Energy


# Meeting California's Zero Net Energy Goal:

## A Statewide Collaboration

Matt Christie
TRC Energy Services
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# Who's collaborating?

# Agenda

- California's Residential Zero Net Energy (ZNE) Goal
- CPUC Strategic Action Plan
- Defining ZNE for Code
- Codes & Standards initiatives
- Residential Incentive Programs
- Design Assistance Programs

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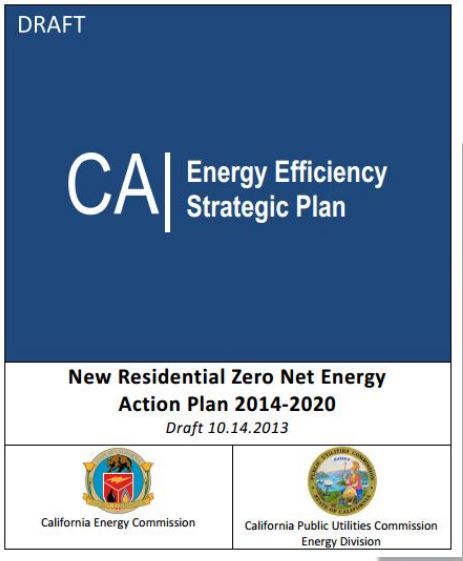
# Big Bold Energy Efficiency Strategies

- **Big Bold** ZNE Goals
  - **Residential new construction ZNE by 2020**
  - Commercial new construction ZNE by 2030
  - **50% or residential building stock ZNE by 2030**
  - 50% of commercial building stock ZNE by 2040
  - All buildings ZNE by 2050

- *Not a law or a mandate*, just a goal

# Strategic Action Plans

- Key Points
  - Deepening public awareness
  - Support for Integrated Design
  - Including all energy end uses
  - Applying Title 24 code to existing buildings





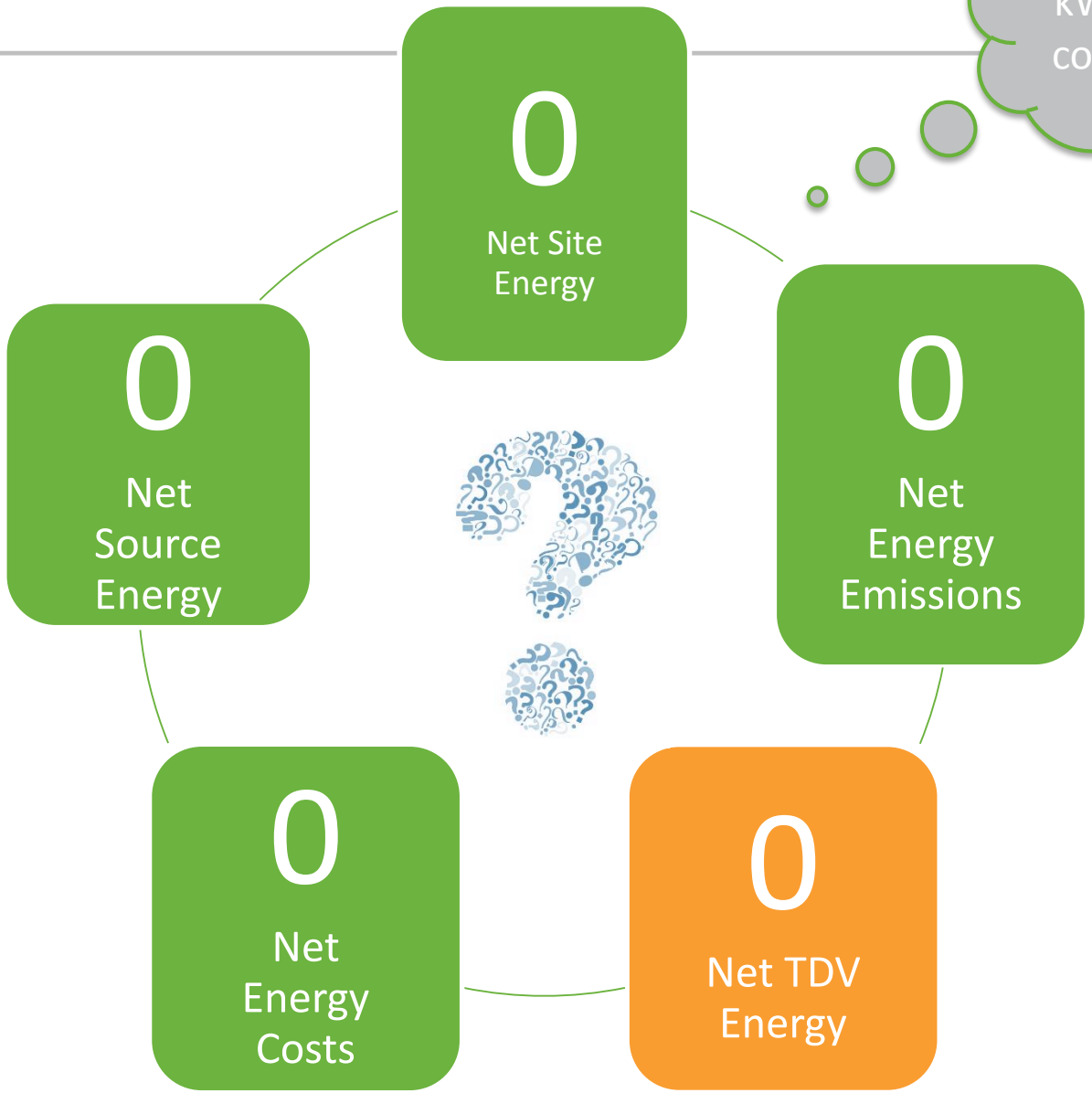
**STRATEGY 2-3: ENSURE COMPLIANCE WITH MINIMUM TITLE 24 CODES AND STANDARDS FOR BUILDING RENOVATIONS AND EXPANSION**



