

Draft Electrification Reach Codes for 2019 Energy Code & Green Building Standards Code

Council Sustainability Committee

September 17, 2019

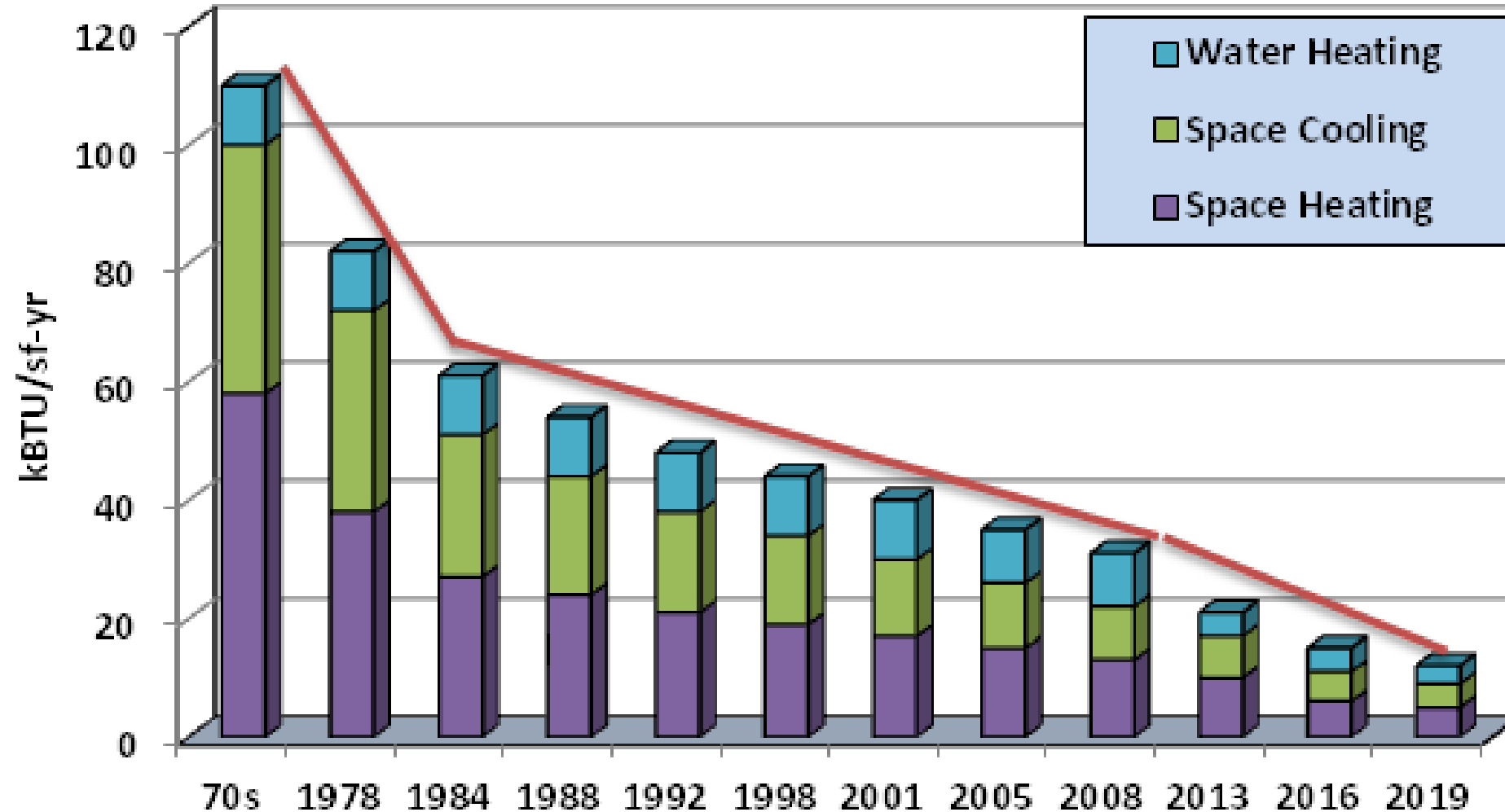


California Building Standards Code

(Title 24 of CA
Code of
Regulations)

- Part 1: California Building Standards Administrative Code
- Part 2: California Building Code
- Part 2.5: California Residential Building Code
- Part 3: California Electrical Code
- Part 4: California Mechanical Code
- Part 5: California Plumbing Code
- **Part 6: [California Energy Code](#)**
- *Part 7: currently vacant (formerly Elevator Safety Code)*
- Part 8: California Historical Building Code
- Part 9: California Fire Code
- Part 10: California Existing Building Code
- **Part 11: [California Green Building Standards Code](#) (CALGreen Code)**
- Part 12: California Reference Standards Code

