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The Road to ZNE – Overview of Policy and Strategic View

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Overview of Policy and Challenges

- Where did we start? - Background of ZNE Policy
- Why are we going there? - Potential benefits of ZNE
- Where are we? – Current status meeting goals
- Are there road hazards? – Challenges to meeting ZNE
- What's the toll? – Projected costs of meeting ZNE
- What's in the road ahead? - Next Steps to achieving ZNE



Where did we start? - Background of ZNE Policy

- **Policy Establishing ZNE goal**
 - 2007 CEC Integrated Energy Policy Report (IEPR)
 - 2008 CPUC/CEC Energy Action Plan
 - 2008 CARB Climate Change Scoping Plan
 - 2008 CPUC California Long Term Energy Efficiency Strategic Plan
- **Further supported by Governor Brown's Executive Order B-18-12**
 - All new State buildings beginning design after 2025 to be ZNE



IEPR/Strategic Plan Big Bold Goals

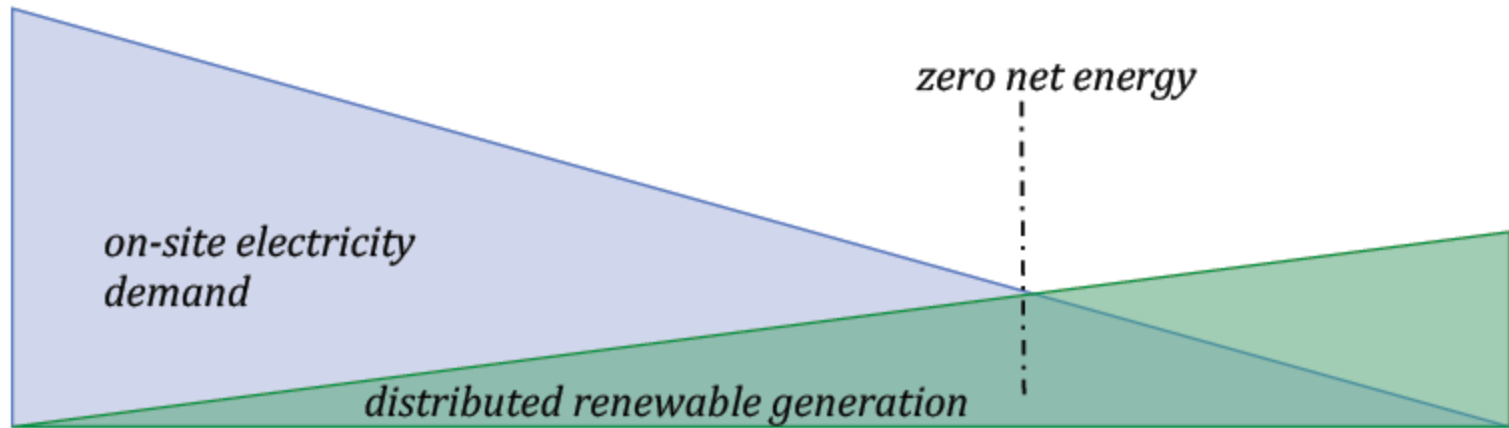
- All new residential construction in California to be ZNE by 2020.
- All new commercial construction in California to be ZNE by 2030.
- 50% of existing commercial buildings will be retrofit to ZNE by 2030





WHAT IS ZERO NET ENERGY?

Zero net energy is a general term applied to a building with a net energy consumption of zero over a typical year. To cope with fluctuations in demand, zero energy buildings are typically envisioned as connected to the grid, exporting electricity to the grid when there is a surplus, and drawing electricity when not enough electricity is being produced.



- **The amount of energy provided by on-site renewable energy sources is equal to the amount of energy used by the building.**
- A ZNE building may also consider embodied energy – the quantity of energy required to manufacture and supply to the point of use, the materials utilized for its building.