Number of ZNE Homes in CA

# Definition(s) of ZNE – Simple Concept, Complex Formulation

All electric? kWh - therm comparison?

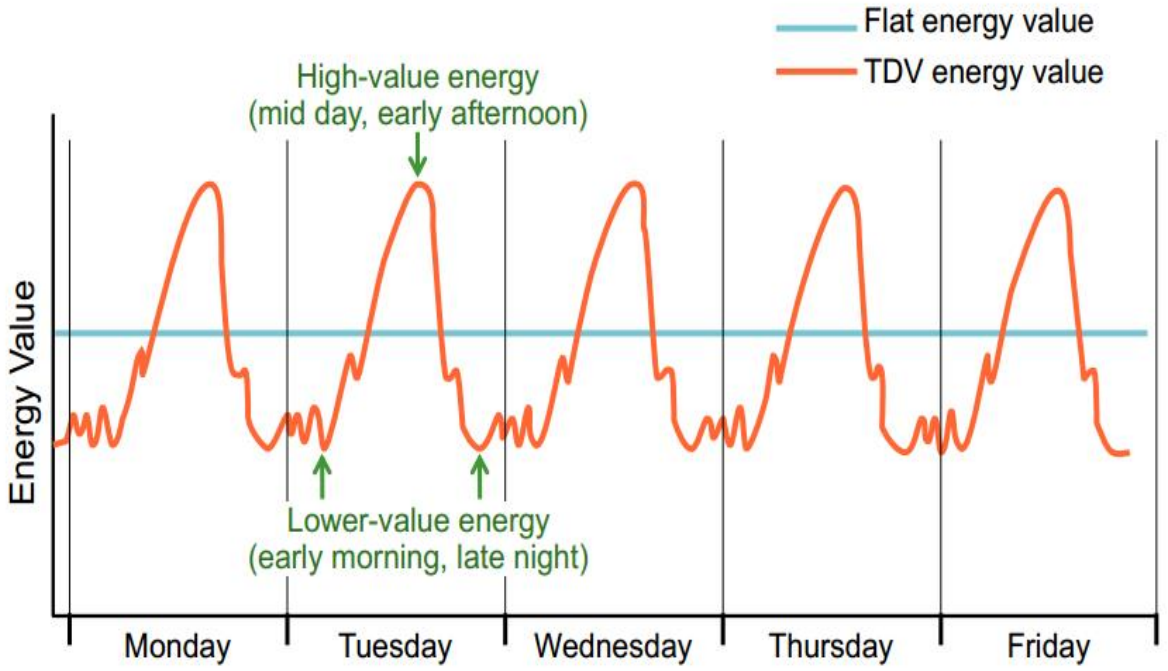


# Time Dependent Valuation (TDV)

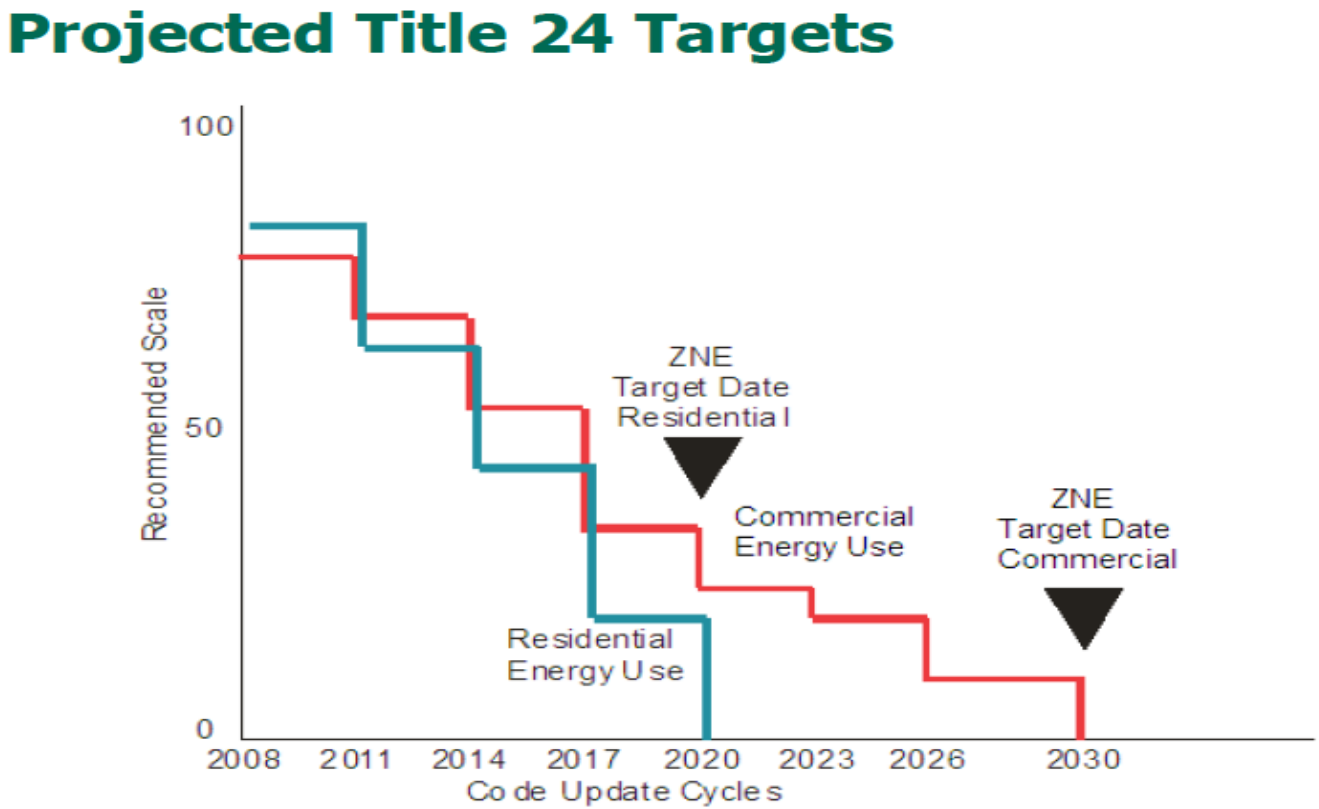
- Societal value of energy by time of day

- TDV multipliers vary by:
  - Energy type (electric vs. gas)
  - Date and hour
  - Climate zone
  - Building Type

(e.g. low rise residential)



# California Energy Code - Title 24, Part 6 Projections




- Increased efficiency 2013 vs. 2008 Title 24
  - **Residential = ~ 25%**
  - Nonresidential = ~30%
- Similar improvement expected in 2016 Title 24