Three-year Building Code Cycle



Source: California Energy Commission

Previous Code (2013)

- Incandescent lighting still allowed
- Some lighting controls in certain areas (occupancy sensors)
- Standard – 2 x 4 wall construction still appropriate (R-13 insulation)
- Attic/Roof insulation – R-30 insulation minimum
- High Efficiency Windows
- Houses must be PV-ready
- High-efficiency HVAC and Water Heating

CALIFORNIA BUILDING CODE 2013

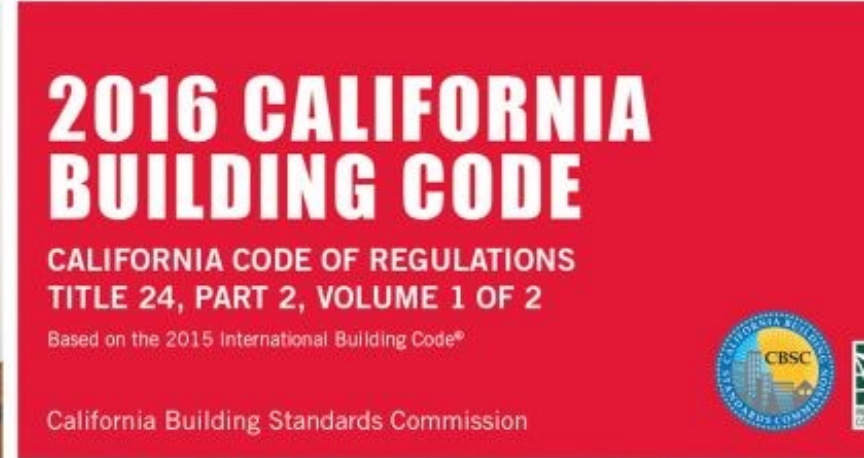
California Code of Regulations
Title 24, Part 2, Volume 1 of 2
Based on the 2012 International Building Code®

International Building Standards Commission



Current Code (2016)

- Incandescent lighting largely-eliminated
- Lighting control requirements intensify (vacancy sensors & occupancy sensors)
- R-19 wall insulation required
- R-38 roof/ceiling insulation required
- Houses must be PV-ready
- Houses must be EV charging-ready
- Window efficiencies increase 30+%
- Increased HVAC & Water Heating Efficiencies



New Code (2019)

Effective January 1, 2020

- Adopted May 9, 2019
- Lighting efficiencies increased – no incandescent lighting (few exceptions)
- 2 x 6 exterior wall framing (R-20 insulation)
- Efficiency for doors must now be addressed (not just windows)
- HERS Verified Quality Insulation Installation prescriptively required
- PV installation prescriptively required
- However, Natural Gas is not eliminated from Code

