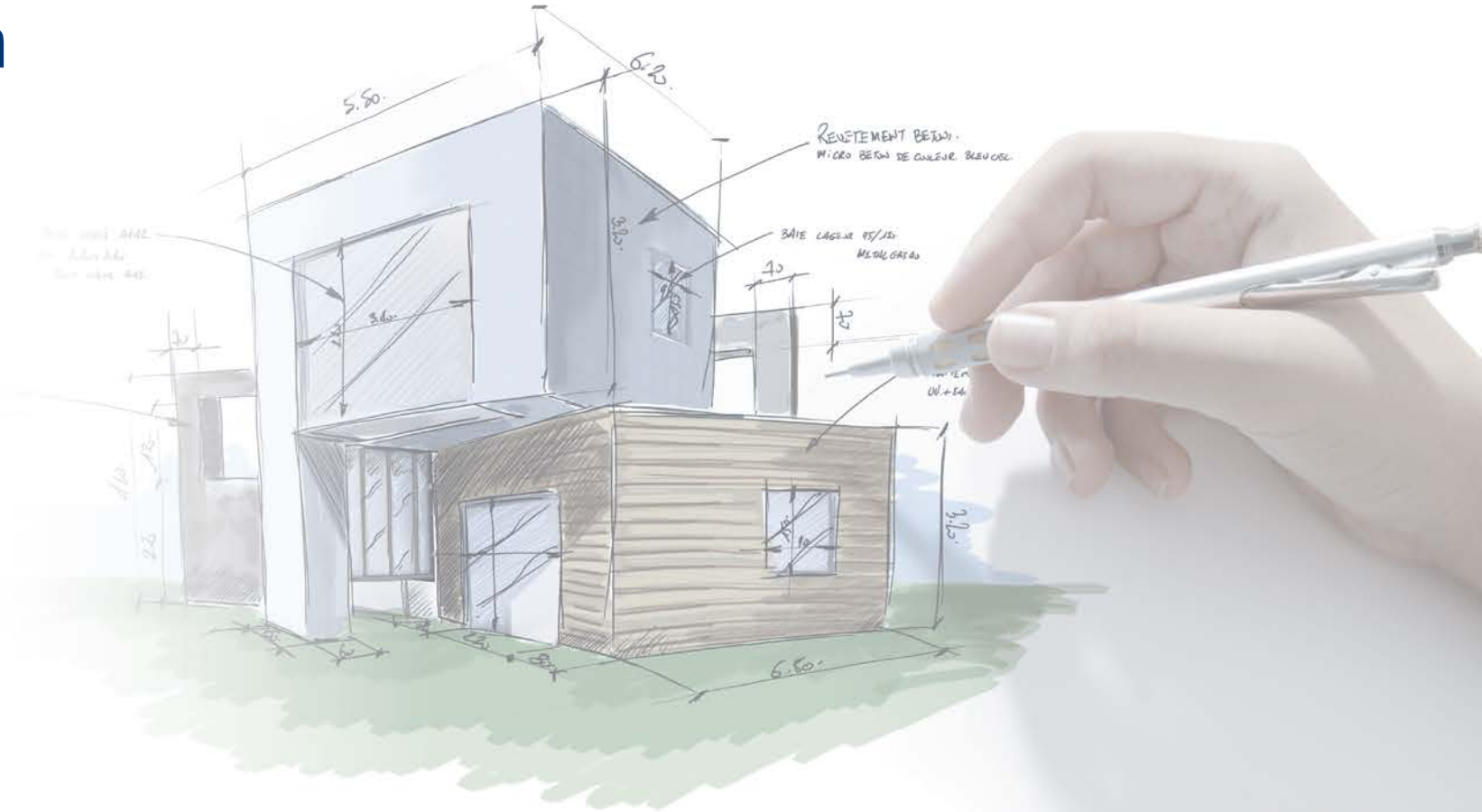




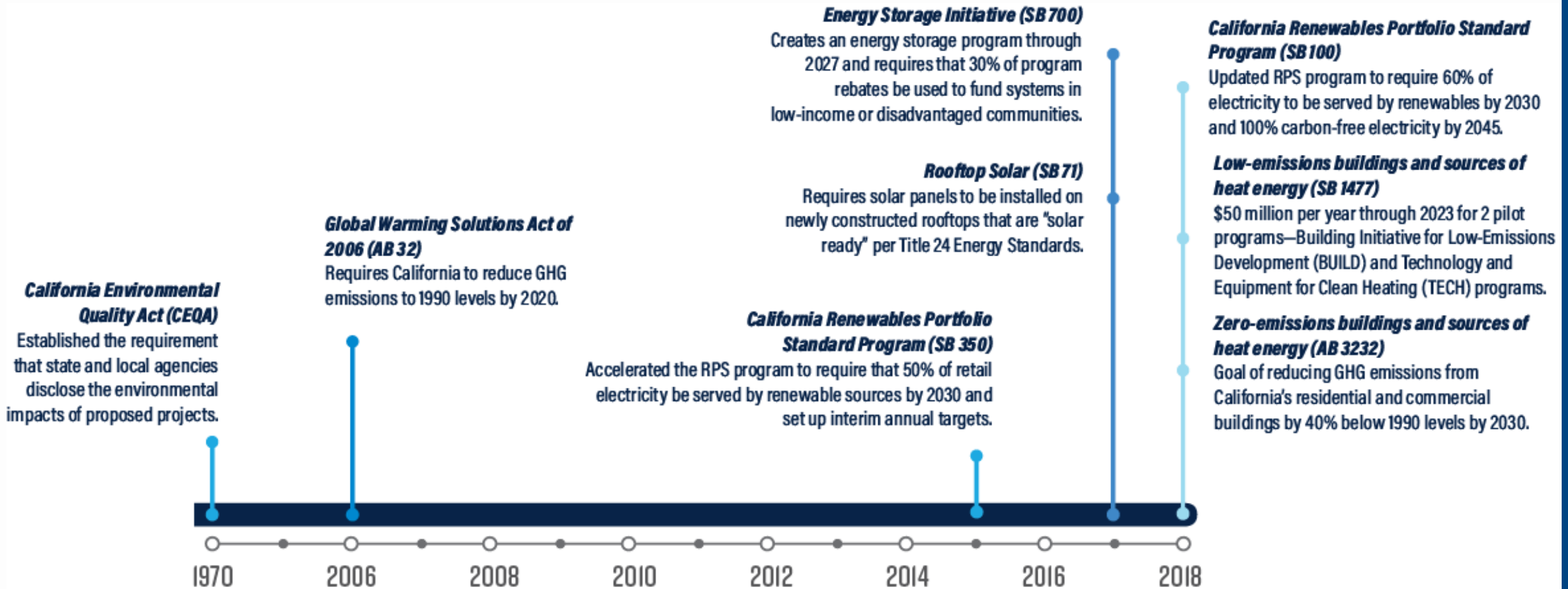


## Review of Presentation

- Background
- Research Approach
- Results
  - Homebuyers
  - Homebuilders
  - Appraisers
  - Mortgage Lenders
- Conclusions



# Policy Context



# Research Approach

Objective: Identify barriers and multi-channel solutions to meet California's residential ZNE and building decarbonization goals



## 1) LITERATURE REVIEW & SECONDARY DATA ANALYSIS

*n=30+ docs*

**Goal:** Characterize policy landscape and past research to develop context for surveys and interviews



## 2) SURVEYS: Individuals in the California homebuyer market

*n=500 people*

**Goal:** Assess awareness of ZNE and decarbonization concepts and determine importance of non-price characteristics in home purchase decision



## 3) INTERVIEWS: Residential Real Estate Market Actors

*n= 9 people: 5 builders; 2 lenders and 2 appraiser*

**Goal:** Understand barriers and solutions to scale ZNE and decarbonization in California residential markets





# RESULTS

## Homeowners

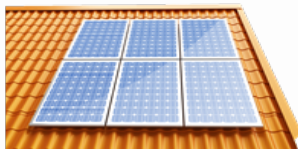
# Desirability of Potential Zero Net Energy Home Features (n=500)



