



2014 CABEC Conference

Commissioner Andrew McAllister
California Energy Commission

October 10, 2014



ZNE Policy Background and Goals

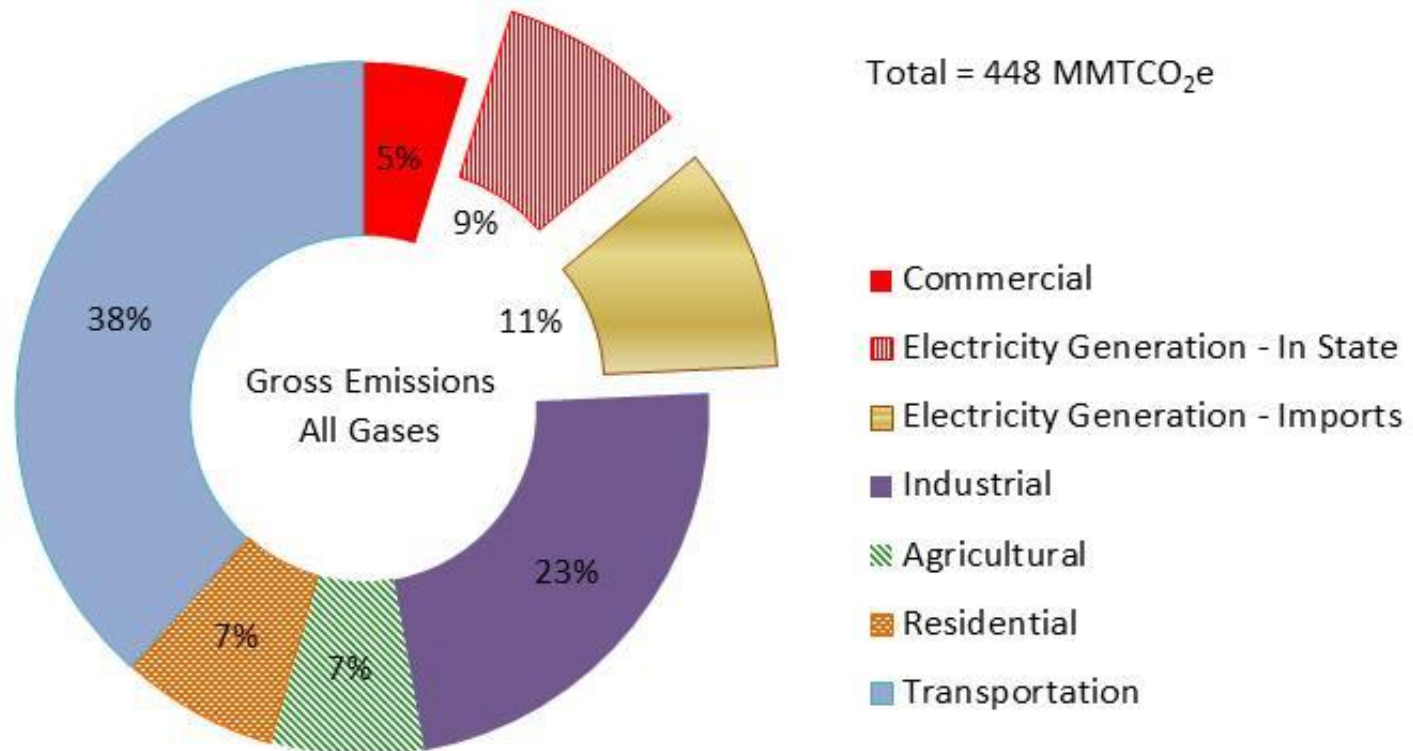
- ZNE policy background
 - 2007 CEC Integrated Energy Policy Report (IEPR)
 - 2008 CPUC California Long Term Energy Efficiency Strategic Plan
 - 2008 CARB Climate Change Scoping Plan
 - 2008 CPUC/CEC Energy Action Plan Update
 - Governor Brown' s Executive Order B-18-12 for state buildings
- ZNE goals
 - All new low –rise residential construction to be ZNE by 2020
 - All new nonresidential construction to be ZNE by 2030