2019 CALIFORNIA BUILDING CODE

CALIFORNIA CODE OF REGULATIONS | TITLE 24, PART 2, VOLUME 1 OF 2

Based on the 2018 International Building Code®

California Building Standards Commission



California Energy Commission

Published Cost vs. Gains – 2019 Code

CALIFORNIA'S 2019 RESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

CALIFORNIA ENERGY COMMISSION

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

\$19,000 SAVINGS OVER A 30 YR. MORTGAGE | INITIAL COST \$9,500



SOLAR PHOTOVOLTAIC SYSTEM

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



DEMAND RESPONSE COMPLIANCE OPTIONS

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



HEALTHY INDOOR AIR QUALITY

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



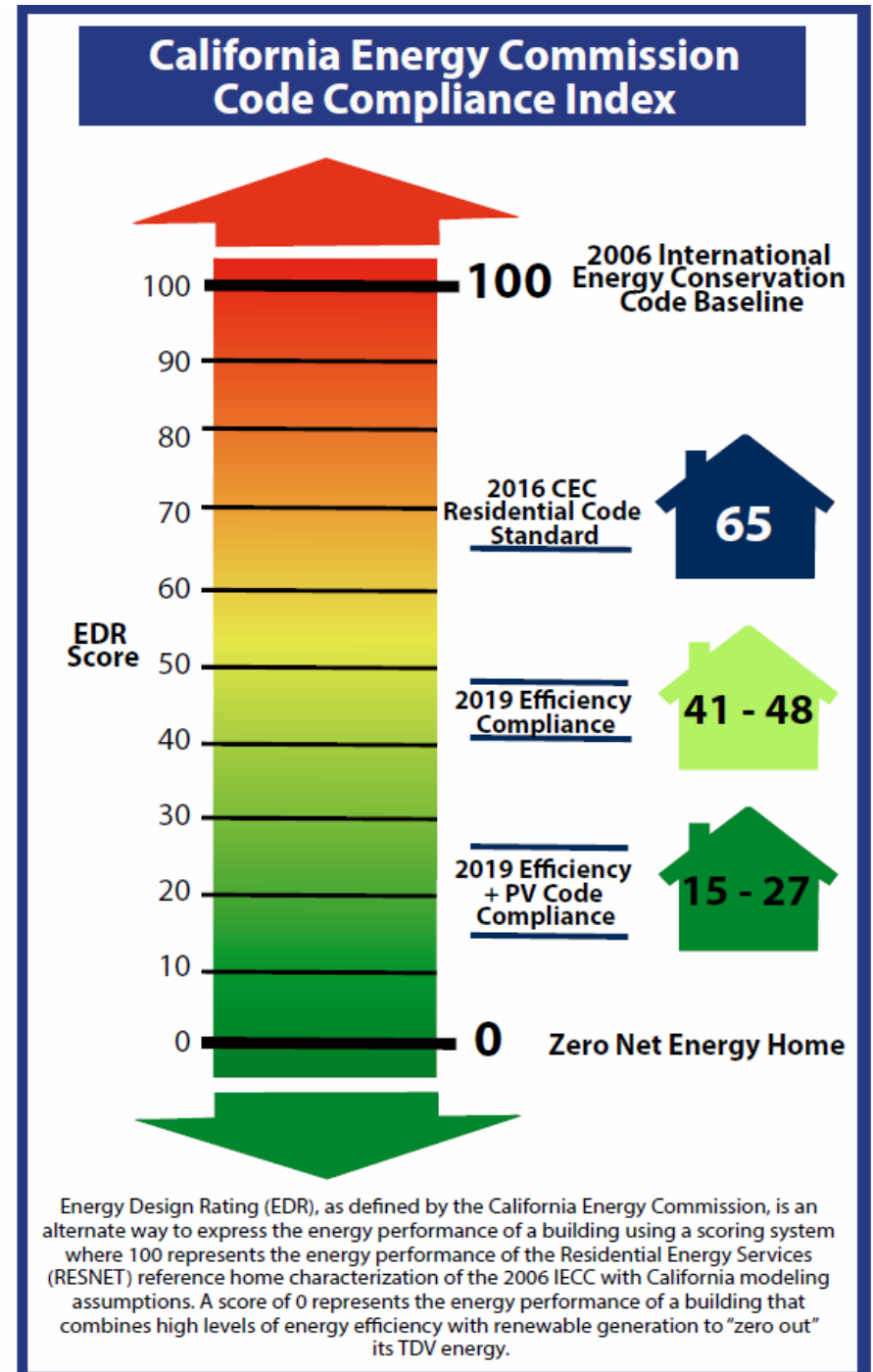
BUILDING ENVELOPE

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



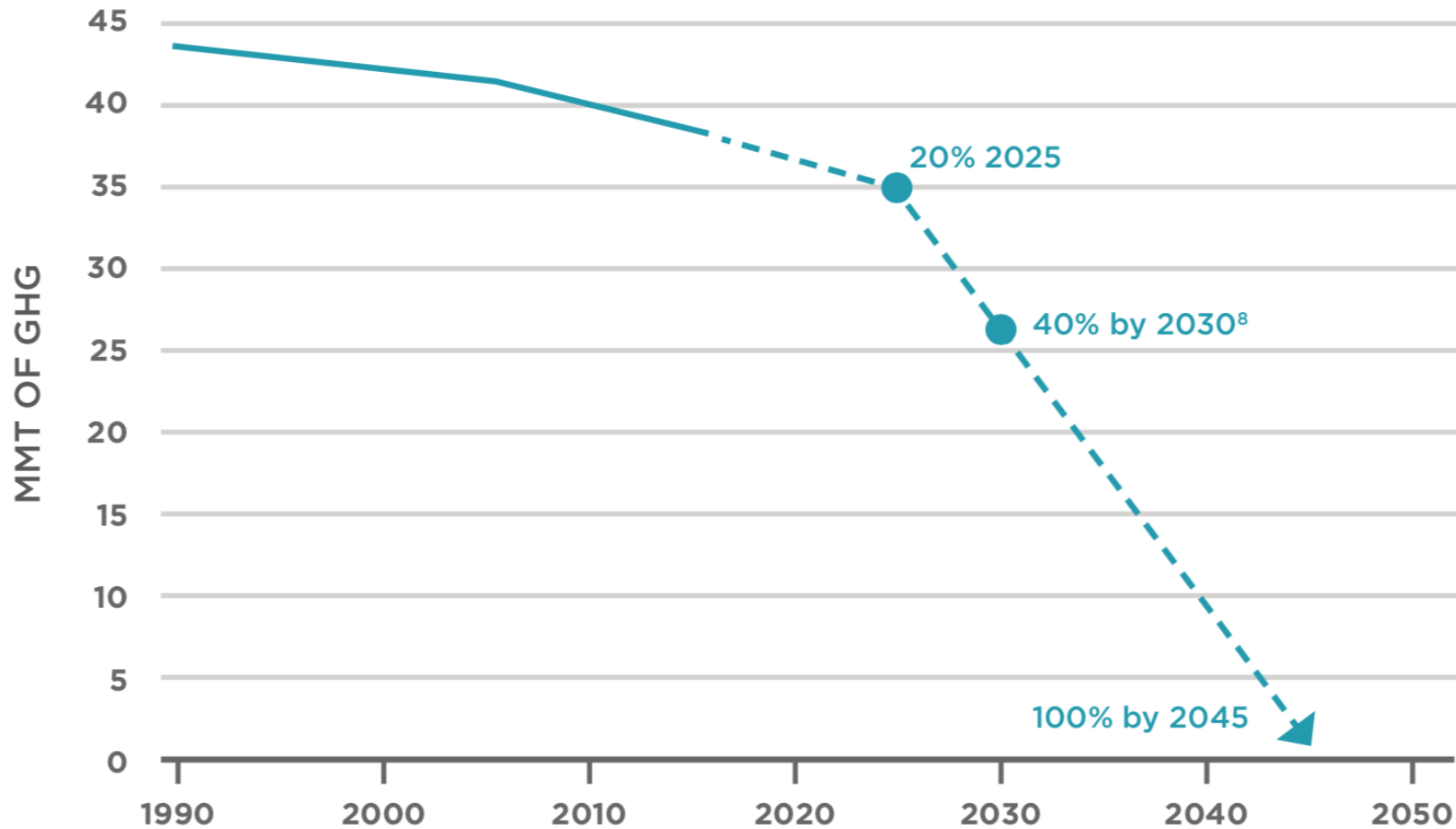
Energy Design Rating (EDR)

- Shows energy performance of a building
- Moving toward ZNE or “0”



