



## Driving to Zero Net Energy Residential Buildings in California

Getting to Zero Forum  
10/13/16

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### CA Policy Context

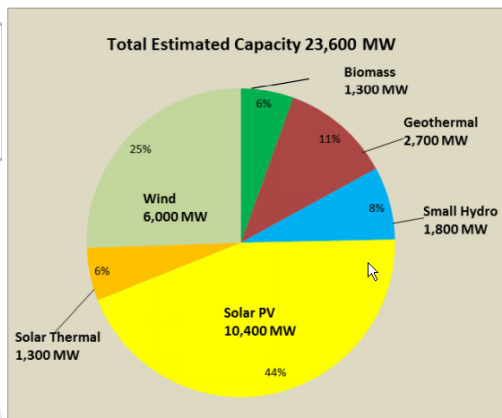
- Warren Alquist Act – 1974
  - Created the *Building Energy Efficiency Standards* (Title-24, Part 6)
- Assembly Bill 32
  - Reduce GHG emissions to 1990 levels by 2020
- Energy Action Plan
  - Loading order = cost effective EE first
- CPUC's *California Long Term Energy Efficiency Strategic Plan* – 2008
  - ZNE by 2020/2030 for residential/commercial

## CA Policy Context, Con't

- Renewable Portfolio Standard
  - 50% by 2030

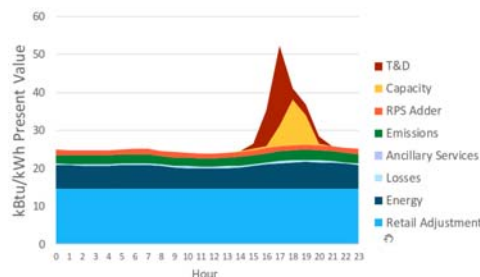
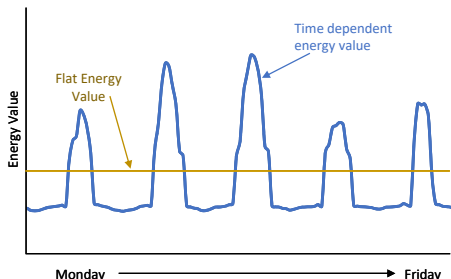


Source: Energy Commission staff  
[http://www.energy.ca.gov/renewables/tracking\\_progress/documents/renewable.pdf](http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf)