Battery for electricity storage



Energy-use monitoring



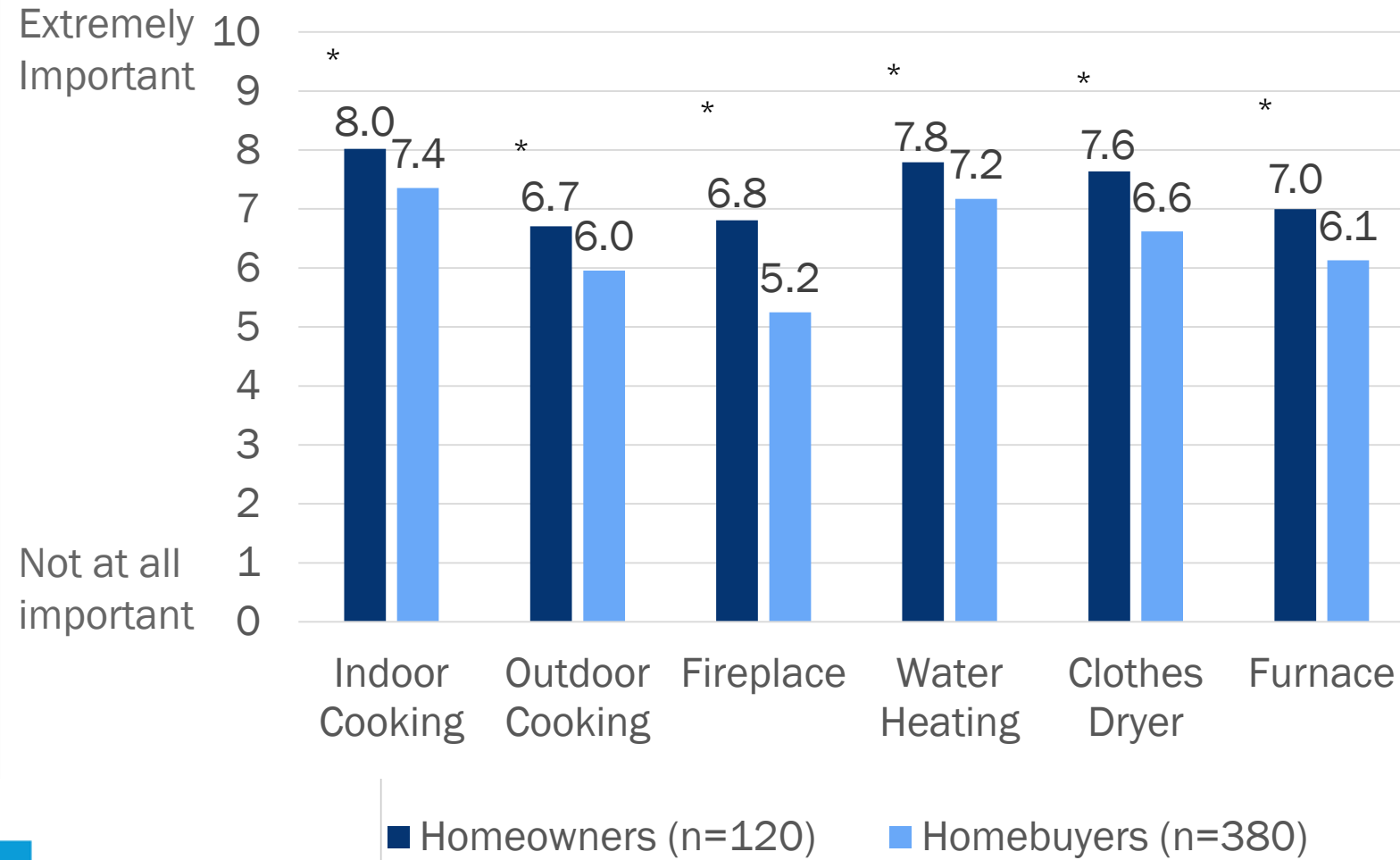
Solar panels



High-efficiency appliances

	Very Desirable	Desirable	No Opinion	Undesirable	Very Undesirable
Battery for electricity storage	41%	35%	18%	4%	2%
Energy-use monitoring	31%	39%	22%	4%	3%
Solar panels	48%	34%	12%	4%	2%
High-efficiency appliances	52%	31%	13%	3%	1%