Pathway to Meet Statewide Goals

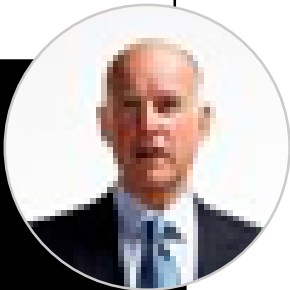
DECARBONIZATION OF THE BUILDING SECTOR⁷



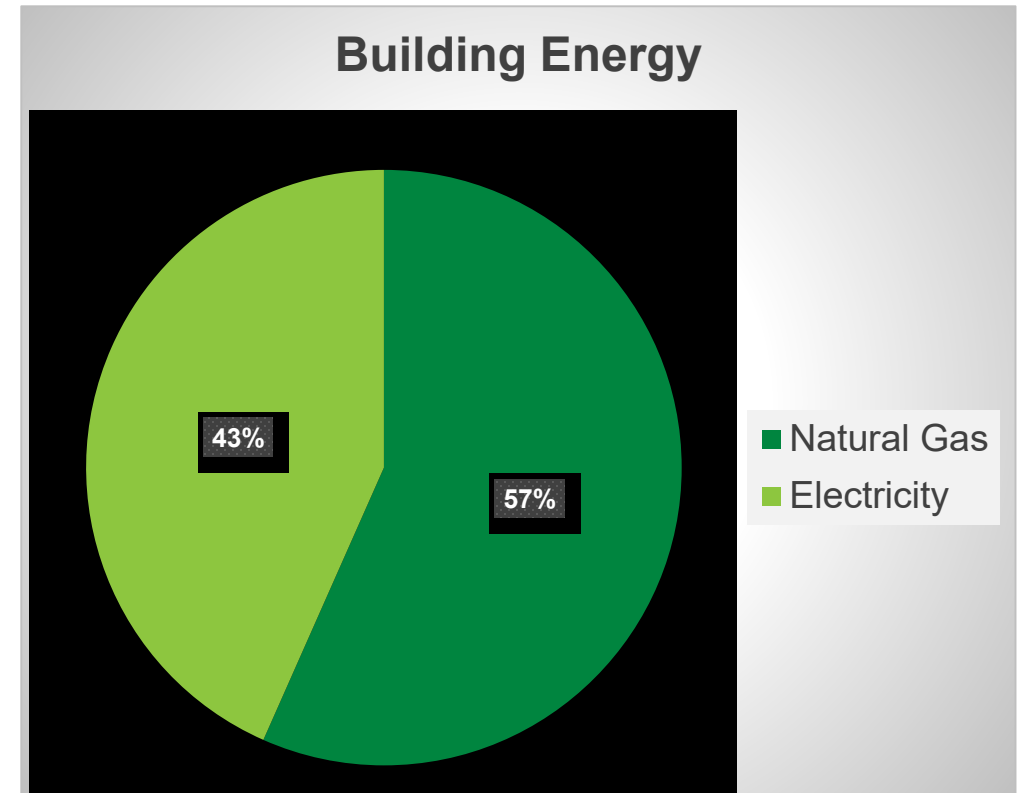
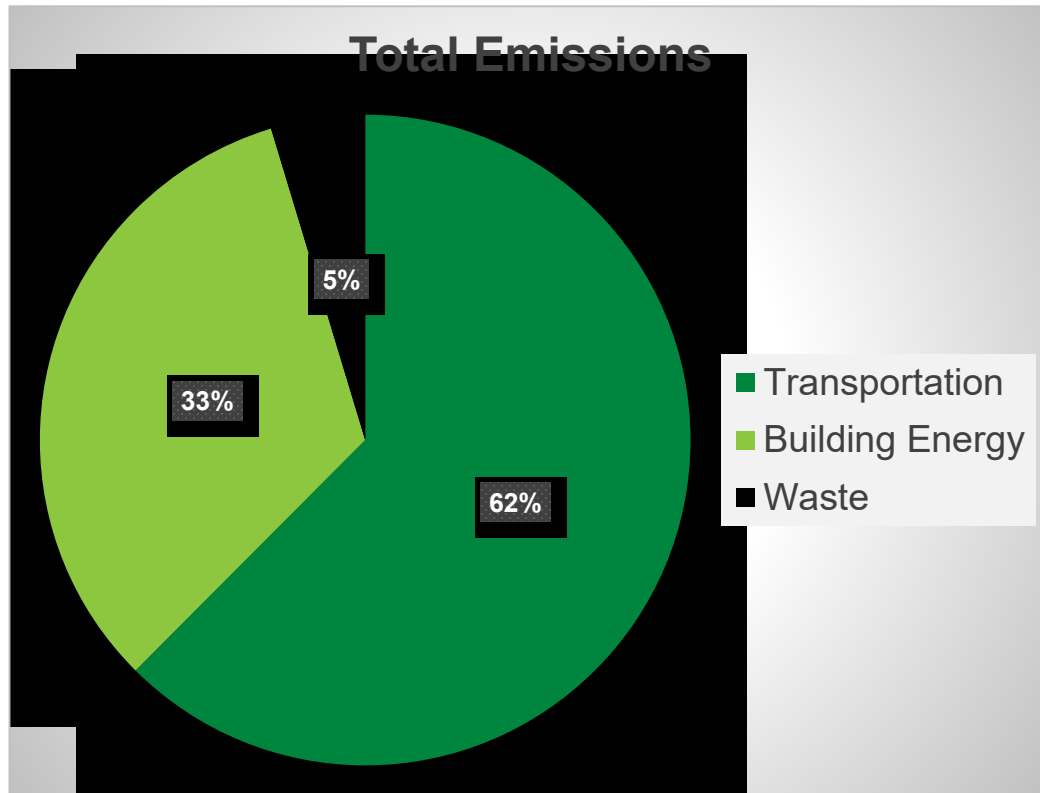
Source: Building Decarbonization Coalition

- Carbon neutrality by 2045

Gov. Exec Order (2018)



Hayward's GHG Emissions



Data is for calendar year 2017 (EBEW GHG Inventory prepared by PlaceWorks)

East Bay Community Energy



More renewables
than PG&E



100%
clean energy



100%
renewable

Legal Requirements for Adopting Reach Codes

Energy efficiency reach codes are similar to other local ordinances, but there are special requirements for reach codes. Like other local laws, reach codes cannot conflict with federal requirements (federal preemption).

A reach code:

- must be at least as stringent as the statewide code.
- must be cost effective.
- must be approved by the California Energy Commission.
- needs to be re-approved with each Energy Code update.



Reach Codes Under Consideration

- Energy Code
 - Encourages All-Electric Construction
 - Energy Efficiency
- CALGreen
 - EV Charging

Other Cities Considering Reach Codes

Alameda County:

Fremont
Oakland
Berkeley
Albany
Piedmont
Emeryville

Presenting to City Councils in October - December

San Jose – City Council on Tuesday, September 17, 2019

Other Cities Considering Reach Codes:

- San Francisco, Mountain View, Palo Alto, Santa Clara, Santa Rosa, Petaluma, Windsor, etc.

