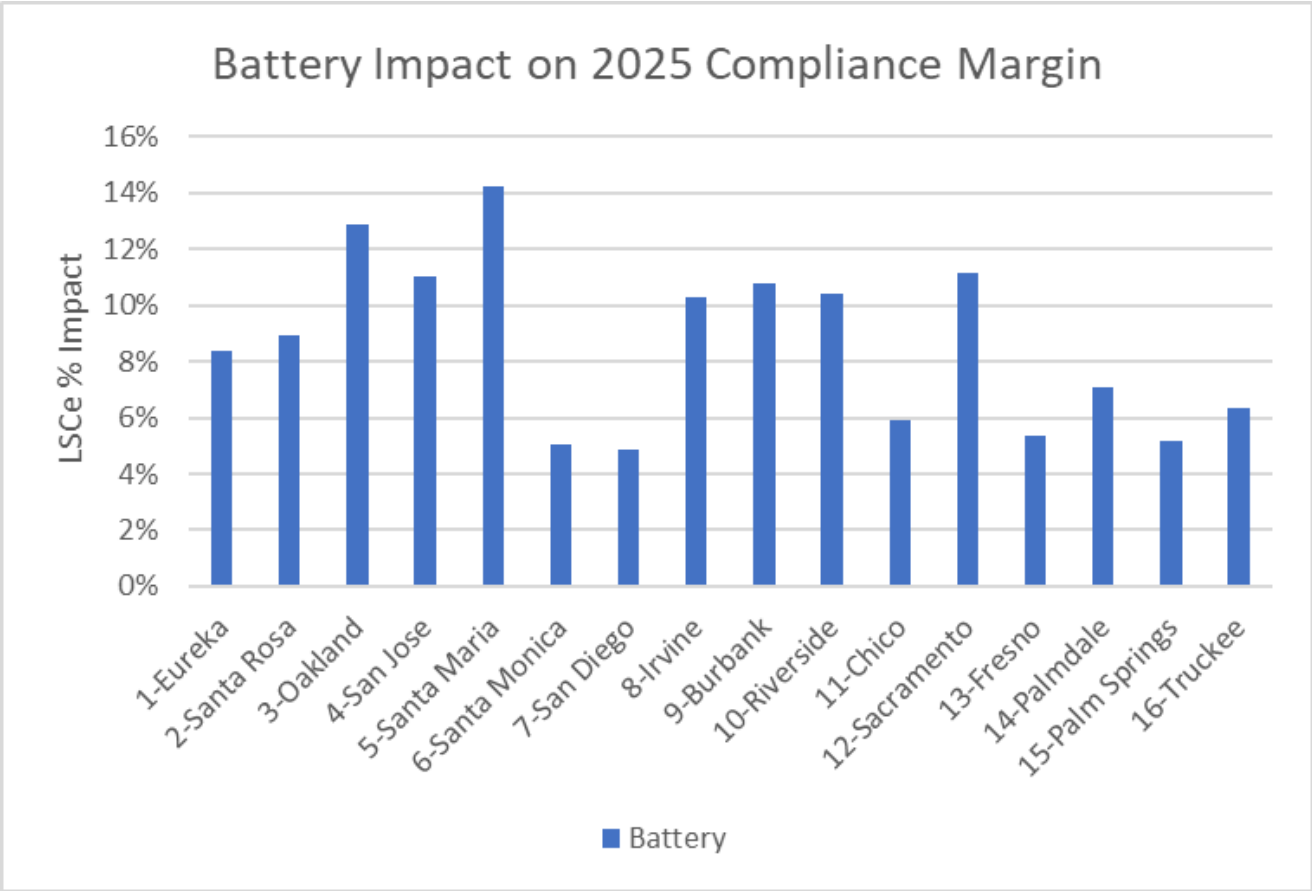
Proposed House

Actual design features

Standard House

Prescriptive Package features

Batteries Provide Solid Compliance Credit