Emissions Contribution by Sector

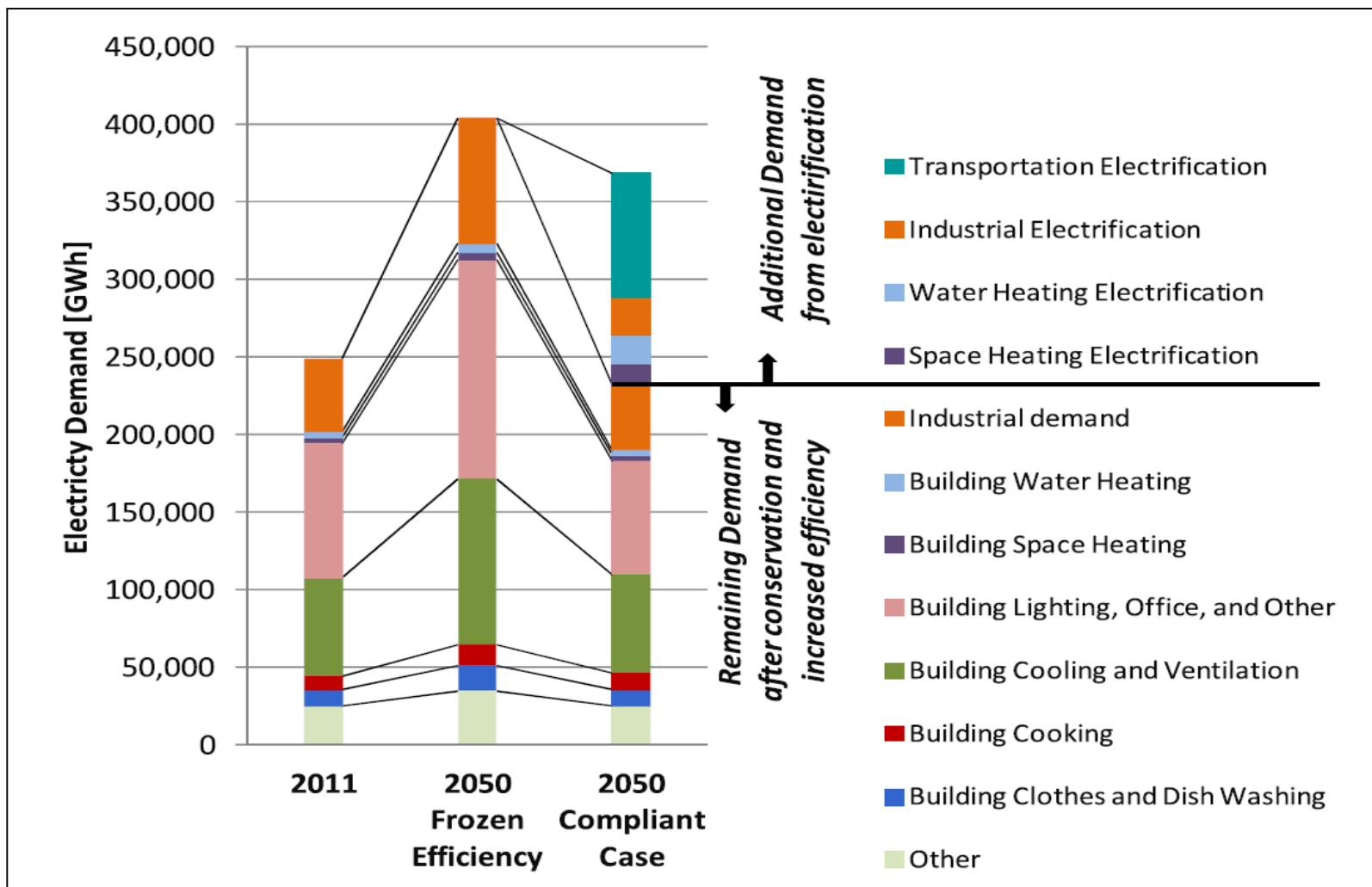
2011 GHG Emissions by Sector

Million Metric Tonnes of CO₂ Equivalent (MMTCO₂e)