ZNE is CEC/ CPUC Policy Goal

- ZNE buildings are “Administration” goal -- not legislative mandate
- CEC/CPUC can advance ZNE building goals within the limits of agencies current statutory authority
 - ZNE buildings included in Title 24 if found to pass cost-effectiveness tests
 - IOU programs support advancing ZNE building goals within cost-effective portfolio
- CPUC mandated IOUs to support ZNE goals in 2010-12
 - \$136 million total expenditures, \$12.9 million of this in **new** programs/pilots and studies (will be similar in 2013-14)

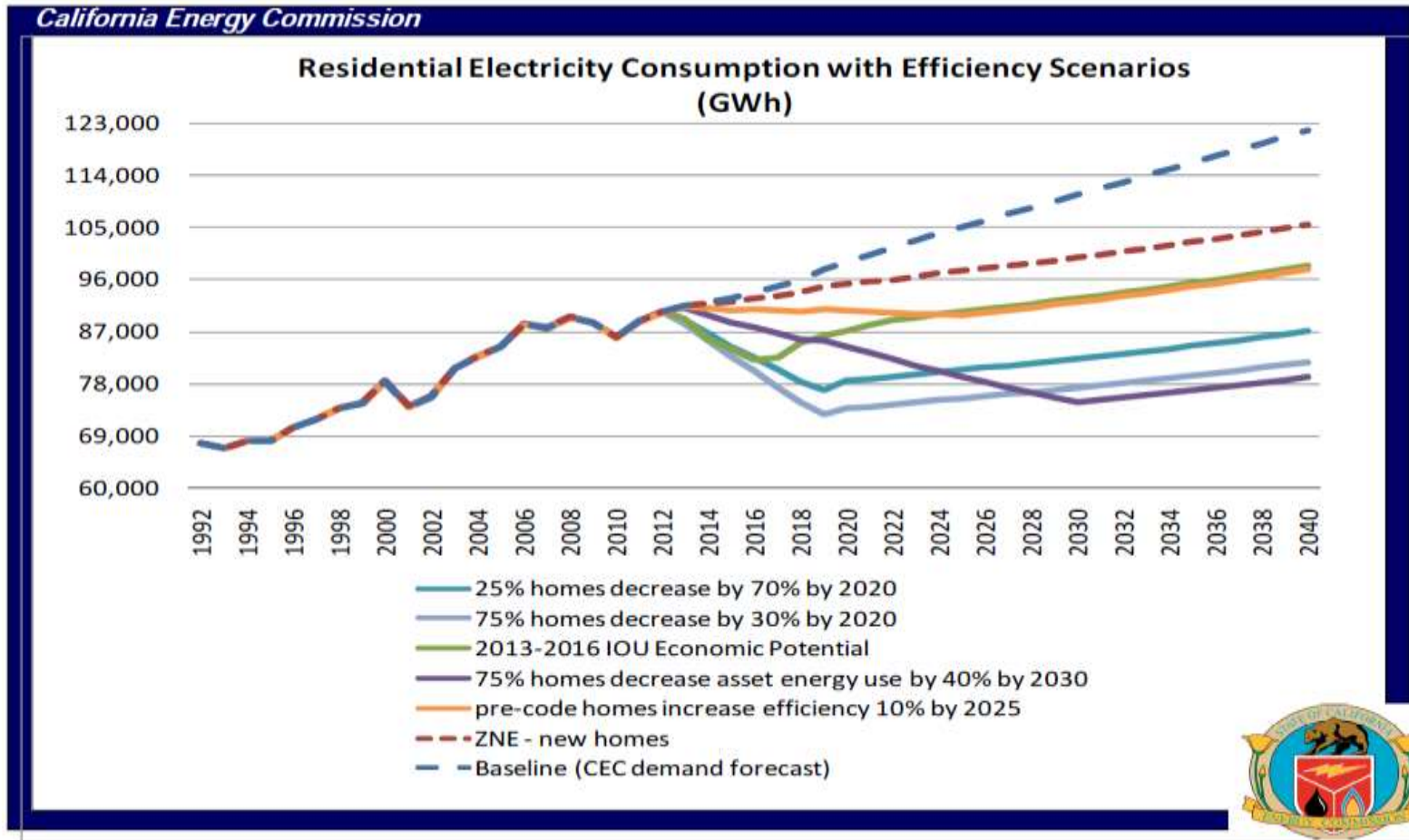


State Buildings ZNE goals- Adopted by Governor's Ex Order B-18-12 in 2012

- All new state buildings and major renovations beginning design after 2025 shall be constructed as ZNE facilities
- 50% of new state facilities beginning design after 2020 shall be ZNE
- State agencies shall take measures towards achieving ZNE for 50% of the square footage of existing state-owned building area by 2025.
- State agencies shall continue measures to reduce grid-based energy purchases for State-owned buildings by at least 20% by 2018 as compared to a 2003 baseline.