# California Code Process

- The good:
  - Energy Code is updated every 3 years (Title 24, Part 6)
  - Rigorous regulatory structure
  - Cost effectiveness criteria
  - Multiple comment and review periods

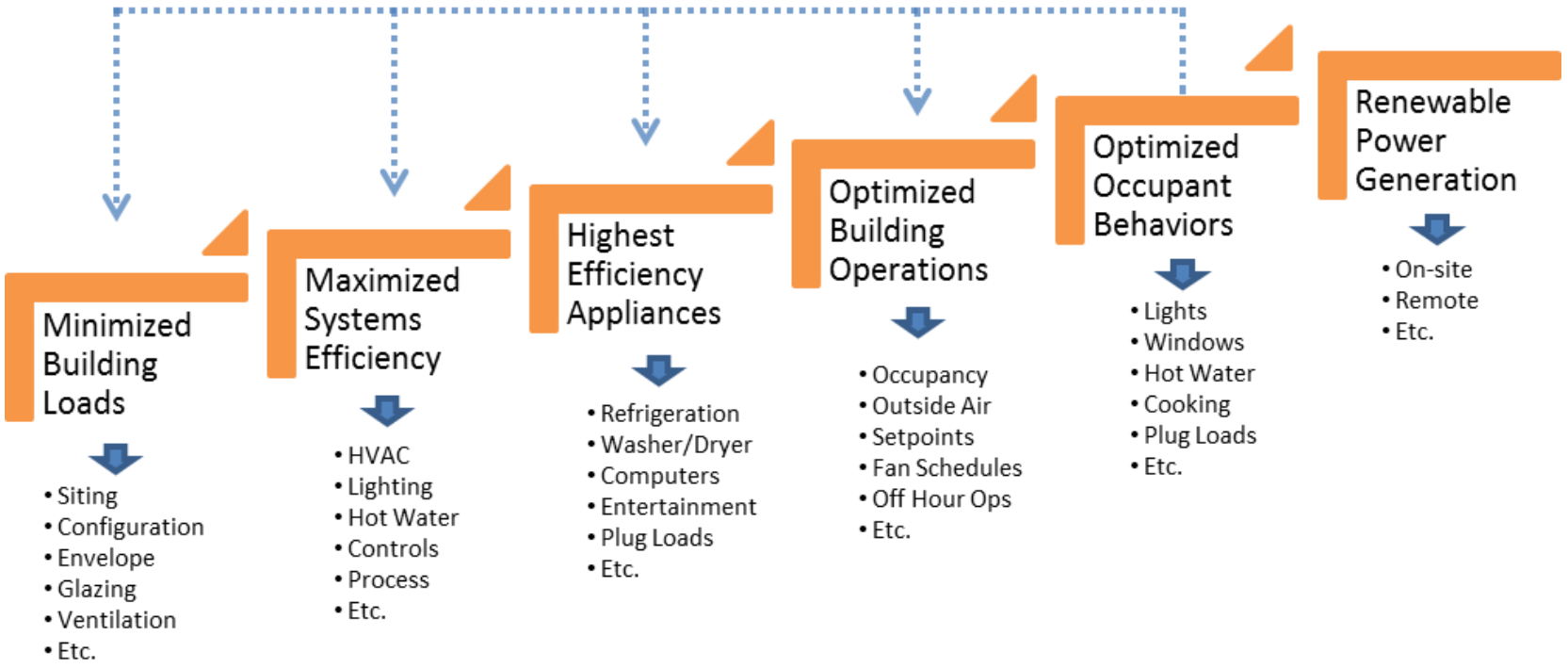
- The challenges
  - Code is written for the lowest common denominator
  - New/complicated technologies hard to include
  - Slow, laborious process
  - Vast assumptions used throughout
  - Only covers heating, cooling, hot water and ventilation
  - Federal preemption

# Standards – Title 20, Parts 1601-1608

- Appliance Standards
  - 23 categories of appliances
  - Covers fed and state regulations
  - Updated regularly

