

2022

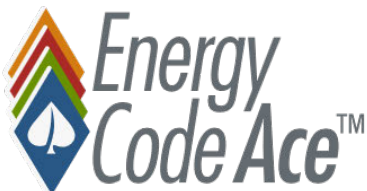
CODE BREAKER

Talking with Clients
about Electrification

Solving the Energy Code Puzzle One Piece at a Time

Participant Handout

June 2024



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LEGAL NOTICE

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ABOUT THE STATEWIDE CODES AND STANDARDS PROGRAM

The Statewide Codes and Standards Program (C&S Program) is jointly managed by PG&E, SDG&E, and SCE. The C&S Program saves energy on behalf of ratepayers by directly influencing standards and code-setting bodies to strengthen energy efficiency regulations, by improving compliance with existing codes and standards, and working with local governments to develop ordinances that exceed statewide minimum requirements.

This class is one of many free courses, tools, and resources that the C&S Program offers.
Please visit <http://energycodeace.com/> or contact info@energycodeace.com to find out more about all program offerings.



AIA Information

2022 Code Breaker: Talking With Clients About Electrification

Learning Units: 1.0 AIA LU | HSW

Energy Code Ace

Provider Number: 404109083

**AIA
Continuing
Education
Provider**

Course Description

If you have been asked questions about electrification requirements in California and need support finding answers, then this presentation is for you. We will provide attendees with essential data to foster a deeper understanding of electric technologies, including Energy Code requirements; how electrification can promote health, safety, and comfort; how California utilities are preparing to meet increased loads from electrification; and which design features support the reliability and affordability of an all-electric home.

Course Objectives

- Summarize key facts regarding heat pump technology — as well as other electric technologies — specific to their performance, affordability, and impact on California electric grid.
- Compare the Energy Code requirements for electric and gas appliances.
- Describe the differences between all-electric designs and mixed-fuel projects in terms of Energy Code compliance and likely impact on construction and operation costs.
- Identify sources of information and how to access them for guidance on incentive programs, tax credits, and rebates supporting the deployment of heat pumps, electric equipment upgrades, and energy efficient appliances.

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

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


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

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Welcome



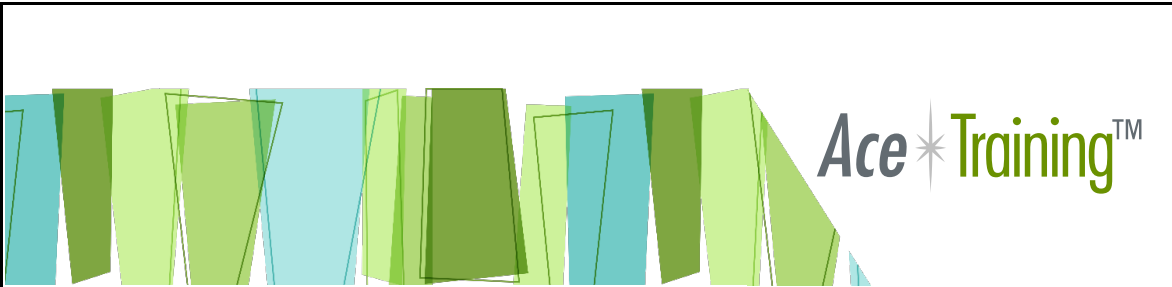
2022 **CODE BREAKER** * Talking With Clients About Electrification
Solving the Energy Code Puzzle One Piece at a Time



Nick Brown
Energy Code Ace Instructor
Build Smart Group

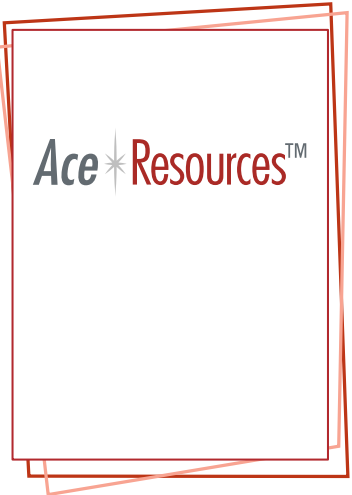
Gina Rodda
Energy Code Ace Instructor
Gabel Energy

Continuing Education Information	
AIA Provider ID: 40410982	AIA Course Number: 22CB TA Elec
ICC Provider ID: 1534	ICC Course Number: 41151



This course will help you:

- ✦ Summarize key facts regarding heat pump technology — as well as other electric technologies — specific to their performance, affordability, and impact on California electric grid.
- ✦ Compare the Energy Code requirements for electric and gas appliances.
- ✦ Describe the differences between all-electric designs and mixed-fuel projects in terms of Energy Code compliance and likely impact on construction and operation costs.
- ✦ Identify sources of information and how to access them for guidance on incentive programs, tax credits, and rebates supporting the deployment of heat pumps, electric equipment upgrades, and energy efficient appliances.



Your one-stop shop for no-cost tools, training and resources to help you comply with California’s Title 24, Part 6 building energy code and Title 20 appliance standards.

We’re powered by the California Statewide Codes & Standards Program and vetted by the California Energy Commission.