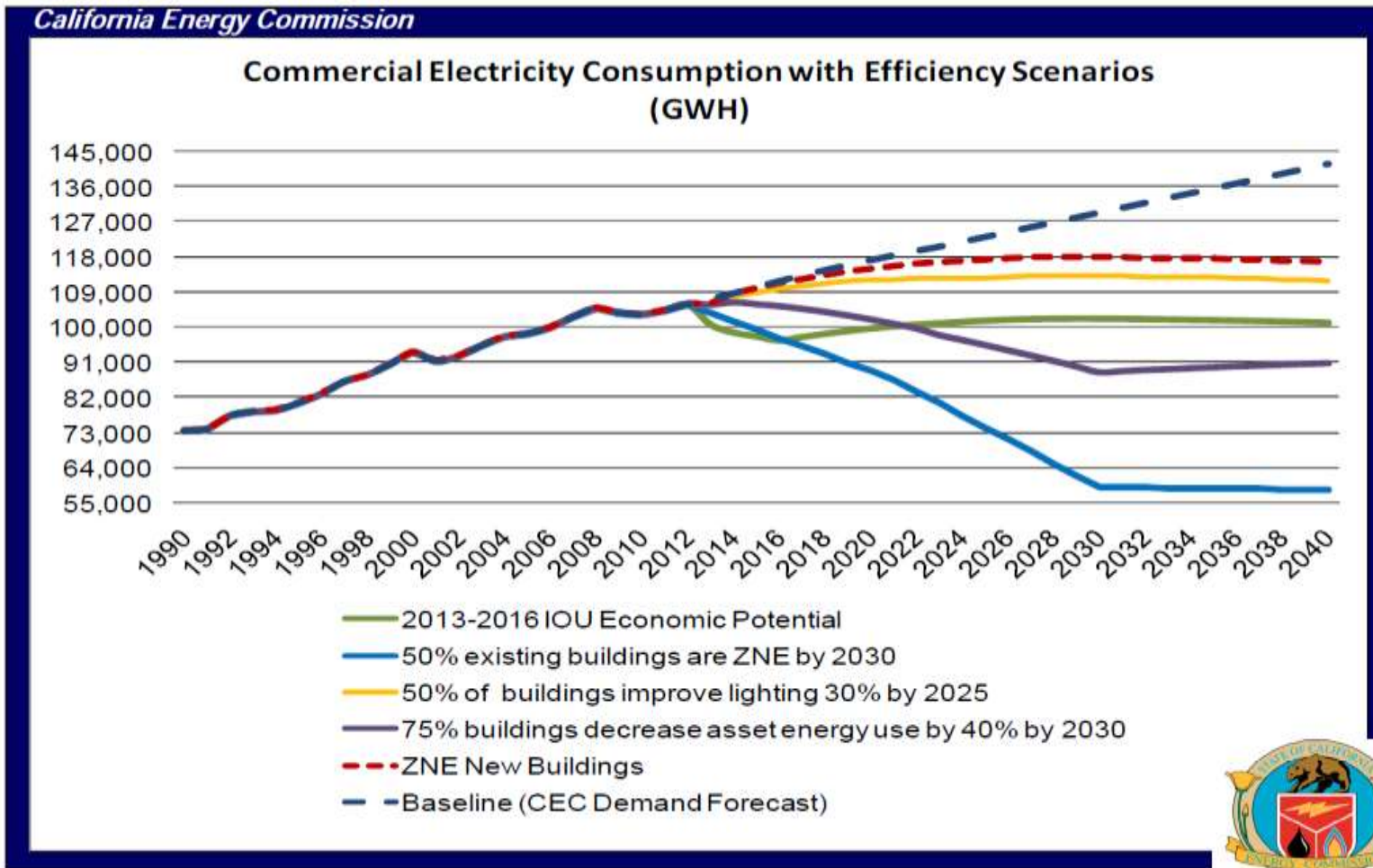


Potential benefits of ZNE - Residential Demand Reductions





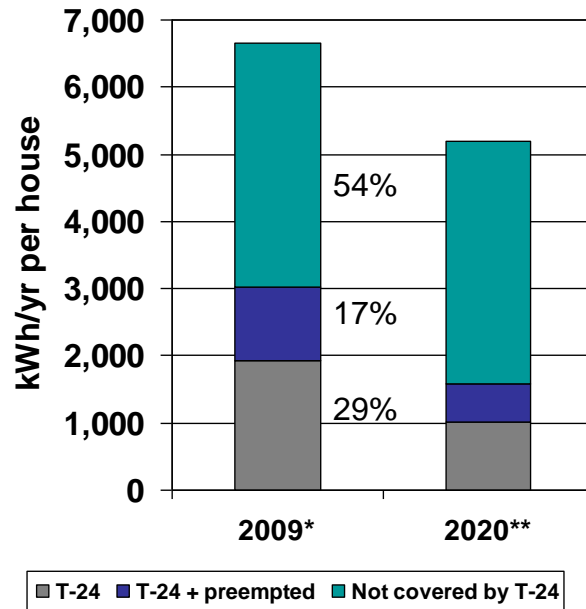
Potential benefits of ZNE – Commercial Demand Reductions



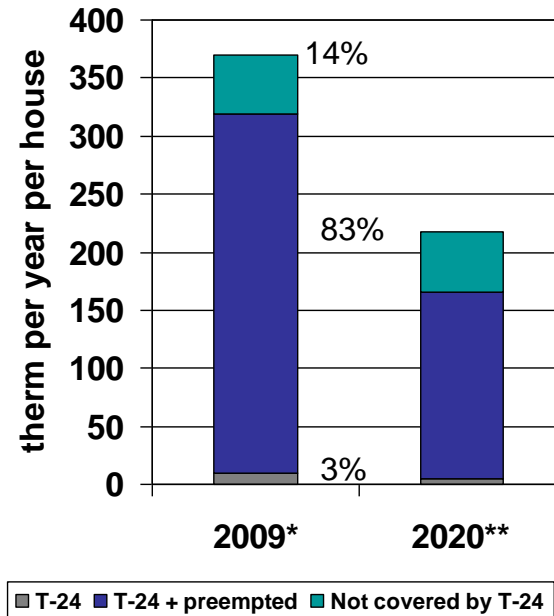


Are We There Yet?

Electricity Consumption



Natural Gas Consumption



* Data for single family home built after 2001. Source: 2009 Residential Appliance Saturation Survey

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

Source: McHugh Energy Consultants



Road Hazards Ahead! Challenges to ZNE Implementation

Near Term Challenges

- o T-24 code measures must pass cost-effectiveness screen
- o Some Building types and Climate Zones less suited to ZNE
- o Net Energy Metering (NEM)/Surplus Compensation Rules discourage over-sizing PV systems (if offsetting of electric and gas use)

Long Term Challenges

- o Grid Integration / Physical System Challenges
- o Some Building types and Climate Zones less suited to ZNE
- o Distribution costs of NEM to other ratepayers
- o NEM cap of 5,000 MW (non-coincident peak)



Road Hazards Ahead! - Title 24 Cost Effectiveness Issues

- T-24 Cost-effectiveness requirements (benefits must exceed cost)
- State incentives are not included in T-24 cost-effectiveness analysis
- NEM policy included in cost-effectiveness for T-24
- Cost-effectiveness requirements
 - New metrics or business as usual
 - ❖ Cost of Carbon Reduction
 - ❖ Energy in water treatment and transport
 - ❖ Transportation energy
 - ❖ Embodied Energy



More Hazards Ahead!

- Asset rating (building) vs operational energy (actual use)
 - Utility bills likely to be non-zero
 - Occupant behavior determines actual usage
- Federal Investment Tax Credit (ITC) drops from 30% to 10% in 2017
- How should leased solar PV systems be considered for use in T-24?