# Energy Efficiency as a Foundation for ZNE

- "All cost-effective energy efficiency"
  - Foundation of a ZNE metric



# Residential Incentive Programs

## California Advanced Homes Program (CAHP)
## California Multifamily New Homes Program (CMFNH)
## SMUD SMART Homes

Redesigned for 2013 Code

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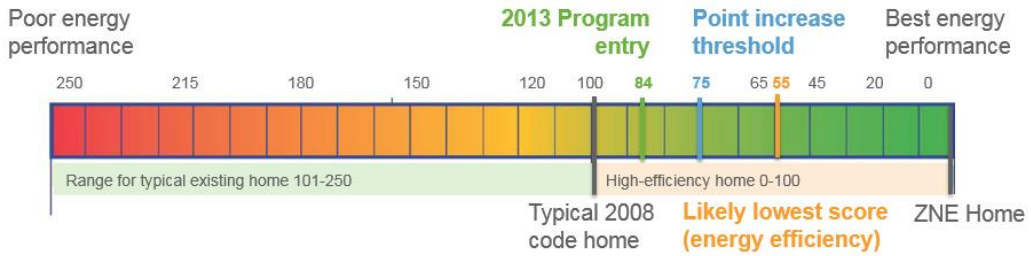
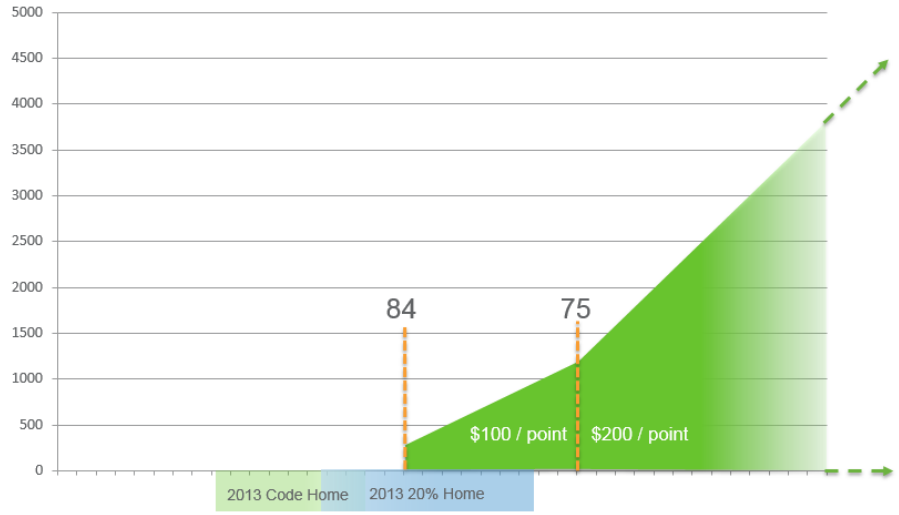
# California Advanced New Homes Program

## ***Redesigned for ZNE and the 2013-code***

- Based on a whole-house, ZNE efficiency metric (CAHP Score)




- Escalating incentives to reward homes as they approach ZNE
- Large bonus incentives for homes that achieve ZNE, and/or 2016 Code

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# SMUD SMART Home

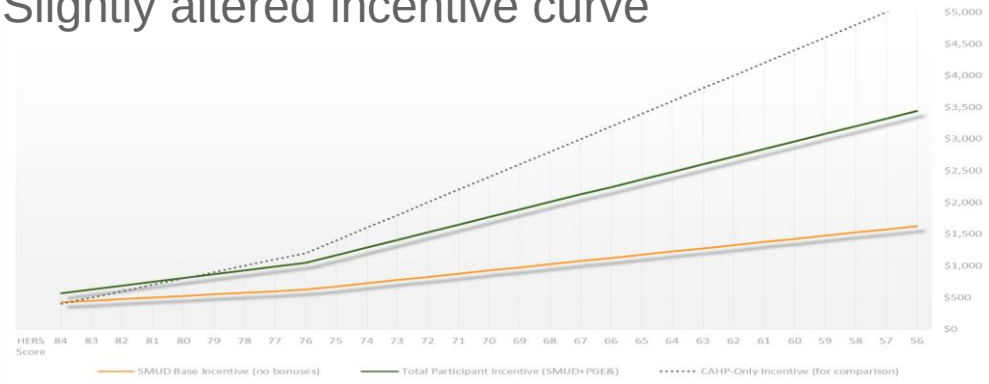
Same Framework as CAHP

- CAHP (HERS) Score of 84


SMUD Specific Prerequisites

- **75% LED lighting**
- **Demand response enabled thermostat**
- **Electric vehicle readiness**