Ace * Training™

Ace * Resources™

A suite of interactive tools to help you understand the compliance process, required forms, installation techniques and energy efficiency regulations applicable to building projects and appliances in California

Our Tools include:

- ✦ Energy Code Product Finder
- ✦ Forms Ace
- ✦ Image Ace
- ✦ Navigator Ace
- ✦ Nonres. Indoor Lighting Wheel
- ✦ Q&Ace
- ✦ Reference Ace
- ✦ Timeline Ace
- ✦ Virtual Compliance Assistant

Ace * Tools™

Ace * Resources™

A portfolio of on-demand and live online and in-person training alternatives on California's Energy Code and Title 20 regulations, tailored to a variety of industry professionals and addressing key measures

Our Training includes a variety of formats:

- ✦ In-person instructor-led
- ✦ Online instructor-led
- ✦ Online self-study
- ✦ Recorded webinars
- ✦ YouTube — live streaming & videos




An array of downloadable materials providing practical and concise guidance on how and when to comply with California's building and appliance energy efficiency standards

Our Resources include:

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



Join us at
www.EnergyCodeAce.com



Key Policy Drivers

Code Breaker: Talking About Electrification

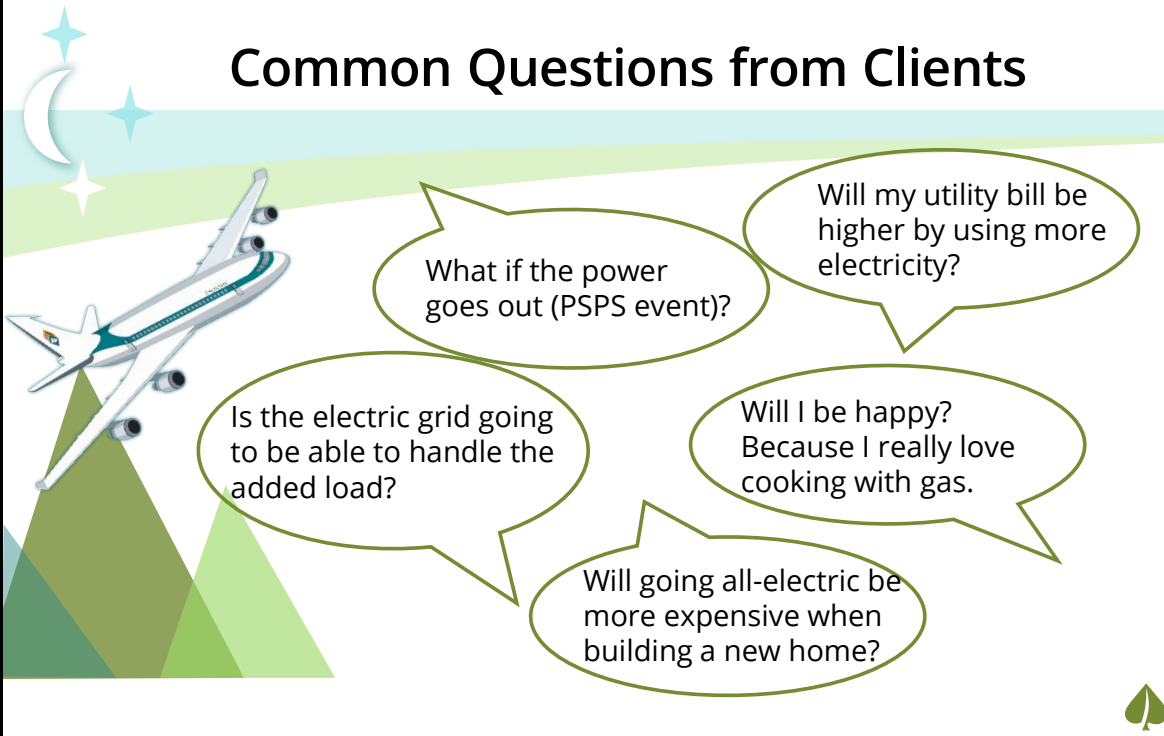
1. Key Drivers

- 2. How Do They Work?
- 3. Will They Work Reliably?
- 4. Can We Afford Them?
- 5. Case Study
- 6. Next Steps

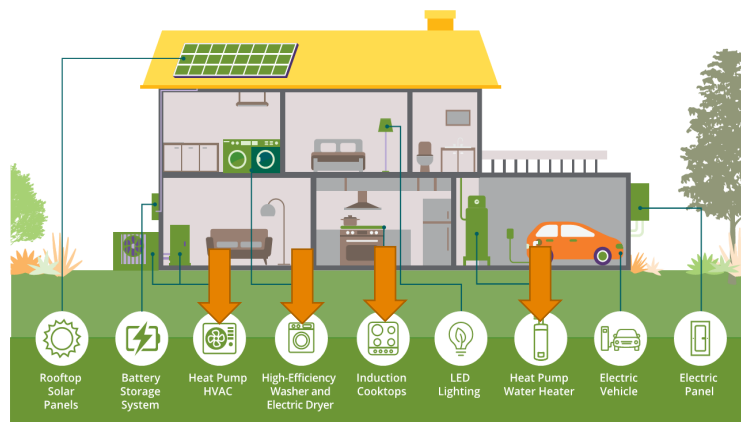
- ✦ **Common Questions from Clients**
- ✦ **Key Policy Drivers**
- ✦ **Benefits of All-electric Designs**
 - ◇ Health and safety advantages
 - ◇ Electric systems have lower emissions



Common Questions from Clients



All-electric versus Mixed-fuel Home



All-Electric Home

- ✦ An all-electric home per the 2022 Energy Code, includes heat pump space heating, water heating, electric stovetop and clothes dryer.

Mixed-fuel Home

- ✦ A mixed-fuel home could potentially use natural or propane gas for space heating, water heating, cooking and clothes dryer.