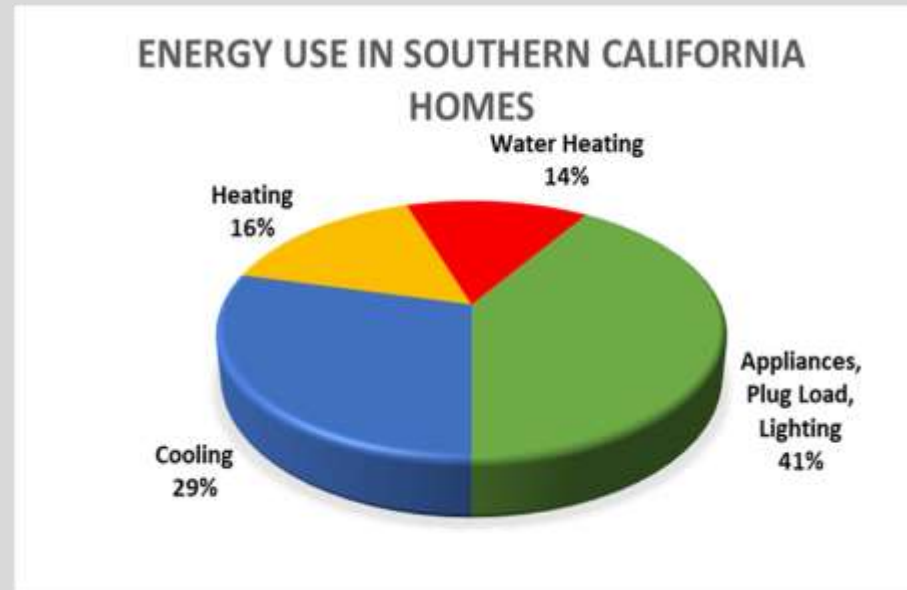
Average Compliance Impact:

- **Efficiency LSC 8.6%**

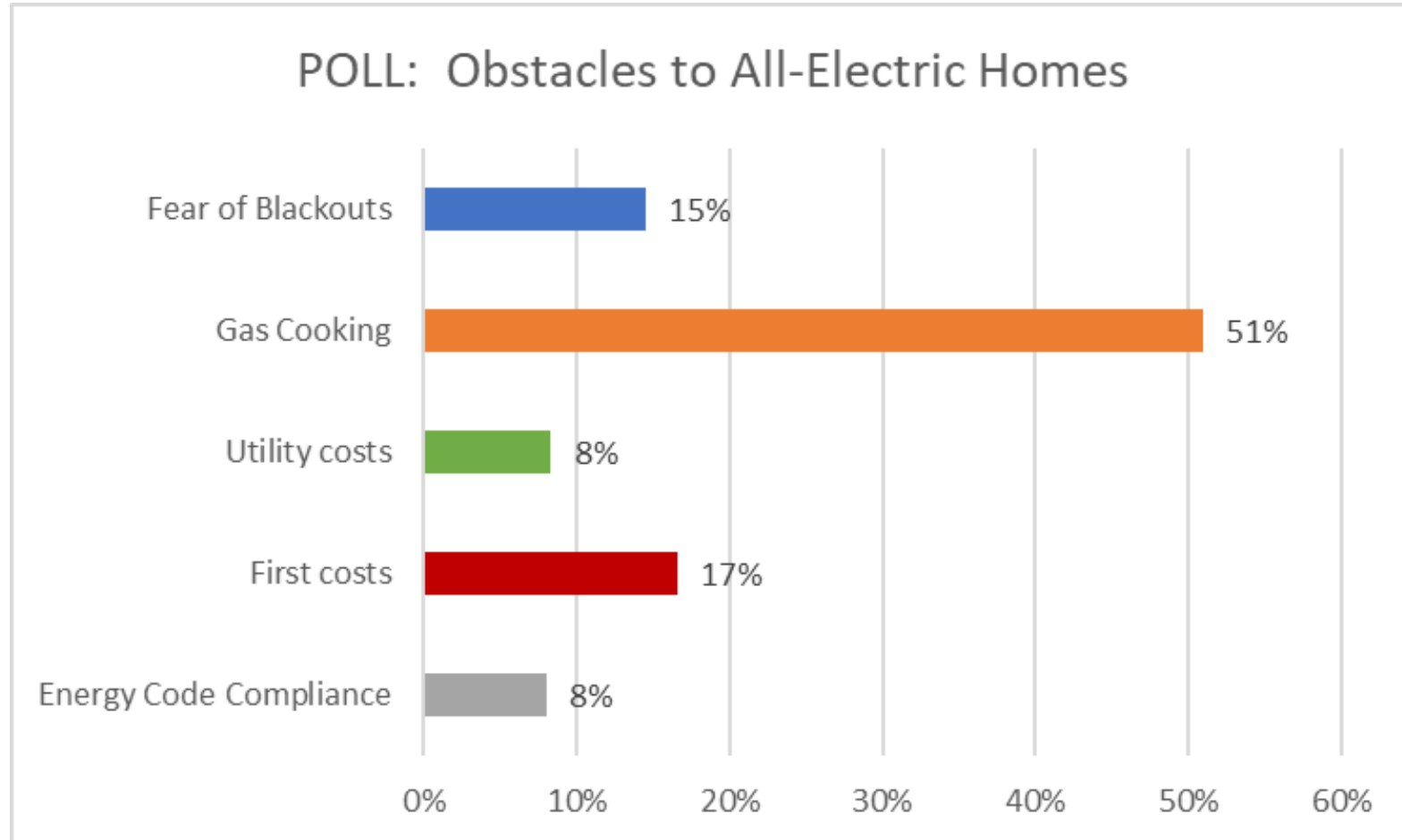
Modeling with 2,100 sf new home and 13.5 kWh battery with Basic control