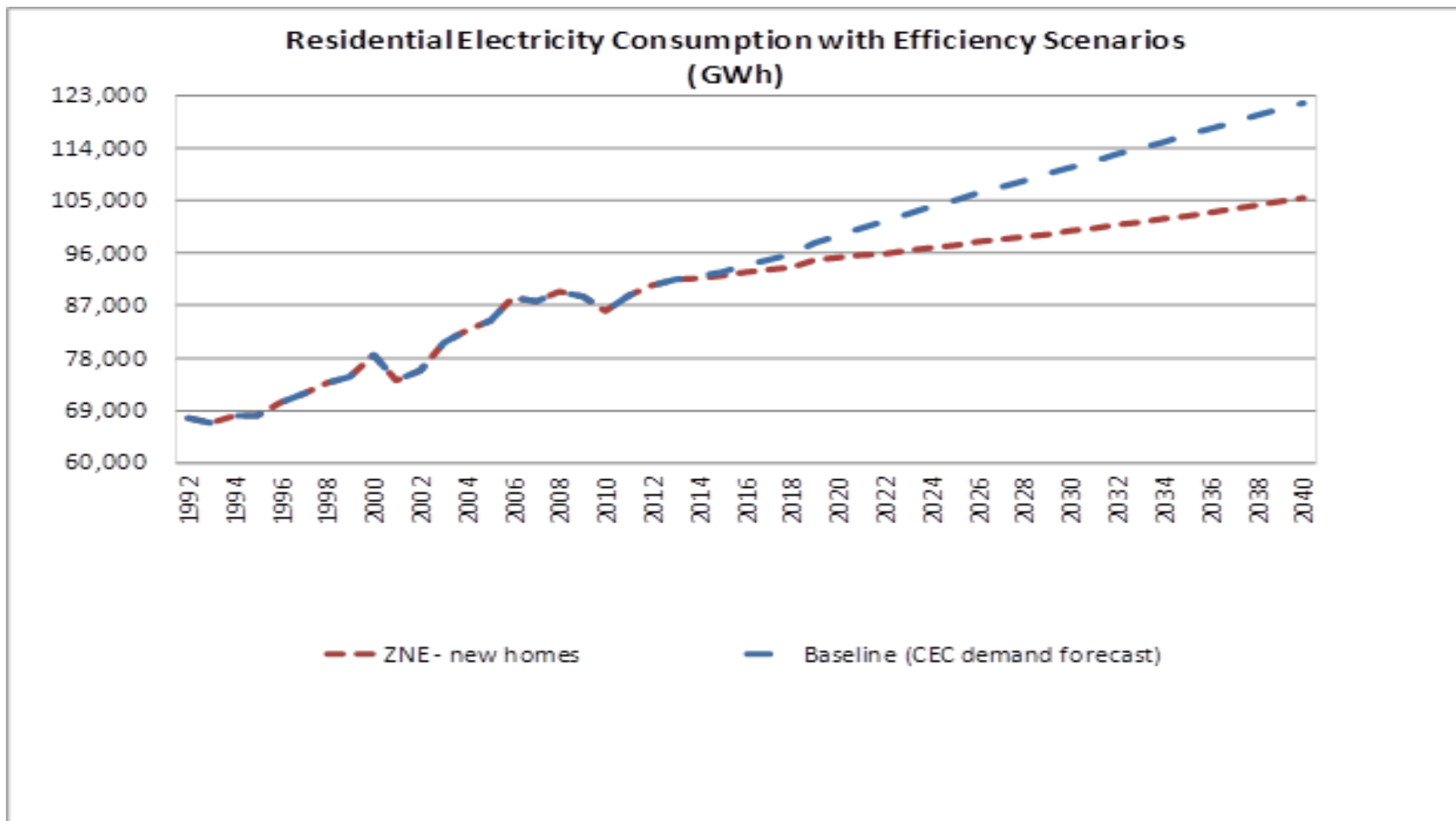


Efficiency is Critical to Long Term Goals





Potential benefits of ZNE - Residential Consumption Reduction





ZNE is a Policy Goal

- ZNE is currently a policy goal -- not a mandate
- ZNE goals can be advanced within the energy agencies' current statutory authority
 - ZNE may be required by Title 24 if determined cost-effective
 - EE programs can support ZNE goals as approved by CPUC or as desired by individual POUs
- 2012 PG&E study on residential ZNE buildings showed \$2 - \$8/sq ft incremental cost for EE component



ZNE Definition Adopted in 2013 IEPR

“A ZNE Code Building is one where the value of the energy produced by on-site renewable energy resources is equal to the value of the energy consumed annually by the building, at the level of a single ‘project’ seeking development entitlements and building code permits, measured using the California Energy Commission’s Time Dependent Valuation (TDV) metric. A ZNE Code Building meets an Energy Use Intensity value designated in the Building Energy Efficiency Standards by building type and climate zone that reflect best practices for highly efficient buildings.”



What Does That Definition Mean?

- The value (as measured by TDV) of the net amount of energy used over the course of a year is equal to zero
- The renewable generation component is located on-site
- (measured by TDV) The boundary for the evaluation of energy used is the project which is being permitted
- There will be an EUI (by bldg type and climate zone) that must be met with EE