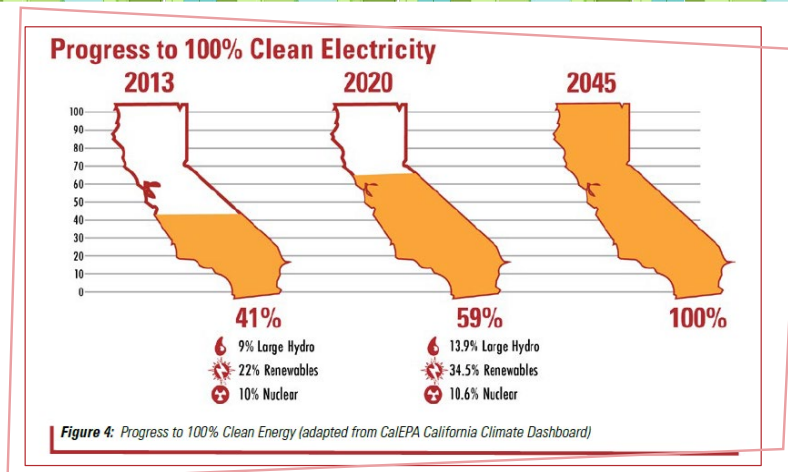
Key Policy Drivers of Electrification



- ✦ California Air Resources Board (CARB) [2022 Scoping Plan](#) includes phase-out of gas appliances by 2030
- ✦ CPUC eliminated **electric line extension subsidies** for mixed-fuel new construction building (projects that use natural gas and/or propane in addition to electricity) beginning July 1, 2024
 - ✦ This is in addition to the CPUC eliminating **natural gas line extension subsidies** for all newly constructed mixed-fuel buildings beginning on July 1, 2023
- ✦ **2022 Energy Code** introduces heat pump HVAC and water heating requirements. Electric-readiness required for new homes and multifamily dwelling units if natural gas utilized for space heating, water heating, cooktops and dryers.



California is Cleaning up the “Grid”



California is working to decarbonize the electricity generation and delivery even more, with the goal of achieving **100% low-carbon source energy for electricity by 2045.**

Source: Energy Code Ace fact sheet "Designing Single Family Homes to Run on Clean Energy"



A Cleaner "Grid" = Cleaner Buildings

Even accounting for how electricity is generated, all-electric homes have lower GHG emissions than mixed fuel because, as of 2020, **59% of California's electricity was already coming from zero-emission sources.**

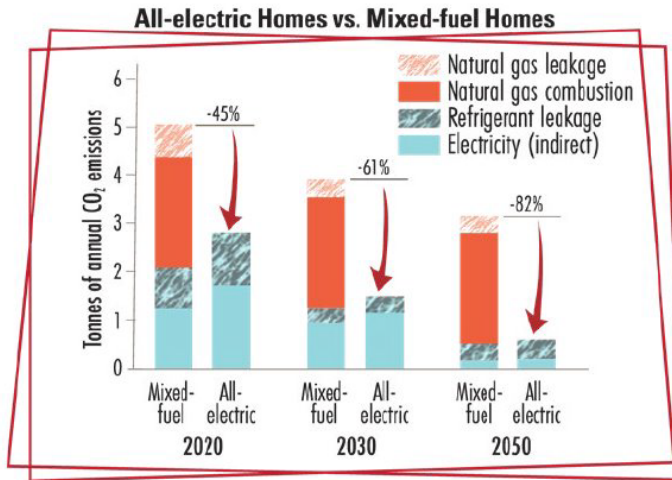
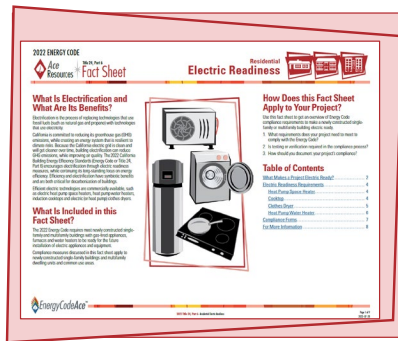


Figure 3: All-electric vs. Mixed-fuel: Annual GHG Emissions for a 1990s Vintage Single-family Home in Sacramento (from "Residential Building Electrification in California", E3, April 2019)



2022 Energy Code - Electric Readiness



Energy Code Ace [factsheet](#) on Residential Electric Readiness

Electric Readiness for Single-family and Multifamily New Construction

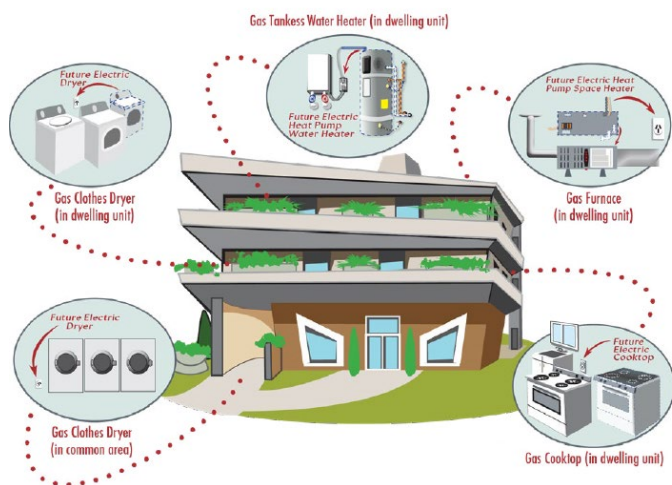


Figure 2. Electric Retrofit Ready Equipment and Appliances for Multifamily Buildings



Health Concerns of Gas Appliances



- ✦ A [UCLA study](#) estimated that replacing gas with electric appliances in California homes would prevent about 350 premature deaths each year and produce **\$3.5 billion in annual health benefits** from cleaner air
- ✦ A research article by [Science Advances](#) concludes that long-term exposure (averaged over a year) to NO₂ **associated with stoves** has been linked to increased incidence and exacerbation of pediatric asthma, incidence and mortality from chronic obstructive pulmonary disease (COPD), incidences of lung cancer, preterm birth, and diabetes mellitus.