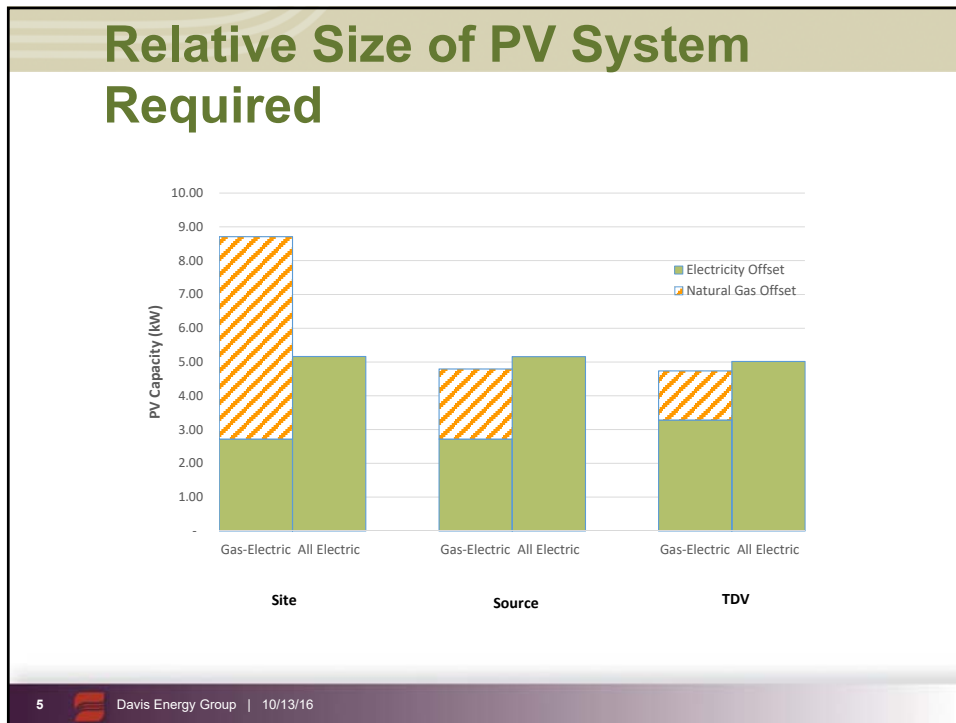


## Title-24 Energy Code

- Statewide code
  - Mandatory, prescriptive, performance
- Time dependent valuation compliance metric
  - Reflects the “societal value” of energy.
  - Higher “value” is assigned during peak demand periods



Source: E3 – Time Dependent Valuation of Energy for Developing Building Efficiency Standards (2019 TDV Data Sources & Inputs)



## 2016 Prescriptive Requirements

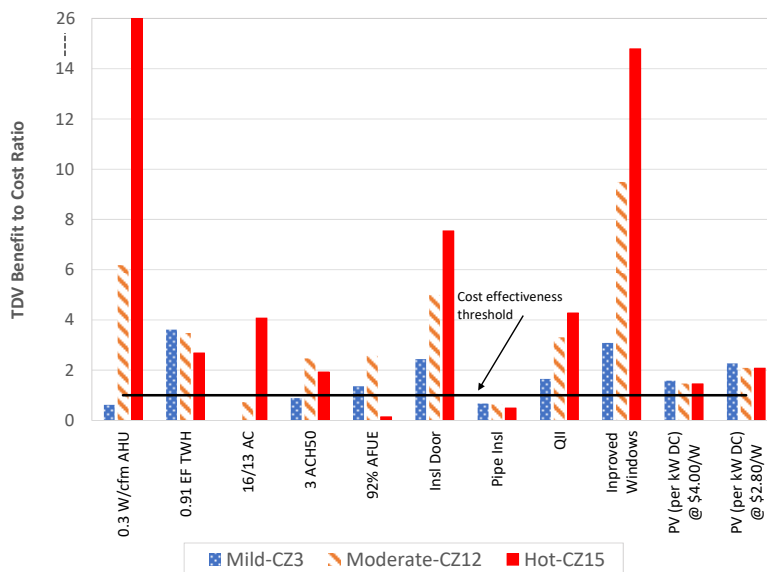
- High Performance Walls
  - 2x6 R-21 w/ R-4 rigid foam or equiv. (U-factor = 0.051)
- High Performance Attics
  - Ducts in vented attic w/ R-38 at ceiling + R13-R18 @ roof, cool roof, R-8 ducts, 5% duct leakage
  - Ducts in conditioned space as alternative
- Water Heating:
  - Gas tankless water heater
- Lighting
  - 100% high-efficacy hard-wired lighting

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## EE Measure Evaluation

Measure	Description	Incremental Cost
Windows	0.30 U-factor; 0.23 SHGC (0.50 heating climates)	\$0.15/ft <sup>2</sup> window area
Insulated doors	U-factor = 0.20	\$1/ft <sup>2</sup> door area
Wall insulation	Add 1" rigid foam for a total of 2"	\$0.31/ft <sup>2</sup> wall area
Infiltration	3.0 ACH50	\$380 including HERS rater
Insulation quality	QII	\$520 including HERS rater
Water heater	0.91 EF condensing tankless	\$100
Heating system	92 AFUE condensing furnace	\$390
Cooling system	16 SEER / 13 EER	\$840 for 3-ton system
Air handler fan	0.30 Watts/cfm airflow	\$145
Hot water distribution system	All hot water piping insulated	\$145
PV	1kW DC system	\$2.80/W-DC after incentives & federal tax credit

## Measure Cost Effectiveness



**Thank you**

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