# Importance of Having Natural Gas in the Home







# RESULTS

## Homebuilders



# Fiscal Impact on New Home Construction

- Four out of the five builders expressed concerns about bearing the cost of changes to California building code
- As mandates increase, marginal costs for labor and materials increase
- Current skilled labor constraints identified as a significant barrier to recovering the costs of building in California
- Homebuilders, while seeing some increased interest in energy efficiency, are not certain homebuyers are motivated to purchase ZNE or low carbon homes



# Feedback on Specific Title 24 Requirements

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## Title 24 Requirements

## Homebuilder Feedback

### Rooftop Solar

- Solar more attractive than EE since homeowners can see the tangible energy production and equipment is visible unlike insulation in walls and the attic
- Decision to lease or own solar up to consumer. Some builders offer leases with no upfront costs, which benefit both the builders and buyers by not adding to sale price

### Electric Appliances

- Consumers prefer gas appliances
- High quality electric cooktops and heat pump heating not familiar to general population making customers apprehensive



# Feedback on Specific Title 24 Requirements

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## Title 24 Requirements

## Homebuilder Feedback

### High Performance Walls

- The material switch for lumber from 2 x 4 to 2 x 6 (which allows for better insulation) will be difficult for homebuilders due to cost of lumber and cost of modifying existing blueprints
- Quality Insulation Installation (QII) key to ZNE. Builders will rely on HERS raters to achieve QII.

### High Performance Attics

- Insulating below roof decks
  - Lack of understand how it impacts HVAC efficiency
  - Safety concerns with using potentially hazardous material. Compliance with fall protection and confined space regulations
  - Cost and labor concerns due to additional time needed
  - Training needed





# RESULTS

## Appraisers

# Two Mainstream Approaches to Appraising Homes

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- **Sales Comparison (Market) Approach** – most frequently used in appraising and it relies on comparable properties (comps) that recently sold in similar locations. Appraisers adjust these comps appropriately based on the characteristics of the homes being compared to approximate the market value of the home.
- **Cost Approach** - determines a property's value by approximating the cost of rebuilding the property, less the depreciation accrued on the home. As such, the cost approach is used more frequently on new homes than existing homes because depreciation is negligible on new homes.



# Challenges with Appraisal Methods

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- Sales Comparison (Market) Approach
  - Most preferred
  - Since it relies on historical sales data, does not favor characteristics newer to the market such as ZNE or low-carbon features
- Cost Approach
  - Cost information not typically provided by homebuilder or contractor
  - Lack of familiarity with newer features despite continuing education requirement for appraisal professionals
  - Appraisers held accountable by the lending community for all of the features to which they assign a value





# How Inadequate Appraisal of Energy Features Affects Closing Costs?



	Standard Home	Home with \$15k of EE improvements
Home Square Footage	1,500	1,250
Number of Bedrooms	3	2
Purchase Price	\$350,000	\$350,000
Appraisal Value	\$350,000	\$335,000
90% Loan	\$315,000	\$301,500
Cash Needed to Close	\$35,000	\$48,500





# Potential Solution: The Green Addendum

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- Published by the Appraisal Institute in 2011
- Developed to remedy the lack of energy-related features included in standard appraisal forms
- Objective: Standardize the communication of the high-performing features of residential properties
- Benefit: If used, generates comparable data needed for appraisers to include energy measures in home valuation
- Barriers:
  - Not mandatory
  - Rarely used
  - Reluctant to populate due to real or perceived liability when making claims about efficiency and savings potential of the home