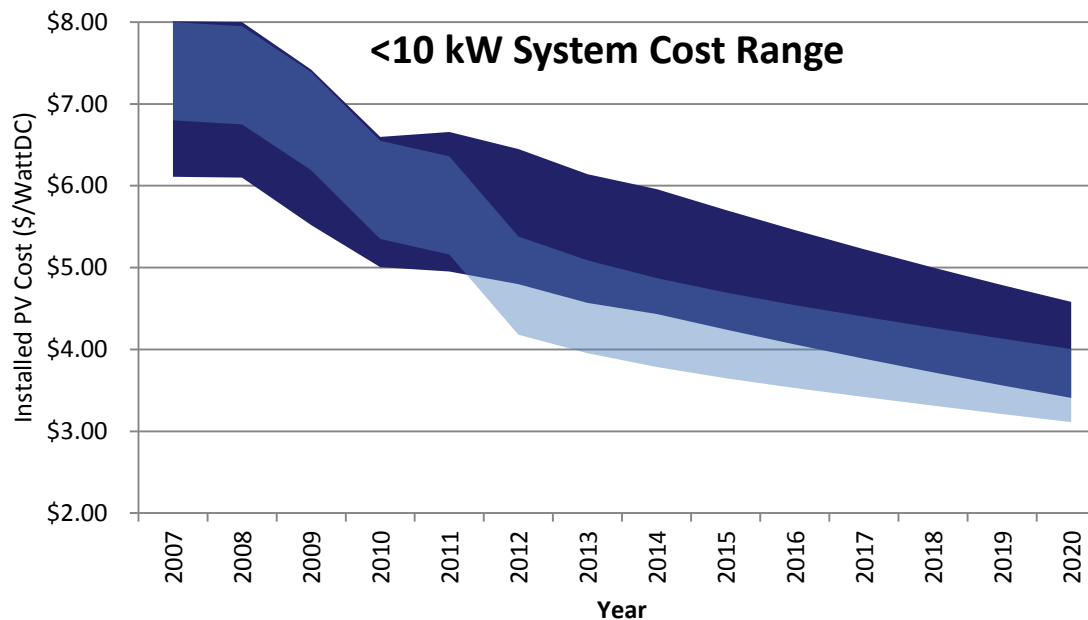


Implementation Challenges - ZNE Capable Buildings

- Not all buildings can reach ZNE Code
- How to treat “exceptions”-- Great value in developing idea of **“ZNE Capable” (or “ZNE Ready”) Buildings**
- **“ZNE Capable/ZNE Ready” Building** – meets Energy Use Intensity (EUIs) by building type- and climate zone that reflect best practices for highly efficient buildings.
- Retain focus on achieving **deep energy efficiency savings** where full ZNE Code building cannot be achieved