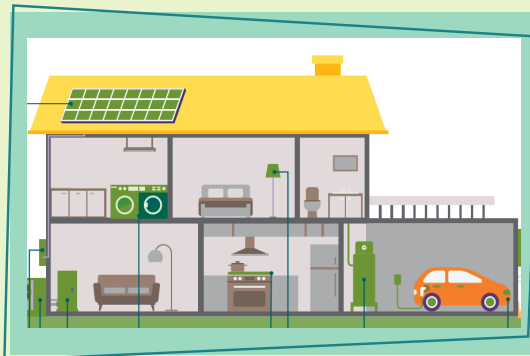


Check Your Understanding #1

What do you think?

- Heat pump space heater
- Induction (or electric) stovetop
- Heat pump water heater
- Heat pump (or electric) clothes dryer
- All of the above

In an all-electric home meeting the 2022 Energy Code, which building systems must use electricity?



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Efficiency

Code Breaker: Talking About Electrification

1. Key Policy Drivers

2. How?

3. Will They Work Reliably?

4. Can We Afford Them?

5. Case Study

6. Next Steps

✦ **Efficiency of Electric Systems**

- ✦ Heat Pump Space Heating
- ✦ Heat Pump Water Heaters
- ✦ Electric/Induction Cooking



Heat Pumps are Efficient

Will my utility bill be higher by using more electricity?

Gas Appliances

- ✦ Minimum Federal indoor gas furnaces efficiency is **80% AFUE**
- ◇ Typical furnaces are **single-stage** and do not adjust according to the need

Heat pump technology takes heat from the air, rather than burning gas, to create heat.



Heat Pumps and other electric appliances

- ✦ Heat pumps are reversible air conditioners. They are up to **300% efficient**, since they move heat instead of generating it.
- ◇ “Minisplit” heat pumps adjust speed up and down according to the need, providing a **more consistent approach to comfort**.



Heat Pumps are Efficient

Will my utility bill be higher by using more electricity?

Gas Appliances

- ✦ **Gas storage** water heaters are ~60% efficient.
- ◇ Federal minimum UEF = 0.61 for 50-gallon high draw
- ✦ **Gas tankless** water heaters are 80-95% efficient.
- ◇ Federal minimum UEF = 0.81

Heat pump water heaters can achieve **300% efficiency and higher.**



Heat Pumps and other electric appliances

- ✦ Heat pump water heaters **take heat from the air** around them rather than burning fossil fuels to create heat.
- ◇ They are programmable, allowing the tank to be utilized as a “energy storage” device when charged by on-site PV during the day.



Induction Cooktop Efficiency

Will I be happy?
Because I really love cooking with gas.

Gas Appliances

- ✦ Gas cooktops are approximately **40% efficient**
- ✧ The rest of the energy is lost as heat not delivered to the food

Induction cooking is faster, easier to clean, provides superior control, and is safer, particularly in homes with children.



Heat pumps and other electric appliances

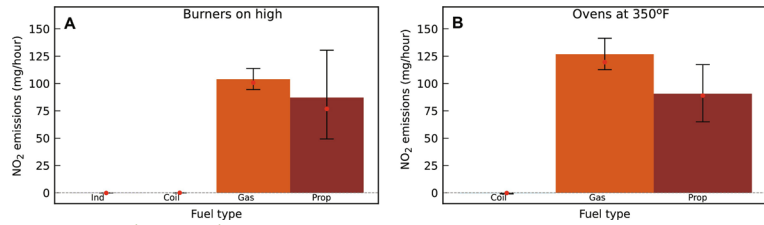
- ✦ Electric resistance cooktops are about **74% efficient**
- ✦ Induction cooktops are up to **90% efficient**



Electric Appliances and IAQ

Burning gas in buildings adds Nitrogen Oxides, which are linked to childhood asthma and other respiratory conditions.*

Mean and median NO₂ emissions by fuel type



RESEARCH ARTICLE by Science Advances
Nitrogen dioxide exposure, health outcomes, and associated demographic disparities due to gas and propane combustion by U.S. stoves

Emissions reported in milligrams of NO₂ per hour by fuel type (electric induction, electric coil/radiant, gas, and propane) for burners on high (A) and for ovens set to 350°F (175°C) (B). The red points are median values, the bar heights are mean values, and the black error bars are the 95% CIs of the mean.

* Source: "Population Attributable Fraction of Gas Stoves and Childhood Asthma in the United States". International Journal of Environmental Research and Public Health, December 2022

Heat Pumps and other electric appliances

- ✦ Heat pump and electric appliances improve indoor air quality (IAQ) by eliminating combustion gases



Electric Cars are Efficient



*Source: Department of Energy, www.fueleconomy.gov

Electric Vehicles

- ✦ Our buildings will increasingly support EVs as an important part of electrification in California as **dictated by CALGreen** (Title 24 Part 11)
- ✦ EVs are more efficient than gas cars*
 - ◇ EVs transmit 65% of energy to the wheels
 - ◇ They add 22% through regenerative braking
 - ◇ EVs convert **87%** of the energy we put into them to road miles
- ✦ Gas cars convert **16-25%** of energy to the wheels
 - ◇ The rest is lost mostly as heat

Source: <https://www.fueleconomy.gov/feg/atv.shtml>

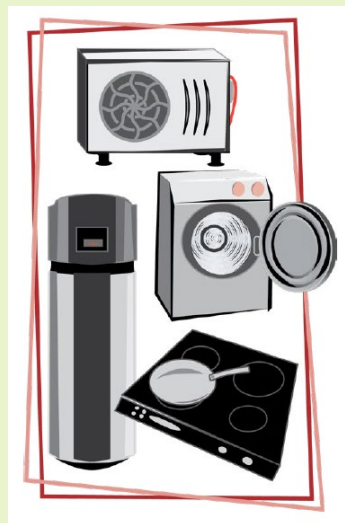


Check Your Understanding #2

What do you think?

What are **YOUR** favorite benefits of heat pump and electric appliances?