What Does That Definition Mean?

- Does not imply a building with zero utility costs
- Based on estimated energy use determined for the building design
- Actual energy use depends on operation of the building
- All buildings require a compliance pathway
 - Necessary to establish reasonable exceptions to account for building and building site limitations
 - Possible example would be community based renewables
- 2015 IEPR mandated to determine the appropriate role of natural gas in ZNE buildings (Bocanegra, Chapter 749, Statutes of 2013)



Supporting Development of ZNE

- EPIC R&D solicitations
 - Advancing Cleaner, Less Costly, More Reliable Distributed Generation to Enable Customer Solutions and Zero-Net Energy Communities
 - Reducing Costs for Communities and Businesses Through Integrated Demand Side Management and Zero-Net Energy Demonstrations
- CPUC – IOUs
 - Codes and Standards Enhancement group
 - Emerging Technologies
 - Performance-based new construction incentives
 - “Reach” code support for local governments



CPUC/IOU ZNE Studies



The Technical Feasibility of
Zero Net Energy Buildings in California

December 2012



For Pacific Gas and Electric Company

On behalf of:

Southern California Edison

San Diego Gas and Electric Company

Southern California Gas Company

ARUP

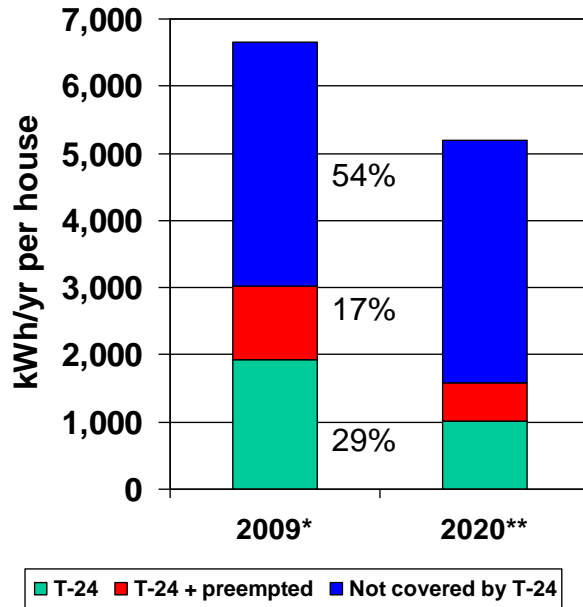
- The Technical Feasibility of Zero Net Energy Buildings in California (ARUP)
- Road to ZNE: Mapping Pathways to ZNE Buildings in California (HMG/TRC)