Reach Codes Adopted & Pending CEC Approval:

- San Mateo, Menlo Park, San Luis Obispo, Santa Monica

Recommended Amendments to Energy Code

Low-Rise Residential (Single-Family & Multi-Family up to 3 Stories)

All-electric buildings must meet the basic requirements of the state's 2019 Code, which includes some solar photovoltaics.

Mixed-fuel buildings must either:

- Meet a minimum EDR margin of 10 (performance approach); or
 - Comply with a prescriptive list of requirements including extra energy efficiency measures, a solar photovoltaic system meeting 100% of the building's estimated annual electrical usage, and battery energy storage system.
-
- Free-standing accessory dwelling units less than 400 square feet are exempt.

Recommended Amendments to Energy Code

Non-residential (could include High-Rise Residential)

All-electric buildings must meet the basic requirements of the state's 2019 Code.

Mixed-fuel buildings must:

- Install solar panels on the entire Solar Zone ; and
- Meet a minimum EDR margin of 10% (or 15% for office and retail); or
- Comply with a prescriptive list of energy efficiency requirements

Recommended Amendments to Energy Code

Existing Buildings

Draft Code Being Prepared:

- Would apply to cases where main panel is being replaced
- Would require panel capacity sufficient for all-electric building
- Committee could consider at October 30 meeting

Cost-effectiveness Studies

California Energy Codes and Standards Program Released Two Studies:

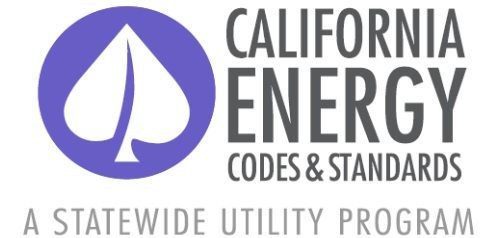
- Residential New Construction
- Non-residential New Construction

Studies Use Two Different Metrics:

- On-Bill
- Time Dependent Valuation (TDV)

Key occupancies covered

- Low-rise residential: ≤ 3 stories, single-family and multi-family
- High-rise residential: > 3 stories, multi-family (to be completed soon)
- Non-residential: office, retail, hotels, etc...