Technologies to Go Electric

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



CABEC Poll Taken September 2020



Preference for Gas Cooking – Real or Not?

Induction: SMUD's cooking now



Customer research

SMUD customer panel: How would you rate your impression of induction cooking before and after trying the induction cooktop?



<http://2019.utilityforum.org/Data/Sites/5/media/posters/smud-induction-infographic-poster2.pdf>

Induction Cooktops

- Work by heating up cookware
- No gas combustion byproducts
- Safer for kids to touch
- Auto-off
- Boil water in half the time
- Digital controls
- Biggest barrier is inertia



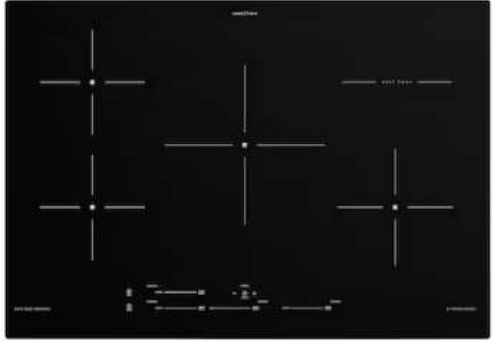
Chefs & Consumer Reports Prefer Induction

- 6 of Top 8 Ranges for 2020 were electric
- Top 2 were Induction



Fuel	Model	Rating	Cost
Induction	GE Profile PHS930SLSS	86	\$2,432
Induction	Kenmore Elite 95073	84	\$1,525
Gas	LG Signature LUTD4919SN	84	\$3,000
Induction	LG LSE4617ST	82	\$2,500
Induction	LG LSE4616ST	82	\$1,700
Smoothtop	Whirlpool WGE745cDFS	82	\$1,000
Gas	Samsung NY58J9850WS	81	\$2,725
Induction	Frigidaire Gallery FGIF3036TF	81	\$1,035

Embrace Better Technologies: Induction Cooking



Top seller



TVÄRSÄKER
Range with induction
\$1,399.00

★★★★★ (11)



FRUITEAM 13-Piece Cookware Set
Non-stick Ceramic Coating
Cooking Set, Induction Pots
Pans Set with Lids, Heavy Du...