- a) They are efficient
- b) When combined with on-site PV, they reduce utility cost
- c) Indoor air quality is improved with electric appliances within the home
- d) ?? Care to share **YOUR** favorite benefit



Reliability

Code Breaker: Talking About Electrification

- 1. Key Policy Drivers
- 2. How Do They Work?
- 3. Reliability**
- 4. Can We Afford Them?
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- ✦ **Reliability Compared to Gas Systems**
- ✦ **How California Utilities are Preparing the Grid**



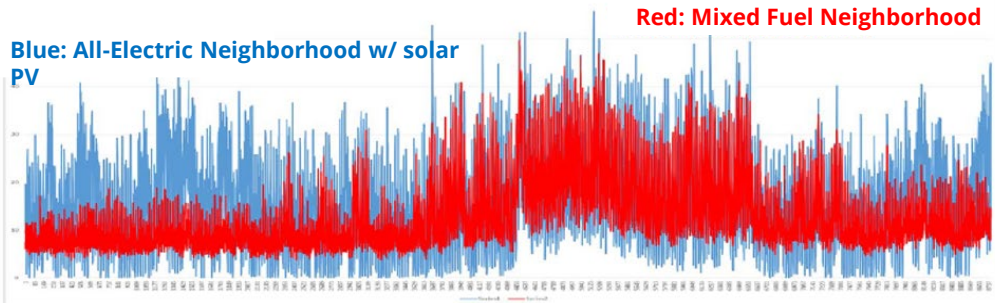
Electric Grid and Peak Demand

Is the electric grid going to be able to handle the added load?

Reliability of the Grid

The electric grid is designed to accommodate “peak demand,” plus a margin

- ✦ **All-electric neighborhoods do not have a significantly higher peak** compared to mixed-fuel
- ✦ All-electric homes do consume more electricity, but this additional consumption mostly occurs **during off-peak hours when there is abundant capacity on the grid**



Transformer-Level Peak Energy Demand over the Course of a Year

Source: Southern California Edison, Fontana ZNE Homes Case Study



Electric Grid Reliability

What if the power goes out (PSPS event)?

Reliability of the Grid

Significant progress has been made to reduce the frequency and duration of customer outages through significant investments in grid-hardening and will continue as we cope with the increasing extreme weather events.

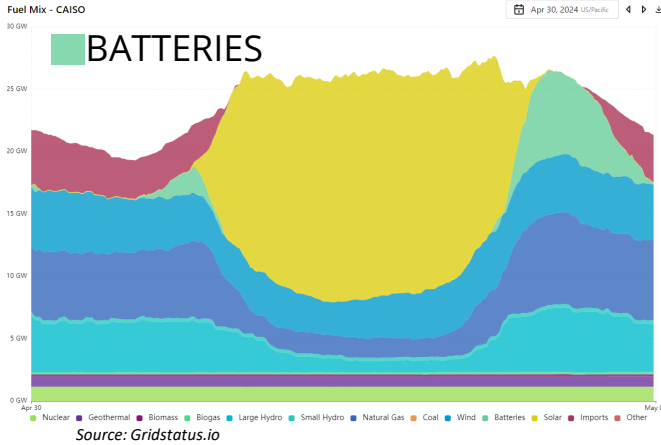


Reliability of the Grid

Utility Impacts

As California is moving towards an all-electric future, so is the grid. Utilities will continue to manage their portfolios to better support a cleaner future.

Batteries can assist with the evening ramp on a daily basis



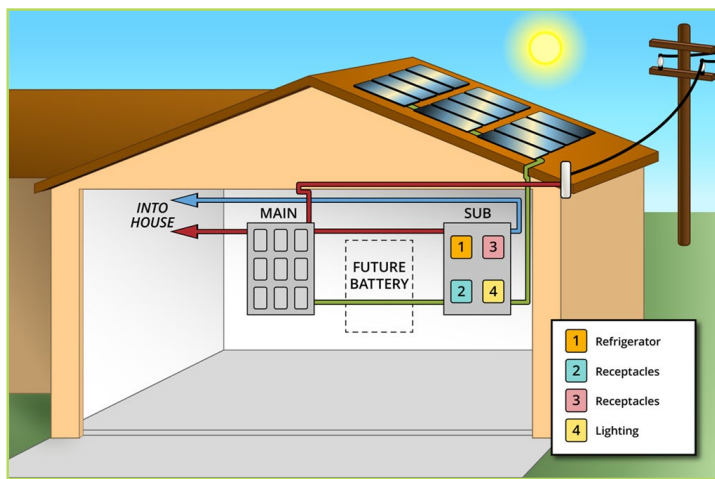
- On April 30th 2024, battery dispatch set a record of 7.04 GW of power supplied to the grid in California
- Just two weeks prior on April 16th, batteries had peaked over 6 GW for the first time (and were the predominant source of electricity on the grid for a two-hour period!)
- Battery capacity will continue to grow, and will play an increasingly crucial role in mitigating curtailment and helping address the evening ramp, the “neck of the duck”



Batteries are Resiliency Assets

On-Site Renewables

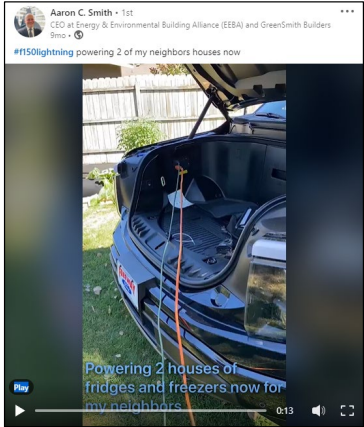
Per the Energy Code, new homes in California are required to install onsite photovoltaics (PV) and are encouraged to include battery storage energy systems. Consider installing a system that can be disconnected from the grid during a power outage.