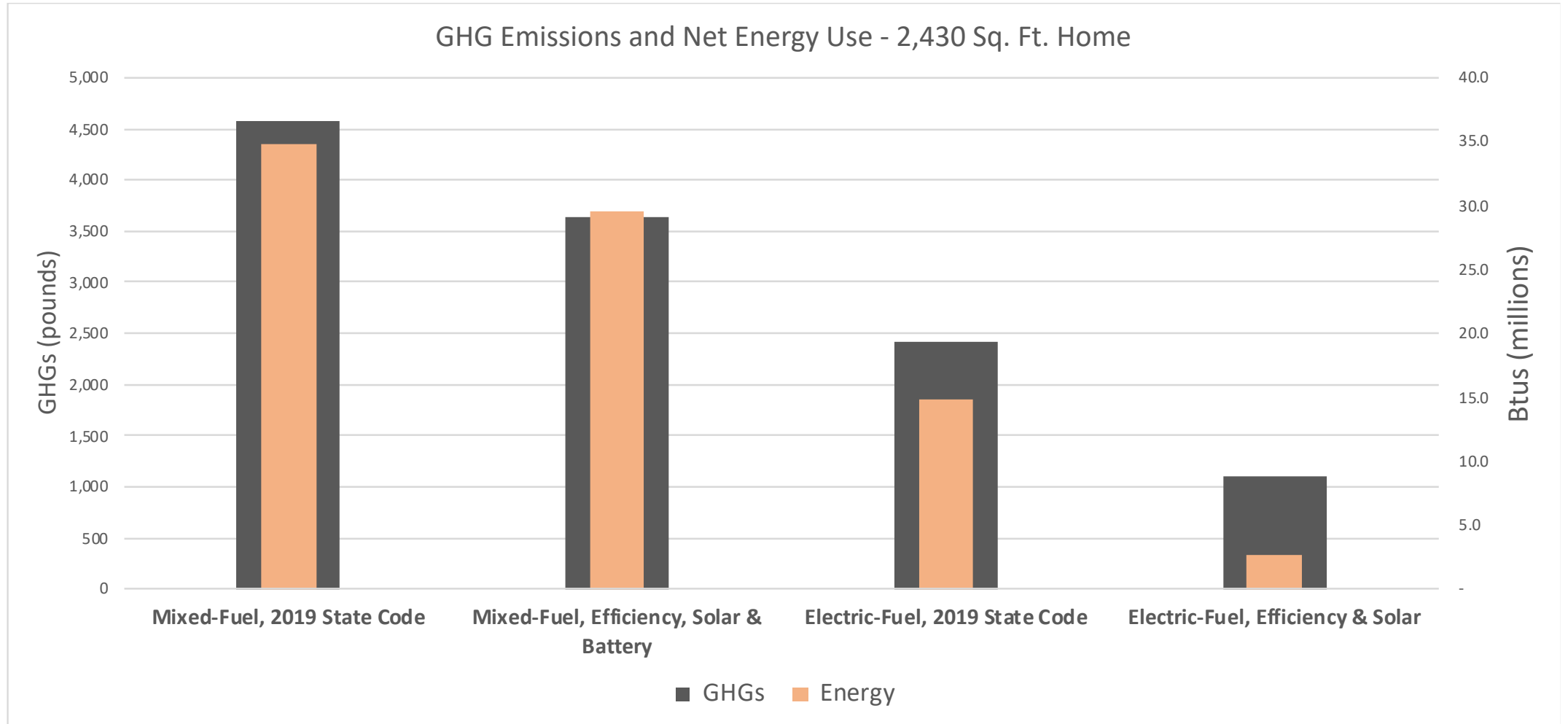


Cost Effectiveness Studies available at:

<https://localenergycodes.com/content/2019-local-energy-ordinances/>

Cost-Effectiveness

GHG and Energy Impact, Single Family Home


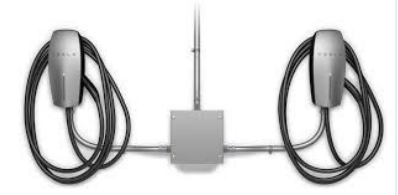



Cost-Effectiveness

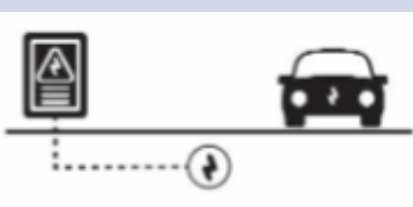
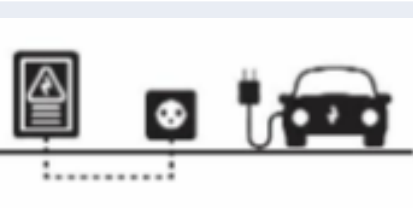

Single-Family

1	Climate Zone 3 PG&E Single Family		Annual Net kWh	Annual therms	EDR Margin ⁴	PV Size Change (kW) ⁵	CO2-Equivalent Emissions (lbs/sf)		NPV of Lifetime Incremental Cost (\$)	Benefit to Cost Ratio (B/C)	
							Total	Reduction		On-Bill	TDV
2	Mixed Fuel ¹	Code Compliant	(0)	348	n/a	n/a	1.88	n/a	n/a	n/a	n/a
3		Efficiency-Non-Preempted	(0)	296	2.5	(0.03)	1.63	0.26	\$1,552	1.28	1.31
4		Efficiency-Equipment	(0)	273	4.0	(0.03)	1.52	0.37	\$1,448	1.91	1.97
5		Efficiency & PV/Battery	(20)	296	10.0	0.07	1.50	0.38	\$5,438	0.38	1.38
6	All-Electric ²	Code Compliant	4,355	0	n/a	n/a	1.00	n/a	n/a	n/a	n/a
7		Efficiency-Non-Preempted	3,584	0	4.5	0.00	0.85	0.15	\$1,519	2.60	2.36
8		Efficiency-Equipment	3,670	0	4.0	0.00	0.86	0.14	\$2,108	1.76	1.62
9		Efficiency & PV	790	0	18.0	1.77	0.46	0.54	\$8,517	2.22	1.68
10		Efficiency & PV/Battery	(12)	0	29.0	2.37	0.23	0.76	\$14,380	1.50	1.58
11	Mixed Fuel to All-Electric ³	Code Compliant	4,355	0	0.0	0.00	1.00	0.89	(\$5,349)	0.55	1.53
12		Efficiency & PV	790	0	18.0	1.77	0.46	1.43	\$3,169	2.88	>1
13		Neutral Cost	2,217	0	10.5	1.35	0.70	1.18	\$0	>1	>1

Electric Vehicle Charger Types

Level 1		15-20 Amp, 120v AC (standard household outlet) Driving Distance provided: 3-4 miles/hour
Level 2		40+ Amp, 208/240v AC Driving Distance provided: 25-30 miles/hour
DC Fast Charge		80-400 Amp, 200-600v DC Driving Distance provided: 125-1000 miles/hour