★★★★☆ ~ 636
\$119⁹⁹ ~~\$159.99~~
Save \$10.00 with coupon
✓prime Get it as soon as Thu, Apr 22
FREE Shipping by Amazon

SÄRKLASSIG
Induction cooktop, 30 "
\$ 829.00



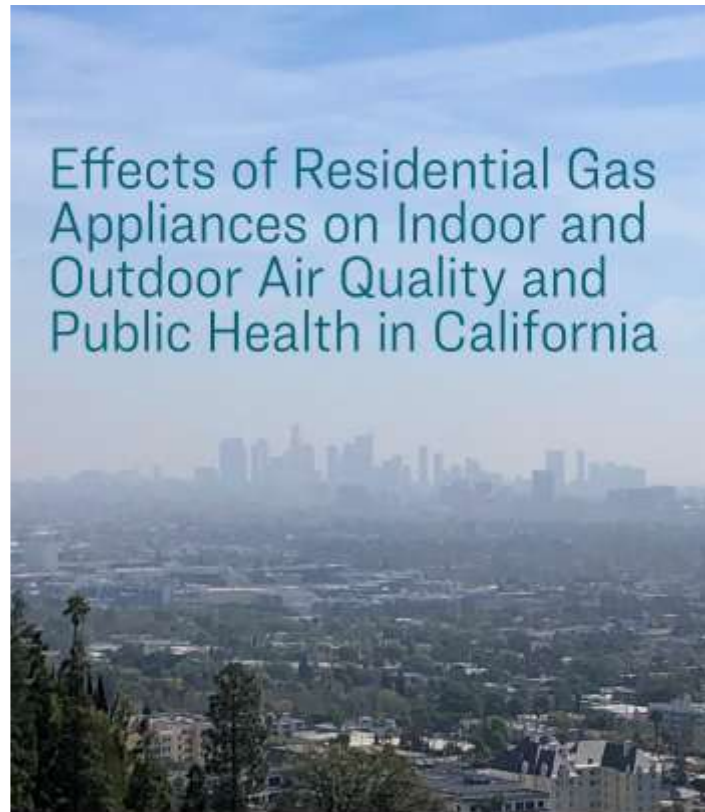
TILLREDA
Portable induction cooktop
\$ 59.99

Induction Oven Averages 20 kWh or \$7 per month for Family of 4



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



- 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



Gas Cooktops Require High-end Range Hoods for 2025

- Compliance requires EITHER:
 - Airflow cfm HERS testing; OR
 - Capture Efficiency & prescriptive duct sizing
- 60% higher airflow/CE required for Gas Ranges
- Higher airflow/CE required for smaller spaces

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

<u>Dwelling Unit Floor Area (ft²)</u>	<u>Hood Over Electric Range</u>	<u>Hood Over Natural Gas Range</u>
<u>>1500</u>	<u>50% CE or 110 cfm</u>	<u>70% CE or 180 cfm</u>
<u>>1000 - 1500</u>	<u>50% CE or 110 cfm</u>	<u>80% CE or 250 cfm</u>
<u>750 - 1000</u>	<u>55% CE or 130 cfm</u>	<u>85% CE or 280 cfm</u>
<u><750</u>	<u>65% CE or 160 cfm</u>	<u>85% CE or 280 cfm</u>



Cooking with Induction



The Practical Guide to All-Electric Residential Building Design

END of PART 1

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!

Don't Forget to Register for Part 2!

- [6/11 – Part 2: Water Heating, HVAC, & Laundry](#)

Upcoming Courses:

- [6/3 - 2025 Energy Code in Practice: Nonresidential](#)
- [6/9 - Reducing Carbon Emissions from MEP Systems](#)
- [6/16 - Natural Insulation for Low Carbon Builds](#)
- [6/17 - Home Electrification Contractor Boot Camp in SLO](#)

Any phone numbers who joined? Please share your name!