Batteries are Resiliency Assets

EV = Resiliency Asset

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



Source: Aaron Smith, Energy Environmental Building Alliance (EEBA) via LinkedIn

<https://www.pgecurrents.com/articles/3882-pg-e-ford-accelerating-vehicle-home-technology-california>

A contractor posted in 2022 about using his F150 Lightning with extension cords to power two houses worth of refrigerators & deep freezers, an exotic fish aquarium, an internet router, and electronic devices.

❖ After six hours, his EV battery was down only 5% from where it started.



Gas Reliability – Modern Appliances

Gas Appliances

Nearly all modern gas appliances (water heaters, furnaces, stovetops, etc.) have electronic ignition or controls that will prevent the use of those appliances when there is a power outage.



Affordability

Code Breaker: Talking About Electrification

1. Key Policy Drivers
2. How Do They Work?
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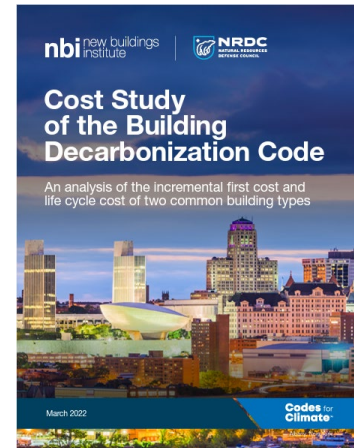
5. Case Study
6. Next Steps

- ✦ **Cost of Construction**
- ✦ **Operating Cost**
- ✦ **Incentive Programs for All-electric**



All-Electric in Residential New Construction

- ✦ The 2022 “Cost Study of the Building Decarbonization Code” found upfront savings of between \$7,500 to \$8,200 to build an all-electric home.
- ✦ The greatest savings were from the avoidance of gas line infrastructure and piping
- ✦ Subsequent policies in California further enhance the economic benefits:
 - ✦ Electric readiness in the 2022 Energy Code
 - ✦ CPUC’s elimination of gas line extension allowances



Source: New Buildings Institute (NBI) and Natural Resources Defense Council (NRDC)



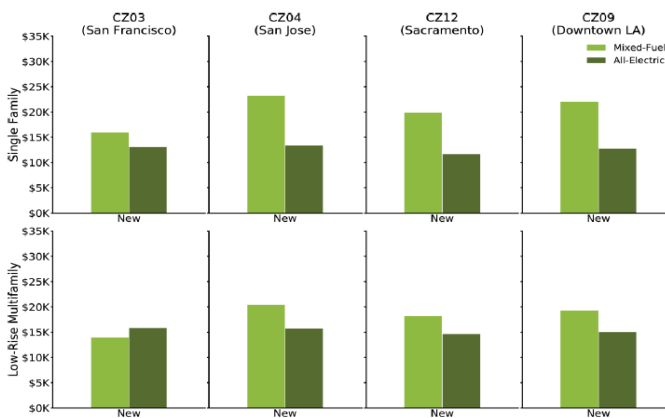
Source: <https://newbuildings.org/resource/cost-study-of-the-building-decarbonization-code/>

Comparison of Cost

Will going all-electric be more expensive when building a new home?

All-Electric Homes Typically Cost Less to Build

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



Source: Energy & Environmental Economics Inc., “Residential Building Electrification in California,” 2019

An E3 study done in 2019 compares capital costs per unit of all appliances and infrastructure (including gas connection costs) for new construction considering the following:

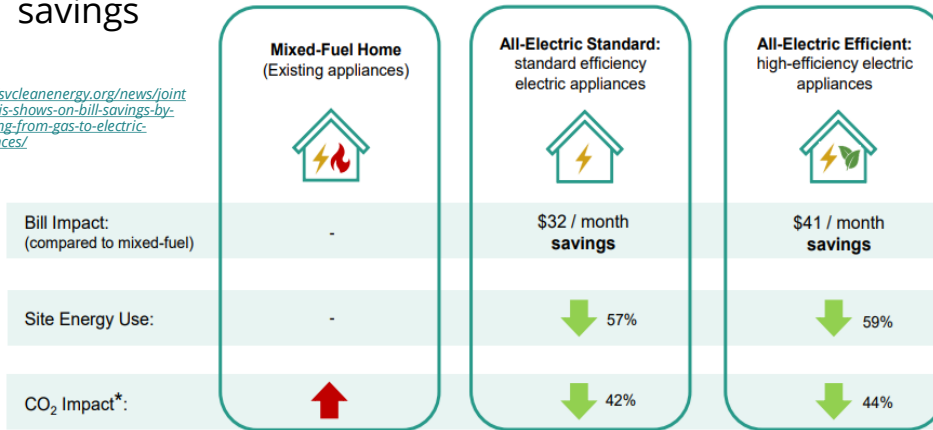
- ✦ HVAC
- ✦ Water Heater
- ✦ Stove
- ✦ Clothes Dryer



Retrofitting All-electric Can Reduce Total Energy

- ✦ 2022 Study by Peninsula Clean Energy & Silicon Valley Clean Energy demonstrated savings with both standard and premium efficiency appliances
- ✦ Even though site energy use was reduced by 60%, the relatively high unit cost of electricity limited total bill savings

Source:
<https://svcleanenergy.org/news/joint-analysis-shows-on-bill-savings-by-switching-from-gas-to-electric-appliances/>



*Based on 0.720 lbs CO₂/kWh per SVCE 2022 GreenStart Power Content Label and 13.446 lbs CO₂/therm per PG&E.