# RESULTS

## Mortgage Lenders

# Valuating ZNE and Low-Carbon Homes

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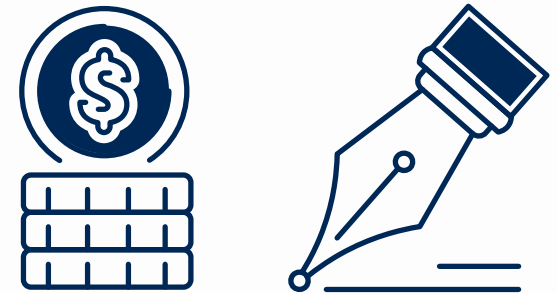
- Conduct underwriting process to assess homebuyer's financials and ability to make loan payments, as well as the appraised value of the home to qualify the homebuyer for mortgage loan
- Current guidelines limit monthly payment (PITI – Principal, Interest, Taxes and Insurance) to 28% of their gross monthly income
- Underwriters also calculate the back-end ratio to determine how much a homebuyer can borrow.
  - Typically can't exceed 40% but percentage depends on the mortgage lender and other attributes of homebuyer
- In theory, lower utility bills may mean a homebuyer could pay a higher mortgage



# Including Utility Cost Savings in Eligibility Calculations?

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- Utility costs not typically included in calculations
- Lenders believe including utility cost savings introduces higher risk
- Energy costs are too small relative to other factors to influence the way industry underwrites loans
- Given that energy costs are variable it would be impossible for an underwriter to develop a matrix of these factors to use in the calculation of a debt service ratio



# Potential Solution: Energy Efficient Mortgages (EEMs)

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- Fannie Mae and Freddie Mac - 1983
  - Objective: To account for the utility savings arising from EE and improve the buyer's ability to meet a larger mortgage payment
  - Pilot increased PITI to 30% of buyer income and allowed financing of EE improvements as part of the mortgage
  - Offered by a single bank and then dropped in 1984 when fewer than ten customers had participated
  - Program not popular
    - Bank did not advertise programs as they didn't think advertising would generate demand
    - Real estate agents did not support program because they did not believe it would help in selling a home
    - Contractors did not market program



# Potential Solution: Energy Efficient Mortgages

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- FHA - 1992
  - Objective: To account for the utility savings arising from EE and improve the buyer's ability to meet a larger mortgage payment
  - Piloted in five states in 1992; Expanded nationwide in 1995
  - Cost-effective improvements can be made up to the lesser of 5% of the adjusted home value, 115% of median price for the area, or 150% of the conventional loan limit. \$8,000 limit.
  - Available currently
  - Little market penetration





# CONCLUSIONS



# Market Actors Face Considerable Barriers in Education

- **Homebuilders** need a skilled workforce, not only to meet the demand for standard houses in California, but to execute the increasingly complex and refined building requirements set forth by the state.
- **Appraisers** need training in how to use the Green Addendum, or other similar methods, so that the features of ZNE and low-carbon homes can be accurately valued in the appraisal of the home.
- **Mortgage lenders** need training in the mechanics and options for EEMs and how they can educate buyers about this option.
- **Realtors and other sales agents** need options for promoting EE home features on websites such as the MLS, and they need training on how to most effectively promote Energy Efficient Mortgages (EEMs).



# Market Actors Face Considerable Barriers in Financing

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- Buyers unaware of financing possibilities for high-performance homes and thus do not know to request an EEM
- Even if buyers are familiar with EEMs, market actors must be willing to facilitate the sale of the high-performing home
- Because each step in the home buying process is dependent on the step before it, failure to support the purchase of a high-performing home results in the buyer not being aware of these key energy features or not receiving adequate financing



# Potential Solutions

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- Increased education for all market actors in the homebuying process
- More widespread adoption of the Green Addendum or a similar method to bolster the ZNE and low carbon home market
- Elevated support for appraisers in valuing high performance home features
- Expanded marketing of EEMs
- Increased marketing of high-performance home features and benefits to realtors and homebuyers





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