Both available at www.calmac.org

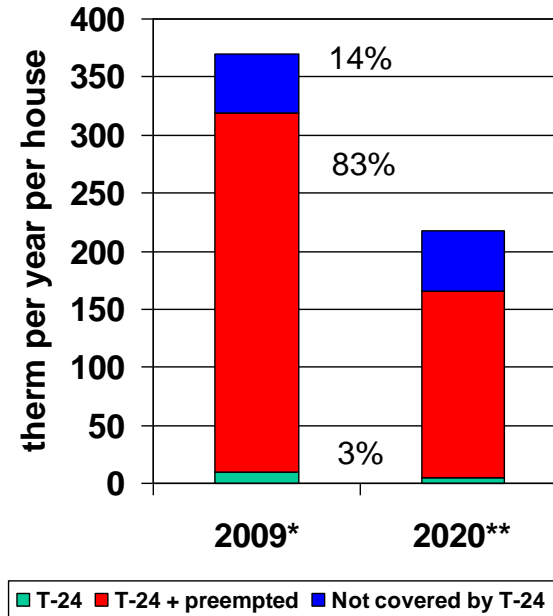


What can be Achieved Through T24

Electricity Consumption



Natural Gas Consumption



* Data for single family home built after 2001 from 2009 Residential Appliance Saturation Survey

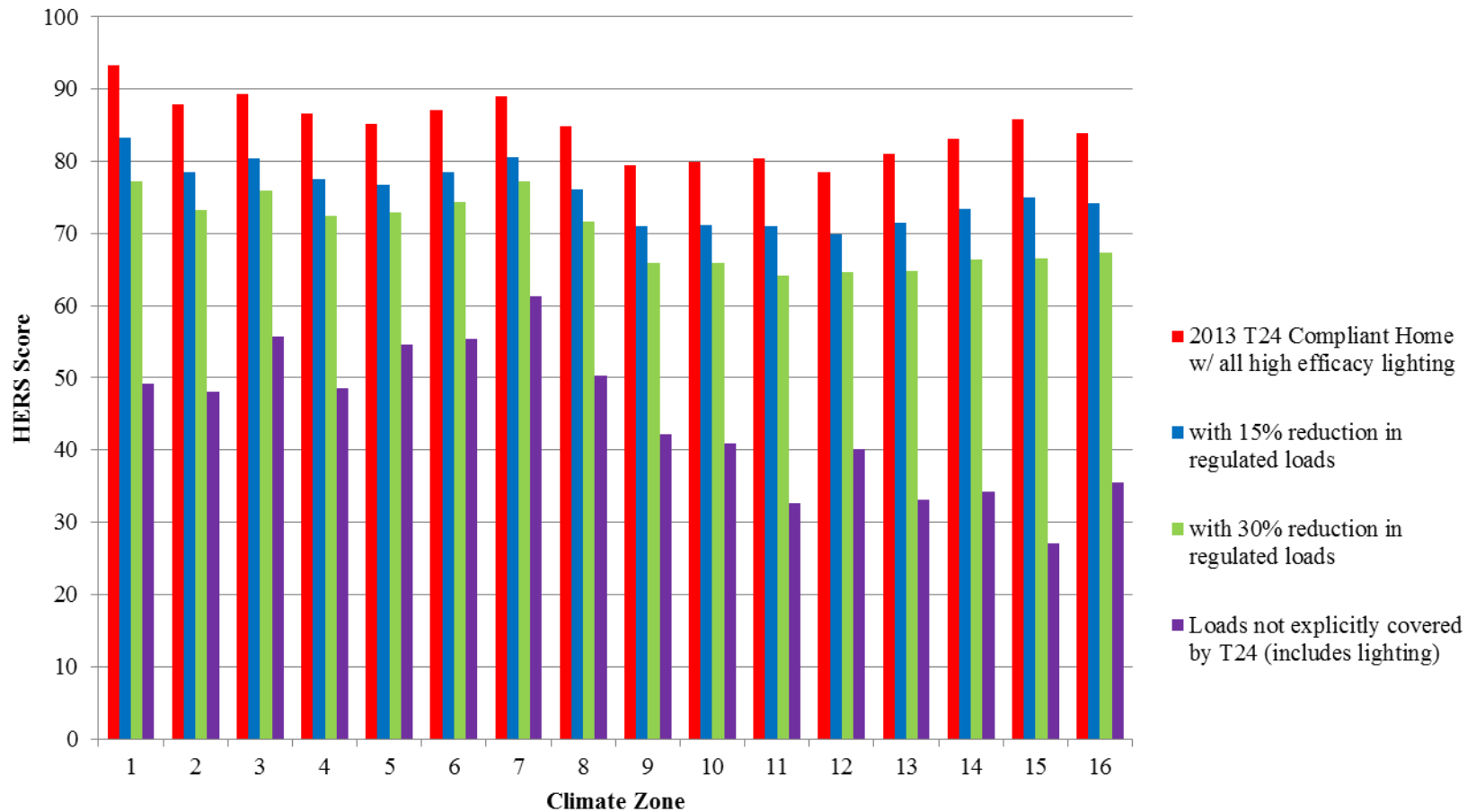
** Projects cumulative 52% reduction in T-24 loads by 2020