Slightly altered incentive curve



# Design Assistance Programs

## CAHP Master Builder Program

Design assistance for production builders to achieve two necessary, and challenging ZNE measures

- High Performance Attic (HPA) / (DCS) and
- High Performance Walls (HPW)

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# CAHP Master Builder Incentives and Offerings

- The proposed program is a collaborative effort to solve a clear need:
  - *To accelerate residential new construction's adoption of two high-impact efficiency measures that are part of the 2016 Title 24 energy code: high performing attics and high R-value*

- Production builders have minimal practical experience incorporating them on a production scale
- They require systemic workforce knowledge and understanding
  - builder executives, architects, HVAC designers/installers, T24 consultants, insulators, framers, building departments and more
- They require integrated design methods to make cost effective
- There is a steep learning curve, which adds significant builder costs for initial installations
- Builders don't have the working knowledge or bandwidth to adopt these measures without support
- Existing measure incentives (CAHP) are insufficient

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# CAHP Master Builder Incentives and Offerings

## Financial incentives

- $30,000/$20,000 for the entire project (min 25 lots)
- Added incentives per-home from CAHP (~$1,500 per house)

## Technical training and resources

- Facilitated design charrette/workshops with design team, consultants, and contractor present
- Facilitated value engineering meeting with design team, consultants, and construction team present
- 250 hours of dedicated design and construction assistance from subject matter experts (SMEs) throughout the project
- On-site training for the design team, energy consultants, and subcontractors
- Installation guides and guidance from product manufacturers

## Limited availability

- Three (3) builder projects per investor-owned utility

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# Questions?