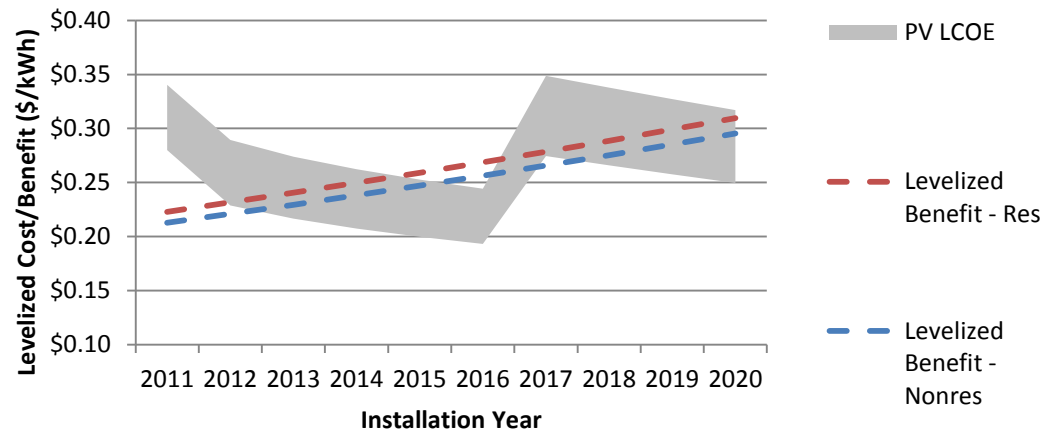
What's the toll? Installed Cost of PV



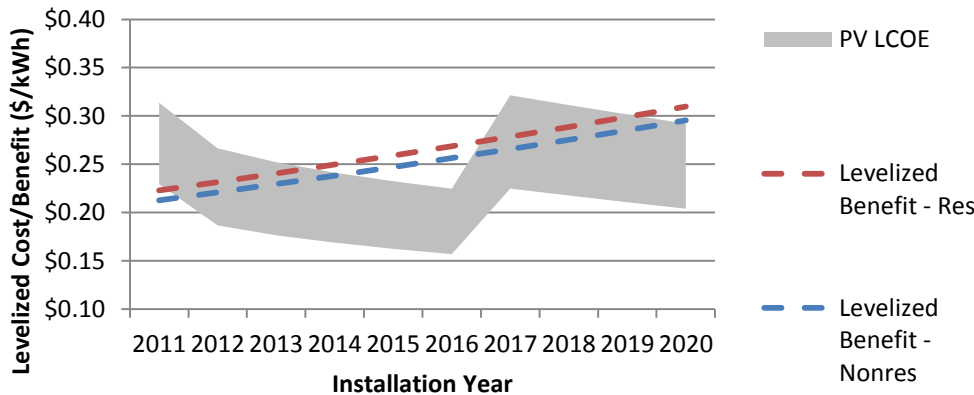


Average Residential Consumer Costs/Benefits

Climate Zone 3

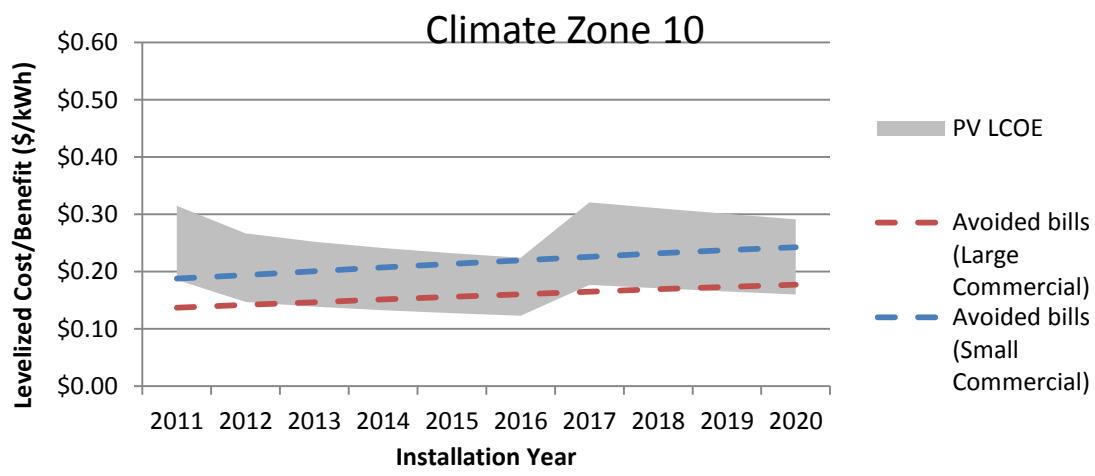
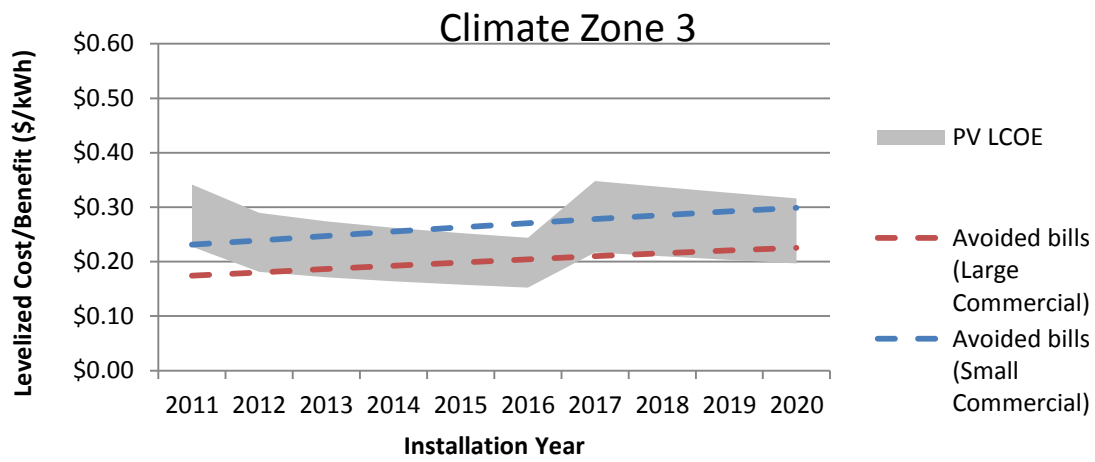