Source: McHugh Energy Consultants



How close are we?

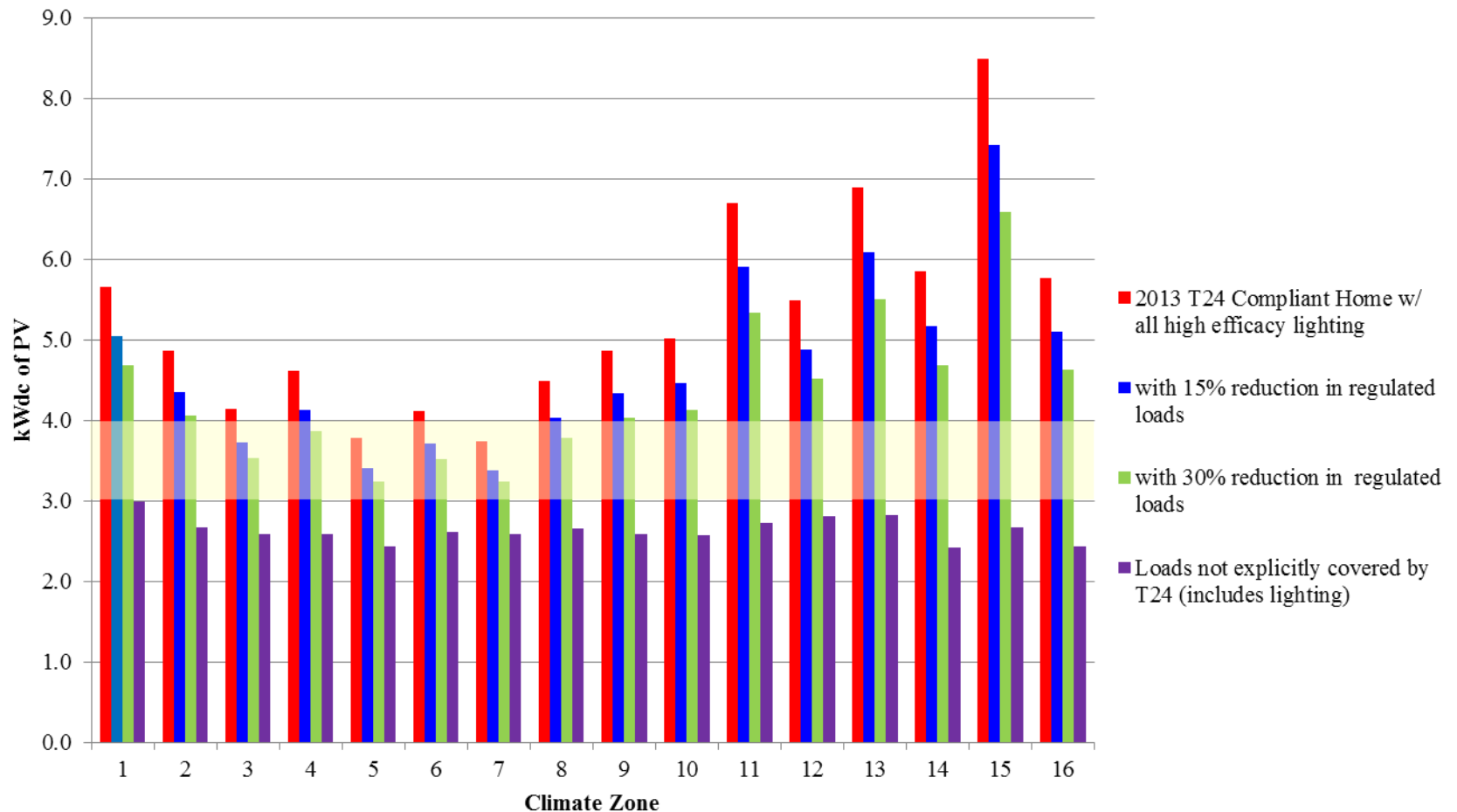
2013 T24 Prescriptive Standard on HERS Scale