# Departing Thought – Quality Matters

- R-19, 2x6 @ 16”
- Quality insulation installation (QII) credit taken

***This does not break any Title 24 rules!***

*Thank you* to the professionals who think *beyond* the code

# Thank you!

**Matthew Christie**
mchristie@trcsolutions.com
**TRC Energy Services**
916-962-7001

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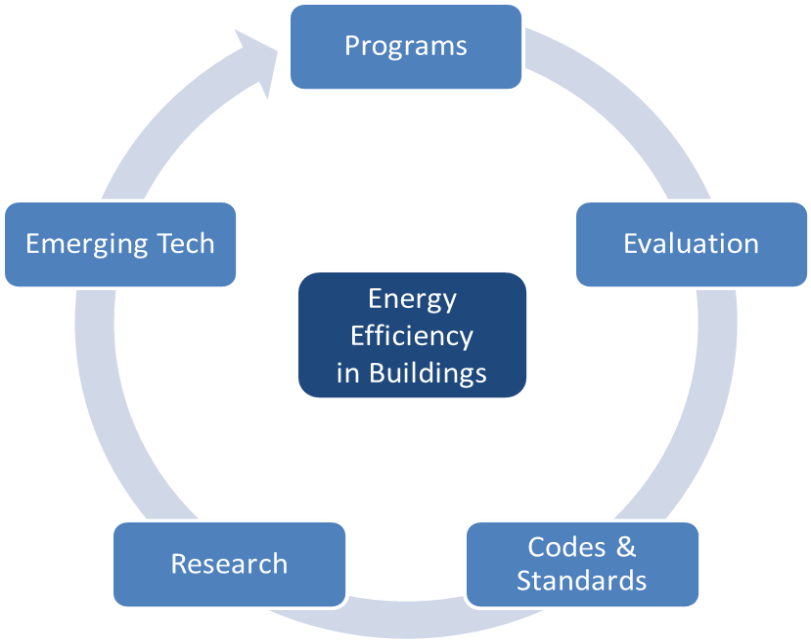
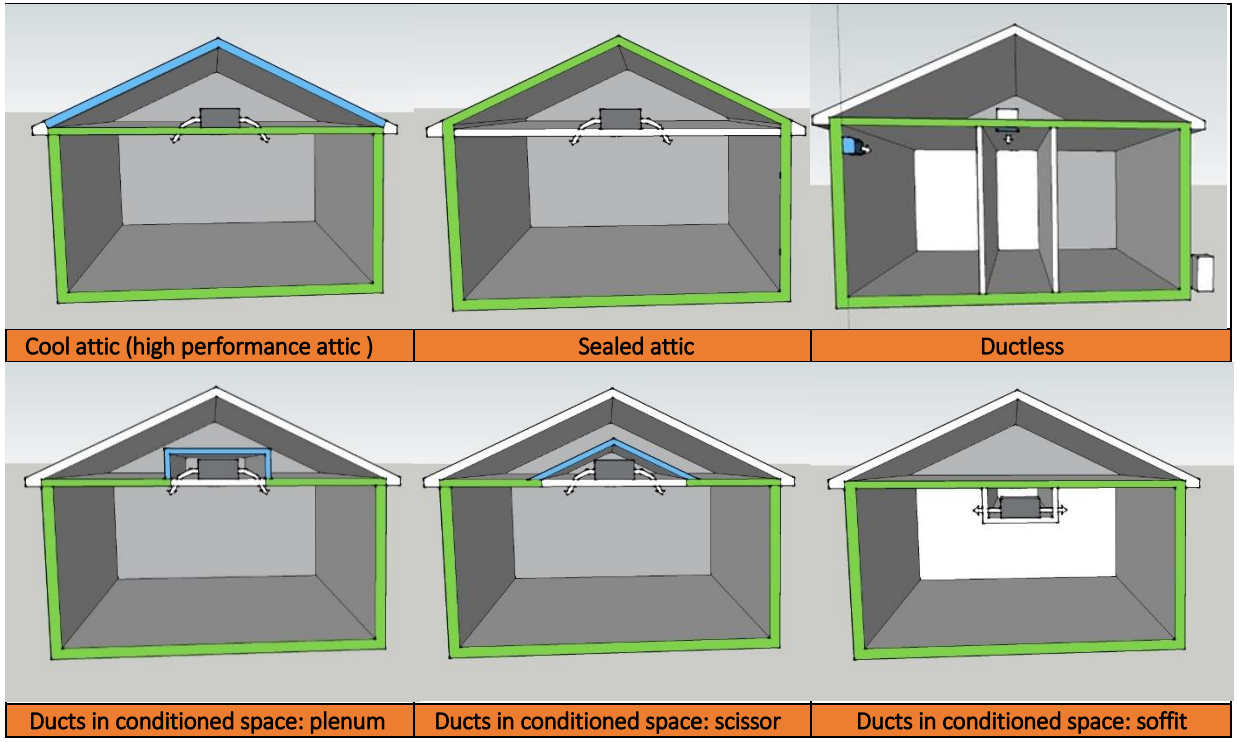


# High Performance Attics

High performance attics minimize the temperature difference between the attic space and the conditioned air that travels through the attic ductwork. This reduced temperature difference leads to lower residential energy use for cooling and heating. High performance attics can increase CAHP incentives by $100 to $2,000 per lot.

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# High Performance Walls

High performance walls minimize thermal bridging and reduce air leakage. This helps to maintain air temperature within the conditioned space, which reduces HVAC system demands and building energy use. The most common current high performance wall design options include 2x6 framing, either 16 inch on center or 24 inch on center, with a combination of cavity insulation and external continuous insulation. High performance walls increase CAHP incentives by $100 to $600 per lot.

| U-factor | Framing | Stud Spacing | Cavity Insulation | Exterior Insulation | Cavity Insulation Type |
|---|---|---|---|---|---|
| 0.050 | 2x6 | 24” OC | R-19 | R-4 (1") | Low density fiberglass batt |
| 0.049 | 2x6 | 16” OC | R-21 | R-4 (1") | High density batt or BIB |
| 0.048 | 2x6 | 16” OC | R-19 | R-6 (1.25") | Low density fiberglass batt |
| 0.049 | 2x4 | 16” OC | R-15 | R-8 (2") | High density batt |

Advanced options include double walls, staggered stud walls, structural insulated panels (SIP), insulating concrete forms (ICF), and other advanced techniques.