EV Parking Space Options

<p>EV Capable</p>		<p>Raceway (conduit), electrical capacity (breaker space) <i>(can amend code to specify 208/240V and 40 amp)</i></p>
<p>EV Ready</p>		<p>EV Capable + overcurrent protection devices, wiring and outlet (i.e. full circuit)</p>
<p>EVCI (electric vehicle charger installed)</p>		<p>All equipment to deliver electricity to EV</p>

Recommended Amendments to CALGreen

	CALGreen	Reach Code
Single Family	<ul style="list-style-type: none"> One Level 2 EV-Capable 	<ul style="list-style-type: none"> Two Level 2 EV Ready circuits
Multi-Family <20 units	<ul style="list-style-type: none"> 10% of spaces must be Level 2 EV-Capable 	<ul style="list-style-type: none"> One Level 2 EV Ready circuit per unit
Multi-Family >20 units	<ul style="list-style-type: none"> 10% of spaces must be Level 2 EV-Capable 	<ul style="list-style-type: none"> 75% of units: a single Level 2 EV Ready circuit per unit; 25% of units, a single Level 2 EV Capable circuit per unit
Non-Residential Office	<ul style="list-style-type: none"> 6% of spaces must be Level 2 EV-Capable 	<ul style="list-style-type: none"> 20% of parking spaces: Level 2 EV Ready circuit 30% of parking spaces: EV Capable
Non-Residential Non-Office	<ul style="list-style-type: none"> 6% of spaces must be Level 2 EV-Capable 	<ul style="list-style-type: none"> 15% of parking spaces: Level 2 EV Ready circuit When more than 100 spaces, first 100 must adhere to above. Option to install a single DC fast charger (Level 3) for each subsequent set of 100 spaces.

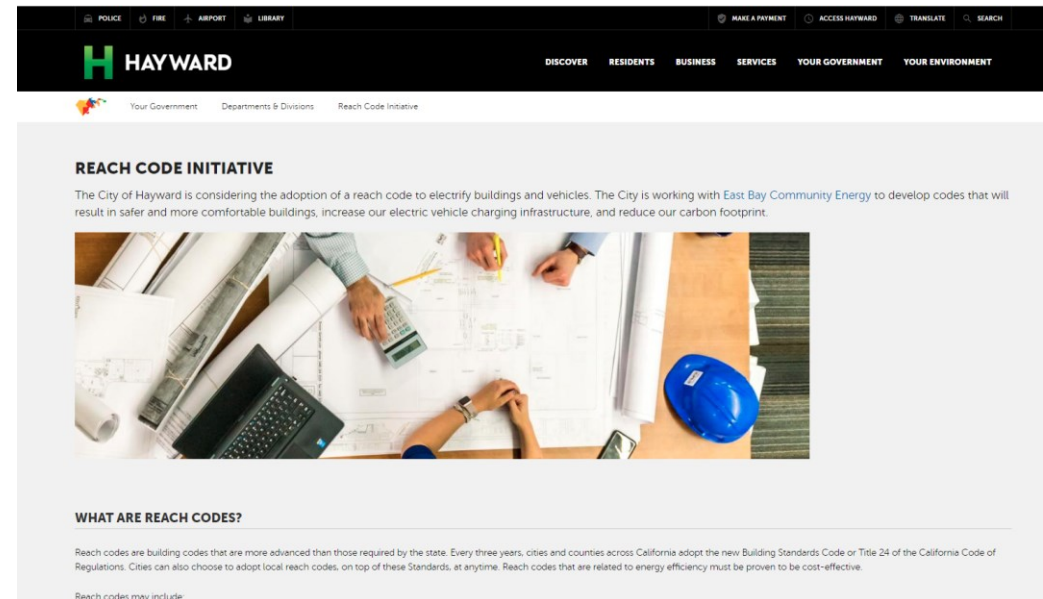
Public Contact

April 23 and 24, 2019:
EBCE held four meetings in Fremont and Berkeley

May 3, 2019:
Chamber of Commerce's Government Relations Council

September 11, 2019:

- 780 letters to developers & contractors
- 320 emails to developers & contractors



<https://www.hayward-ca.gov/reach-code>

Timeline

Sept. - November	Continue Stakeholder Engagement
October 30	Sustainability Committee Meeting?
November 19	City Council Meeting
December 3	City Council Meeting
Early January	File with CA Building Standards Commission
March 2020	Reach Code would be Effective

Summary

Staff is seeking the Committee's direction:

1. Allow for Two-Pathway Approach (all-electric and mixed-fuel) for low-rise residential?
2. Include High-Rise Residential?
3. Address existing buildings (for panel upgrades)?
4. Bring Reach Codes back to Committee on October 30?

Questions