Source: <https://svcleanenergy.org/wp-content/uploads/SVCE-PCE-Single-Family-On-Bill-Impacts-Results-2023.pdf>

Retrofits - Strategies to Keep Costs Low




Things to consider to avoid expensive electrical service upgrades


- ✦ Load-sharing devices
- ✦ 120v Heat Pump Water Heaters
- ✦ Combination condensing washer/dryer
- ✦ Improved envelope efficiency to reduce needed HVAC size
- ✦ Meter collars for direct PV tie-in
- ✦ Midsized EV charger
- ✦ The [Watt Diet Calculator](#)



Where to Get More Information


<https://localenergycodes.com/>

Statewide Reach Codes Program 




Supplemental Resources


- Energy Efficiency and Decarbonization Resources
- PV and Storage Systems
- State and Regional Agencies
- 2022 Archived Cost-effectiveness Reports
- Local Government Services
- Incentives
- Accessory Dwelling Units (ADUs)



Where to Get More Information


<https://localenergycodes.com/>

Statewide Reach Codes Program 



Supplemental Resources

- Energy Efficiency and Decarbonization Resources
 - League of Women Voters: Ten Actions a City Can Take to Reduce its GHG Emissions and Recommended Processes
 - 2030 Palette
 - Getting to Zero
 - Passive House California
 - The Switch is On
- Electrification Guidebooks
 - Worthen Foundation: The Building Decarbonization Practice Guide
 - EPRI: Consumers Guide to Modern Heat Pumps (for HVAC)
- Redwood Energy
 - Pocket Guide to All-Electric Commercial Retrofits
 - Zero Emissions All Electric Single Family Construction
 - Zero Emissions All Electric Multifamily Construction
 - Zero Carbon Commercial Construction Guide
 - Pocket Guide to Single Family Electric Retrofits
- Kitchen Electrification
 - [Building Decarbonization Coalition: Kitchen Electrification Resource Directory](#)
 - Food Service Technology Center
- Refrigerants
 - Refrigerants and Climate Change Fact Sheet
- Municipal Buildings
 - BayREN's Resource Guide for Reducing Energy Use and Carbon Emissions from Municipal Buildings



Where to Get More Information

<https://localenergycodes.com/>

Statewide Reach Codes Program



REACHING BEYOND

Supplemental Resources

Incentives

- ✦ Incentives can be up to \$17,000 supporting all-electric retrofits
- ✦ Federal tax credits and California incentives are stackable!

Incentives

- The Switch is On Decarbonization Incentive Finder
- California Electric Vehicle Infrastructure Project (CALeVIP)
- TECH Clean California
- Building Initiatives for Low Emissions Development (BUILD)
- Self-Generation Incentive Program (SGIP)
- California Electric Homes Program (CalEHP)
- California Energy Smart Homes
- California Energy Design Assistance (CEDA) Program



Check Your Understanding #3

What do you think?

What makes all-electric homes lower cost?

- Elimination of the need to run gas infrastructure
- Heat pumps are inherently more efficient
- Solar systems can power electric homes much of the day
- All of the above



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Case Study

Code Breaker: Talking About Electrification

1. Key Policy Drivers
2. How Do They Work?
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4. Can We Afford Them?

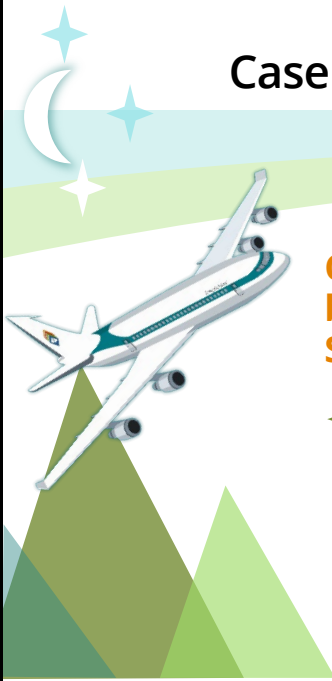
5. Case Study

6. Next Steps

- ✦ **Code Compliant All-electric designs**
- ✦ **Code Compliant designs with gas**



Case Study Project: Dominguez Residence



Cost effective compliance options for a 3-bed 2-bath, 1,410 ft² new home in Sacramento area (CZ 12)

- ✦ Mixed fuel vs. all-electric



Case Study Project: Climate Zone 12



Showing Compliance to the 2022 Energy Code

Energy Features	Option 1 - Gas/Gas			Option 4 - All Electric		
	Source EDR1	Eff. EDR2	Total EDR2	Source EDR1	Eff. EDR2	Total EDR2
Compliance Margins Both PASS	0.6	6.5	8.7	8.8	0.3	0.1
Building Envelope						
Wall Insulation	R-21+R-5			R-21		
Attic Insulation	Roof	R-19 below roof deck		Same		
	Ceiling	R-38		Same		
Fenestration	NFRC U=0.30/SHGC=0.23			Same		
HERS verified QII*	Required			Not Required		
Solar PV	Min. Required			Same		
Battery Storage	≥5 kWh Battery			None		
Mechanical System						
Heating	Central	95% AFUE Furnace		7.5 HSPF2 (min. efficiency)		
	Split AC	15 SEER2/12.5 EER2		14.3 SEER2 (min. efficiency)		
Ducts	R-8 Ducts in Attic			R-6 Ducts in Attic (min.)		
Ventilation	Default whole house fan			Same		
IAQ Fan	Default Exhaust IAQ			Same		
Hot Water (HW) Heater	0.95 UEF Tankless Gas			Tier 3 HPWH		
HW Distribution	Standard pipe insulation			Same		

- ✦ The gas design requires extensive upgrades
- ✦ The all-electric design requires no feature upgrades

RED = More expensive than the Prescriptive Design feature
GREEN = Less expensive than the Prescriptive Design feature
 *Quality Insulation Installation





Check Your Understanding #4

What do you think?

The California energy code now favors all-electric designs over gas. What does it require to build with gas today?