How much PV might be needed?

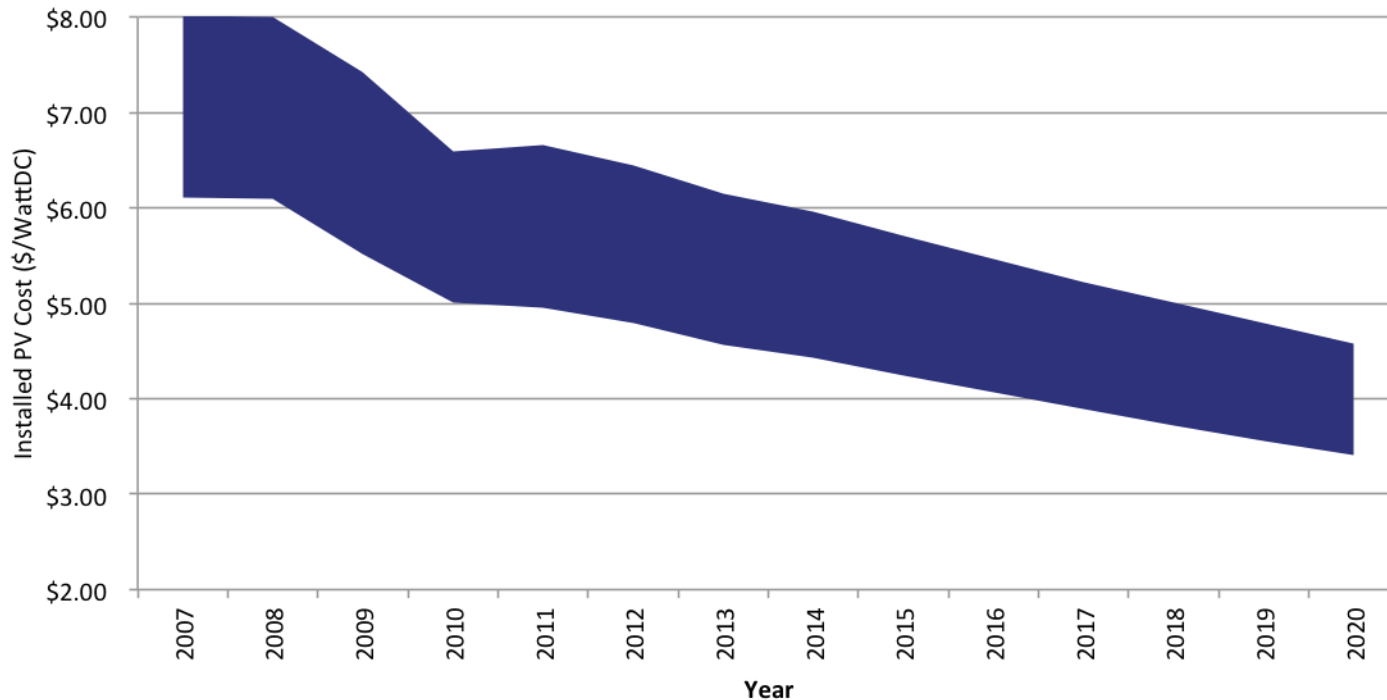
PV (kWdc) Required to Hit Zero on HERS Scale