Climate Zone 10





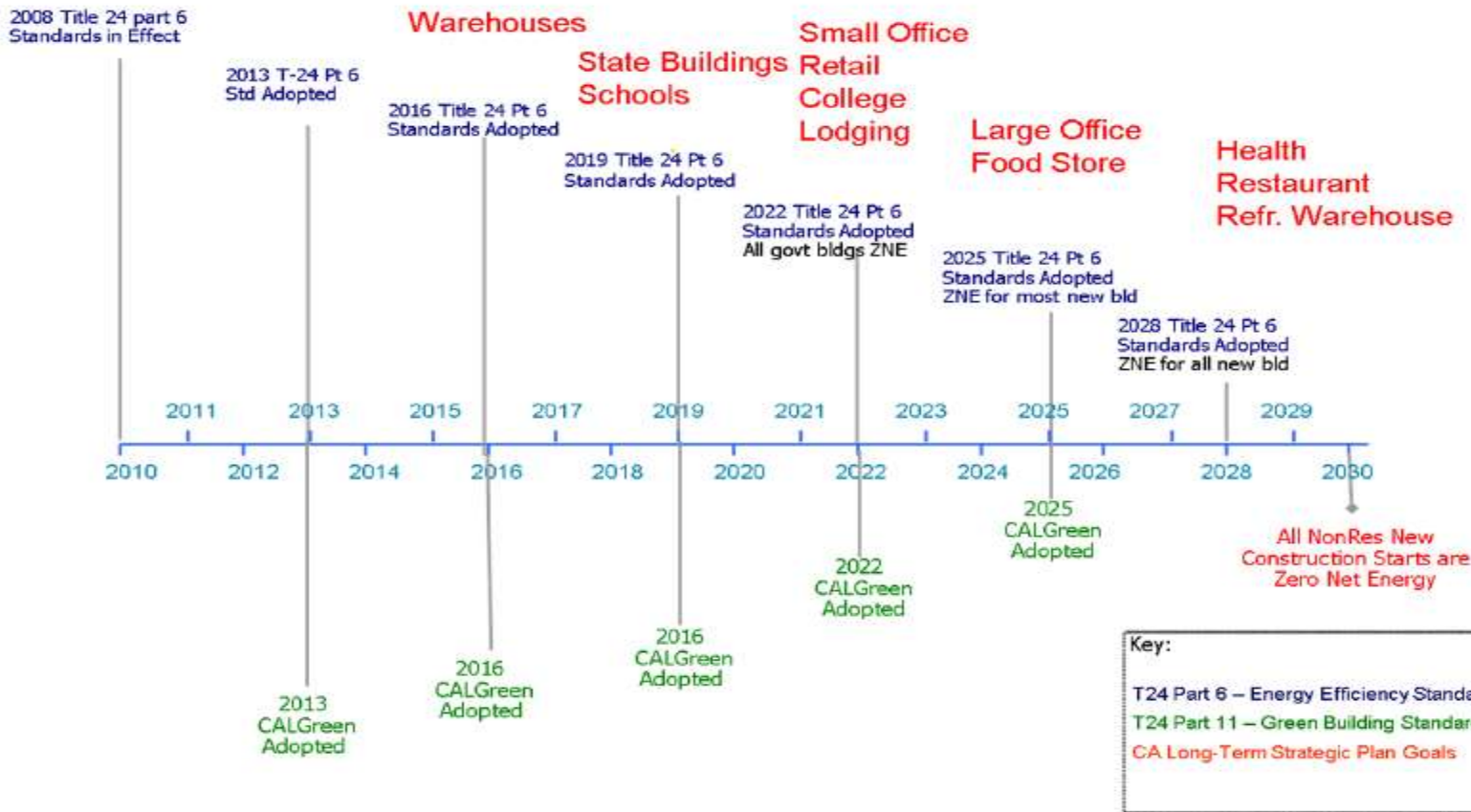
Levelized PV Cost vs Levelized Commercial Bill Savings



Source: E3



What's Ahead ? Road to Non-Res. ZNE Buildings in Title 24- Start with Easiest Buildings



Source: "The Road to ZNE" (2012, PG&E/HMG), p. 161.



What's Ahead? Next Steps to implementing ZNE

- Joint Commission(s) adoption of ZNE definition
- Continued path toward energy efficiency through Building and Appliance standards
 - Goal to reduce loads so single family home achieves ZNE with 4 kW of PV
- Quicker migration from R&D and emerging tech
- Continued Collaboration with PIER, CPUC, ARB, utilities
- Education & outreach / Build market demand



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