- a) Homes must be built electric-ready
- b) Gas systems require flues to vent combustion gases
- c) Additional feature upgrades will be needed for mixed fuel designs to meet Title 24
- d) All of the above



Check Your Understanding #5

What do you think?

Do you feel more comfortable talking with clients about electrification?

Do you have any additional questions?



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Next Steps

Code Breaker: Talking About Electrification

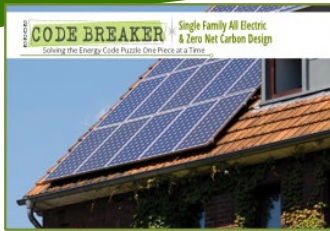
- 1. Key Policy Drivers
- 2. How Do They Work?
- 3. Will They Work Reliably?
- 4. Can We Afford Them?
- 5. Case Study

6. Next Steps

✦ Energy Code Ace



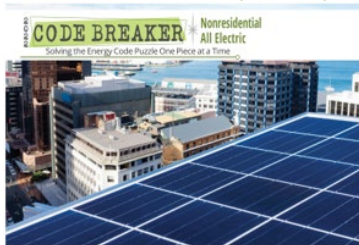
Additional Code Breakers



2022 Single-family All Electric & Zero Net Carbon Design
Offered Upon Request



2022 Multifamily All Electric & Zero Net Carbon Design
Offered Upon Request



2022 Nonresidential All Electric & Zero Net Carbon Design
Offered Upon Request



Virtual Classes



2022 Single-family Standards: Solar & Battery Storage
Online Live Event

2022 Single-family Standards for Architects & Designers
Online Live Event



2022 Nonresidential Standards for Architects & Designers
Online Live Event



Factsheets

2022 ENERGY CODE

Ace Resources **2024 Part 6**
Fact Sheet

Residential Electric Readiness

What Is Electrification and What Are Its Benefits?
Electrification is the process of replacing conventional fuel-burning heat (such as natural gas and propane) with technologies that use electricity.

California is committed to reducing its greenhouse gas (GHG) emissions, with cooling air energy systems that is critical to climate risk. Because the California electric grid is clean and will get cleaner over time, building electrification can reduce GHG emissions, while improving air quality. The 2022 California Building Energy Efficiency Standards (Energy Code) Title 24, Part 6 encourages electrification through electric readiness measures, while continuing to bring standards focus on energy efficiency. Efficiency and electrification have synergistic benefits and can both contribute to decarbonization of buildings.

Efficient electric technologies are commercially available, such as electric heat pump water heaters, heat pump water heaters, induction cooktops and electric for heat pump clothes dryers.

What Is Included in this Fact Sheet?
The 2022 Energy Code requires new newly constructed single-family and multifamily buildings with gas-fired appliances, furnaces and water heaters to be ready for the future installation of electric appliances and equipment.

Compliance measures discussed in this fact sheet apply to newly constructed single-family buildings and multifamily dwelling units and common use areas.

How Does this Fact Sheet Apply to Your Project?
This fact sheet is for use by owners of Energy Code compliance requirements to make a newly constructed single-family or multifamily building electric ready:

1. What requirements does your project need to meet to comply with the Energy Code?
2. Is testing or verification required in the compliance process?
3. How should you document your project's compliance?

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2022 ENERGY CODE

Ace Resources **2024 Part 6**
Fact Sheet

Designing Single-family Homes to Run on Clean Energy

Goals to Reduce Greenhouse Gas Emissions
This fact sheet supports new newly constructed single-family homes, such as single-family dwellings, duplexes, townhomes or any type and accessory dwelling units (ADUs), and help to meet California's energy goals by installing more efficient systems and ensuring to deliver energy services.

California is aiming to reduce its greenhouse gas (GHG) emissions while creating an energy system that is resilient to climate risk, spurring innovation and a low-carbon transition nationally and internationally.

California met its 2020 target four years early in 2016, and projections have continued to drop since then (Figure 1). California's next climate target is to reduce emissions by 40% below 1990 levels by 2030 and by 70% below 1990 levels by 2050.

According to a California Energy Commission (CEC) report from 2021, energy efficiency measures for 20% of California's new buildings could reduce direct emissions from building fuel use for heating and cooling, gas leaks and refrigerant leaks, just efficiency measures that are proven to be electricity used in buildings. See Figure 2 for a snapshot of these GHG emissions in 2018.

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Energy Efficiency
When considering cleaner energy sources for a new home, it is important to make sure that the building overall is as energy efficient as possible. Building energy efficiency measures include, but are not limited to:

- Building envelopes (windows, walls, roof, floors and other exterior surfaces) designed to keep heat loss in the winter and heat gain in the summer. Homes in most parts of California will benefit from high insulation levels and high-performing windows, glass doors and skylights. Hot areas will need additional features to help manage heating load, such as cool roof coatings and window overhangs.
- High-efficiency and thoughtfully designed space conditioning and water heating systems.
- Efficient household appliances, such as those with EnergyStar ratings.

Progress toward 2030

Figure 1 Closing in on California's 2030 Climate Target (Adapted from the CEC's California Climate Dashboard)

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Hello Example New Account,

Welcome to Energy Code Ace!

Please click the link below to verify your account and access our free Title 24, Part 6 and Title 20 tools, trainings and resources.

You can use your email address (example_new@youremail.com) to sign in with the password you created when you signed up.

To begin using your account, click the verify my email address button below:

[Verify My Email Address](#)

1 Create an account

Sign In

Sign In to Energy Code Ace

Or if this is your first time here, you can [create a new account](#) in no time!

Email Address

My Profile

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Please select at least one role to opt in to email communications.

Industry Role: _____ Company: _____

Appliance Industry Chapters

Builder


Building Department personnel

Consumer

3 Be sure to select at least one Role under "Professional Information"

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Thank you


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