Potential Cost Ranges

- EE component - 2012 PG&E study on res ZNE bldgs
 - \$2 to \$8 per SF incremental cost
- PV component – E3 work for the Energy Commission





ZNE Implementation Challenges

- T24 code measures must pass cost-effectiveness screen
- Some building types and climate zones less suited to ZNE
- Over-sized PV system to offset natural gas usage?
- Net energy metering tariff provisions pending at CPUC as required by AB 327 (Perea)
- Federal Investment Tax Credit (ITC) for renewables drops from 30% to 10% in 2017
- Grid integration impacts and costs
- Consumer messaging
 - ZNE is a design criteria based on expected typical occupant patterns
 - Cannot represent actual energy production and energy consumption after the building is occupied
 - Actual utility bills will not be zero
 - Occupant behavior determines actual usage , “your mileage may vary”



Background – Public Domain Software

- Energy Commission mandated to provide Public Domain Software that implements the Performance Compliance Approach
- Available to public for its intended use at no or low cost
- Access to source code for development of derivative works
- Access to all data, logic and code to understand, review and critique the implementation of the performance compliance approach
- Software functionality limited to what can be accomplished with available public resources



Why the software ecosystem was changed

- Software licensing meant CEC never owned the source code and couldn't make changes or updates to it
- Very high barrier to entry for new 3rd party software vendors
- Multiple interpretations of the rules for implementing the performance compliance approach
- Standards compliance tools were completely separate from architectural and mechanical design tools so EE decisions not integrated into design practices



Why the software ecosystem was changed

- Current nonresidential building energy simulation software has not been updated or supported for over 15 years – many limitations on modeling envelope and mechanical
 - Limited ability to model solar gains, thermal mass, ventilation, infiltration, HVAC system performance
- Needed to update the analysis tools within the Compliance Software to include technologies and building practices necessary for Zero Net Energy



CBECC - What we are working on

- Software training
 - Utility funded classes
 - Project specific help from CEC staff
 - Online FAQs & training sessions
- Ongoing bug fixes & additional functionality
 - Issued in 4-6 week release intervals
- Options to reduce time for completing design alternative analyses



CBECC - What we are working on

- Improvements to the nonres compliance documentation
 - Reduce overall bulk of documentation
 - Focus on what is needed by building departments for plan checking
 - Utility ACE group partnering with CEC on this effort
- Users can report software issues at:
 - Residential: <https://code.google.com/p/cbecc-res/issues/list>
 - Nonresidential: <https://code.google.com/p/cbecc/issues/list>
- CEC is meeting with CABEC Board of Directors in November



CBECC- Where We Need CABEC' s Help

- Host on-line CBECC software users groups for:
 - Sharing example project files & modeling solutions
 - Keeping current on status of software issues, fixes, new releases
 - Recommend priorities for CBECC updates
- Establish better/more direct lines of communication with CEC staff
- Sponsor training events on specific modeling/compliance topics
- Quarterly meetings with CEC
 - focus on highest priority topics, pre-vetted by membership



Discussion

Thank You